

**FROM CONTINUING FORMATION TO TEACHER'S WELL-BEING: SOCIAL
OCCUPATIONAL CHARACTERISTICS AND PREVENTION OF
OSTEOMUSCULAR SYMPTOMS**

***DA FORMAÇÃO CONTINUADA AO BEM-ESTAR DOCENTE: CARACTERÍSTICAS
SÓCIO-OCUPACIONAIS E PREVENÇÃO DE SINTOMAS OSTEOMUSCULARES***

***DE LA FORMACIÓN CONTÍNUA AL BIENESTAR DOCENTE: CARACTERÍSTICAS
SOCIO-OCUPACIONALES Y PREVENCIÓN DE SÍNTOMAS
MUSCULOESQUELÉTICOS***

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ABSTRACT: The osteomuscular diseases are highlighted among the problems which most affect teacher's health. The present study is due to evaluate the association among the social occupational characteristics and osteomuscular symptoms in teachers of Basic Education who take part in the Formation-Action Program in Creative Schools, aiming to outline strategies to assist in their well-being. 48 teachers took part in the research who work with Child Education and Elementary School from institutions bond to the Municipal Department of Education of São Ludgero and Paulo Lopes, Santa Catarina, Brasil. To collect the data, the following tools were used: The Social Economic and Occupational Questionnaire (BJORNER; OLSEN, 2010) and the Nordic Questionnaire of Osteomuscular Symptoms (BARROS; ALEXANDRE, 2003). The study verified that different social occupational characteristics showed in the participants are associated with specific musculoskeletal symptoms and this can assist in the outlining of prevention strategies to reduce even more the prevalence of musculoskeletal symptoms in teachers who go to the formation program proposed by the research.

KEYWORDS: Teacher formation. Teacher's health. Osteomuscular diseases. Creative schools.

RESUMO: *Os distúrbios osteomusculares são destaque entre os problemas que mais afetam a saúde docente. Este estudo objetiva avaliar a associação entre características sócio-*

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ocupacionais e sintomas osteomusculares em docentes da Educação Básica que frequentam o Programa de Formação-Ação em Escolas Criativas, visando o delineamento de estratégias que colaborem com seu bem-estar. Participaram da pesquisa 48 docentes atuantes na Educação Infantil e no Ensino Fundamental de instituições vinculadas às Redes Municipais de Ensino de São Ludgero e Paulo Lopes, Santa Catarina, Brasil. Para a coleta de dados, foram utilizados os seguintes instrumentos: o Questionário Socioeconômico e Ocupacional (BJORNER; OLSEN, 2010) e o Questionário Nórdico de Sintomas Osteomusculares (BARROS; ALEXANDRE, 2003). O estudo constatou que diferentes características sócio-ocupacionais apresentadas pelos participantes se associam a sintomas osteomusculares específicos; isso pode auxiliar na definição de estratégias de prevenção para reduzir ainda mais a prevalência dos sintomas osteomusculares em docentes que frequentam o programa de formação proposto nesta pesquisa.

PALAVRAS-CHAVE: Formação docente. Saúde docente. Distúrbios osteomusculares. Escolas criativas.

RESUMEN: Los trastornos musculoesqueléticos se destacan entre los problemas que más afectan a la salud docente. Este estudio tiene como objetivo evaluar la asociación entre características socio-ocupacionales y los síntomas musculoesqueléticos en docentes de la Educación Básica que cursan el Programa de Formación-Acción en Escuelas Creativas, con el objetivo de estrategias que aporten a su bienestar. Participaron de la investigación 48 docentes actuantes en la Educación de Niños y en la Enseñanza Básica de instituciones vinculadas a las Redes Municipales de Enseñanza de São Ludgero y Paulo Lopes, Santa Catarina, Brasil. Para la recolecta de datos, se utilizaron los siguientes instrumentos: El Cuestionario Socioeconómico y Ocupacional (BJORNER; OLSEN, 2010) y el Cuestionario Nórdico de Síntomas Musculoesqueléticos (BARROS; ALEXANDRE, 2003). Por medio del estudio se ha constatado que diferentes características sociolaborales presentadas por los participantes se asocian con síntomas musculoesqueléticos específicos, puede eso auxiliar en la definición de estrategias de prevención para reducir aún más la prevalencia de los síntomas musculoesqueléticos en docentes que asisten al programa de formación propuesto en esta investigación.

