

Prescribed medication use among elementary teachers: Prevalence and associated factors

Uso de medicamento prescrito em professores do ensino
fundamental: Prevalência e fatores associados

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Abstract *The aims of the study were to assess the prevalence and analyze the associated factors of medication use among teachers. A cross-sectional study was carried out, involving 530 teachers from Londrina city, Paraná, Brazil. The dependent variable was prescribed medication use and the independent variables were sociodemographic, work-related, lifestyle, health disorders, and chronic diseases, all assessed through questionnaires. Prevalence of medication use was 59.1%. Chronic disease was associated with all medications analyzed. Variables positively associated with medication use according to health disorder type were: Cardiometabolic (Length of employment, overweight, not current tobacco use, and TV viewing); Psychological (Length of employment, common mental disorders, current tobacco use, and disability); Orthopedic (Length of employment, health insurance, overweight, musculoskeletal pain, low job support, and disability); Respiratory (TV viewing and problems related to dust or chalk powder); and Gastrointestinal (common mental disorders and physical activity [negative association]). Support for access, the appropriate use of medicines, and a reduction in medication use should consider work-related, lifestyle, and health disorders, as well as chronic diseases.*

Key words *Pharmaceutical Preparations, Healthy Lifestyle, Work*

Resumo *Os objetivos do estudo foram verificar a prevalência e analisar os fatores associados ao uso de medicamentos em professores. Estudo transversal envolvendo 530 professores da cidade de Londrina, Paraná, Brasil. As variáveis dependentes foram o uso de medicamentos prescritos e as variáveis independentes foram os aspectos sociodemográficos, relacionados ao trabalho, estilo de vida, distúrbios de saúde e doenças crônicas, todas estimadas por meio de um questionário. A prevalência do consumo de medicamento foi de 59,1%. Doenças crônicas foram associadas a todos os medicamentos analisados. As variáveis positivamente associadas ao uso de medicamentos de acordo com o tipo de distúrbio foram: Cardiometabólico (tempo no emprego, sobrepeso, não uso atual de tabaco e uso de TV); Psicológico (tempo no emprego, transtornos mentais comuns, uso atual de tabaco e incapacidade); Ortopédico (tempo no emprego, plano de saúde, sobrepeso, dor musculoesquelética, baixo suporte no trabalho e incapacidade); Respiratório (uso de TV e problemas relacionados à poeira); Gastrointestinal (transtornos mentais comuns e atividade física [associação inversa]). O suporte ao acesso, uso apropriado e redução do uso de medicamentos devem considerar variáveis relacionadas ao trabalho, estilo de vida, distúrbios de saúde e doenças crônicas.*

Palavras-chave *Preparações Farmacêuticas, Estilo de Vida Saudável, Trabalho*

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Introduction

Health behaviors are determinants of the four main non-communicable chronic diseases: cardiovascular, chronic respiratory, cancers, and diabetes¹. Since adults expend one third of the day working, work-related characteristics can play an important role in health^{2,3}. Among professions associated with health impairment, teachers are highlighted due to the demands of their work, such as preparing and conducting lessons, assessing students' work performed during classes or at home, attending meetings, participating in school pedagogical planning, constantly remaining updated, and being involved in extracurricular activities. The demands become more difficult as they are generally performed with several barriers related to school and social contexts^{4,5}.

Teachers are at risk of developing a variety of health related disorders⁶⁻¹². Approximately 50% of teachers suffer from musculoskeletal symptoms in the neck, shoulders, and back⁹. The prevalence of respiratory disorders varies from 25.1 to 80.4%⁶ and voice disorders affect 33.9% of teachers¹². Regarding mental health, there is a high prevalence of high stress (25.7%)⁷, common mental disorders (29.7%)⁸, and burnout (8.3 to 56.6%)¹¹. Furthermore, teachers also present other health risks, such as overweight (46.7%), physical inactivity (34.8%), low fruit and vegetable consumption (79.6%), alcohol consumption (21.6%), and tobacco use (14.1%)⁷. The most commonly cited causes of health related disorders among teachers are higher length of employment, poor work conditions and environment, work overload, discipline problems, low social and job support, low self-efficacy, bad vocal use, and adverse conditions to vocal health^{4-6,8,9,11}.

The presence of disease usually requires pharmacological management, which is effective both for preventing and treating health disorders, reducing or eliminating the symptoms of disease. The majority of epidemiological information available describes the prevalence and factors associated with medication use for the general adult population¹³⁻¹⁶. However, although there are many studies assessing health risks among elementary teachers⁶⁻¹⁰, no studies have described the medication use profile in this population.

Despite the benefits of prescribed medication in the treatment of health disorders, medicines also result in negative effects such as adverse drug reactions and hospitalizations, co-medication, dependence, and self-medication risk¹⁷⁻¹⁹. Furthermore, costs associated with medication

use can result in catastrophic health expenditure, mainly in families with low socioeconomic status²⁰. The lack of information regarding a representative sample of elementary teachers prevents knowledge of the pattern and variables associated with higher medication consumption. These data can guide policies to provide support on access and the appropriate use of medicines with a focus on vulnerable groups. Therefore, the aims of this study were to assess the prevalence and associated factors of medication consumption among elementary teachers.

Methods

Study location

This is a cross-sectional study with a representative sample of elementary teachers from Londrina city, Paraná, Brazil, from July to December 2014. Londrina is a medium-sized city and the population was estimated at 506,701 inhabitants and a health development index = 0.778 according to a census conducted in 2010²¹.

