

What Was the Impact of COVID-19 Pandemic on Low Back Pain? Data from the PAMPA Cohort, Brazil.

Eduardo L Caputo (✉ caputoeduardo@yahoo.com.br)

Federal University of Pelotas

Paulo H Ferreira

The University of Sydney

Natan Feter

Federal University of Pelotas

Igor R Doring

Federal University of Pelotas

Jayne S Leite

Federal University of Rio Grande Do Sul

Ricardo Alt

Federal University of Pelotas

Júlia Cassuriaga

Federal University of Pelotas

Felipe F Reichert

Federal University of Pelotas

Airton J Rombaldi

Federal University of Pelotas

Marcelo C da Silva

Federal University of Pelotas

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Abstract

Background: To evaluate how COVID-19 pandemic impacted low back pain (LBP) outcomes in southern Brazil.

Methods: Data from the Prospective Study about Mental and Physical Health (PAMPA) Cohort were analyzed. Adults were recruited between June and July 2020 in the Rio Grande do Sul state using online-based strategies. Participants responded a self-reported, online questionnaire on LBP with two timepoints: before (retrospectively) and during COVID-19 pandemic. We assessed the presence of LBP, LBP-related activity limitation (no/yes), and LBP intensity (0 to 10 [strongest pain]).

Results: From a total sample of 2,321 respondents (mean age: 37.6 ± 13.5 ; 75.4% women), the prevalence of LBP did not change significantly from before (74.7% [95%CI 72.3; 76.9]) to during the COVID-19 pandemic (74.2% [95%CI 71.9; 76.3]). However, an increased pain levels (β : 0.40; 95%CI 0.22; 0.58) and a higher likelihood for activity limitation due to LBP was observed during the pandemic (PR 1.14; 95%CI 1.01; 1.29). Longitudinal analyzes showed that age, gender, BMI, chronic diseases, physical activity and anxiety and depression symptoms, were associated with LBP during the COVID-19 pandemic.

Conclusion: Although the prevalence of LBP did not change during the COVID-19 pandemic, LBP-induced impairment in daily activities and LBP intensity was higher during than before the pandemic. Sociodemographic and lifestyle characteristics were associated with increased LBP and related outcomes.

Background

Low back pain (LBP) is one of the main musculoskeletal disorders responsible for disability[1]. The Global Burden of Disease, Injuries, and Risk Factors Study demonstrated that the prevalence of LBP increased between 1990 and 2017, especially in southern Latin America, which has the highest LBP point prevalence worldwide (13.5%)[2].

Social distancing measures are an essential strategy to avoid coronavirus disease (COVID-19) spread[3], however it might lead to myriad changes in people's lives. These actions, have direct and indirect effects on distinct aspects of populational health such as increasing physical inactivity and worse levels of mental health[4–6].

Furthermore, longer and uninterrupted time spent at home due to social distancing might lead to additional time spent in sedentary activities, such as sitting. The increase in those activities, as well as the decrease in active commuting due to home office, could potentially be associated with a higher burden of LBP during the pandemic[7, 8].

Recently LBP has been recognized as a health and research priority in Brazil due to its impact on productivity and days of work lost[9]. Also, the COVID-19 outbreak raised further health issues related to

LBP, given an observed reduction in the number of acute LBP cases treated in clinical settings, probably as a consequence of fear to virus and disease exposure.[10] To date, no longitudinal study has investigated the effects of social distancing during the COVID-19 outbreak on the prevalence and disability associated with LBP. This study aimed to evaluate how social distancing and prolonged homestay affected LBP, activity limitation, and pain intensity during the pandemic.

Materials And Methods

Study design

We analyzed data from the PAMPA cohort (**P**rospective **S**tudy **A**bout **M**ental and **P**hysical **H**ealth), a longitudinal study designed to gather data on mental and physical health in adults living in the state of Rio Grande do Sul, southern Brazil. Data were collected on June and July of 2020, which was around 3 months after the first social distancing actions implemented in Brazil. Participants answered questions related to the period before the social distancing measures (retrospectively) and the current time. The study protocol was approved by the institutional research ethics board of the Faculty of Physical Education of the Federal University of Pelotas, Brazil (CAAE: 31906920.7.0000.5313). More details of the project methods and study design can be found elsewhere[11].

Sample

Sample size calculations were based on the three primary outcomes of the PAMPA Cohort, which were LBP, mental health and healthcare access. The largest sample size required was 1,359 participants[12]. After accounting for a lost-to-follow-up of up to 30%, our final sample size was estimated as 1,767.

Participant recruitment

A four-arm approach was used to achieve the target sample size [11]. Firstly, information about the survey objectives and a link to access the questionnaire was sent by email to potential participants in public and private universities within the state. Secondly, social media campaigns (i.e. Facebook® and Instagram®) were used to deliver the questionnaire's link to different regions of the state. Thirdly, we contacted local media (radio stations, newspapers) to inform the population about the study. Finally, each researcher involved in this survey shared the link with the questionnaire access to personal contacts across the state. The recruitment stage lasted four weeks between June and July 2020.