PALABRAS CLAVE: Formación docente. Salud docente. Trastornos musculoesqueléticos. Escuelas creativas.

Introduction

Musculoskeletal (osteomuscular) disorders constitute of an inflammatory and degenerative condition affecting tendons, muscles, ligaments, peripheral nerves, joints, and supporting blood vessels. Such conditions result in overstrain of bones, ligaments, and muscles, typically manifesting as musculoskeletal pain with subsequent functional impairment (EGGERS; PILLAY; GOVENDER, 2018).

Musculoskeletal disorders represent the second leading cause of health problems in the working population, affecting 50% to 80% of this population worldwide, second only to mental

and behavioral disorders (SHUAI *et al.*, 2014). Among the occupational categories that have a high prevalence of musculoskeletal disorders are teachers.

In the case of these professionals, musculoskeletal disorders cause suffering, limitations and absenteeism from work, negatively impacting their quality of life. These disorders also have undesirable effects on student performance, since the difficulties experienced by teachers reflect on the quality of their teaching practices, reducing the learning potential (SCHEUCH; HAUFE; SEIBT, 2015).

In a systematic review conducted in 13 countries (three from America, four from Europe, five from Asia and Australia), the prevalence of musculoskeletal disorders reached 40% to 50% of teachers (TEMESGEN *et al.*, 2019). Specifically in the Brazilian context, 39% to 95% of teachers are affected by musculoskeletal problems, constituting a major public health problem (ERICK; SMITH, 2011).

Other studies confirm this reality by finding a high percentage of teachers who presented symptoms in the 12 months prior to data collection, among them: a) the research that investigated 525 Kindergarten and Elementary School teachers from the Municipal Teaching Network of Jaboatão dos Guararapes, Pernambuco, finding that 73.5% presented the symptoms (CEBALLOS; SANTOS, 2015); b) the research that investigated 320 teachers from the Municipal Teaching Network of Pelotas, Rio Grande do Sul, finding that 89.7% presented the symptoms (BRANCO; JANSEN, 2011); c) the research that investigated 157 teachers from state and municipal schools in a city in the countryside of São Paulo, finding that 90.4% presented the symptoms (CARVALHO; ALEXANDRE, 2006); d) and the research that investigated 242 teachers from the Municipal Teaching Network of Natal, Rio Grande do Norte, finding that 93% presented the symptoms (FERNANDES; ROCHA; COSTA-OLIVEIRA, 2011).

The rate, however, was lower in the teachers specifically participating in this study, 26%, as indicated by Zwierewicz *et al.* (2019), arousing the interest in investigating whether there is an association between socioeconomic and occupational characteristics and musculoskeletal symptoms manifested by these professionals. It is noteworthy that the research participants work in Basic Education schools in the Municipal Education Networks of Paulo Lopes and São Ludgero, in the south of the state of Santa Catarina, Brazil, and during data collection were attending, for the second consecutive year, the Training-Action Program in Creative Schools.

This program has been developed in Basic Education in different cities of Santa Catarina since 2009, with the objective of favoring the development of innovative pedagogical practices

by stimulating collaborative work, the relevance of teaching, resilience, and valuing the protagonism of those involved.

The fact that the indexes presented by these teachers were lower than those detected in several previous studies motivated this research. Therefore, the association between socioeconomic and occupational characteristics and musculoskeletal symptoms was investigated, with the intention that more data would be obtained and considered in the development of prevention strategies in the next training program offerings.

This study is part of the research project entitled "Stress level and quality of life of teachers in the state education network", approved in the FAPESC Public Call No. 09/2015. The project began its research in the midwest region of Santa Catarina and is expanding to other regions of the state in order to map and propose strategies that contribute to the well-being of teachers.