Population and Sample

In 2014 there were 74 municipal elementary schools in the urban area of Londrina with a total of 2,500 teachers distributed according to each region of the city: north (32.8%), south (20.0%), east (20.3%), west (22.1%), and center (4.8%). All schools were invited to participate in the study and 63 accepted. The inclusion criteria were: a) having been a teacher of municipal schools for at least 1 year and working in an elementary school; b) not being retired or on medical leave during data collection; c) not having been work relocated (i.e., teacher working as a secretary or in administration). The sample size calculation was performed using the following parameters: N=2,500, a 50% outcome prevalence, 5% sample error, confidence interval of 95%, and design effect of 1.5, using the software OpenEpi 3.01. The minimum number of participants required was 500 stratified according to region of the city.

Data collection

The study was approved by the Ethics Committee for Research involving human beings of the State University of Londrina. The guidelines of Resolution N° 466/2012 of the Brazilian National Health Council were followed. All par-

ticipants signed an informed written consent containing the objectives, procedures, risks, and benefits of the study, as well as the researchers' contact details. Data collection was performed in five steps: 1) The project was presented to the Municipal Education Department who provided permission to conduct the study; 2) All schools that agreed to participate in the study were visited to present the study proposal and obtain authorization of the principals; 3) The purpose and procedures of the study were presented to teachers and data collection was scheduled randomly in schools where the teachers were enrolled; 4) Teachers completed the self-report questionnaire; 5) Data collection was performed again for teachers who were absent on the scheduled date.

Variables and instruments

The dependent variable was medication use, prescribed by a physician and consumed continuously during the previous six months. The following closed question was used to assess medication consumption: "Do you regularly use (continuously) any type of medication? Indicate only medicines used under medical prescription during the last six months". A list of medicine categories and the answer options "yes" or "no" were presented for each category. Teachers indicated the medication use for cardiometabolic (hypertension, diabetes, dyslipidemia, and cardiovascular disease), psychological (anxiety, depression, insomnia, stress, and panic syndrome), orthopedic, respiratory, gastrointestinal, nervous system, cancer and weight control related disorders. It was not performed the analysis of the association between medication used for nervous system, weight control and cancer because the low number of cases made the analysis impracticable.

The independent variables were assessed through a self-report questionnaire. Gender, age, length of employment, TV viewing, and computer use during leisure time were analyzed using open questions. The body mass index was estimated by self-report measures of height and weight. The other independent variables were assessed by the questions: Health insurance, "How do you pay for health services?", with response options "Private health insurance", "Employer's health insurance", or "I use the public health system"; Socioeconomic status was estimated according to the values proposed by the Brazilian Association of Polling Companies²²; School infrastructure, "Do you consider the infrastructure

of your school appropriate? (aspects that should be considered were listed: noise, temperature, lighting, cleaning, ventilation, size, and furniture)" with answer options "yes", "no", and "partially"; Voice disorders, "Do you have a frequent voice-related problem?" with answer options "yes", "no"; Problems related to chalk powder, "Do you have a frequent problem with dust or chalk powder?" with answer options "yes", "no" for each problem (nasal stuffiness, eye irritation, rhinitis, coryza, cough, skin problems); Alcohol consumption, "Usually how many times in a normal month do you consume ≥ 5 doses of the drinks below (men) or ≥ 4 doses (women) in less than 2 hours?" The list contained wine, beer, and distilled drinks; Tobacco use, "Have you smoked at least 100 cigarettes in your entire life?" with answer options "yes" and "no"; "How often during a typical week do you smoke", "none", "1-2 days", "3-4 days", "5-6 days" and "daily"; Chronic diseases, "Has a doctor or psychologist reported that you have any of the following chronic diseases?" and answer options were "yes" and "no" for a list of categories of chronic diseases (cardiometabolic, psychological, orthopedic, respiratory, gastrointestinal, nervous system, cancer, and weight control).

Physical activity was estimated using the long form of the International Physical Activity Questionnaire (IPAQ), Brazilian version²³. Section 4 was considered which includes recreational, sport, exercise, and leisure time physical activity. The cutoff used was 150 min/week of moderate and vigorous intensity. Musculoskeletal pain and disability were estimated using the Brazilian version of the Standardized Nordic questionnaire²⁴. Common mental disorders were assessed by the Brazilian version of a Self Report Questionnaire²⁵ and the cut-off adopted was 7/8. To estimate work stress, the Brazilian version of the questionnaire job stress scale²⁶ was used, which contains demand, control, and job support dimensions. Two stress outcomes were considered: 1) Teachers who were above percentile 50 for demand and below percentile 50 for control (high demand and low control); 2) Those who were below percentile 50 on job support (low job support).

Some variables were assessed using questions elaborated to achieve the objectives of the present study. To ensure the quality of the information, the following procedures were adopted: a) The questions were developed by researchers based on the available scientific literature, study objectives, and target population; b) The questions were submitted to evaluation by a panel of

four expert judges in the Health Sciences areas from three Universities, with experience in the validation of questionnaires, full professors of postgraduate programs and with relevant scientific production; c) The questions were modified in accordance with the suggestions of the judges; d) The questions were applied to a group of 50 participants (not included in sample of this study) over a period of seven days (test-retest) to assess the readability, clarity, comprehensiveness, and reproducibility; and e) The participants were interviewed about necessary modifications to the questions. The variables presented acceptable reproducibility (intraclass coefficient > 0.5 for continuous variables and kappa index > 0.40 for categorical variables).

