Contextual and individual aspects related to musculoskeletal pain in adults in southern Brazil

Aspectos contextuais e individuais relacionados à dor osteomuscular em adultos do sul do Brasil

Cândido Norberto Bronzoni de Mattos[1,2], Fernanda de Souza Bairros[3], Marcos Pascoal Pattussi[1]

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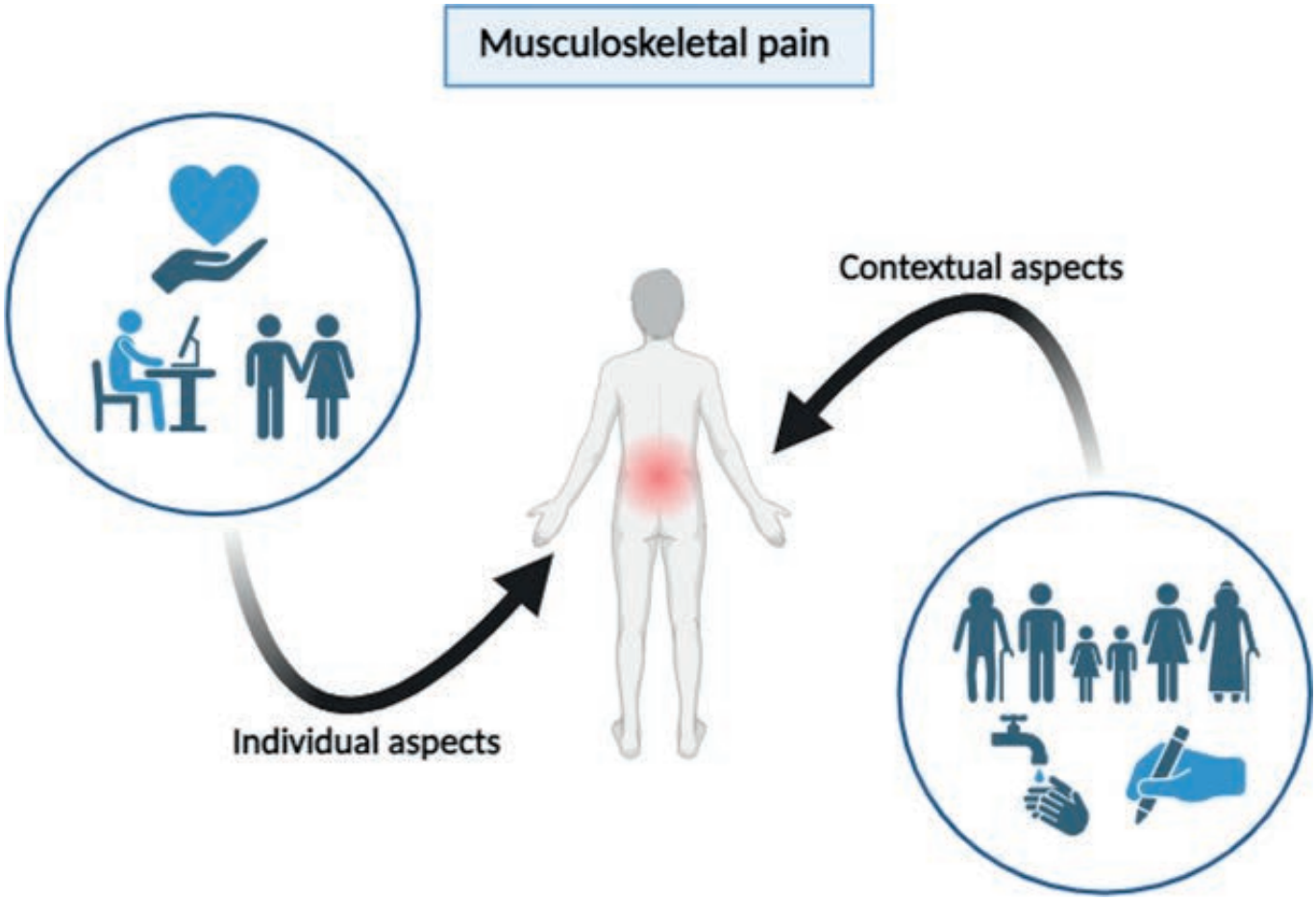
GRAPHICAL ABSTRACT



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ABSTRACT

BACKGROUND AND OBJECTIVES: Pain generates negative consequences in the personal and social life of individuals. The objective of this study was to investigate the association between musculoskeletal pain and individual and contextual aspects in adults in the south of Brazil.

METHODS: Cross-sectional analysis of a population-based cohort study (n=571). Musculoskeletal pain was assessed using the adapted and translated version for Brazil of the Nordic Musculoskeletal Questionnaire (NMQ). In the multivariable analysis, the variables were adjusted for each other taking into account the two levels: contextual and individual.