From Musculoskeletal Symptoms to the Training-Action Program in Creative Schools and its approach to the 2030 Agenda

Osteomuscular symptoms represent one of the most common and important occupational health problems among workers, standing out among work-related diseases (CARDOSO *et al.*, 2011). Having as possible causes the changes in lifestyle habits and in the environment, the increase in stress and the demands of the corporate world (HUGUE; PEREIRA JÚNIOR, 2011), they generate negative impacts on the quality of life of workers, decrease productivity and increase economic costs caused by absences for health treatment (SOLIS-SOTO *et al.*, 2017, SHUAI *et al.*, 2014). These symptoms can lead to functional disability and even the definitive impediment of the execution of the work activity (SOLIS-SOTO *et al.*, 2017).

In the Brazilian context, musculoskeletal symptoms began to stand out in the 1980s and gradually became a major public health problem (CARVALHO; ALEXANDRE, 2006). Currently, they constitute an epidemic and represent one of the prominent groups among the occupational diseases that permeate the national reality (PICOLATO; SILVEIRA, 2008).

Among the workers who present high prevalence of musculoskeletal symptoms are those in education (CEBALLOS; SANTOS, 2015). Research indicates that in the 39% to 95% of teachers affected by musculoskeletal problems, the most affected anatomical regions are the back, shoulders, neck, and knees (CONVERSO *et al.*, 2018).

Epidemiological studies show that the causal factors associated with the high prevalence of musculoskeletal disorders in teachers are the biomechanical ones present in the activity, the

psychosocial ones, individual characteristics and occupational factors (TEMESGEN *et al.*, 2019). However, these factors can change depending on the socioeconomic, demographic, and occupational context in which teachers are inserted. Knowing these contexts can subsidize actions for the development of policies to promote health and quality of life in teaching, especially in times of pandemic.

Specifically in relation to COVID-19, examples are the studies by Ammar *et al.* (2020) and Vicent *et al.* (2020), dedicated to researching the effects linked to social isolation measures - such as school closures - on the physical activity of the confined population. The studies of Camacho-Cardenosa *et al.* (2020) and Antunes *et al.* (2020) are also references, researching the effects of physical activity on the mental health of the population.

Before the pandemic, we highlight a study conducted with 298 teachers of Basic Education in a city in the midwest region of Santa Catarina, whose results indicated a high prevalence of musculoskeletal symptoms. However, the factors that could be associated with the result were not analyzed (ROCHA *et al.*, 2017).

In general, the causal factors that stand out for the high prevalence of musculoskeletal symptoms in teachers include prolonged standing time in the classroom and repetitive writing on the blackboard, prolonged and frequent reading sessions at the desk and computer, and uncomfortable postures. Also part of this scenario are class preparation and corrections of student assignments, psychosocial factors, which include high demand and work overload, high perceived stress levels, low social support, and low job satisfaction (CONVERSO *et al.*, 2018).

Therefore, interventions to reverse this reality are indispensable. They can be developed both during the initial training to work in Basic Education and in the continuing education process, because these are two moments required by Brazilian legislation for professional performance.

On the one hand, the trainings can be mechanical and reproduce routines that stimulate musculoskeletal symptoms. On the other, they can stimulate well-being in teachers, especially when the formative moments offer alternatives to meet their real needs in their performance contexts, using their own work as inspiration for continuing education (LÜDKE; GOING, 2018).

This is the intentionality of the Training-Action Program in Creative Schools. Developed in different municipalities of the state of Santa Catarina, Brazil, among them Paulo Lopes and São Ludgero, the program is being offered as an extension action of a Higher Education Institution (HEI) of Santa Catarina and its schedule is structured primarily in monthly meetings. By working from a transdisciplinary and eco-training perspective, committed to

stimulating collaborative work, the relevance of teaching, resilience and appreciation of the protagonism of those involved, using an innovative methodology, it is expected that the program can increase the well-being of teachers and students, also improving the conditions of the school environment (ZWIEREWICZ *et al.*, 2016).