Self-reported data

A self-administered online-based questionnaire was developed using the Google® Forms platform. The average time to complete the survey was approximately 10 minutes (range 7 to 12 minutes). Questions related to LBP, mental health (i.e. anxiety and depression), and physical activity were asked twice to address these outcomes at different periods (before and during social distancing).

LBP

The presence of LBP, as well as activity limitation and pain intensity associated with the condition were assessed through an image of a person in the supine position with the low back area highlighted in a different color, followed by the question: “*Before (or During) social distancing, have you had pain in your lower back, as shown in the image, for at least one day?*”.

Pain intensity was assessed using a numeric pain rating scale where “0” indicated no pain and “10” indicated the worst pain possible[13]. Activity limitation related to LBP was assessed by asking: “*Before (or During) social distancing was your low back pain severe enough to limit your daily activities for at least one day?*”.

Exposures

Sociodemographic (i.e. gender, age, and educational levels), nutritional status (i.e. Body Mass Index [BMI]), chronic diseases (e.g. Diabetes, cancer, heart disease), depressive and anxiety symptoms, physical activity, and commitment to social distancing were used as exposures variables. BMI was calculated as body weight (kg) / height (m)². Diagnostic of chronic diseases was assessed based on questions used in the Brazilian Surveillance System of Risk Factors for Chronic Diseases by Telephone Interviews (VIGITEL) [14]. Participants were also asked regarding their attitudes toward social distancing measures. For analytical purposes participants were classified regarding their commitment to social distancing as follows: Low (very little and little), Medium (somewhat), and High (very much and totally isolated).

The Hospital Anxiety and Depression Scale (HDAS) was used to identify symptoms of depression and anxiety in both pre- and during social distancing[15–17]. This instrument includes seven items that are scored from 0 to 3, for each domain (depression and anxiety). The following criteria was used to classified the participants based on their scores: non-cases (less than 7), mild cases (between 8 and 10), moderate (between 11 and 14), and severe (between 15 and 21)[18]. As symptoms of anxiety and depression were assessed in two time points (before and during social distancing), for analytical purposes a variable was created, regarding the change of status between timepoints such as follows: “Sustained/Better” (those who reduced or maintained their scores) or “Worse” (those who increased).

Participants’ physical activity before and during social distancing was assessed through the frequency (days per week) and time (minutes per day) spent practicing physical activity. A cut-off point of 150 minutes per week was used to classify participants as physically inactive (less than the cut-off point) or active (equal to or higher than the cut-off point). A four-category variable was created to characterize the change of physical activity status between timepoints, based on participants’ status (active or inactive) before and during social distancing, as follows: “Sustained inactive”, “Become inactive”, “Sustained active” and “Become active”.

Data analyzes

Data were exported from Google® Sheets to Stata 15.1 (StataCorp, College Station, Texas). Due to a higher number of respondents from one mesoregion in the state (South, N=1,247 [53.7%]), all analyzes

were weighted for the number of respondents in each region. To verify differences between LBP and activity limitation proportions, and pain intensity levels between periods, test of difference between proportions and t-test were used, respectively. Univariate and multivariable regression analyzes were performed for LBP (Poisson Regression), activity limitation (Poisson Regression) and pain intensity (Linear Regression) to evaluate differences between time periods and their determinants. A sensitivity analysis was conducted to investigate the presence of collinearity among the anxiety, depression and physical activity variables, and four adjusted models were built. The first model was composed of sociodemographic variables (gender, age, educational level), BMI, diagnosed chronic diseases and commitment to social distancing. The second, third and fourth models were composed by the first model plus, anxiety, depression and physical activity, respectively. A $p\text{-value} \leq 0.20$ was set to determine whether variables were kept in the model, and a p-value lower than 0.05 was adopted as the level of significance.

Results

Descriptive data

Participants' descriptive data and LBP, before and during social distancing, are showed in Table 1. Participants with high school or lower educational levels, who were obese, reported chronic diseases, and females were more likely to report LBP compared to their counterparts in both time periods. In addition, participants who reported worsen levels of anxiety and depression symptoms, who remained inactive before and during the pandemic, and had low adherence to social distancing measures reported higher prevalence rates of LBP in both periods analyzed.

Table 1
Sociodemographic, health and behavioral characteristics of participants who reported LBP. Rio Grande do Sul, Brazil, 2020 (N=2,321).