RESULTS: The prevalence of musculoskeletal pain was 71.1% (95% CI: 66.4-75.4). In the adjusted analysis, the following were associated with greater musculoskeletal pain at the contextual level: lower income, lower social support from the neighborhood and lower social action. At the individual level, sex (female), older age, lower education, lower social support and morbidities (≥ 3) were associated.

CONCLUSION: The present research findings showed a high prevalence of musculoskeletal pain. Social action at the contextual level remained in the model after adjustment, this association suggests the contribution of socio-environmental factors to health outcomes.

Keywords: Cross-sectional studies, Musculoskeletal pain, Pain.

RESUMO

JUSTIFICATIVA E OBJETIVOS: A dor gera consequências negativas na vida pessoal e social dos indivíduos. O objetivo deste estudo foi investigar a associação entre dor osteomuscular e aspectos individuais e contextuais em adultos do sul do Brasil.

MÉTODOS: Análise transversal de um estudo de coorte de base populacional (n=571). A dor osteomuscular foi avaliada através da versão adaptada e traduzida para o Brasil do Questionário Nórdico de Sintomas Osteomusculares (QNSO). Na análise multivariável, as variáveis foram ajustadas entre si levando em consideração os dois níveis: contextual e individual.

RESULTADOS: A prevalência de dor osteomuscular foi de 71,1% (IC 95%:66,4-75,4). Na análise ajustada estiveram associados a maior dor osteomuscular em nível contextual: menor renda, menor apoio social da vizinhança e menor ação social. Em nível individual estiveram associados o sexo (feminino), maior idade, menor escolaridade, menor apoio social e morbidades (≥3).

CONCLUSÃO: Os achados desta pesquisa evidenciaram alta prevalência de dor osteomuscular. A ação social no nível contextual permaneceu no modelo após ajustamento, essa associação sugere a contribuição dos fatores socioambientais em desfechos de saúde.

Descritores: Dor, Dor musculoesquelética, Estudos transversais.

INTRODUCTION

According to the International Association for the Study of Pain (IASP) and other studies in the field[1,2], the current definition of pain is "an unpleasant sensory and emotional experience associated with, or resembling that associated with, actual or potential tissue damage". Musculoskeletal pain (MP), in turn, can be the result of repetitive strain, overuse or musculoskeletal disorders. As a result, these injuries cause pain in joints, bones, muscles or adjacent structures[3].

There are negative physical and mental impacts of MP and it is one of the main reasons for seeking care in health services, standing out as one of the causes of high demand for self-medication

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HIGHLIGHTS
- Cross-sectional analysis of a population-based cohort study;
- A multivariable data analysis was carried out;
- Modeling was based on a conceptual model of determination.

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in the country[4]. It also affects the quality of life of individuals, producing functional disabilities and reducing productivity[5].

A global study of diseases, injuries and risk factors showed that between 2007 and 2017, when adjusted for disability, musculoskeletal disorders led to a significant increase in the years of life lost in the population investigated by the Disability Adjusted Life Years (DALYs)[6].

Although there has been an increase in epidemiological studies about pain in Brazil, it is still relevant to investigate the prevalence of MP in the country. A systematic review in low- and middle-income countries found a prevalence of musculoskeletal symptoms of 26% (95% CI:19-33) among adults and 39% (95% CI:23-57) among senior individuals[7].

The presence of MP can be influenced by various factors, both contextual and individual. Population-based studies in Brazil have pointed to some individual aspects associated with a higher prevalence of MP. Among the main factors it is possible to mention being female, older, less schooling, higher body mass index (BMI) and smoking[8-12]. Psychosocial factors have also been associated with MP. An Austrian population-based study found an association between individual social capital and MP in adults. The results showed a higher prevalence of pain in individuals with low social capital[13].

Social capital can be defined as the resources obtained from the individuals' participation in durable networks of social relationships[14], shedding light on non-monetary relationships and their consequences for people through involvement and participation in groups[15]. It is through these support networks that people share their information, enable and receive support from their peers and work collectively to achieve goals and objectives, including those related to their health, which are not as successful individually[16].

At a contextual level, psychosocial and socioeconomic aspects also have an impact on health outcomes, as they are related to where people live and social and interpersonal factors[17,18]. A European study on teenagers found that low social capital in the neighborhood was associated with higher rates of MP[19].

Although studies have shown an association between various factors, including psychosocial ones, and MP, there are still gaps in this knowledge, especially for Latin American studies that take this approach at an individual and contextual level. For this reason, the way is open for new work to be carried out in order to help public policies also focus on social indicators to overcome the burden of disease[20].

Thus, the present study's objective was to investigate the relationship between MP and individual and contextual aspects in adults participating in a cohort study in southern Brazil.