It is also noteworthy that the Training-Action Program in Creative Schools - based on transdisciplinarity and eco-training - is committed to stimulating complex thinking (ALMEIDA, 2018). The dynamization of these concepts in the training meetings is justified by the need announced by Gatti, Barreto, and André (2011) to reflect on the continuing education references that have been implemented, especially when developed out of context with the school reality, prioritizing a transmissive training, focused on lectures, seminars, workshops, and short courses.

While transdisciplinarity strengthens "[...] the construction of a new epistemology capable of rescuing the multidimensionality of the subject, understood from a complex ontology" (RIBEIRO; MORAES, 2014, p. 244). 244), eco-training constitutes an invitation "[...] to meet again and to dialogue between the natural and the cultural [...]" so that, by meeting nature again, subjects can "[...] meet themselves and others again. Therefore, through eco-training, it is proposed that "[...] the formative contact with things, with objects and with nature [...] may be formative of other connections, especially human connections" (SILVA, 2008, p. 102).

This process contributes to the stimulus of complex thinking, i.e., "[...] a type of thinking that does not separate, but rather unites and seeks the existing relationships between the various aspects of life [...]" (PETRAGLIA, 2013, p. 16). One of the nodal theses of complex thinking is the reconnection of knowledge and, "[...] therefore, the overcoming of the fragmentation of knowledge about the human, nature, and society.

Based on this conceptual triad - complex thinking, transdisciplinarity and eco-training - the Training-Action Program in Creative Schools is developed in stages that stimulate the connection with the reality of the participating teachers and their contexts. In this process, it favors "[...] the mobilization of teachers in the consolidation of a formation that, in fact, translates into action [...]". Hence,

[...] It is not a training in the traditional format, because, while it contributes to the deepening of the pedagogical conception, it prioritizes a methodology that encourages the application of what is collectively proposed by the team in the classroom with the students (ALMEIDA; ZWIEREWICZ; CARREÑO-SAUCEDO, 2019, p. 97).

By encouraging teacher protagonism and resilience, the Training-Action Program is close to the Sustainable Development Goals (SDGs) present in the 2030 Agenda for Sustainable Development, among them, those committed to the well-being of the population, sustainable development, and building effective, responsible, and inclusive institutions (UN BRAZIL, 2015). Therefore, the training meetings are based on transdisciplinarity and eco-training and prioritize the stimulus of complex thinking.

This research is justified because it is the first quantitative study structured to evaluate the association between socioeconomic and occupational characteristics and musculoskeletal symptoms in teachers who attend the Training-Action Program in Creative Schools. Its relevance consists of the possibilities that the results offer to make decisions that redefine the training program to meet the demands observed in the investigated teachers.

Research Methodology

Considering that the objective of this study was to evaluate the association between socioeconomic and occupational characteristics and musculoskeletal symptoms in Basic Education teachers who attend the Training-Action Program in Creative Schools and present a lower prevalence than those investigated in previous studies, the use of associative descriptive research was prioritized, with cross-sectional design and quantitative approach. The research was approved by the Research Ethics Committee of the Alto Vale do Rio Peixe University (UNIARP), thus meeting the ethical precepts involved in research involving human beings.

The study was carried out in the state of Santa Catarina, specifically in two of its 295 municipalities: Paulo Lopes and São Ludgero. The selection of these municipalities occurred because teachers from the two municipal education networks had been participating, for two consecutive years, in the Training-Action Program in Creative Schools. The research included 48 volunteer teachers of Kindergarten and Elementary School, most of them women, working in the respective municipal education networks.

To carry out the study, authorization for the research was requested from the education secretaries of the municipalities. Then, during the continuing education process, the teachers were informed about its procedures, and only those professionals who signed the Free and Informed Consent Form (FICF) participated.

The collection of data related to the teachers' socioeconomic and occupational characteristics was carried out through the application of the Socioeconomic and Occupational

Questionnaire. This instrument was structured according to the procedures described by Bjorner and Olsen (2010).