	Before social distancing	During social distancing
Gender (<i>n</i> = 2,319)	% (95%CI)	% (95%CI)
Male	68.1 (64.0; 71.8)	62.4 (58.1; 66.3)
Female	77.7 (75.6; 79.4)	77.2 (75.1; 79.0)
Age group (<i>n</i> = 2,300)		
18-30	75.5 (72.9; 77.9)	73.7 (71.0; 76.1)
31-59	73.2 (70.1; 76.2)	73.3 (70.2; 76.3)
60+	78.9 (74.3; 82.8)	73.8 (68.9; 78.1)
Educational level (<i>n</i> = 2,321)		
High school or less	81.8 (77.4; 85.5)	82.1 (77.7; 85.7)
College degree	73.9 (71.1; 76.5)	73.3 (70.5; 75.9)
Postgraduate	74.6 (71.7; 77.2)	70.9 (68.0; 73.8)
BMI* (<i>n</i> = 2,315)		
Normal	72.7 (70.0; 75.3)	70.2 (67.4; 72.9)
Overweight	77.9 (74.8; 80.6)	76.1 (73.0; 78.9)
Obese	77.6 (73.4; 81.2)	78.0 (73.9; 81.6)
Chronic disease (<i>n</i> = 2,321)		
No	67.7 (64.8; 70.5)	69.1 (66.1; 71.7)
Yes	81.5 (79.3; 83.5)	77.5 (75.1; 79.6)
Social distancing adherence (<i>n</i> = 2,321)		
Low	75.8 (67.5; 82.6)	81.1 (73.6; 86.9)
Middle	72.2 (66.7; 77.1)	73.4 (68.2; 78.1)
High	75.2 (72.5; 77.7)	73.5 (70.7; 76.1)
Anxiety (<i>n</i> = 2,313)		
Sustained/Better	73.8 (71.1; 76.2)	66.2 (63.4; 68.8)
Worse	77.5 (74.9; 79.7)	81.5 (79.1; 83.5)

	Before social distancing	During social distancing
Depression (<i>n</i> = 1,916)		
Sustained/Better	75.4 (72.9; 77.7)	68.5 (65.7; 70.9)
Worse	76.9 (73.5; 79.9)	79.2 (75.9; 82.1)
Physical activity (<i>n</i> = 2,241)		
Sustained inactive	78.9 (76.3; 81.3)	77.2 (74.5; 79.7)
Become inactive	72.0 (68.3; 75.4)	75.7 (72.1; 78.9)
Become active	77.9 (71.0; 83.5)	67.4 (60.0; 74.0)
Sustained active	74.0 (69.6; 77.9)	65.5 (60.9; 69.9)
*Body mass index		

There was no significant change of LBP prevalence from before (74.7% [95%CI 72.3; 76.9]) to during the COVID-19 pandemic (74.2% [95%CI 71.9; 76.3]) ($p= 0.7549$). However, a significant increase in the prevalence of activity limitation was observed from before (30.2% [95%CI 27.6; 32.9]) to during (34.1% [95%CI 31.3; 36.9]) ($p= 0.014$), as well as an increased pain intensity between periods (5.3 ± 2.2 vs 5.6 ± 2.7 ; $p<0.001$). Changes in LBP prevalence, activity limitation, and pain intensity status during social distancing measures are shown in Figure 1. Most participants remained suffering with LBP during social distancing (63.6%; 95%CI 61.1; 65.9), and 10.6% (95%CI 9.1; 12.3) reported that they initiated with LBP symptoms during this period (Figure 1A). Regarding activity limitation, 55.1% (95%CI 51.8; 58.2) of participants remained without any limitations, and 18.9% (95% CI 16.5; 21.6) reported activity limitation associated with LBP in both time periods (Figure 1B). Also, 78.5% reported no change or an increase in pain intensity during social distancing (Figure 1C).

Multivariable analyzes

Regression analyzes were performed to evaluate how LBP and related outcomes changed in different groups in the two time periods. Crude and adjusted longitudinal analyzes of LBP, activity limitation and pain intensity are displayed in Figure 2. There was no difference in the likelihood of experiencing LBP during social distancing compared to the period before (PR 0.99; 95%CI 0.95; 1.04). However, participants were 14% (95% CI 1.01; 1.29) more likely to report activity limitation during social distancing. Further, a significant increase in pain intensity was observed from before to during the pandemic (β 0.40; 95% CI 0.22; 0.58).

The factors associated with changes in LBP, activity limitation, and pain intensity between periods are shown in Tables 2, 3 and 4, respectively. Participants who were female (PR 1.16; 95%CI 1.10; 1.23), overweight (PR 1.13; 95%CI 1.08; 1.18), obese (PR 1.10 95%CI 1.04; 1.16), with diagnosed chronic diseases (PR 1.12; 95%CI 1.07; 1.17), and worsen anxiety (PR 1.06; 95%CI 1.04; 1.08) and depression (PR

1.04; 95%CI 1.02; 1.07) symptoms during pandemic were more likely to experience LBP when compared to the period before. On the other hand, participants with higher educational levels (i.e. university degree or postgraduate), were less likely to experience LBP (PR 0.91 95%CI 0.86; 0.97 and PR 0.92 95%CI 0.87; 0.97, respectively) (Table 2).

