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Original Article

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Impact of COVID-19 on utilization of nonpharmacological and pharmacological treatments for chronic low back pain and clinical outcomes

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Abstract

Context: The novel coronavirus 2019 (COVID-19) pandemic has impacted the delivery of health care services throughout the United States, including those for patients with chronic pain.

Objectives: To measure changes in patients' utilization of nonpharmacological and pharmacological treatments for chronic low back pain and related outcomes during the COVID-19 pandemic.

Methods: A pre-post study was conducted within the Pain Registry for Epidemiological, Clinical, and Interventional Studies and Innovation (PRECISION Pain Research Registry) using data in the 3 months before and 3–6 months after the declaration of a national emergency related to COVID-19. Participants 21–79 years old with chronic low back pain were included in the study and provided self reported data at relevant quarterly encounters. Use of exercise therapy, yoga, massage therapy, spinal manipulation, acupuncture, cognitive behavioral therapy, nonsteroidal antiinflammatory drugs, and opioids for low back pain was measured. The primary outcomes were low back pain intensity and back related functioning measured with a numerical rating scale and the Roland Morris Disability Questionnaire, respectively. Secondary outcomes included health related quality of life scales measured with the Patient Reported Outcomes Measurement Information System, including scales for physical function, anxiety, depression, low energy/fatigue, sleep disturbance, participation in social roles and activities, and pain interference with activities.

Results: A total of 476 participants were included in this study. The mean age of participants at baseline was 54.0 years (standard deviation, ±13.2 years; range, 22–81 years). There were 349 (73.3%) female participants and 127 (26.7%) male participants in the study. Utilization of exercise therapy (odds ratio [OR], 0.37; 95% confidence interval [CI], 0.23–0.57), massage therapy (OR, 0.46; 95% CI, 0.25–0.83), and spinal manipulation (OR, 0.53; 95% CI, 0.29–0.93) decreased during the pandemic. A reduction in NSAID use was also observed (OR, 0.67; 95% CI, 0.45–0.99). Participants reported a significant, but not clinically relevant, improvement in low back pain intensity during the pandemic (mean improvement, 0.19; 95% CI, 0.03–0.34; Cohen's *d*, 0.11). However, White participants reported a significant improvement in low back pain intensity (mean improvement, 0.28; 95% CI, 0.10–0.46), whereas Black participants did not (mean improvement, –0.13; 95% CI, –0.46 to 0.19; p for interaction=0.03). Overall, there was a significant and clinically relevant improvement in pain interference with activities (mean improvement, 1.11; 95% CI, 0.20–2.02; Cohen's *d*, 0.20). The use of NSAIDs during the pandemic was associated with marginal increases in low back pain intensity.

Conclusions: Overall, decreased utilization of treatments for chronic low back pain did not adversely impact pain and functioning outcomes during the first 6 months of the pandemic. However, Black participants experienced significantly worse pain outcomes than their White counterparts.

Keywords: chronic low back pain; COVID-19; nonpharmacological therapy; opioids; pain management.

Low back pain is highly prevalent and is the leading cause of disability worldwide [1]. A transition from acute to chronic low back pain is often accompanied by disability, which may be associated with higher patient utilization of invasive procedures and greater health care expenditures.

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National guidelines [2, 3] recommend nonpharmacological treatments as first line interventions to manage chronic low back pain before it becomes disabling. However, the impact of the COVID-19 pandemic on chronic low back pain management and related clinical outcomes in the United States remains unclear, as we remain in the midst of a pandemic that was first declared a national emergency in the United States on March 13, 2020 [4].

An international expert panel issued consensus recommendations [5] for chronic pain management during the early stage of the pandemic that included using telemedicine first and exclusively in most cases. Another expert panel consisting of leaders from the Veterans Health Administration, United States military, medical societies, and academia similarly recommended that telemedicine be utilized whenever possible if indicated for pain management [6]. However, telemedicine carries both benefits and drawbacks in managing chronic pain. Although telemedicine may improve access to health care during the pandemic, there may be patient engagement issues, diminished quality of interaction between providers and patients, and limited ability to perform a physical examination or intervention [7]. Moreover, the growth over time in utilization of mobile technologies to facilitate the physical modalities and psychology based therapies that may be most applicable to chronic low back pain management has yielded only small and questionable clinical benefits [6].