METHODS

A cross-sectional study, part of a larger population-based cohort study, with a representative sample of adults from the town of São Leopoldo, Rio Grande do Sul, Brazil. The town is located in the Rio dos Sinos Valley, in the metropolitan region of Porto Alegre and, according to the 2010 census, had a population of 214087 inhabitants[21].

In order to calculate the baseline sample size, the research used data from the pilot study using the method for proportions with cluster randomization[22] and the outcome of self-perceived health. A sample of 1260 households in 36 census tracts was estimated to be necessary.

Therefore, in the baseline, carried out in 2006 and 2007, 1100 people aged 18 or over living in 38 census tracts in the urban area of the town of São Leopoldo were interviewed. Further details on the methodological procedures are available in previous publications[23-25].

The second wave began in 2013 and ended in 2018, when new interviews were carried out in order to reduce the number of losses. An a posteriori sample calculation was carried out for the outcome MP in the last 12 months, with gender as the exposure. A power of 80% (1-β=0.80) was considered, with a confidence level of 95%, an exposed/unexposed ratio of 0.32, in order to detect a prevalence ratio of 1.24 or more, requiring a sample of 561 individuals. In this second wave there was a 43% loss to follow-up, in which 571 individuals were interviewed, the sample being analyzed in the present study.

Data was collected through structured interviews, using a standardized questionnaire which had been pre-tested with the person responsible for the household. The questionnaire covered sociodemographic, economic, behavioral and psychosocial issues.

The outcome of the study, MP in the last 12 months, was assessed using the Nordic Questionnaire of Musculoskeletal Symptoms (QNSO) adapted and translated for Brazil[26]. This tool covers various anatomical areas of the body grouped into three large groups: spine (neck, upper back and lower back), upper limbs (shoulders, elbows, wrists/hands) and lower limbs (hips, knees, ankles/feet).

In addition to the occurrence of symptoms in the last 12 months prior to the interview, the respondent had to consider whether they had taken time off work and whether they had consulted a health professional in the last 12 months due to their symptoms. The categorization was dichotomous: yes (pain in at least one of the anatomical segments) and no (no symptoms in any anatomical segment).

The psychosocial variables used in the study were social capital and social support. Social capital was measured using the collective efficacy scale proposed by the authors[27], made up of 23 questions, previously explored in the literature on the subject[24,28,29]. The scale refers to 5 dimensions: social trust, with 5 items referring to neighborhood social relations; neighborhood social support, with 4 items referring to reciprocity between neighbors with a view to the good of the other; informal social control, with 5 items referring to informal social norms that produce positive individual and community benefits; political perception, with 4 items referring to the individual's perceptions of public power; social action, with 5 items referring to the individual's actions from the perspective of collective cooperation. All the answers were collected using a Likert scale.

In order to assess each of the dimensions, an ordinal categorical variable was created, in which the items that make up each construct were added together and transformed into a scale from 0 to 100, being categorized into tertiles.

Individual social support was collected using the Social Support Scale used in the Medical Outcomes Study (MOS)[30], adapted and validated for Portuguese[31]. The scale consists of 19 questions in 5 functional dimensions: material, affective, emotional, positive social interaction and information, and for all of them there are five response options: 1 ("never"); 2 ("rarely"); 3 ("sometimes"); 4 ("almost always"); and 5 ("always"). The variable was transformed into a scale from 0 to 100 and then categorized into tertiles.

Demographic variables included gender, age (18 to 29, 30 to 39, 40 to 49, 50 to 59 and ≥ 60 years), skin color (white and yellow/black/brown/indigenous) and marital status (with a partner and without a partner). The individual socioeconomic variables were schooling (in complete years of study) and family income (in minimum wages), both categorized in tertiles. The study's behavioral variables were: physical activity (active: practices physical activity for more than 150 minutes/week; and sedentary: does not practice physical activity or practices less than 150 minutes/week) according to the study[32]; smoking habit (smoker and non-smoker); and alcohol consumption (consumes and does not consume). The health variables were: BMI, classified according to the World Health Organization[33] (eutrophic ≤ 24.9 kg/m^2, overweight 25.0 to 29.9 kg/m^2 and obese ≥ 30.0 kg/m^2); and morbidities, categorized according to the number of diseases presented (0, 1/2 and ≥ 3 morbidities).

The contextual variables related to income, schooling and sanitary conditions were collected from the 2010 demographic census of the Brazilian Institute of Geography and Statistics (IBGE)[21], where: income is the average monthly nominal income of the person responsible for the household in the census tract in Brazilian *reais*; literacy is the percentage of literate people in the census tract; and sanitation is the percentage of households in the census tract with sanitation in the general sewage or rainwater system. All these variables were categorized in tertiles.

In turn, the dimensions of social capital at the contextual level were defined based on the arithmetic mean of the individual scores in each of the census sectors, and the variable was categorized into tertiles (high, medium, and low).