Table 2
Crude and adjusted longitudinal Poisson regression analyzes of LBP experience. Rio Grande do Sul, Brazil. 2020.

	Crude		Model 1	
	<i>PR (95% CI)</i>	<i>p-value</i>	<i>PR (95% CI)</i>	<i>p-value</i>
Gender		<0.001		<0.001
Male	1.00		1.00	
Female	1.15 (1.09; 1.22)		1.16 (1.10; 1.23)	
Age group		0.884		0.413
18-30	1.00		1.00	
31-59	0.96 (0.87; 1.05)		1.01 (0.96; 1.06)	
60+	0.99 (0.95; 1.03)		0.93 (0.85; 1.02)	
Educational level		0.046		0.029
High school or less	1.00		1.00	
University degree	0.90 (0.85; 0.95)		0.91 (0.86; 0.97)	
Postgraduate	0.92 (0.87; 0.97)		0.92 (0.87; 0.97)	
BMI*		<0.001		<0.001
Normal	1.00		1.00	
Overweight	1.12 (1.07; 1.17)		1.13 (1.08; 1.18)	
Obese	1.11 (1.05; 1.17)		1.10 (1.04; 1.16)	
Chronic disease		<0.001		<0.001
No	1.00		1.00	
Yes	1.15 (1.10; 1.19)		1.12 (1.07; 1.17)	
Commitment to social distancing		0.377		0.138
		0.1834 ^a		0.0889 ^a
Low	1.00		1.00	
Medium	0.93 (0.86; 1.01)		0.92 (0.85; 1.00)	
High	0.95 (0.88; 1.01)		0.93 (0.86; 1.00)	
			Model 2	
Anxiety		<0.001		<0.001

	Crude		Model 1
Sustained/Better	1.00		1.00
Worse	1.07 (1.05; 1.09)		1.06 (1.04; 1.08)
			Model 3
Depression		<0.001	<0.001
Sustained/Better	1.00		1.00
Worse	1.06 (1.03;1.08)		1.04 (1.02; 1.07)
			Model 4
Physical activity		0.0313 ^a	0.7289 ^a
Sustained active	1.00		1.00
Sustained inactive	1.09 (1.02; 1.16)		1.03 (0.96; 1.09)
Become inactive	1.04 (0.97; 1.11)		1.01 (0.94; 1.09)
Become active	1.04 (0.95; 1.14)		0.99 (0.90; 1.08)
*Body Mass Index			
^a p for heterogeneity			
Model 1: adjusted for gender, educational level, BMI, chronic disease and commitment to social distancing.			
Model 2: Model 1 plus anxiety.			
Model 3: Model 1 plus depression.			
Model 4: Model 1 plus physical activity.			

Table 3

Crude and adjusted longitudinal Poisson regression analyzes of activity limitation. Rio Grande do Sul, Brazil. 2020.

	Crude		Model 1	
	<i>PR (95% CI)</i>	<i>p-value</i>	<i>PR (95% CI)</i>	<i>p-value</i>
Gender		0.020		0.110
Male	1.00		1.00	
Female	1.21 (1.03; 1.42)		1.14 (0.97; 1.32)	
Age group		<0.001		<0.001
18-30	1.00		1.00	
31-59	1.54 (1.34; 1.79)		1.41 (1.23; 1.63)	
60+	1.63 (1.30; 2.05)		1.30 (1.03; 1.65)	
Educational level		0.367		0.816
High school or less	1.00		1.00	
University degree	0.84 (0.71; 1.01)		0.88 (0.74; 1.05)	
Postgraduate	1.01 (0.85; 1.19)		0.94 (0.79; 1.12)	
BMI*		0.002		0.292
Normal	1.00		1.00	
Overweight	1.21 (1.04; 1.38)		1.08 (0.94; 1.25)	
Obese	1.26 (1.08; 1.48)		1.08 (0.92; 1.27)	
Chronic disease		<0.001		<0.001
No	1.00		1.00	
Yes	1.98 (1.71; 2.29)		1.85 (1.59; 2.15)	
Commitment to social distancing		<0.001		0.010
		0.0011 ^a		0.0118 ^a
Low	1.00		1.00	
Medium	1.55 (1.15; 2.08)		1.47 (1.11; 1.96)	
High	1.65 (1.26; 2.16)		1.48 (1.14; 1.93)	
			Model 2	
Anxiety		0.023		0.005

	Crude	Model 1
Sustained/Better	1.00	1.00
Worse	1.08 (1.01; 1.15)	1.10 (1.03; 1.17)
		Model 3
Depression		<0.001
Sustained/Better	1.00	1.00
Worse	1.14 (1.07; 1.22)	1.14 (1.06; 1.22)
		Model 4
Physical activity		0.0001 ^a
Sustained active	1.00	1.00
Sustained inactive	1.57 (1.29; 1.90)	1.37 (1.13; 1.65)
Become inactive	1.37 (1.11; 1.70)	1.32 (1.07; 1.62)
Become active	1.38 (1.03; 1.27)	1.20 (0.90; 1.29)
*Body Mass Index		
a p for heterogeneity		
Model 1: adjusted for gender, age group, chronic disease and commitment to social distancing.		
Model 2: Model 1 plus anxiety.		
Model 3: Model 1 plus depression.		
Model 4: Model 1 plus physical activity.		