There is emerging evidence that the uptake of several nonpharmacological treatments was significantly impacted by lockdowns or social distancing restrictions imposed within the 3 months immediately following the national emergency proclamation, although low back pain intensity and back related functioning appeared unaffected [8]. The purpose of this study was to use a pain research registry to update measures of the utilization of first line treatments for chronic low back pain and related clinical outcomes as the pandemic now extends into 2021 in the United States.

Methods

Study participants were selected from the Pain Registry for Epidemiological, Clinical, and Interventional Studies and Innovation (PRECISION Pain Research Registry). When the registry was established at the University of North Texas Health Science Center in 2016, participants were primarily recruited from its clinics and other local health care facilities in the Dallas-Fort Worth metroplex using either face-to-face or online screening questionnaires for eligibility. The registry transitioned to a digital research platform in 2019, thereby facilitating remote screening and the subsequent collection of data on chronic low back pain management and outcomes from eligible participants throughout the 48 contiguous states and District of Columbia. Such remote data acquisition ensured the ongoing operations of the registry without interruption during the COVID-19 pandemic, thereby enabling the present study to be conducted. The registry enrolls participants with chronic low back pain according to the National Institutes of Health diagnostic criteria [9]. These require that participants report having had low back pain for at least the past 3–6 months, and with a frequency of at least half of the days over the past 6 months. Registry participants must range from 21 to 79 years old at enrollment and be able to complete case report forms in English, either independently or with assistance from registry staff. Registry procedures were approved by the North Texas Regional Institutional Review Board (protocol 2015-169) and all study participants provided written informed consent prior to enrollment.

Registry participants completed case report forms at quarterly intervals. They provided responses to the following at each quarterly encounter: items within the Minimum Dataset for Chronic Low Back Pain recommended by the National Institutes of Health [9]; a current treatments inventory involving the utilization of six common nonpharmacological treatments (exercise therapy, yoga, massage therapy, spinal manipulation, acupuncture, and cognitive behavioral therapy), nonsteroidal antiinflammatory drugs (NSAIDs), and opioids for low back pain; an 11 point numerical rating scale (NRS) for low back pain intensity (0–10); and the Roland Morris Disability Questionnaire for back related functioning (0–24) [10]. Participants also provided responses to various other research instruments, including a comorbidity history inventory involving nine common spinal or medical conditions (herniated disc, sciatica, osteoporosis, osteoarthritis, hypertension, heart disease, diabetes mellitus, asthma, and depression), the Patient Reported Outcomes Measurement Information System with 29 items (PROMIS-29) [11], Pain Catastrophizing Scale [12], and Pain Self Efficacy Questionnaire [13] upon enrollment and during other scheduled quarterly encounters. This study included registry participants who reported standard quarterly encounter data during the 3 months immediately prior to the national emergency proclamation date relating to the COVID-19 pandemic (December 2019 through March 2020) and who also reported the corresponding paired data during the quarterly encounter that occurred from 3 to 6 months after the national emergency proclamation date (June 2020 through September 2020).

Descriptive statistics were used to summarize participant characteristics, including the mean ± standard deviation for continuous variables and the number (%) for categorical variables. The impact of the pandemic on utilization of each nonpharmacological and pharmacological treatment for low back pain was analyzed using McNemar's test for the paired observations for each participant during the relevant quarterly encounters prior to the national emergency proclamation date and during the pandemic. Correspondingly, paired changes on the NRS for low back pain intensity and on the Roland Morris Disability Questionnaire for back related functioning reported by each participant during the relevant quarterly encounters were analyzed using the Student's t-test to assess these primary clinical outcomes. Paired changes reported by participants on the PROMIS-29 for health related quality of life during these quarterly encounters were considered secondary clinical outcomes because this instrument was not deployed at all quarterly registry encounters, thereby yielding smaller sample sizes and diminished statistical power in these analyses. Subgroup analyses involving 13 prespecified demographic, clinical, and psychological variables were also conducted for the primary clinical outcomes to test for interaction effects. Finally, linear regression was used to assess the relationships between utilization of each nonpharmacological and pharmacological treatment and primary clinical outcomes during the pandemic from June 2020 through