Data entry was carried out in the Epi Info 6 software, version 6.0 (Centers for Disease Control and Prevention, Atlanta, United States), in double entry, with a posteriori comparison, to eliminate the probability of possible typing errors. Data analysis was carried out using Stata 14.0 for Windows (StataCorp., College Station, United States). The prevalence of MP and its respective 95% confidence intervals (95% CI) were estimated, and the association between the outcome and independent variables was estimated using Pearson's Chi-square test. Poisson regression was used to estimate the crude and adjusted prevalence ratios (PR) and their respective 95% confidence intervals (95% CI), using a control for design purposes with the svy command.

For the adjusted analysis, a strategy based on the hierarchical conceptual model proposed by the authors[34] was used with the backward method, whereby all the variables in the same block were included and only those with p-values below the significance level of 0.10 remained. The multivariable analysis was carried out using four models. In the first, the control variables were the contextual (psychosocial and sociodemographic); in the second, individual sociodemographic variables were included; in the third, individual psychosocial variables; and in the fourth, behavioral and health variables.

The research project was approved by the Research Ethics Committee of the University of Vale do Rio dos Sinos (UNISINOS; CEP projects no. 04/034 and no. 11/054). The study participants signed a Free and Informed Consent Term (FICT), which guaranteed the total confidentiality of the data.

RESULTS

Of the 571 participants in the study, the majority of the sample were women (75.7%), white (81.4%) and had a partner (60.4%). More than a third of the individuals were aged 60 or over. As for behavior, there was a predominance of sedentary people (87.8%), non-smokers (84.3%) and alcohol consumers (76.0%). Eutrophic people represented 39.9% of the sample and those with no morbidity were 41.2% (Table 1). The distribution of contextual variables is shown in table 2.

Of the total number of individuals, 401 (71.1%; 95% CI: 66.4-75.4) had MP in at least one spot, 154 (27.3%; 95% CI: 23.7-31.2) reported that the pain prevented them from carrying out work, domestic and leisure activities, and 225 (39.9%; 95% CI: 35.4-44.5) had to consult a health professional because due to pain. As the pain location, the lower back (33.1%; 95% CI: 28.8-37.6), ankles/feet (26.1%; 95% CI: 22.4-30.3) and knees (25.8%; 95% CI: 22.1-30.0) were the locations with the most pain (Table 3).

The highest prevalence rates of pain were found in women (75.8%; 95% CI: 70.7-80.2), individuals aged between 50 and 59 years (76.6%; 95% CI: 69.1-82.7), those with low levels of schooling (79.1%; 95% CI: 72.4-84.6), low income (78.9%; 95% CI:71.9-84.6), sedentary (72.9%; 95% CI:68.3-77.1), obese (83.0%; 95% CI:72.3-90.1) and who had three or more morbidities (86.0%; 95% CI:77.6-91.6) (Table 1).

In the crude analysis, women showed a 1.33 times greater increase in pain prevalence (95% CI: 1.14-1.56) than men. In addition, individuals aged 50 to 59 had a prevalence 1.76 times higher (95%CI:1.16-2.67) than those with ages 18 to 29. As for schooling, there was an increase in prevalence as schooling decreased, being 1.25 times higher (95%CI:1.09-1.42) in people with low schooling (Table 4).

Also in the crude analysis, sedentary individuals had a prevalence 1.26 times higher (95% CI: 1.02-1.55) than those who were active. Obese individuals had a prevalence 1.24 times higher (95% CI: 1.10-1.40) than eutrophic individuals, while individuals with three or more morbidities had a prevalence 1.42 times higher (95% CI: 1.24 - 1.61) than those without morbidities. In the individual social support psychosocial variable, individuals with low social support had a 1.29 times higher prevalence (95% CI: 1.16-1.43) of pain than those with high social support (Table 4).

In the adjusted analysis, model 1 included the contextual variables. Income, neighborhood social support and social ac-

tion remained in the model. Individuals with low income, low social support and low social action had pain prevalences 1.28 (95% CI: 1.08-1.52), 1.16 (95% CI: 1.00-1.34) and 1.15 (95% CI: 1.00-1.34) times higher than those with high income, social support and social action, respectively. Model 2 included individual sociodemographic variables, and females had a prevalence 1.32 times higher (95%CI:1.13-1.54) than males. As for age, those aged 50 to 59 had a prevalence 1.76 times higher (95%CI:1.16-2.67) than those aged 18 to 29 (Table 4).

Table 1. Distribution of the sample according to individual demographic, socioeconomic, behavioral and psychosocial variables and prevalence of musculoskeletal pain in adults. São Leopoldo, Rio Grande do Sul, Brazil, 2018 (n=571).