Comprising 15 questions, the questionnaire collects data on gender, age, number of children, marital status, individual income, practice of weekly physical activities, smoking, use of daily medication, time teaching, weekly workload, work shift, multiple jobs, educational level of employment (Kindergarten or Elementary School), number of students per class and time off work for health treatment in the last 12 months.

To evaluate musculoskeletal symptoms, we used the Nordic Musculoskeletal Symptoms Questionnaire (NMQ), composed of a human figure divided into nine anatomical regions, culturally adapted for the Portuguese language by Barros and Alexandre (2003). The respondent must report the occurrence of symptoms considering both the 12 months and the seven days preceding the interview, in addition to the occurrence of absence from routine activities in the last year (PINHEIRO, TRÓCCOLI; CARVALHO, 2002).

Both instruments were applied at the beginning of the training sessions held in July. Soon after the opening, the teachers had access to the questionnaires and filled them out before the beginning of the theoretical and practical activities planned for the meeting.

The data treatment was carried out through descriptive analysis, presenting the absolute and relative frequency. To analyze the association between socioeconomic and occupational variables and musculoskeletal symptoms, Pearson's chi-square test was used with a significance level of $p < 0.05$. All analyses were performed in the Statistical Package for the Social Sciences (SPSS), version 25.0.

Results and discussion

The socioeconomic characteristics of the Kindergarten and Elementary School teachers showed that 88.9% were female, over 40 years old, and had at least one child. Moreover, 77% were married and had an income of less than three minimum wages, 81.2% practiced some kind of weekly physical activity, and most of them did not smoke and did not use daily medications.

The occupational characteristics of the teachers showed that 43.8% had worked in kindergarten or elementary school for 10 years, with a weekly workload between 21 and 40 hours, most of them in two daily shifts. There was a predominance of those who had two jobs (77.1%), who were permanent employees and had an average of 20 students per classroom. The highest percentage of teachers (73%) had not left their activities in the last 12 months for health treatment.

Regarding musculoskeletal symptoms (Table 1), 26% of the teachers presented problems in the last 12 months, and the most frequent regions were the lower back (43.8%), shoulders (33.3%), and wrists/hands (31.3%).

Table 1 – Frequency of musculoskeletal symptoms and functional disability in kindergarten and elementary school teachers

Anatomical region	Symptoms in the past 12 months (%)	Impediment to perform activities in the last 12 months (%)	Symptoms during the last 7 days (%)
Neck	27,1	6,3	10,4
Shoulders	33,3	8,3	8,3
Upper Back	29,2	8,3	10,4
Elbows	8,3	2,1	6,3
Wrists/Hands	31,3	8,3	8,3
Lower back	43,8	12,5	14,6
Hips/thighs	16,7	4,2	6,3
Knees	20,8	8,3	22,9
Ankle/foot	22,9	6,3	8,3
Average ± Dp	26,0±10,2	7,1±2,9	10,6±5,2

Source: Research data (2020)

In the analysis of the association between socioeconomic and occupational characteristics and musculoskeletal symptoms in different anatomical regions of the teachers' bodies (Table 2), marital status, the practice of weekly physical activity and the use of medication were associated with symptoms in the hip/thighs, neck and knees, respectively ($p < 0.05$). In addition, length of tenure in teaching and multiemployment were associated with symptoms in wrists/hands and ankles/feet, respectively, ($p < 0.05$). In the other socioeconomic and occupational variables, there was no association with musculoskeletal symptoms ($p > 0.05$).

Table 2 – Analysis of the association between musculoskeletal symptoms and socioeconomic and occupational characteristics

Socioeconomic and occupational variables ⁴	Musculoskeletal Symptoms								
	SC	/M	IC	/C	/P				
Gender	,563	,000	,307	,000	,000	,121	,000	,000	,000
Age	,000	,081	,413	,125	,097	,413	,128	,152	,193
Number of children	,475	,972	,967	,000	,260	,652	,811	,131	,137
Marital status	,350	,390	,750	,000	,158	,109	,013*	,640	,237

⁴ Significant association with $p < 0.05$. P - Neck; O - Shoulders; PSC - Upper back; C - Elbows; P/M - Wrists/hands; PIC - Lower back; Q/C - Hips/thighs; J - Knees; T/P - Ankles/foot; LTS - Health Care Leave.