September 2020. These regression analyses included a series of univariate models and a multivariate model for each primary clinical outcome. Participant data were recoded as needed for certain clinical outcomes so that all measures reported herein as positive change scores represent improvements during the pandemic, whereas negative change scores represent worsening. Cohen's *d* statistic was computed for the paired t-test results to assess the effect of the pandemic on each clinical outcome measure (small effect, $0.20 \leq d \leq 0.49$; medium effect, $0.50 \leq d \leq 0.79$; large effect, $d \geq 0.80$) [14], in addition to conventional statistical significance testing. Any outcome not meeting the threshold for at least a small effect was considered not clinically relevant. Data management and statistical analyses were primarily performed with the IBM SPSS Statistics software package (Version 25). Two sided tests and significance thresholds of $p \leq 0.05$ were used for all statistical analyses.

Results

A total of 476 registry participants provided paired data for the relevant study periods prior to and during the COVID-19 pandemic. The mean age of participants at baseline was 54.0 years (standard deviation, ±13.2 years; range, 22–81 years). There were 349 (73.3%) female participants and 127 (26.7%) male participants in the study (Table 1). A total of 216 (45.4%) participants reported ever having lost work for at least 1 month, and 115 (24.2%) participants had ever received disability or workers' compensation benefits because of their low back pain. The mean number of comorbid conditions was 2.8 ± 1.8 and 246 (51.7%) participants reported depression. Mean NRS scores for low back pain intensity and RMDQ scores for back related functioning were 6.1 ± 2.0 and 14.3 ± 6.4, respectively. Participants reported deficits across the entire spectrum of health related quality of life on the PROMIS-29 instrument, particularly in the domains of physical function (mean, 37.5 ± 7.3) and pain interference with activities (mean, 63.6 ± 7.5).

The utilization of nonpharmacological treatments for low back pain decreased during the pandemic. The mean number of nonpharmacological treatments used by participants between December 2019 and March 2020 was 0.68 ± 1.00 compared with 0.47 ± 0.85 for the period from June 2020 through September 2020 ($p<0.001$). There were significant reductions in the use of exercise therapy (OR, 0.37; 95% CI, 0.23–0.57; $p<0.001$), massage therapy (OR, 0.46; 95% CI, 0.25–0.83; $p=0.008$), and spinal manipulation (OR, 0.53; 95% CI, 0.29–0.93; $p=0.03$; Table 2). The use of NSAIDs for low back pain also decreased significantly (OR, 0.67; 95% CI, 0.45–0.99; $p=0.045$), whereas opioid use remained unchanged (OR, 1.00; 95% CI, 0.58–1.73; $p>0.99$).

The distributions of improvement in low back pain intensity and back related functioning during the pandemic

Table 1: Participant characteristics during the pre-COVID-19 pandemic period (n=476).*

Characteristic	n (%)
Sociodemographic	
Age, years, mean ± SD (range)	54.0 ± 13.2 (22–81)
Sex	
Male	127 (26.7)
Female	349 (73.3)
Race	
American Indian or Alaskan native	7 (1.5)
Asian	6 (1.3)
Black	105 (22.1)
Native Hawaiian or other Pacific Islander	3 (0.6)
White	355 (74.6)
Ethnicity	
Hispanic	59 (12.4)
NonHispanic	417 (87.6)
Ever had work loss≥1 month due to LBP	
Yes	216 (45.4)
No	260 (54.6)
Ever received disability or workers' compensation benefits due to LBP	
Yes	115 (24.2)
No	361 (75.8)
Comorbidity history[a]	
Herniated disc	166 (34.9)
Sciatica	202 (42.4)
Osteoporosis	57 (12.0)
Osteoarthritis	183 (38.4)
Hypertension	202 (42.4)
Heart disease	48 (10.1)
Diabetes mellitus	97 (20.4)
Asthma	133 (27.9)
Depression	246 (51.7)
Clinical	
Current smoker	71 (14.9)
Current widespread pain	122 (25.6)
Ever had LBP surgery	87 (18.3)
BMI, kg/m^2, mean ± SD (range)	32.5 ± 8.2 (16–65)
PCS score, mean ± SD (range)[a]	19.6 ± 13.8 (0–52)
PSEQ score, mean ± SD (range)[a]	33.9 ± 15.0 (0–60)
NRS score, mean ± SD (range)	6.1 ± 2.0 (1–10)
RMDQ score, mean ± SD (range)	14.3 ± 6.4 (0–24)
Health related quality of life (PROMIS-29)[b]	
Physical function, mean ± SD (range)	37.5 ± 7.3 (22.9–56.9)
Anxiety, mean ± SD (range)	56.8 ± 10.5 (40.3–81.6)
Depression, mean ± SD (range)	54.7 ± 9.9 (41.0–79.4)
Low energy/fatigue, mean ± SD (range)	59.6 ± 10.8 (33.7–75.8)