Statistical analysis

Descriptive statistics were carried out using relative frequency. The bivariate analysis was performed using the Chi-Squared test and variables associated at $P < 0.20$ were included in the multivariate analysis. Logistic regression was conducted to estimate the odds ratio and confidence intervals of 95% of the associations between the independent variables and each category of medication use. In the multivariate analysis, variables were inserted in regression in different levels: Level 1 (sociodemographic and work-related characteristics), Level 2 (lifestyle and health risks), and Level 3 (disability and chronic diseases). The goodness-of-fit of each model was assessed using the Hosmer-Lemeshow test. The significance level in the final models was set at 5%.

Results

A total of 595 teachers returned the questionnaires, however due to incomplete information on some variables, the final sample was composed of 530 teachers. Missing participants did not differ from those included in the final sample with regard to sex, region of the city, income, health risks, or medication consumption. Conversely, the missing sample was more prevalent in those > 40 years of age.

Sample characteristics and the prevalence of any medication use according to independent variables among elementary school teachers are described in Table 1. The prevalence of any medication use was 59.1%. Teachers with higher age and length of employment, higher socioeconomic status, overweight, common mental disorders,

Table 1. Sample characteristics and prevalence of medication use according to independent variables among elementary teachers (n = 530).

Variables	All (%)	Medication use	
		No (%)	Yes (%)
All	-	40.9	59.1
Gender		P=0.241	
Male	4.7	52.0	48.0
Female	95.3	40.2	59.8
Age		P<0.001	
<40 years	47.7	49.0	51.0
≥40 years	52.3	33.2	66.8
Length of employment		P<0.001	
<9 years	26.6	54.6	45.4
10 to 19 years	32.8	41.4	58.6
>20 years	40.6	31.2	68.8
Health insurance		P=0.799	
No	17.5	41.9	58.1
Yes	82.5	40.5	59.5
Socioeconomic status		P=0.022	
Low	15.8	50.0	50.0
Medium	43.6	42.0	58.0
High	40.6	35.8	64.2
School infrastructure		P=0.082	
Adequate	21.5	42.7	57.3
Not adequate	78.5	33.6	66.4
Overweight		P<0.001	
No	56.4	50.8	49.2
Yes	43.6	27.7	72.3
Common mental disorders		P<0.001	
No	69.1	47.0	53.0
Yes	30.9	26.8	73.2
Physical activity		P=0.028	
No	77.9	38.3	61.7
Yes	22.1	49.6	50.4
Musculoskeletal pain		P<0.001	
No	16.6	54.5	45.5
One region	17.9	51.6	48.4
Two regions	26.2	41.0	59.0
≥Three regions	39.2	29.8	70.2
Alcohol consumption		P=0.687	
No	68.1	40.2	59.8
Yes	31.9	42.0	58.0
Tobacco use		P=0.014	
Never	87.0	43.2	56.8
Not current smoker	9.6	25.5	74.5
Current smoker	3.4	22.2	77.8
TV viewing		P=0.104	
<2h/day	57.4	43.8	56.3
≥2h/day	42.6	36.7	63.3

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Table 1. Sample characteristics and prevalence of medication use according to independent variables among elementary teachers (n = 530).

Variables	All (%)	Medication use	
		No (%)	Yes (%)
Computer use		P=0.380	
<2h/day	57.0	42.4	57.6
≥2h/day	43.0	38.6	61.4
Voice disorders		P<0.001	
No	65.1	46.4	53.6
Yes	34.9	30.3	69.7
Problems related to dust or chalk powder		P=0.002	
No	27.9	51.4	48.6
One	33.2	41.5	58.5
≥Two	38.9	32.5	67.5
High stress		P=0.092	
No	71.1	38.5	61.5
Yes	28.9	46.4	53.6
Low job support		P=0.047	
No	59.2	44.3	55.7
Yes	40.8	35.6	64.4
Disability due to musculoskeletal disorders		P<0.001	
No	64.2	47.9	52.1
Yes	35.8	27.9	72.1
Chronic disease		P<0.001	
None	21.9	81.9	18.1
One	24.0	57.5	42.5
Two	21.1	28.6	71.4
≥Three	33.0	9.1	90.9

P refers to the chi-square test.

physical inactivity, musculoskeletal pain, tobacco use, voice disorders, problems related to dust, low job support, disability due to musculoskeletal disorders, and chronic diseases presented a higher prevalence of any medication use ($P < 0.05$).

The prevalence of medication consumption for each health related disorder according to the independent variables studied is described in Table 2. The prevalence ranged from 10.2% (respiratory disorders) to 27.7% (psychological disorders), while 18.1% of teachers reported the consumption of \geq three medications simultaneously. Medication consumption for the nervous system, weight control, and cancer presented 3.0, 2.8, and 0.4% respectively (data not shown).

Table 3 describes the multivariate association between sociodemographic and work-related characteristics and medication consumption. Length of employment increased the odds ratio of medication use for cardiometabolic, psycho-

logical, orthopedic, and clustering of medication use by 1.81 to 6.37 times. The same occurred for health insurance and school infrastructure for orthopedic disorders (OR = 2.42) and clustering of medication use (OR = 1.76) respectively.