Income	,783	,810	,000	,000	,000	,478	,723	,734	,297
PA practice	,491	,910	,000	,000	,561	,308	,873	,002*	,797
Smoking	,000	,000	,503	,000	,532	,186	,000	,377	,410
Medications	,025*	,413	,676	,124	,692	,715	,116	,047*	,068
Teaching time	,088	,445	,262	,660	,023*	,067	,129	,267	,210
Working hours	,000	,257	,443	,000	,000	,179	,000	,781	,797
Shift	,000	,000	,060	,630	,371	,165	,250	,151	,000
Pluriemployment	,458	,293	,000	,561	,000	,000	,000	,416	,048*
Link	,622	,694	,654	,000	,227	,186	,000	,000	,000
Students per class	,330	,201	,320	,282	,000	,544	,000	,000	,000
LTS	,298	,735	,480	,563	,000	,000	,000	,706	,702

Source: Research data (2020)

The results of this research showed the predominance of middle-aged, married and female teachers. Regarding the predominance of women, the result is in accordance with national and international research with teachers who work in Basic Education, confirming that the school is a work space with female predominance (ROCHA *et al.*, 2017, CONVERSO *et al.*, 2018).

Regarding the lifestyle of teachers in this study, most of them practice some kind of weekly physical activity, contrary to studies that show that the practice of physical activity by Brazilian teachers is low and that most do not reach the recommended values of 150 minutes of moderate to vigorous activity per week (BRITO *et al.*, 2012). Importantly, a physically active lifestyle reduces the risk of developing cardiometabolic diseases, in addition to preserving and maintaining the general health status of teachers, and can positively influence the quality of teaching and student learning (MOTA JÚNIOR *et al.*, 2017).

In assessing the teachers' risk behaviors, the results showed that few of them use tobacco and alcoholic beverages. This result converges with three other studies: a) the survey involving 525 Kindergarten and Elementary School teachers from the Municipal Teaching Network of Jaboatão dos Guararapes, located in the Metropolitan Region of Recife, capital of the state of Pernambuco, which found a low frequency of tobacco and alcoholic beverage use by the teachers investigated (CEBALLOS; SANTOS, 2015); b) the survey of 414 Basic Education teachers in the municipality of Bagé, Rio Grande do Sul, which also found few smokers (SANTOS; MARQUES, 2013); c) the study by Yue, Liu, and Li (2012), conducted with 893

Basic Education teachers, which also identified a low rate of smokers. As previously mentioned, healthy lifestyle habits, such as reducing alcohol and tobacco consumption, reduce the risk of various health problems, especially those related to chronic noncommunicable diseases, especially cardiovascular diseases, cancer, respiratory diseases, and diabetes (SANTANA; PEIXOTO, 2017).

In the analysis of occupational characteristics, there was a predominance of working hours above 20 hours per week in a single school, concurrent and teaching activity as the main occupation. Other studies with Basic Education teachers also found similar results to those of the present research (CONVERSO *et al.*, 2018; CEBALLOS; SANTOS, 2015; SANTOS; MARQUES, 2013).

In the past 12 months, 26% of the faculty members participating in this research had osteomuscular symptoms, as indicated by Zwierewicz *et al.* (2019), which can also be seen in Table 1. The data are below other national studies systematized in this article and international studies, including the survey conducted in Taiwan, China, with teachers of Basic Education, whose result indicated that 86% of participants had some type of osteomuscular symptom (CHENG *et al.*, 2016).

The difference in musculoskeletal symptoms of the respondents in this study compared to the others may be related to the formative activities, lifestyle and occupational characteristics of the teachers. Healthy lifestyle habits demonstrated by the practice of physical activity and low tobacco and alcohol consumption can increase physical fitness and decrease occupational stress, resulting in greater support for physiological work loads and, consequently, reduction of musculoskeletal symptoms (DIAS *et al.*, 2017).