Table 1: (continued)

Characteristic	n (%)
Sleep disturbance, mean ± SD (range)	57.4 ± 8.7 (32.0–73.3)
Participation in social roles and activities, mean ± SD (range)	43.2 ± 9.3 (27.5–64.2)
Pain interference with activities, mean ± SD (range)	63.6 ± 7.5 (41.6–75.6)

*Table entries are n (%) unless otherwise indicated. [a]Data were collected at the time of registry enrollment. [b]Scale scores were normed to the United States general population, with mean ± SD=50 ± 10. Higher scores represent worse quality of life on all scales except physical function and participation in social roles and activities. These data were available for 230 participants during the pre-COVID-19 period because the PROMIS-29 instrument was not deployed at all quarterly registry encounters. BMI, body mass index; COVID-19, novel coronavirus 2019; LBP, low back pain; NRS, Numerical Rating Scale for low back pain intensity; PCS, Pain Catastrophizing Scale; PROMIS-29, Patient Reported Outcomes Measurement Information System with 29 items; PSEQ, Pain Self Efficacy Questionnaire; RMDQ, Roland Morris Disability Questionnaire for back related functioning; SD, standard deviation.

are presented in Figure 1. Participants reported significant improvement in low back pain intensity during the pandemic (mean NRS score improvement, 0.19; 95% CI, 0.03–0.34; p=0.02; Table 3). However, the magnitude of low back pain improvement (Cohen's d=0.11) was not considered to be clinically relevant. Back related functioning was essentially unchanged during the pandemic (mean RMDQ score improvement, –0.01; 95% CI, –0.33 to 0.31; p=0.95). In subgroup analyses, White participants reported significant improvement in low back pain intensity (mean improvement, 0.28; 95% CI, 0.10–0.46), whereas Black participants did not (mean improvement, –0.13; 95% CI, –0.46 to 0.19) (p for interaction=0.03; Table 4). Overall, participants reported a significant improvement in the degree to which pain interfered with their activities on the PROMIS-29 instrument (mean score improvement, 1.11; 95% CI, 0.20–2.02; p=0.02), which met the threshold for a small effect (Cohen's d=0.20). None of the other secondary clinical outcomes for health related quality of life achieved statistical significance or clinical relevance.

A marginally significant negative association was observed for the use of NSAIDs in the linear regression models for improvement in low back pain intensity, including the model that adjusted for age, sex, and use of each of the other nonpharmacological and pharmacological treatments (standardized β coefficient, –0.094; t, –2.04; p=0.04; Table 5). There were no other significant associations involving age, sex, or use of any other nonpharmacological or pharmacological treatments in the linear regression models for improvement in low back pain intensity or improvement in back related functioning.