Variables	n (%)	Prevalence of pain % (CI 95%)	p-value
Gender			<0.001
Male	139 (24.3)	56.8 (48.4-64.9)	
Female	432 (75.7)	75.8 (70.7-80.2)	
Age (years)			0.002
18 to 29	30 (5.3)	43.3 (28.1-59.9)	
30 to 39	71 (12.5)	62.0 (48.6-73.7)	
40 to 49	108 (19.0)	73.1 (63.4-81.1)	
50 to 59	160 (28.2)	76.6 (69.1-82.7)	
≥ 60 years	199 (35.0)	73.1 (65.9-79.2)	
Skin color			0.688
White	441 (81.4)	71.0 (65.6-75.9)	
Non white	101 (18.6)	73.3 (62.3-81.9)	
Marital status			0.953
With a partner	341 (60.4)	71.4 (65.2-76.9)	
Without a partner	224 (39.6)	71.2 (65.2-76.5)	
Schooling (years)			0.003
High (≥ 11)	189 (34.8)	63.5 (57.1-69.5)	
Medium (6 to 10)	165 (30.4)	72.7 (64.6-79.6)	
Low (≤ 5)	189 (34.8)	79.1 (72.4-84.6)	
Family income (MW)			0.027
High (≥ 3,07)	185 (33.9)	66.5 (59.7-72.7)	
Medium (1,60 to 3,06)	189 (34.6)	69.1 (60.9-76.3)	
Low (≤ 1,59)	172 (31.5)	78.9 (71.9-84.6)	
Physical activity			0.021
Active (≥ 150min/week)	69 (12.2)	58.0 (43.7-71.1)	
Sedentary (≤ 149min/week)	499 (87.8)	72.9 (68.3-77.1)	
Smoking habit			0.846
Non-smoker	477 (84.3)	70.9 (65.9-75.5)	
Smoker	89 (15.7)	71.9 (61.5-80.4)	
Alcohol consumption			0.169
Does not consume	428 (76.0)	73.0 (66.8-78.4)	
Consumes	135 (24.0)	64.4 (54.1-73.6)	
BMI			0.015
Eutrophic (≤ 24,9)	221 (39.9)	66.7 (60.3-72.5)	
Overweight (25 to 29,9)	198 (35.7)	67.5 (59.1-74.9)	
Obesity (≥ 30)	135 (24.4)	83.0 (72.3-90.1)	
Morbidities			<0.001
0	233 (41.2)	61.0 (53.9-67.7)	
1 or 2	232 (41.1)	74.7 (66.0-81.7)	
≥ 3	100 (17.7)	86.0 (77.6-91.6)	
Individual social support			<0.001
High (100)	326 (57.7)	66.3 (60.0-72.0)	
Medium (84 to 99)	110 (19.5)	69.2 (58.2-78.3)	
Low (0 to 83)	129 (22.8)	85.2 (78.5-90.0)	
Social trust			0.043
High (80 to 100)	90 (16.1)	66.7 (54.9-76.7)	
Medium (70 to 75)	305 (54.7)	68.6 (61.9-74.7)	
Low (0 to 65)	163 (29.2)	79.1 (73.3-84.0)	
Neighborhood social support			0.993
High (100)	199 (35.5)	71.7 (63.9-78.4)	
Medium (62,5 to 93,8)	173 (30.9)	71.5 (63.5-78.4)	
Low (0 to 56,3)	188 (33.6)	71.3 (62.7-78.5)	
Informal social control			0.029
High (80 to 100)	123 (22.0)	61.8 (52.5-70.3)	
Medium (60 to 75)	243 (43.5)	73.4 (67.1-78.9)	
Low (0 to 55)	193 (34.5)	75.1 (68.0-81.1)	
Political perception			0.423
High (100)	220 (39.4)	67.9 (60.0-74.9)	
Medium (59 to 92)	224 (40.1)	73.7 (64.8-81.0)	
Low (0 to 58,4)	114 (20.5)	74.6 (65.0-82.2)	
Social action			0.939
High (25 to 100)	151 (26.8)	70.7 (63.2-77.2)	
Medium (5 to 20)	239 (42.4)	71.4 (63.5-78.2)	
Low (0)	174 (30.8)	72.4 (65.2-78.5)	

CI = confidence interval; BMI = body mass index; MW = minimum wages; *Pearson's Chi-square.

Table 2. Distribution of the sample according to demographic, socioeconomic and psychosocial contextual variables and prevalence of musculoskeletal pain in adults. São Leopoldo, Rio Grande do Sul, Brazil, 2018 (n=571).