As for the occupational characteristics, Neves and Silva (2006) warn about the influence on teaching health of the social devaluation of their work, the lack of stimulus to work, the requirement of mastering different and constantly changing subjects, the existence of unsatisfactory interpersonal relationships, in addition to the large classes, the extensive work day, and the feeling of guilt for not satisfactorily dealing with domestic and family activities. These conditions justify the transdisciplinary and eco-formative emphasis of the training program offered to the participants of this study.

The anatomical regions of the body most affected by musculoskeletal symptoms were the back, shoulders, wrists/hands and neck (Table 1). The results of this research show similarity with previous research, in which the main musculoskeletal problems found in faculty members are located in regions such as the back, neck, shoulders, and wrists/hands (ROCHA *et al.*, 2017; CONVERSO *et al.*, 2018; SOLIS-SOTO *et al.*, 2017; CHENG *et al.*, 2016; ERICK;

SMITH, 2014; NG; VOO; MAAKIP, 2019). Studies have shown that the characteristics of the teaching work - such as prolonged time in sitting and standing positions, frequent and prolonged sessions of reading, preparing classes, and typing activities on the computer - associated with the biomechanical factors present in the activities - of repetitive demands and developed in environments without adequate ergonomic planning - are aspects that result in musculoskeletal changes (SHUAI *et al.*, 2014).

Individual characteristics such as gender, age, number of children, income and smoking were not associated with musculoskeletal symptoms in the different anatomical regions of the teachers' bodies. However, married teachers, those who practice physical activities, and those who do not use medication were associated with symptoms in the hip/thighs, neck, and knees, respectively (Table 2).

It is noteworthy that studies have shown conflicting results in the association of individual characteristics with musculoskeletal symptoms. A survey of 754 elementary school teachers in a city in the northeastern region of Ethiopia showed that age, marital status, and smoking were not associated with musculoskeletal symptoms in the shoulders and neck. In addition, exercise reduced shoulder and neck pain, corroborating in part with this study (TEMESGEN *et al.*, 2019). Erick and Smith (2014), meanwhile, assessed 1747 elementary education teachers in Botswana, and the results showed that age, marital status, and tobacco use were not associated with back pain.

In a survey conducted with 525 kindergarten and elementary school teachers from the Municipal Education Network of Jaboatão dos Guararapes, metropolitan region of Recife, it was found that female gender and smoking were associated with shoulder, upper back and neck pain, while the other socioeconomic variables showed no significant association (CEBALLOS; SANTOS, 2015). In the study by Yue, Liu and Li (2012), with 893 Chinese teachers who worked in Basic Education in the city of Puning, the female gender was positively associated with musculoskeletal symptoms in the shoulders and knees, and the practice of physical exercise reduced the risk in these same body regions.

Importantly, physical activity has been found to be a protective factor for the occurrence of musculoskeletal problems in teachers. We infer that it is because of the increase in muscle strength and flexibility, the increase in pain threshold and the strengthening of muscular and ligamentous structures, which start to support more efficiently the work overloads and daily stress of the activities (TEMESGEN *et al.*, 2019).

Regarding labor characteristics, teachers who have been working for a short time in elementary education and those who work in only one school are associated with

musculoskeletal symptoms in the wrist/hand and ankle/foot regions, respectively. Other job characteristics, such as workload, shift, employment status, sick leave, and number of students per class were not associated with musculoskeletal symptoms (Table 2).

Yue, Liu, and Li (2012) found that teaching experience and weekly workload were not associated with musculoskeletal symptoms in 893 elementary school teachers. In contrast, in Temesgen *et al.*'s (2019) study of 754 Basic Education teachers, longer teaching experience and workload above 30 hours per week were associated with shoulder and neck pain. Also in the study by Cardoso *et al.* (2009), with 4,496 teachers in the Municipal Teaching Network of Salvador, Bahia, longer time working at school, weekly workload of 40 hours, and multiemployment were positively associated with musculoskeletal pain.