Discussion

The number of nonpharmacological treatments for chronic low back pain used by participants in this study decreased significantly during the initial 6 months of the COVID-19 pandemic. Specifically, participants were less likely to report using exercise therapy, massage therapy, and spinal manipulation. The latter finding has potentially important implications for osteopathic physicians, if patients with low back pain are less likely to visit them for osteopathic manipulative treatment during the pandemic because of

Table 2: Utilization of nonpharmacological and pharmacological treatments for chronic low back pain before and during the COVID-19 pandemic (n=476).*

Treatment	Pre-COVID-19 pandemic (Dec 2019 to Mar 2020) n (%)	During COVID-19 pandemic (Jun 2020 to Sep 2020) n (%)	OR	95% CI	p-value
Nonpharmacological					
Exercise therapy	89 (18.7)	42 (8.8)	0.37	0.23–0.57	<0.001
Yoga	43 (9.0)	38 (8.0)	0.78	0.40–1.52	0.53
Massage therapy	71 (14.9)	50 (10.5)	0.46	0.25–0.83	0.008
Spinal manipulation	85 (17.9)	67 (14.1)	0.53	0.29–0.93	0.03
Acupuncture	11 (2.3)	7 (1.5)	0.50	0.11–1.87	0.39
Cognitive behavioral therapy	25 (5.3)	21 (4.4)	0.75	0.32–1.69	0.57
Pharmacological					
Nonsteroidal antiinflammatory drugs	300 (63.0)	278 (58.4)	0.67	0.45–0.99	0.045
Opioids	150 (31.5)	150 (31.5)	1.00	0.58–1.73	>0.99

*The use of each treatment during the COVID-19 pandemic relative to the prepandemic period was measured by the OR, based on McNemar's test. CI, confidence interval; COVID-19, novel coronavirus 2019; OR, odds ratio.

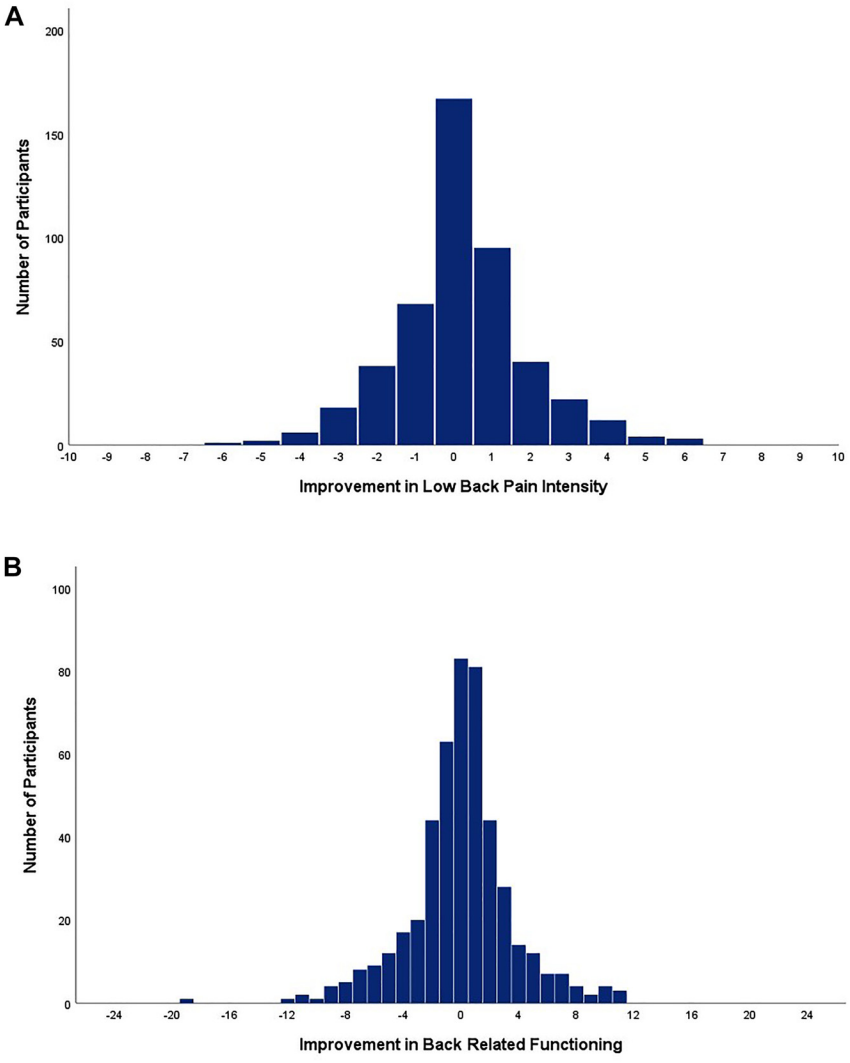

Figure 1: Distributions of improvements in (A) low back pain intensity and (B) back related functioning during the novel coronavirus 2019 (COVID-19) pandemic. Improvements were computed as change scores reported by participants on a numerical rating scale for low back pain intensity and the Roland Morris disability questionnaire for back related functioning from the period prior to the pandemic (December 2019 to March 2020) to the period during the pandemic (June 2020 to September 2020). Positive values represent improvement.