The multivariate analysis of the association between lifestyle and health risks and medication consumption are described in Table 4. The variables that increased the odds ratio of cardiometabolic medication use were, overweight (OR = 3.59), currently not a smoker (OR = 2.16), and TV viewing \geq 2h (OR = 1.81). Teachers with a common mental disorder (OR = 2.57) and current smokers (OR = 3.81) had a higher odds ratio to use medications for psychological disorders. Overweight (OR = 2.09), musculoskeletal pain \geq three regions (OR = 5.03) and low job support (OR = 1.89) increased the odds ratio of medication use for orthopedic disorders. TV viewing \geq 2h (OR = 2.06), \geq 2 problems related to dust or chalk powder (OR = 8.26) were positively associated with medication use for respiratory problems. Gastrointestinal medication use was higher for teachers with common mental disorders (OR = 2.47) while among on those who performed physical activity the odds ratio for medication use was lower (OR = 0.42). The clustering of medication use was more prevalent in teachers with common mental disorders (OR = 3.93) and low support in the job (OR = 1.72).

Teachers with disability due to musculoskeletal disorders presented higher medication consumption for psychological and orthopedic disorders and clustering medication use (OR = 1.67 to 7.64). The presence of chronic disease increased the likelihood of medication use for all disorders analyzed (OR = 3.79 to 66.60) (Table 5). The final models presented good fit values in the Hosmer Lemeshow goodness-of-fit test: Cardiometabolic (0.442), Psychological (0.973), Orthopedic (0.924), Respiratory (0.926), Gastrointestinal (0.308), and Clustering (0.615).

Discussion

To our knowledge, this is the first study to investigate the prevalence and associated factors of medication use among elementary teachers. In the present study the prevalence of medication consumption for psychological, cardiometabolic, gastrointestinal, orthopedic, and respiratory disorders was 27.7, 19.6, 18.5, 15.7, and 10.2%, respectively. The prevalence was higher compared to the general population for psycholog-

Table 2. Prevalence of prescribed medication use for cardiometabolic, psychological, orthopedic, respiratory, gastrointestinal disorders and \geq three medications clustered according to independent variables studied among elementary teachers.

Variables	Cardiometabolic	Psychological	Orthopedic	Respiratory	Gastrointestinal	Clustering
	%	%	%	%	%	%
All	19.6	27.7	15.7	10.2	18.5	18.1
Gender	P=0.584	P=0.020	P=0.982	P=0.278	P=0.157	P=0.053
Male	15.4	7.7	15.4	3.8	7.7	3.8
Female	19.8	28.6	15.6	10.4	18.7	18.8
Age	P<0.001	P<0.001	P=0.002	P=0.395	P=0.778	P<0.001
< 40 years	11.2	20.9	10.5	11.2	17.8	10.9
\geq 40 years	27.3	33.8	20.3	9.0	18.8	24.8
Length of employment	P<0.001	P=0.001	P<0.001	P=0.303	P=0.090	P=<0.001
< 9 years	6.8	17.8	4.1	10.3	15.1	4.8
10 to 19 years	19.4	26.3	14.4	12.6	15.5	16.6
> 20 years	28.4	35.3	24.3	7.9	22.8	28.4
Health insurance	P=0.218	P=0.039	P=0.006	P=0.334	P=0.311	P=0.037
No	14.7	18.9	6.3	12.6	14.7	10.5
Yes	20.5	29.4	17.6	9.4	19.2	19.6
Socioeconomic status	P=0.511	P=0.141	P=0.642	P=0.120	P=0.620	P=0.831
Low	17.9	20.2	11.9	15.5	20.2	20.2
Medium	18.1	27.4	14.6	9.7	16.4	17.3
High	22.2	31.6	16.2	7.6	19.4	17.9
School infrastructure	P=0.074	P=0.045	P=0.101	P=0.355	P=0.385	P=0.008
Adequate	17.9	25.6	13.9	9.4	17.5	15.6
Not adequate	25.4	35.1	20.2	12.3	21.1	26.3
Overweight	P<0.001	P=0.246	P<0.001	P=0.672	P=0.233	P=0.037
No	9.7	25.8	10.4	9.7	16.7	15.1
Yes	32.5	30.3	22.5	10.8	20.8	22.1
Common mental disorders	P=0.184	P<0.001	P=0.004	P=0.108	P<0.001	P<0.001
No	18.1	21.1	12.6	8.8	12.1	10.4
Yes	23.0	42.4	22.4	13.3	32.7	35.2
Physical activity	P=0.060	P=0.596	P=0.889	P=0.297	P=0.004	P=0.520
No	21.4	27.2	15.6	10.9	21.1	18.7
Yes	13.6	29.7	16.1	7.6	9.3	16.1
Musculoskeletal pain	P=0.220	P=0.057	P=<0.001	P=0.103	P<0.001	P=0.001
No	21.6	17.0	4.5	3.4	9.1	10.2
One region	7.2	25.8	7.2	9.3	12.4	7.2
Two regions	23.9	29.0	13.0	13.0	15.2	22.5
\geq Three regions	21.7	32.4	26.2	11.6	27.5	23.7
Alcohol consumption	P=0.287	P=0.287	P=0.620	P=0.767	P=0.210	P=0.888
No	21.3	29.2	15.5	9.6	20.8	18.4
Yes	17.3	24.7	17.3	10.5	16.0	17.9
Tobacco use	P=0.016	P=0.011	P=0.974	P=0.231	P=0.205	P=0.067
Never	17.7	25.8	15.4	10.7	18.6	16.6
Not current smoker	34.7	34.7	16.3	4.1	14.3	28.6
Current smoker	22.2	55.6	16.7	16.7	33.3	27.8
TV viewing	P=0.006	P=0.759	P=0.374	P=0.008	P=0.035	P=0.286
< 2h/day	15.6	27.5	14.6	7.3	15.2	16.6
\geq 2h/day	25.1	28.7	17.5	14.3	22.4	20.2
Computer use	P=0.340	P=0.718	P=0.407	P=0.092	P=0.010	P=0.077
< 2h/day	18.3	27.3	14.7	8.3	14.7	15.7
\geq 2h/day	21.7	28.8	17.3	12.8	23.5	21.7