Variables	n (%)	Prevalence of pain % (95% CI)	p-value
Income (MW)			0.196
High (2.9 to 9.9)	179 (32.1)	65.9 (57.0-73.9)	
Medium (1.9 to 2.8)	195 (35.0)	72.3 (61.4-81.1)	
Low (1.0 to 1.9)	183 (32.9)	75.3 (68.8-80.8)	
Literacy %			0.322
High (92.0 to 97.0)	209 (37.5)	67.9 (55.8-78.0)	
Medium (88.4 to 91.9)	169 (30.3)	71.0 (65.6-75.9)	
Low (81.4 to 88.3)	179 (32.1)	75.3 (68.9-80.7)	
Sewage %			0.643
High (96.9 to 100)	183 (32.9)	71.0 (58.4-81.1)	
Medium (80.3 to 96.1)	187 (33.5)	73.8 (66.0-80.3)	
Low (19.6 to 75.7)	187 (33.5)	68.8 (61.3-75.5)	
Social trust			0.291
High (80 to 100)	187 (33.0)	66.7 (56.7-75.3)	
Medium (70 to 75)	200 (35.3)	71.9 (64.3-78.3)	
Low (0 to 65)	180 (31.7)	74.9 (65.9-82.1)	
Neighborhood social support			0.303
High (100)	187 (33.0)	67.2 (57.8-75.4)	
Medium (62.5 to 93.8)	196 (34.6)	75.4 (66.5-82.5)	
Low (0 to 56.3)	184 (32.4)	70.5 (61.4-78.2)	
Informal social control			0.155
High (80 to 100)	200 (35.3)	65.7 (56.6-73.7)	
Medium (60 to 75)	182 (32.1)	73.6 (63.2-81.9)	
Low (0 to 55)	185 (32.6)	74.5 (68.7-79.4)	
Political perception			0.427
High (100)	188 (33.2)	69.4 (62.3-75.6)	
Medium (59 to 92)	194 (34.2)	68.9 (60.1-76.5)	
Low (0 to 58.4)	185 (32.6)	75.1 (64.1-83.7)	
Social action			0.100
High (25 to 100)	180 (31.8)	64.8 (55.9-72.8)	
Medium (5 to 20)	197 (34.7)	75.5 (65.9-83.1)	
Low (0)	190 (33.5)	72.5 (65.3-78.7)	

CI = confidence interval; MW = minimum wages;* Pearson's Chi-square.

Table 3. Distribution of the prevalence of pain, impediment to performing activities and visits to health professionals in the last 12 months, overall and according to pain location in adults. São Leopoldo, Rio Grande do Sul, Brazil, 2018 (n=571).

Location	Pain		Impediment		Consultation	
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)
General	401	71.1 (66.4-75.4)	154	27.3 (23.7-31.2)	225	39.9 (35.4-44.5)
Lower back	187	33.1 (28.8-37.6)	61	10.8 (8.1-14.2)	90	16.0 (12.6-19.9)
Ankles/feet	148	26.1 (22.4-30.3)	58	10.3 (7.6-13.9)	77	13.7 (10.4-17.7)
Knees	146	25.8 (22.1-30.0)	65	11.5 (8.8-14.9)	85	15.1 (12.1-18.6)
Wrists/hands	125	22.1 (18.4-26.3)	45	8.0 (6.0-10.5)	52	9.2 (7.0-12.0)
Upper back	119	21.1 (17.2-25.5)	44	7.8 (6.1-10.0)	66	11.7 (9.1-14.9)
Shoulders	103	18.2 (13.9-23.5)	35	6.2 (4.2-9.1)	50	8.9 (6.1-12.6)
Neck	93	16.5 (14.1-19.2)	37	6.6 (4.8-8.9)	49	8.7 (6.5-11.5)
Hips	74	13.1 (10.3-16.5)	36	6.4 (4.3-9.4)	47	8.3 (6.0-11.5)
Elbows	56	9.9 (6.8-14.1)	22	3.9 (2.3-6.5)	28	5.0 (2.9-8.4)

CI = confidence interval.

Table 4. Crude and adjusted prevalence ratios (PR) for musculoskeletal pain according to the adjustment models. São Leopoldo, Rio Grande do Sul, Brazil, 2018 (n=571).

Variables	Crude PR (95% CI)	Model 1 PR (95% CI)	Model 2 PR (95% CI)	Model 3 PR (95% CI)	Model 4 PR (95% CI)
Contextual					
Income (MW)					
High (2.9 to 9.9)	1.00	**1.00**	**1.00**	**1.00**	**1.00**
Medium (1.9 to 2.8)	1.10 (0.96-1.26)	**1.13 (0.96-1.34)**	**1.12 (0.94-1.33)**	**1.15 (0.96 1.36)**	**1.14 (0.96-1.36)**
Low (1.0 to 1.9)	1.14 (0.99-1.30)	**1.28 (1.08-1.52)**	**1.23 (1.03-1.47)**	**1.23 (1.02 1.48)**	**1.24 (1.03-1.50)**

Continue...