Table 3: Improvement in clinical outcomes during the COVID-19 pandemic.*

Improvement measure	n	Mean	95% CI	Cohen's *d*	p-value
Primary clinical outcomes					
Low back pain intensity	476	0.19	0.03—0.34	0.11	0.02
Back related functioning	476	−0.01	−0.33—0.31	0.00	0.95
Secondary clinical outcomes[a]					
Physical function	147	0.37	−0.26—0.99	0.10	0.25
Anxiety	147	−0.15	−1.50—1.21	−0.02	0.83
Depression	147	0.32	−0.83—1.47	0.04	0.59
Low energy/fatigue	147	0.71	−0.51—1.93	0.10	0.25
Sleep disturbance	147	−0.47	−1.64—0.70	−0.07	0.42
Participation in social roles and activities	147	0.29	−0.72—1.31	0.05	0.57
Pain interference with activities	147	1.11	0.20—2.02	0.20	0.02

*Low back pain intensity was measured with an 11 point numerical rating scale. Back related functioning was measured with the Roland Morris Disability Questionnaire. Secondary clinical outcomes were measured with the Patient Reported Outcomes Measurement Information System with 29 items. [a]The number of paired observations for the secondary clinical outcomes was smaller because the PROMIS-29 instrument was not deployed at all quarterly registry encounters. CI, confidence interval; COVID-19, novel coronavirus 2019.

Table 4: Subgroup analyses for improvement in primary clinical outcomes during the COVID-19 pandemic.*

Subgroup	n	Improvement in low back pain intensity				Improvement in back related functioning			
		Mean	95% CI	Cohen's *d*	p–value	Mean	95% CI	Cohen's *d*	p-value
Overall	476	0.19	0.03—0.34	0.11	0.02	−0.01	−0.33—0.31	0.00	0.95
Age, yr									
<50	164	0.12	−0.16—0.39	0.06	0.63	0.21	−0.41—0.84	0.05	0.25
50-61	154	0.16	−0.09—0.40	0.10		0.14	−0.35—0.63	0.05	
>61	158	0.29	0.01—0.57	0.16		−0.39	−0.94—0.15	−0.11	
Sex									
Male	127	0.18	−0.13—0.49	0.10	0.96	−0.20	−0.81—0.42	−0.06	0.49
Female	349	0.19	0.01—0.37	0.11		0.06	−0.32—0.43	0.02	
Race[a]									
Black	105	−0.13	−0.46—0.19	−0.08	0.03	−0.36	−1.04—0.32	−0.10	0.23
White	355	0.28	0.10—0.46	0.16		0.11	−0.26—0.48	0.03	
Ethnicity									
Hispanic	59	0.29	−0.11—0.69	0.19	0.63	−0.22	−1.18—0.74	−0.06	0.63
NonHispanic	417	0.17	0.01—0.34	0.10		0.02	−0.32—0.36	0.01	
Ever had work loss ≥1 month due to LBP									
Yes	216	0.20	−0.01—0.42	0.13	0.85	0.15	−0.24—0.54	0.05	0.38
No	260	0.17	−0.05—0.39	0.10		−0.14	−0.63—0.35	−0.04	
Ever received disability or workers' compensation benefits due to LBP									
Yes	115	0.41	0.12—0.70	0.26	0.11	0.03	−0.55—0.60	0.01	0.90
No	361	0.12	−0.07—0.30	0.07		−0.02	−0.40—0.36	−0.01	
History of herniated disc									
Yes	166	0.19	−0.06—0.44	0.12	0.96	0.34	−0.08—0.75	0.12	0.12
No	310	0.18	−0.01—0.38	0.10		−0.20	−0.63—0.24	−0.05	
History of sciatica									
Yes	202	0.12	−0.10—0.35	0.08	0.49	0.20	−0.24—0.65	0.06	0.26
No	274	0.23	0.02—0.45	0.13		−0.17	−0.62—0.28	−0.04	
History of depression									
Yes	246	0.27	0.07—0.47	0.17	0.29	0.04	−0.41—0.50	0.01	0.73
No	230	0.10	−0.14—0.34	0.05		−0.07	−0.52—0.38	−0.02	
Ever had LBP surgery									
Yes	87	0.13	−0.23—0.48	0.08	0.72	0.28	−0.31—0.86	0.10	0.41
No	389	0.20	0.03—0.37	0.12		−0.07	−0.45—0.30	−0.02	
BMI, kg/m^2									
<28.4	162	0.19	−0.07—0.45	0.11	0.80	−0.04	−0.55—0.46	−0.01	0.59
28.4–34.6	156	0.25	−0.02—0.52	0.14		0.21	−0.39—0.81	0.06	
>34.6	158	0.12	−0.16—0.40	0.07		−0.20	−0.76—0.37	−0.05	
Pain catastrophizing									
<11	161	0.28	0.00—0.56	0.15	0.70	0.19	−0.30—0.67	0.06	0.52
11-24	160	0.15	−0.11—0.41	0.09		0.04	−0.59—0.66	0.01	
>24	155	0.13	−0.14—0.39	0.08		−0.26	−0.82—0.29	−0.08	
Pain self efficacy									
<29	168	0.14	−0.10—0.37	0.09	0.77	−0.07	−0.53—0.38	−0.02	0.73
29-41	151	0.16	−0.12—0.44	0.09		−0.13	−0.81—0.54	−0.03	
>41	157	0.27	−0.03—0.57	0.14		0.17	−0.38—0.72	0.05	