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Table 2. Prevalence of prescribed medication use for cardiometabolic, psychological, orthopedic, respiratory, gastrointestinal disorders and \geq three medications clustered according to independent variables studied among elementary teachers.

Variables	Cardiometabolic	Psychological	Orthopedic	Respiratory	Gastrointestinal	Clustering
	%	%	%	%	%	%
Voice disorders	P=0.272	P=0.087	P=0.106	P=0.016	P=0.016	P=0.026
No	18.2	24.9	13.2	7.9	15.2	15.0
Yes	22.2	31.9	18.5	14.6	23.8	22.7
Problems related to dust or chalk powder	P=0.169	P=0.064	P=0.035	P<0.001	P=0.055	P=0.003
No	16.1	23.5	10.1	2.0	12.1	10.7
One	18.0	24.7	15.3	6.7	20.2	16.9
\geq Two	23.6	33.5	20.2	19.2	21.7	24.6
High stress	P=0.967	P=0.643	P=0.476	P=0.081	P=0.131	P=0.258
No	19.6	28.3	16.4	11.6	20.1	19.3
Yes	19.7	26.3	13.9	6.6	14.5	15.1
Low job support	P=0.537	P=0.008	P=0.002	P=0.023	P=0.128	P=0.001
No	20.5	23.4	11.6	7.7	16.3	13.5
Yes	18.3	33.9	21.6	13.8	21.6	24.8
Disability due to musculoskeletal disorders	P=0.089	P<0.001	P<0.001	P=0.092	P=0.022	P<0.001
No	17.3	21.1	5.4	8.6	15.8	11.0
Yes	23.4	38.3	34.0	13.3	23.9	30.3
Chronic disease	P<0.001	P<0.001	P<0.001	P<0.001	P<0.001	P<0.001
None	2.6	5.2	2.6	0.9	4.3	0.9
One	13.0	10.7	9.9	6.1	6.9	2.3
Two	15.3	28.8	12.6	9.0	18.0	7.2
\geq Three	38.7	54.9	30.8	20.2	37.0	48.6

Clustering: \geq 3 medications simultaneously. P refers to the chi-square test.

ical (5.5 to 18.4%)^{15,16,27,28}, gastrointestinal (7.3 to 12.8%)^{16,29,30}, orthopedic (5.7 to 9.1%)^{15,16,30}, and respiratory medication (1.9 to 4.1%)^{15,16,29,30}. One study showed a higher prevalence of medication use for the alimentary tract and metabolism (19.1%)¹⁵, however unlike the present study, this category included anti-obesity products and medication for diabetes.

The higher prevalence of medication use compared to the general population for psychological, gastrointestinal, orthopedic, and respiratory disorders can be explained by risks associated with the teaching profession. It has been extensively described that teachers are affected by behavioral risks, poor physical health, musculoskeletal pain, mental disorders, high stress, and voice and respiratory disorders⁶⁻¹² and the data from the present study suggest that this could result in high medication use to treat these health disorders. Psychotropic medication was the most commonly used in the sample studied. This corroborates with the results of a study that demon-

strated that teachers are the professionals with the highest number of medical sick leave days due to mental disorders among public servants³¹. It is probable they are more exposed to mental disorders compared to other professionals. Another aspect that reinforces this statement is that length of employment was positively associated with four of the six dependent variables analyzed in the present study. Teachers with a longer length of employment are exposed to profession conditions and health risks for a longer time and for this reason, have less quality of life compared to their peers with a low length of employment³².

Previous studies demonstrated that socio-demographic variables such as sex and age are related to medication use in the general population^{13,15,16,27-30}, however, the present study reported contrary results. With regard to sex, the sample analyzed was composed of teachers and there is no evidence describing that work conditions affects the health of men and women in different ways. Similarly, age was not related to any type

Table 3. Association between sociodemographic and work-related characteristics and prescribed medication use for cardiometabolic, psychological, orthopedic, respiratory, gastrointestinal disorders and \geq three medications clustered among elementary teachers.