Table 4. Crude and adjusted prevalence ratios (PR) for musculoskeletal pain according to the adjustment models. São Leopoldo, Rio Grande do Sul, Brazil, 2018 (n=571) – continued

Variables	Crude PR (95% CI)	Model 1 PR (95% CI)	Model 2 PR (95% CI)	Model 3 PR (95% CI)	Model 4 PR (95% CI)
Contextual					
Neighborhood social support					
High (100)	1.00	1.00	1.00	1.00	1.00
Medium (62.5 to 93.8)	1.12 (0.99-1.28)	1.19 (1.02-1.40)	1.20 (1.03-1.41)	1.18 (1.01-1.39)	1.21 (1.03-1.43)
Low (0 to 56.3)	1.05 (0.91-1.20)	1.16 (1.00-1.34)	1.19 (1.03-1.38)	1.17 (1.01-1.35)	1.14 (0.99-1.32)
Social action					
High (25 to 100)	1.00	1.00	1.00	1.00	1.00
Medium (5 to 20)	1.16 (1.02-1.33)	1.10 (0.93-1.30)	1.06 (0.89-1.26)	1.06 (0.89-1.25)	1.03 (0.86-1.22)
Low (0)	1.12 (0.97-1.29)	1.15 (1.00-1.34)	1.15 (0.99-1.33)	1.16 (1.00-1.34)	1.16 (1.00-1.34)
Individual					
Gender					
Male	**1.00**		**1.00**	**1.00**	**1.00**
Female	**1.33 (1.14-1.56)**		**1.32 (1.13-1.54)**	**1.31 (1.12-1.52)**	**1.26 (1.08-1.47)**
Age (years)					
18 to 29	1.00		1.00	1.00	1.00
30 to 39	1.43 (0.91-2.24)		1.39 (0.88-2.20)	1.39 (0.88-2.20)	1.35 (0.84-2.15)
40 to 49	1.69 (1.10-2.58)		1.58 (1.02-2.45)	1.52 (0.98-2.37)	1.51 (0.96-2.37)
50 to 59	1.76 (1.16-2.67)		1.67 (1.08-2.58)	1.63 (1.05-2.51)	1.52 (0.98-2.38)
≥ 60 years	1.69 (1.11-2.56)		1.62 (1.04-2.51)	1.56 (1.01-2.43)	1.48 (0.94-2.33)
Schooling (years)					
High (≥ 11)	1.00		1.00	1.00	1.00
Medium (6 to 10)	1.15 (0.99-1.32)		1.09 (0.95-1.26)	1.09 (0.94-1.26)	1.09 (0.95-1.26)
Low (≤ 5)	1.25 (1.09-1.42)		1.15 (0.99-1.34)	1.18 (1.02-1.37)	1.14 (0.98-1.32)
Individual social support					
High (100)	**1.00**			**1.00**	**1.00**
Medium (84 to 99)	**1.04 (0.90-1.21)**			**1.04 (0.89-1.21)**	**1.05 (0.90-1.22)**
Low (0 to 83)	**1.29 (1.16-1.43)**			**1.28 (1.15-1.41)**	**1.23 (1.11-1.37)**
Physical activity					
Active (≥ 150min/week)	1.00				1.00
Sedentary (≤ 149min/week)	1.26 (1.02-1.55)				1.19 (0.97-1.46)
BMI					
Eutrophic (≤ 24.9)	1.00				1.00
Overweight (25 to 29.9)	1.01 (0.88-1.16)				1.00 (0.88-1.14)
Obesity (≥ 30)	1.24 (1.10-1.40)				1.13 (1.00-1.28)
Morbidities					
0	**1.00**				**1.00**
1 to 2	**1.23 (1.08-1.40)**				**1.10 (0.97-1.26)**
≥ 3	**1.42 (1.24-1.61)**				**1.16 (1.01-1.34)**

PR = prevalence ratio; MW = minimum wages; CI = confidence interval; BMI = body mass index.
Model 1: socioeconomic variables and area social capital adjusted for each other. Model 2: model 1 variables + individual sociodemographic variables. Model 3: variables from model 1 + model 2 + individual social support and social capital. Model 4: variables from model 1 + model 2 + model 3 + behavioral and health variables. Values in bold: statistically significant (p<0.05).

In model 3, individual psychosocial variables were included, and individual social support remained in the model. Individuals with low social support had a pain prevalence 1.28 times higher (95%CI: 1.15-1.41) than those with high social support. Finally, model 4 included behavioral and health variables, and people with three or more morbidities had a prevalence 1.16 times higher (95%CI:1.01-1.34) than those without morbidities (Table 4).

DISCUSSION

The present study aimed to investigate the relationship between MP and contextual and individual aspects in adults. The prevalence of pain in the study's population was 71.1% (95% CI: 66.4-75.4), higher than that found in population-based studies in Brazil and Europe[9,13,35].

Regarding contextual variables, individuals living in low-income census tracts had a higher prevalence of MP. A systematic review, which included 30 studies, found an estimated prevalence of chronic pain of 14.5% (95% CI: 3.9-25.1) in developing countries with a lower Human Development Index (HDI), a higher prevalence than that found in developed countries with a higher HDI[36].The authors[36] suggest that financial strain and low socioeconomic conditions can trigger muscle tension, resulting in stress-induced MP.