*Categories for age, body mass index, pain catastrophizing, and pain self efficacy were based on tercile cutpoints. Pain catastrophizing and pain self efficacy were measured with the Pain Catastrophizing Scale and Pain Self Efficacy Questionnaire, respectively. [a]Only Black and White participants were included as racial subgroups, as there were too few participants in other racial categories for meaningful analysis. BMI, body mass index; CI, confidence interval; COVID-19, novel coronavirus 2019; LBP, low back pain.

Table 5: Associations between utilization of nonpharmacological and pharmacological treatments and the primary clinical outcomes (n=476).*

Treatment	Improvement in low back pain intensity					
	Univariate models			Multivariate model		
	Standardized β	t	p-value	Standardized β	t	p-value
Nonpharmacological						
Exercise therapy	0.052	1.14	0.25	0.058	1.19	0.24
Yoga	−0.023	−0.50	0.62	−0.048	−0.99	0.32
Massage therapy	0.043	0.93	0.35	0.036	0.69	0.49
Spinal manipulation	0.023	0.50	0.62	0.007	0.13	0.89
Acupuncture	−0.003	−0.07	0.95	−0.004	−0.08	0.94
Cognitive behavioral therapy	0.060	1.31	0.19	0.067	1.43	0.15
Pharmacological						
Nonsteroidal antiinflammatory drugs	−0.089	−1.95	0.051	−0.094	−2.04	0.04
Opioids	−0.040	−0.86	0.39	−0.051	−1.10	0.27
Treatment	**Improvement in back related functioning**					
	Univariate models			Multivariate model		
	Standardized β	t	p-Value	Standardized β	t	p-Value
Nonpharmacological						
Exercise therapy	−0.003	−0.07	0.94	0.011	0.23	0.82
Yoga	−0.008	−0.17	0.86	−0.012	−0.24	0.81
Massage therapy	−0.009	−0.19	0.85	−0.002	−0.04	0.97
Spinal manipulation	−0.018	−0.38	0.70	−0.025	−0.50	0.62
Acupuncture	0.020	0.44	0.66	0.018	0.38	0.70
Cognitive behavioral therapy	−0.020	−0.43	0.67	−0.018	−0.39	0.70
Pharmacological						
Nonsteroidal antiinflammatory drugs	−0.010	−0.21	0.83	−0.011	−0.23	0.82
Opioids	−0.059	−1.29	0.20	−0.055	−1.16	0.24