Variables	Cardiometabolic	Psychological	Orthopedic	Respiratory	Gastrointestinal	Clustering
	OR (95%CI)	OR (95%CI)	OR (95%CI)	OR (95%CI)	OR (95%CI)	OR (95%CI)
Gender						
Male	-	Reference	Reference	Reference	Reference	Reference
Female	-	3.85 (0.88-16.90)	-	-	2.48 (0.57-10.78)	3.70 (0.47-28.66)
Age						
<40 years	Reference	Reference	Reference	Reference	Reference	Reference
\geq 40 years	1.72 (0.94-3.13)	1.32 (0.77-2.25)	0.93 (0.48-1.82)	-	-	1.33 (0.70-2.53)
Length of employment						
<9 years	Reference	Reference	Reference	Reference	Reference	Reference
10 to 19 years	3.28 (1.49-7.19)	1.47 (0.83-2.57)	3.69 (1.44-9.42)	-	1.00 (0.54-1.86)	3.34 (1.39-8.03)
>20 years	3.65 (1.56-8.52)	1.81 (1.06-3.09)	6.37 (2.31-17.52)	-	1.44 (0.82-2.55)	5.00 (1.94-12.84)
Health insurance	-					
No	-	Reference	Reference	Reference	Reference	Reference
Yes	-	1.42 (0.78-2.56)	2.42 (1.02-5.97)	-	-	1.42 (0.68-2.95)
Socioeconomic status						
Low	-	Reference	Reference	Reference	Reference	Reference
Medium	-	1.37 (0.72-2.61)	-	0.60 (0.28-1.25)	-	-
High	-	1.69 (0.88-3.25)	-	0.45 (0.20-1.01)	-	-
School infrastructure						
Adequate	Reference	Reference	Reference	Reference	Reference	Reference
Not adequate	1.49 (0.89-2.49)	1.56 (0.97-2.50)	1.44 (0.82-2.54)	-	-	1.76 (1.03-2.98)

Clustering: \geq 3 medications simultaneously. OR (95%CI) = Adjusted odds ratio and confidence interval of 95%. The models were adjusted for variables that presented $P < 0.20$ in the Chi-Squared test. Bold denotes significant associations ($P < 0.05$).

of medication use in the adjusted model. Length of employment was inserted in the same block as the age variable, which indicates that work can affect medication use independent of age.

As expected, the number of chronic diseases diagnosed was positively associated with all types of medication use analyzed. Chronic non-communicable diseases are the main causes of mortality, disability, and health costs in the general population³³. Since chronic diseases are treatable but irreversible, intervention programs aimed at decreasing medication use among teachers should focus on preventing health risks associated with the development of chronic diseases³³.

Musculoskeletal pain (\geq three regions of body), overweight, health insurance, and low job support were associated with medication use for orthopedic disorders. Although it was expected that musculoskeletal pain would be associated with medication use for orthopedic disorders, only teachers with pain in \geq three regions of the

body presented higher medication use. Multisite pain presented a significant association with medication use as it can reflect in higher discomfort and limitations compared to isolated pain. This could possibly also explain the association found for low job support, since it is related to multisite pain among workers³⁴. Furthermore, overweight was associated with medication use due to an increased risk of orthopedic disorders resulting in higher body load and a pro-inflammatory state³⁵. Similarly, health insurance was associated with medication use for orthopedic disorders. However, this variable may not be considered a risk for medication use. Orthopedic disorders require expensive procedures (i.e., medical imaging) and for this reason, teachers who have health insurance probably have greater opportunity for diagnosis, treatment, and monitoring of orthopedic diseases.

Disability due to musculoskeletal disorders predicted medication use for musculoskeletal

Table 4. Association between lifestyle and health risks and prescribed medication use for cardiometabolic, psychological, orthopedic, respiratory, gastrointestinal disorders and \geq three medications clustered among elementary teachers.

Variables	Cardiometabolic	Psychological	Orthopedic	Respiratory	Gastrointestinal	Clustering
	OR (95%CI)	OR (95%CI)	OR (95%CI)	OR (95%CI)	OR (95%CI)	OR (95%CI)
Overweight						
No	Reference	-	Reference	Reference	Reference	Reference
Yes	3.59 (2.15-5.99)	-	2.09 (1.21-3.60)	-	-	1.21 (0.71-2.07)
Common mental disorders						
No	Reference	Reference	Reference	Reference	Reference	Reference
Yes	1.01 (0.59-1.74)	2.57 (1.61-4.09)	1.16 (0.65-2.06)	0.86 (0.45-1.64)	2.47 (1.48-4.13)	3.93 (2.22-6.93)
Physical activity						
No	Reference	Reference	Reference	Reference	Reference	Reference
Yes	0.83 (0.43-1.60)	-	-	-	0.42 (0.20-0.88)	-
Musculoskeletal pain						
No	-	Reference	Reference	Reference	Reference	Reference
One region	-	1.24 (0.56-2.74)	1.39 (0.37-5.20)	2.08 (0.51-8.42)	1.03 (0.36-2.89)	0.34 (0.10-1.11)
Two regions	-	1.27 (0.61-2.66)	2.06 (0.63-6.73)	2.70 (0.72-10.07)	1.32 (0.51-3.45)	1.23 (0.48-3.12)
\geq Three regions	-	1.44 (0.71-2.92)	5.03 (1.64-15.39)	2.00 (0.54-7.32)	2.22 (0.90-5.47)	1.18 (0.48-2.91)
Alcohol consumption						
No	-	Reference	Reference	Reference	Reference	Reference
Yes	-	-	-	-	-	-
Tobacco use						
Never	Reference	Reference	Reference	Reference	Reference	Reference
Not current smoker	2.16 (1.03-4.54)	1.16 (0.57-2.38)	-	-	-	1.87 (0.81-4.27)
Current smoker	1.05 (0.31-3.53)	3.81 (1.32-10.96)	-	-	-	1.16 (0.33-4.11)
TV viewing						
<2h/day	Reference	Reference	Reference	Reference	Reference	Reference
\geq 2h/day	1.81 (1.11-2.96)	-	-	2.06 (1.11-3.83)	1.60 (0.97-2.61)	-
Computer use						
<2h/day	Reference	Reference	Reference	Reference	Reference	Reference
\geq 2h/day	-	-	-	1.32 (0.71-2.44)	1.60 (0.98-2.61)	1.71 (0.99-2.91)
Voice disorders						
No	Reference	Reference	Reference	Reference	Reference	Reference
Yes	-	1.14 (0.71-1.82)	1.06 (0.60-1.87)	1.36 (0.74-2.50)	1.42 (0.85-2.37)	1.15 (0.65-2.02)
Problems related to dust or chalk powder						
No	Reference	Reference	Reference	Reference	Reference	Reference
One	1.05 (0.54-2.04)	0.79 (0.44-1.42)	1.51 (0.68-3.34)	2.97 (0.80-10.98)	1.38 (0.68-2.79)	1.29 (0.60-2.81)
\geq Two	1.51 (0.79-2.86)	0.96 (0.54-1.71)	1.81 (0.82-3.97)	8.26 (2.40-28.41)	1.02 (0.57-1.82)	1.33 (0.61-2.87)
High stress						
No	Reference	Reference	Reference	Reference	Reference	Reference
Yes	-	-	-	0.68 (0.31-1.47)	1.02 (0.57-1.82)	-
Low job support						
No	Reference	Reference	Reference	Reference	Reference	Reference
Yes	-	1.30 (0.84-2.04)	1.89 (1.08-3.32)	1.50 (0.80-2.80)	1.32 (0.80-2.18)	1.72 (1.03-2.99)