Table 4

Crude and adjusted longitudinal Linear regression analyzes of pain intensity. Rio Grande do Sul, Brazil. 2020.

	Crude		Model 1	
	β (95% CI)	<i>p</i> -value	β (95% CI)	<i>p</i> -value
Gender		<0.001		<0.001
Male	Ref		Ref	
Female	0.49 (0.27; 0.71)		0.50 (0.28; 0.71)	
Age group		<0.001		0.011
18-30	Ref		Ref	
31-59	0.54 (0.35; 0.73)		0.43 (0.23; 0.64)	
60+	0.46 (0.07; 0.84)		0.13 (-0.27; 0.53)	
Educational level		0.084		0.002
High school or less	Ref		Ref	
University degree	-0.23 (-0.48; 0.03)		-0.24 (-0.50; 0.02)	
Postgraduate	-0.27 (-0.54; -0.001)		-0.43 (-0.70; -0.16)	
BMI*		<0.001		<0.001
Normal	Ref		Ref	
Overweight	0.26 (0.05; 0.47)		0.21 (-0.01; 0.42)	
Obese	0.66 (0.41; 0.91)		0.48 (0.22; 0.75)	
Chronic disease		<0.001		<0.001
No	Ref		Ref	
Yes	0.75 (0.57; 0.94)		0.62 (0.43; 0.82)	
Commitment to social distancing		0.170		0.526
		0.2161 ^a		0.4578 ^a
Low	Ref		Ref	
Medium	0.30 (-0.08; 0.67)		0.23 (-0.13; 0.59)	
High	0.29 (-0.04; 0.61)		0.17 (-0.15; 0.49)	
			Model 2	
Anxiety		<0.001		<0.001

	Crude	Model 1
Sustained/Better	Ref	Ref
Worse	0.27 (0.18; 0.38)	0.28 (0.19; 0.38)
		Model 3
Depression		<0.001
Sustained/Better	Ref	Ref
Worse	0.23 (0.13; 0.35)	0.22 (0.11; 0.33)
		Model 4
Physical activity		<0.001 ^a
Sustained active	Ref	Ref
Sustained inactive	0.82 (0.57; 1.07)	0.55 (0.29; 0.82)
Become inactive	0.32 (0.04; 0.60)	0.23 (-0.05; 0.51)
Become active	0.51 (0.11; 0.90)	0.26 (-0.15; 0.66)
*Body Mass Index		
^a p for heterogeneity		
Model 1: adjusted for gender, age group, educational level, BMI and chronic disease.		
Model 2: Model 1 plus anxiety.		
Model 3: Model 1 plus depression.		
Model 4: Model 1 plus physical activity.		

Participants who were middle (PR 1.41; 95%CI 1.23; 1.63) and older-age (PR 1.30; 95%CI 1.03; 1.65), with diagnosed chronic diseases (PR 1.85 95%CI 1.59; 2.15), classified as medium/high committed with social distancing measures (PR 1.47 95%CI 1.11; 1.96, and PR 1.48; 95%CI 1.14; 1.93, respectively), and with worsened symptoms of anxiety (PR 1.10; 95%CI 1.03; 1.17) and depression (PR 1.14; 95%CI 1.06; 1.22) were more likely to report activity limitation during social distancing when compared to the pre-COVID period. Also, participants who became or sustained physically inactive during social distancing were 32% (95%CI 1.07; 1.62) and 37% (95%CI 1.13; 1.65) more likely, respectively, to have some activity limitation due to LBP (Table 3) between time periods.

An increase in pain intensity was observed in participants who were female (β 0.50; 95%CI 0.28; 0.71), middle-aged (β 0.43; 95%CI 0.23; 0.64), obese (β 0.48; 95%CI 0.22; 0.75), had a chronic disease (β 0.62; 95%CI 0.43; 0.82), had worsened anxiety (β 0.28; 95%CI 0.19; 0.38) and depression (β 0.22; 95%CI 0.11; 0.33) symptoms, and sustained physically inactive (β 0.55; 95%CI 0.29; 0.82). On the other hand, a

decrease in pain intensity was observed in participants with high educational level (postgraduate) (β -0.43; 95%CI -0.70; -0.16) (Table 4).