Population studies have shown that individuals living in economically disadvantaged areas are more likely to suffer from chronic pain[37]. These results, in which there is an association between health outcomes and the socioeconomic context of individuals, corroborate the hypothesis that the environment has an influence on people's individual health.

It should be noted that, for individuals living in poverty, every financial decision is guided by low socioeconomic status, making it difficult to access interventions, drugs and consultations with health professionals in order to control pain[38]. Consequently, poorer areas, with worse economic conditions and greater income inequality, can negatively affect health outcomes[39].

The present study results also indicate that low social action, one of the dimensions of social capital at the contextual level, was associated with a higher prevalence of MP. A study carried out in Sweden with young people aged between 13 and 18 years old found that those with low neighborhood social capital were twice as likely to have MP as those with high social capital. Although the European country is highly egalitarian from a social and economic point of view, less reliable relationships between individuals in the same area can lead to negative health outcomes[19].

Other health outcomes have also been associated with low levels of contextual social capital, such as greater tooth pain, mortality and functional disability[24,40,41]. Although studies on pain and social capital are concentrated in developed countries, which hinders comparability, these findings reinforce the comprehension of social capital from a perspective of collective cooperation and the impact of socio-environmental factors on health[17,18].

Regarding individual-level variables, the present study showed that women had a 31% higher prevalence of MP than men.

A population-based study carried out in the city of Pelotas, RS, Brazil, found a 24% higher prevalence of back pain in women[9]. Another population-based study carried out in the city of Criciúma, also in southern Brazil, found that acute and chronic back pain was associated with females[12]. Moreover, data from the 2013 National Health Survey (PNS) showed a higher prevalence of chronic back pain among women[42].

These differences between genders can be explained by women's greater awareness of symptoms and signs of illness. Other factors such as the "double shift", due to household chores in addition to the work routine, anatomical and functional differences such as a higher body mass index, shorter stature and lower bone load also contribute to greater overload and consequently greater pain[42-44].

Increasing age was associated with an increase in the prevalence of MP; other Brazilian studies have also found similar results[8,41,45-47]. These findings can be explained by physiological changes in the body and musculoskeletal degeneration, which result from the process of ageing[42].

Low schooling was associated with a higher prevalence of pain, similar to that found in other studies[8,42,45,46]. Restricted access to quality public education results in individuals with low levels of schooling being subjected to inferior working conditions, with excessive working hours and greater physical effort than those with high levels of schooling and better professional qualifications[44,48].

In the present study, individuals with low individual social support had a higher prevalence of MP. There is a consensus among researchers that greater social support contributes positively to health benefits, and that low social support results in risk factors and social fragilization[49]. A cohort study carried out in England with senior individuals over 65 years old showed an association between the presence of MP in at least one area of the body and generalized pain with insufficient social support[50].

It is important to note that social support works as a mechanism of solidarity, participation and citizenship based on mutual benefit with the objective of coping with illnesses, as well as preventing and promoting health[51].

Another finding of the present study is the association between the presence of three or more morbidities and MP. The 2013 Brazilian National Health Survey (PNS - *Pesquisa Nacional de Saúde*) found that a diagnosis of hypertension and high cholesterol were associated with chronic back pain in adult men and women[42]. In a study carried out in Baltimore (USA) with individuals aged between 30 and 64, those who reported MP were more likely to have comorbidities[52]. This association may be related to the aging process, since increasing age leads to a greater risk of individuals having more morbidities and consequently a higher prevalence of MP[51].

It should be noted that this study had limitations which are inherent to the design type. Although it is part of a cohort, the analysis was cross-sectional, so there is a possibility of reverse causality. In addition, prevalence rates may be overestimated, since MP was collected retrospectively and is subject to recall error.

On the other hand, a multivariable analysis was carried out in order to control possible confounding factors, and the modeling used was based on a conceptual model of determination[34].

CONCLUSION

The present study's findings showed a high prevalence of MP, which sometimes causes physical and occupational disability. It is worth highlighting the association with contextual psychoso-

cial variables, which suggests the contribution of socio-environmental factors to health outcomes. Thus, the present findings can support further studies on the subject and the planning of programs and public policies to tackle musculoskeletal symptoms in the population.

AUTHORS' CONTRIBUTIONS

Cândido Norberto Bronzoni de Mattos
Statistical analysis, Conceptualization, Methodology, Writing - Preparation of the original, Writing - Review and Editing, Visualization
Fernanda de Souza Bairros
Data Collection, Conceptualization, Writing - Review and Editing, Supervision
Marcos Pascoal Pattussi
Statistical analysis, Funding Acquisition, Data Collection, Conceptualization, Project Management, Research, Methodology, Writing - Preparation of the original, Writing - Review and Editing, Supervision

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