Clustering: \geq 3 medications simultaneously. OR (95%CI) = Adjusted odds ratio and confidence interval of 95%. The models were adjusted for variables that presented $P < 0.20$ in the Chi-Squared test and for sociodemographic and work-related characteristics (Level 1). Bold denotes significant associations ($P < 0.05$).

Table 5. Association between disability and chronic diseases and prescribed medication use for cardiometabolic, psychological, orthopedic, respiratory, gastrointestinal disorders and \geq three medications clustered among elementary teachers.

Variables	Cardiometabolic		Psychological		Orthopedic		Respiratory		Gastrointestinal		Clustering	
	OR (95%CI)	OR (95%CI)	OR (95%CI)	OR (95%CI)	OR (95%CI)	OR (95%CI)	OR (95%CI)	OR (95%CI)	OR (95%CI)	OR (95%CI)	OR (95%CI)	OR (95%CI)
Disability due to musculoskeletal disorders												
No	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference
Yes	1.02 (0.59-1.77)	1.67 (1.01-2.78)	7.64 (3.97-14.68)	1.07 (0.55-2.07)	1.24 (0.72-2.14)	2.28 (1.17-4.43)						
Chronic disease												
None	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference
One	5.46 (1.49-20.05)	1.93 (0.69-5.35)	7.39 (1.45-37.67)	7.98 (0.95-66.59)	1.52 (0.48-4.82)	2.31 (0.22-23.54)						
Two	4.12 (1.12-15.11)	5.45 (2.09-14.21)	5.46 (1.09-27.26)	9.86 (1.21-80.33)	3.79 (1.32-10.89)	4.15 (0.49-35.28)						
\geq Three	19.16 (5.52-66.41)	16.47 (6.37-42.54)	14.07 (2.97-66.75)	25.41 (3.29-195.86)	8.18 (2.96-22.58)	66.60 (8.52-520.57)						

Clustering: ≥ 3 medications simultaneously. OR (95%CI) = Adjusted odds ratio and confidence interval of 95%. The models were adjusted for variables that presented $P < 0.20$ in the Chi-Squared test and for sociodemographic, work-related, lifestyle and health risks variables (Levels 1 and 2). Bold denotes significant associations ($P < 0.05$).

and psychological disorders. Disability is a severe condition of the musculoskeletal system that initiates with musculoskeletal pain³⁶. Due to the severity of the clinical condition, patients with musculoskeletal disability are generally affected, in a higher proportion compared to the general population, by psychological disorders including common mental disorders, major depression, anxiety, and substance and personality disorders³⁷. The treatment of psychological disorders can require pharmacological use³⁸, which results in higher psychotropic consumption by those affected by mental disorders, as described in the present study. Similarly, tobacco use was also positively associated with psychotropic consumption. Epidemiological studies have demonstrated that tobacco use is associated with subsequent depression or anxiety, and vice-versa³⁹. Although the direction of the association it is not clear³⁹, teachers who use tobacco are at risk of consuming psychotropic medication, probably to treat mental disorders.

It has been described that alcohol consumption, overweight, tobacco use, and physical activity are determinants of non communicable chronic diseases⁴⁰. In the present study, overweight was associated with medication use for cardiometabolic disorders, which possibly explains the higher risk of teachers with this characteristic having cardiometabolic disorders. Only not current smokers presented a higher odds ratio to use cardiometabolic medication, because they were smokers in the past. The same occurred for sedentary behavior and although this is not included among the main health-risks related to non communicable chronic diseases^{33,40}, evidence from a systematic review demonstrated that sedentary behaviour is associated with the incidence of cardiovascular disease, cancer, and type 2 diabetes diseases in adults⁴¹. Conversely, physical activity was not associated with cardiometabolic medication use in the present study. The association between sedentary behavior and physical activity with health among adults has been widely studied. There is evidence that time spent sedentary is strongly associated with cardiometabolic health and is a better indicator than physical activity among adults with a high risk of type 2 diabetes mellitus⁴². However, this is not a consensus in the literature and additional information has described an independent association between sedentary behavior and physical activity with cardiometabolic health in adults⁴³. Furthermore, data regarding the association between physical activity and medication use

in the general population is controversial^{16,28,29} and although physical activity can prevent risk factors and chronic diseases among the general population, the results of the present study indicate that it is not associated with cardiometabolic medication use among elementary teachers.