Discussion

Our study showed similar patterns of self-reported LBP in before and during the first months of pandemic in the south of Brazil. On the other hand, an increased likelihood of activity limitation and pain intensity related to LBP between periods was observed. Factors such as gender, age, educational level, BMI and diagnosed chronic diseases were related to LBP, activity limitation and higher pain intensity during social distancing than in the period before it. This scenario was also related to worsen anxiety and depression symptoms, as well as to a decreased level of physical activity.

Between 2012-2016 LBP was responsible for 59 million days off work in Brazil[9]. The cost and disability from LBP was expected to increase before pandemic[1]. However, the sanitary and economic crisis installed in Brazil due to COVID-19 pandemic aggravated this scenario in short-term. Although there was a stability of self-reported LBP from before to during social distancing, an increase of pain intensity and activity limitation was observed. Public policies are necessary to decrease the LBP burden, which was aggravated in the first months of the COVID-19 pandemic.

The relationship among female gender and obesity with LBP are well established in literature[19, 20]. Physiological characteristics such as a decreased muscle mass may predispose women to experience LBP[21]. Also, the daily workload routine is higher for women, as child care and household chores pile up with their paid work, which are related to this gender effect on LBP[22]. This daily overload might increase during social distancing and prolonged homestay and may, therefore, aggravate the burden of LBP in this population. Obesity is a known risk factor for LBP, since increasing body weight might cause an overload in the lumbar spine articular structures, which increase the risk of disk degeneration, thus reducing spinal mobility[23, 24]. In addition, the prolonged home stay due to social distancing measures might increase sedentary sitting activities, which can have a negative effect on joint and muscles, increasing the likelihood to increase LBP.

Recent global data showed that LBP prevalence increases from 18 years onwards and peaks at the 80's[2]. Our data is in line with this biological path, as it indicated an increased likelihood for middle- and older-age participants to report activity limitation from before to during social distancing. Postural problems, reduced flexibility, as well as an increased musculoskeletal degeneration are related to LBP in the aging process[25]. The decreased muscle activation during sitting position, combined with the high load on lumbar spine, can lead to LBP[26]. This is worrisome, especially during social distancing and prolonged homestay, since people are spending more time sitting[27], which can consequently increase pain levels and activity limitation.

LBP is associated with several chronic diseases, such as diabetes, cancer, hypertension and pulmonary diseases[28, 29]. Nordin et al.[30] have found that any comorbidity are related to disability in a working population. Our data are in line with these studies, showing that participants who reported chronic

disease were more likely to report LBP, activity limitation and high pain levels during social distancing when compared to the period before. People with chronic diseases are instructed to stay home, and are probably more likely to adhere to social distancing measures, since they are in the high-risk group for COVID-19. Also, people with chronic diseases are less likely to seek in-person healthcare during pandemic[31], which can contribute to increase pain levels in this population. These factors, as well as the consequent inability to keep on their usual routine might explain this association.

Depression and anxiety symptoms interfere in pain over time, as well as in daily activities[32, 33]. Our study revealed that participants who reported worsened symptoms of depression and anxiety, from before to during social distancing, were more likely to experience LBP, increased pain levels and activity limitation. The burden of mental health due to COVID-19 pandemic is a global concern[34]. Also, we previously showed a sharp increase on anxiety and depression symptoms on southern Brazil population[35]. Since these conditions and pain have a similar biologic pathway[36], it is plausible to assume that an increase in anxiety and depression could lead to worse pain outcomes during pandemic.

Physical inactivity was associated with an increased activity limitation and pain intensity. Studies conducted before the COVID-19 pandemic showed a protective effect of physical activity in LBP[20, 37]. However, because of social distancing and prolonged homestay, people are more likely to become or stay inactive[38–40]. Previous studies have not found an association between pain intensity and activity limitation with physical activity[41, 42]. However, it is possible that an increase in pain levels, as well as in activity limitation can be a barrier for participants to engage in physical activity, which might explain our findings.

Limitations of our study should be pointed. Because of COVID-19 pandemic, face-to-face data collection are not allowed by ethics boards. Thus, selection bias cannot be ruled out since data were assessed online making an overrepresentation of younger and more schooled individuals evident in our sample when compared to the Rio Grande do Sul population[43]. Also, the retrospective design of our study might be subject to recall bias. However, as LBP is a remarkable event in people's life and it has increased during COVID-19 pandemic, this bias effect is expected to be minimal. In spite of these limitations, LBP is an important health outcome and can be affected by COVID-19 pandemic measures. Moreover, to the time of this paper we have not found any large, longitudinal population-based study concerning the relationship between LBP and the COVID-19 pandemic.