In another study of 525 Kindergarten and Elementary School teachers, length of service of more than 10 years was positively associated with ankle and/or foot pain (CEBALLOS; SANTOS, 2015). In Erick and Smith's (2014) survey of 1747 elementary education teachers in Botswana, length of service was associated with musculoskeletal symptoms in the lower back. On the other hand, weekly workload, number of students per class and multiple jobs were not associated with musculoskeletal symptoms.

Final considerations

Considering that the Training-Action Program in Creative Schools prioritizes the stimulus to collaborative work, the pertinence of teaching, resilience and valorization of the protagonism of those involved, using an innovative methodology in its development, besides encouraging teachers to use a process that replicates these conditions in the classroom, this study contributes to indicate some strategies that may be essential both to reduce the number of teachers who manifest symptoms and to help those who do. Some strategies depend, in part, on public authorities, while others can be streamlined in the training itself.

In summary, the Kindergarten and Elementary School teachers of the municipal education networks involved in the study showed a low frequency of musculoskeletal symptoms, and the body regions most affected by the symptoms were the lower and upper back, shoulders and wrists and/or hands. In addition, the teachers' socio-occupational characteristics were associated with musculoskeletal symptoms.

The high number of women, the age of most of them over 40 years old, and the commitments with children and family define a profile with several responsibilities in addition to those assigned by the profession. Considering these conditions in the planning of training

meetings and in the planning of the teachers themselves is a priority demand in order to improve both the quality of life and the work performance of these women.

In this sense, expanding collaborative work can be a determining factor in minimizing the teachers' workload. In addition, building repositories of activities developed by different schools can reduce the time devoted to planning, without, however, disregarding that adaptations are necessary based on the context of each of the teaching units.

Regarding the results concerning the large number of teachers who practice physical activities, are not smokers, and do not use medications, especially those indicated for depressive disorders, it is observed the importance of continuing to motivate teachers. In this sense, the valorization of the protagonism and the encouragement of resilience through formative activities that help in facing adversities may be fundamental for the indexes obtained to be maintained or even improved. In the specific case of this study, the results invite us to think that the proposed formative program can be a prevention program for musculoskeletal symptoms, especially in professionals who work in Basic Education.

In relation to the association of teaching time in teaching and multi-employment with symptoms in wrists/hands and ankles/foot, respectively, it is observed that the solution is not limited to the capacity of the program. However, the finding can collaborate both in planning self-training activities with specialists who discuss care of the respective body parts, and in encouraging teachers to plan activities in such a way that so much writing and so much standing in the classroom are not required of them.

These strategies are also valid for improving the results regarding the anatomical body regions most affected by the symptoms, which were the back, shoulders, wrists/hands, and neck. In this process, it is necessary to overcome practices that still demand excessive writing from teachers, a condition considered when working with transdisciplinary and eco-training pedagogical proposals, and which, according to Oliveira, Behrens and Prigol (2020, p. 1891), comprise a "[...] non-linear dynamic of the teaching and learning process.

It is also noteworthy that the differences in the association of occupational characteristics with musculoskeletal symptoms, as pointed out in studies such as this, may be related to the characteristics of the samples, the information collection period, occupational conditions, the time of experience in teaching, and the regions where the teachers live.

In addition, in the evaluation of the muscular symptoms of the participants in this study, a self-reported recall questionnaire was applied. Although this is the most widely used in the literature, it may cause memory bias, underestimating or overestimating the values found. It is also necessary to consider that data collection in the month of July may have underestimated

the prevalence of musculoskeletal symptoms when compared to the final months of the school year, leading to results with less work overload and stress

Despite this, it is considered that the data collected and its comparison with other studies can contribute to the definition of strategies committed to the well-being of teachers. Thus, the relevance of trainings that overcome reproductive patterns to listen to teachers and give visibility to their local reality, without underestimating global demands, is presented.

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