Medication use for gastrointestinal disorders was higher for teachers with common mental disorders and lower for those who were physically active. Gastrointestinal disorders are somatic symptoms commonly presented by people with common mental disorders. In addition, the instrument used to assess common mental disorders in the present study contained two questions regarding gastrointestinal disorders: poor digestion and unpleasant sensations in the stomach²⁵. Another aspect that could explain the association is that psychopharmacological treatment is also used to treat gastrointestinal disorders⁴⁴. With regard to physical activity, it is a primary treatment for irritable bowel syndrome and should be considered before pharmacological treatment⁴⁴.

Teachers who had two or more health problems related to dust and chalk powder presented higher medication use for respiratory disorders compared to those who did not have these health problems. Teachers are exposed daily to respiratory health risks such as dampness, pests, dust, and poor indoor-outdoor air exchange, work related risks associated with respiratory disorders⁶. In Brazil, chalk is usually used to write on the blackboard and this characteristic increases dust accumulation in classrooms, and the present study described that it can increase medication use for respiratory disorders. Although sedentary behavior is associated with chronic diseases such as chronic obstructive pulmonary disease due to cardiorespiratory limitation⁴⁵, problems related to dust or chalk powder analyzed in the present study did not include chronic diseases, however all analyses were adjusted for this variable. The association between TV viewing and medication use for respiratory disorders could be due to the preferences for sedentary activities in people with disorders that require pharmacological treatment for respiratory disorders.

It is well known that work condition can impair teachers' health^{6,9,11}. Curiously, in the present study infrastructure of schools and low job support were associated with consumption of three or more medications but not with isolated specific medication use. Brazilian teachers commonly deal with an inadequate work environment related to cleaning, lighting, furniture, noise, tem-

perature, relationships with co-workers and superiors, social relevance of work, motivation, and remuneration⁴⁶. Generally, work characteristics are not isolated and can affect different aspects of health and possibly result in concomitant medication use. Similarly, teachers with low job support presented higher clustered medication use. In the present study two indicators of stress were analyzed: High demand/low control of work and low support on job. Information specifically describing the effects of dimensions of stress on health is scarce. Stress is commonly studied as a unique dimension and the literature describes the effects of stress on psychological, physiological, psychosomatic, immune, cardiovascular, and metabolic systems, as well as on disease onset⁴⁷. The association of low job support and clustered medication use found in the present study could be a characteristic of teachers' work.

Generalization of the present results to elementary school teachers from other Brazilian regions can be made since work conditions and health related disorders associated with the teaching profession are similar independent of location. Furthermore, educational systems are guided by federal guidelines which are similar across regions, despite adaptations due to local characteristics being common. However, the results should not be extrapolated to the general population, since health related disorders of the teaching profession may not occur in the same magnitude⁴⁸ and as a consequence, medication consumption could be different.

Some limitations of the present study should be considered when interpreting the results. Recall is a bias inherent when using self-report questionnaires and commonly the measures of validity and reproducibility are not perfect. High errors of measurement affect analysis since they attenuate the magnitude of associations and decrease the power of studies⁴⁹. Some methodological procedures (steps of development of questions described in the methods) were conducted to ensure information quality and minimize this limitation. Moreover, as an inclusion criterion of the study, values >0.40 were used for the kappa statistic in the test-retest for categorical variables, an agreement that can be classified as moderate⁵⁰ and commonly adopted in epidemiological studies⁴⁹. A cross-sectional design was adopted and although the analyses were conducted based on conceptual frameworks, it was not possible to confirm causality of the associations described. Medication use was estimated only for medication used under prescription. This limitation

could underestimate the prevalence of medication use as self medication is a common practice among adults¹⁹. Another limitation is that prescribed medication suspended prior to data collection was not considered. Furthermore, medication was estimated according to health disorders and there is no information regarding the quantity or active principle of the medicines reported by teachers. Finally, another limitation is that the study did not control for the healthy worker effect since all teachers in the sample were working at the time of data collection. If teachers on sick leave had been included in the analysis, it is probable that the prevalence of medication consumption could be higher.

Conclusions

A prevalence of medication use higher than 10% was found for treatment of respiratory, orthopedic, gastrointestinal, cardiometabolic, and psychological disorders. The consumption of at least one medicine was present in 59.1% of the sample and the prevalence of a combination of three or more was present in 18.1%. Programs aimed at supporting access, appropriate use, and reduction in medication use among elementary teachers should be directed at prevention of chronic diseases, disability, common mental disorders, musculoskeletal pain, lifestyle risks, low job support, schools with inadequate infrastructure, and teachers with a longer length of employment.

Collaborations

DHC Coledam participated in the conception and design of the study, acquisition of data, analysis and interpretation of data, drafting the article and approve the final version to be submitted. YM Silva participated in the acquisition of data, analysis and interpretation of data, revised it critically and approved the final version of the manuscript.

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Article submitted 24/03/2018

Approved 15/04/2019

Final version submitted 17/04/2019