Conclusion

Activity limitation and LBP intensity increased in the first months of COVID-19 pandemic in Brazil. Female sex, overweight/obese, participants who were middle-/older-age, had chronic diseases, and those who became physically inactive were more likely to experience LBP. Worsened symptoms of anxiety and depression were associated with all outcomes, which shows that mental health is highly related to LBP.

Abbreviations

LBP – Low back pain

HDAS - Hospital Anxiety and Depression Scale

PR – Prevalence Ratio

Declarations

Ethics approval and consent to participate

This study was approved by the Ethics Board of the Physical Education Faculty, Federal University of Pelotas, Brazil (CAAE: 31906920.7.0000.5313), in accordance with the Declaration of Helsinki. Written informed consent was obtained from all participants.

Consent for publication

Not applicable.

Availability of data and materials

The data that support the findings of this study are available from Faculty of Physical Education (Federal University of Pelotas), but restrictions apply to the availability of these data, which were used under license for the current study, and so are not publicly available. Data are however available from the authors upon reasonable request and with permission of Faculty of Physical Education (Federal University of Pelotas).

Competing Interests

The authors declare they have no competing interests.

Funding

None declared.

Authors' contributions

ELC instigated this research project and was responsible for data analyzes and writing; IRD, JSL, RA, JC, contributed to the research design; NF, FFR, AJR, PHF and MCS assisted with the initial construction, direction and arguments of the discussion. All authors reviewed and provided constructive advice and critique to the editing process for the multiple iterations of this document. Following this rigorous review and editing process all authors support the submission of this manuscript for peer review and publication. The author(s) read and approved the final manuscript.

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Figures

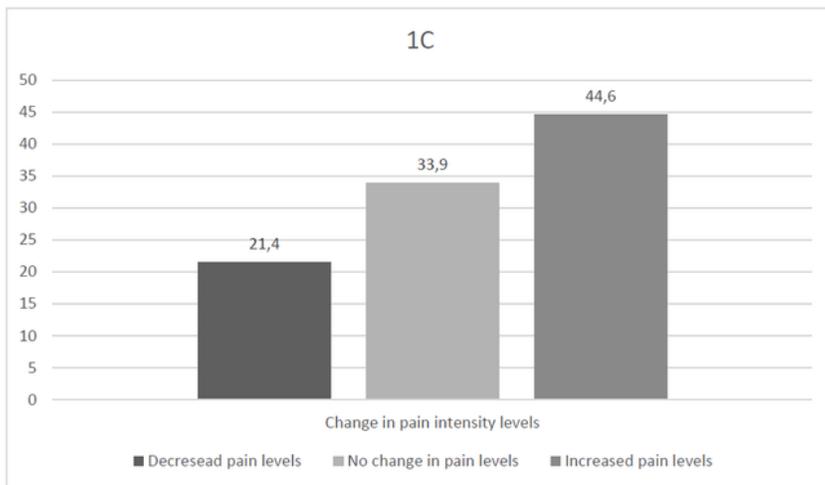
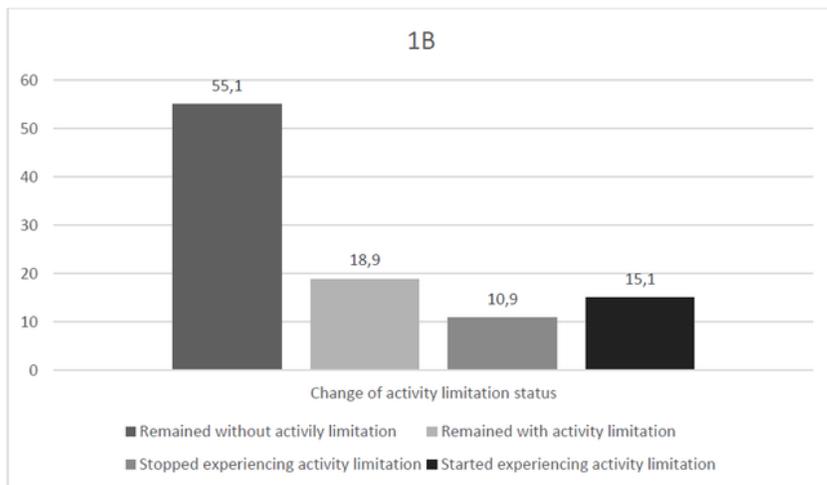
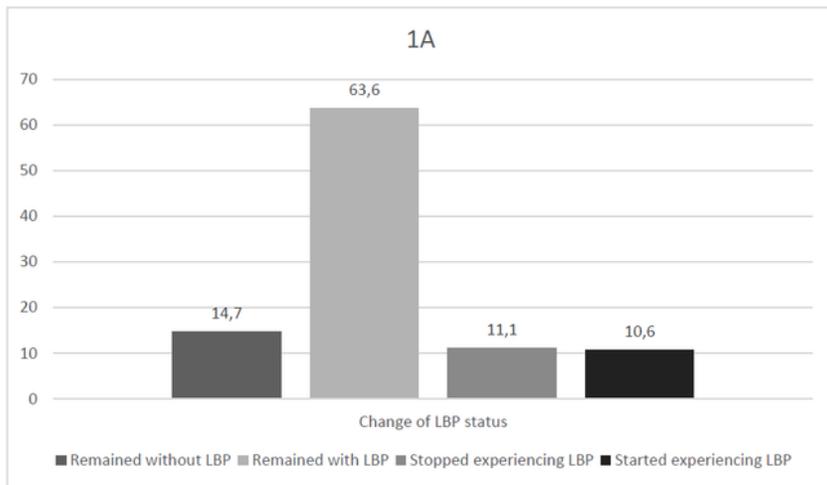