*Associations were determined using linear regression models. The multivariate model included age, sex, and each of the other nonpharmacological and pharmacological treatments as independent variables.

concerns relating to virus transmission or restricted access due to lockdowns or social distancing. A marginally significant decrease in NSAID use for low back pain was also observed, although opioid use remained unchanged. Participants reported an improvement in low back pain intensity that was not considered to be clinically relevant. However, they also reported a small and clinically relevant improvement in pain interference with activities. It is unclear if the two latter findings could be explained by less demanding physical or social activities during the pandemic. The only interaction effect noted among the 13 prespecified subgroup variables analyzed for each of the primary clinical outcomes involved a racial disparity in which White participants experienced a significant improvement in low back pain intensity during the pandemic, whereas Black participants experienced a nonsignificant worsening in low back pain intensity.

Participants who were currently using a nonpharmacological treatment during their most recent quarterly encounter within the pandemic period did not report significantly different outcomes than nonusers of the treatment on either of the primary clinical outcome measures, including in the multivariate analyses that adjusted for age, sex, and use of each of the other nonpharmacological and pharmacological treatments. It is somewhat surprising that the decreased utilization of recommended nonpharmacological treatments for chronic pain did not have a greater adverse impact on the primary and secondary clinical outcomes studied; however, a possible explanation may be that participants undertook less demanding physical or social activities during pandemic lockdowns. Although emerging evidence now indicates that the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) spike protein is analgesic in a

nerve injury rat model [15], it is not possible to determine whether infection with the virus during the pandemic may have impacted utilization of the treatments or the clinical outcomes studied herein.

Participants who were currently using NSAIDs reported marginally significant increases in low back pain intensity during the pandemic, whereas current opioid users did not experience a significant change in low back pain intensity. It is unlikely that the increased low back pain intensity among NSAID users represents an opioid substitution effect, potentially attributable to unavailability of opioids, because reported opioid use remained stable during the pandemic. The reported decrease in NSAID use during the pandemic may reflect discontinued use by some participants because of less demanding physical or social activities, thereby selecting for more vulnerable NSAID users who continued to require chronic pain management to maintain or even increase their usual activities during the pandemic.

This study has several strengths and limitations that should be noted. It was conducted within a pain research registry involving a digital research platform that enabled remote data acquisition before and during the pandemic using a series of validated research instruments relating to chronic low back pain, including several recommended by the National Institutes of Health Task Force [9]. Historically, over 90% of participants continue to remain in the registry and provide complete data during all quarterly encounters within the first year [16]. The use of paired participant data before and during the pandemic not only controlled for potential known and unknown confounders, but also strengthened the likelihood of the pandemic being a cause of the observed findings. However, the study was limited by using only standard case report forms that did not ask participants about SARS-CoV-2 infection or other COVID-19-specific factors that may have impacted chronic pain management and clinical outcomes. For example, it is unknown to what degree the usual work or social activities of participants was curtailed by the pandemic and whether nonpharmacological or pharmacological treatments used during the pandemic were acquired during conventional treatment visits or by telemedicine or other methodologies adapted to deal with lockdowns or social distancing restrictions. Unfortunately, the registry case report forms were not designed to accommodate *ad hoc* data needs that may arise during a pandemic. Also, this study only addressed short term changes during the initial 6 months of the pandemic. It is unclear whether different patterns of chronic pain management services and utilization will emerge as the pandemic evolves, and what impact these may have on clinical outcomes over a longer time period.

Conclusions

The utilization of nonpharmacological treatments (particularly exercise therapy, massage therapy, and spinal manipulation) and NSAIDs for low back pain decreased during the initial 6 months of the COVID-19 pandemic. Overall, participants reported improvement in low back pain intensity during this period, although the magnitude of the pain reduction was not clinically relevant. However, there was significant heterogeneity in this study finding, as Black participants reported nonsignificant worsening of low back pain intensity during the pandemic compared with the significant improvement reported by White participants. A small overall improvement in pain interference with activities was also reported; however, it is unclear whether this may have been a consequence of less frequent or intensive activities during the pandemic.

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