Figure 1

Change of LBP (1A), activity limitation (1B) and pain intensity (1C) status from before to during social distancing. Rio Grande do Sul, Brazil.

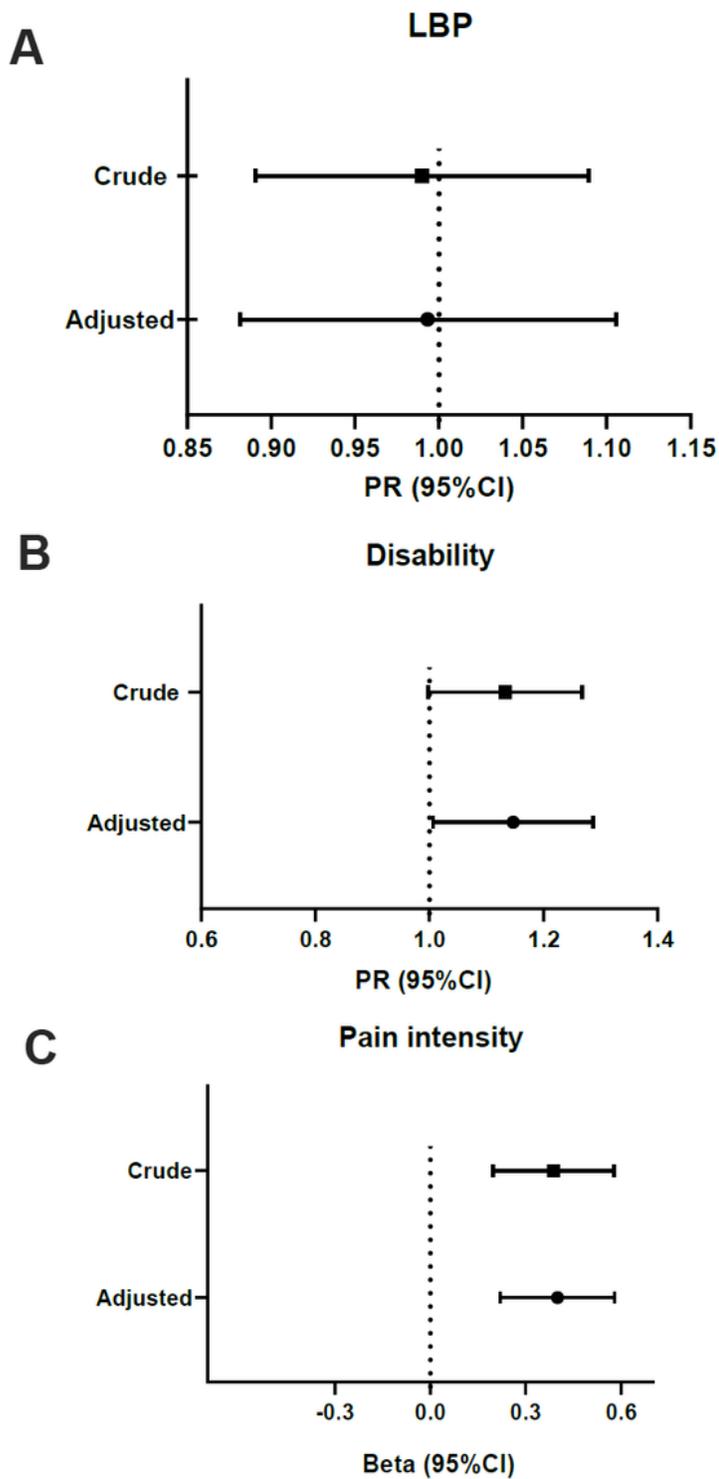


Figure 2

Crude and adjusted prevalence ratio (95%) for LBP (A) and activity limitation (B), and β coefficient (95%CI) for pain intensity, comparing two timepoints (before and during social distancing). Rio Grande do Sul, Brazil, 2020. LBP was adjusted for gender, educational level, BMI, chronic disease and commitment to social distancing. Activity limitation was adjusted for gender, age, chronic disease and commitment to

social distancing. Pain intensity was adjusted for gender, age group, educational level, BMI and chronic disease.