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Original Research Article

The Relationship Between Neighborhood Deprivation and Perceived Changes for Pain-Related Experiences Among US Patients with Chronic Low Back Pain During the COVID-19 Pandemic

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Abstract

Objective. Disruptions caused by the COVID-19 pandemic could disproportionately affect the health of vulnerable populations, including patients experiencing persistent health conditions (i.e., chronic pain), along with populations living within deprived, lower socioeconomic areas. The current cross-sectional study characterized relationships between neighborhood deprivation and perceived changes in pain-related experiences during the COVID-19 pandemic (early-September to mid-October 2020) for adult patients ($N = 97$) with nonspecific chronic low back pain. **Methods.** We collected self-report perceived experiences from participants enrolled in an ongoing pragmatic randomized trial across medical centers within the Salt Lake City, Utah and Baltimore, Maryland metropolitans. The Area Deprivation Index (composite of 17 US Census deprivation metrics) reflected neighborhood deprivation based on participants' zip codes. **Results.** Although those living in the neighborhoods with greater deprivation endorsed significantly poorer physical (pain severity, pain interference, physical functioning), mental (depression, anxiety), and social health during the pandemic, there were no significant differences for perceived changes in pain-related experiences (pain severity, pain interference, sleep quality) between levels of neighborhood deprivation since the onset of the pandemic. However, those in neighborhoods with greater deprivation endorsed disproportionately worse perceived changes in pain coping, social support, and mood since the pandemic. **Conclusions.** The current findings offer evidence that changes in pain coping during the pandemic may be disproportionately worse for those living in deprived areas. Considering poorer pain coping may contribute to long-term consequences, the current findings suggest the need for further attention and intervention to reduce the negative effect of the pandemic for such vulnerable populations.

Key Words: COVID-19 Pandemic; Chronic Low Back Pain; Pain Management; Disparities; Neighborhood Deprivation

Introduction

The 2019 novel coronavirus (COVID-19) has had an overwhelming health impact, with 76 million people infected worldwide and 1.7 million associated deaths as of December 20, 2020 [1]. The disruptions caused by the COVID-19 pandemic on the economy, child/family care, social relationships, and healthcare have had profound effects on health and well-being [2]. The potential consequences of the disruptions created by the pandemic may be particularly serious for vulnerable populations managing chronic health conditions, such as chronic pain [3, 4].

Considering stress' role on chronic pain concerns [5, 6], chronic pain-related experiences such as pain interference, sleep quality, and the ability to manage pain may become exacerbated due to the life disruptions caused by the pandemic. Additionally, well-intended physical distancing public health efforts may also contribute to disruptions that could limit access to traditional pain coping and self-management methods such utilizing social support, remaining physically active, and attending healthcare appointments. Early reports suggest the COVID-19 pandemic exacerbates pain severity to a larger degree for those experiencing greater life disruption. For instance, a recent study examining German adults living with polyneuropathy during the early COVID-19 pandemic (April 2020) found patients overall endorsed either stable or reduced pain severity across different measures [7]. However, sub-analyses found those who reported negative changes to their social life (e.g., reduced social interactions) due to local pandemic regulations endorsed increased pain severity relative to those who did not experience disruptions. This finding suggests that among patients living with chronic pain, the negative impact of the pandemic may be greater for those who are experiencing greater life disruptions.

While the ongoing pandemic affects everyone, not everyone is affected equally. The pandemic disproportionately burdens vulnerable populations with fewer social and material resources, such as individuals with lower socioeconomic status or living in neighborhoods deprived of material resources [8–10]. Among those living with chronic pain, including those with chronic back pain, fewer social and material resources such as education, income, and employment predict worse pain outcomes [11–14]. The Area Deprivation Index (ADI) is a measure used to capture various socioeconomic determinants that may influence health outcomes. Composed of 17 metrics (e.g., education, employment, housing-quality, poverty), ADI can identify US neighborhood deprivation at the Census block-group level [15]. Previous research has demonstrated greater neighborhood deprivation on the ADI also predicts worse physical and mental health status among orthopedic patients relative to counterparts with the lowest neighborhood deprivation [16, 17]. Moreover, greater socioeconomic deprivation on comprehensive deprivation indices similar to the ADI also predict greater musculoskeletal condition occurrence [18, 19]. However, while earlier studies implicate neighborhood deprivation as a risk factor for worse pain outcomes, a current pressing concern is whether the COVID-19 pandemic exacerbates painful experiences and pain coping difficulties to a greater degree for patients with chronic pain who are also living in socially deprived neighborhoods.

To address this concern, the primary goal of the current study was to characterize the relationship between neighborhood deprivation and perceived changes in pain-related experiences and pain coping during the COVID-19 pandemic (early-September to mid-October 2020) for patients living in the United States with chronic low back pain. We assessed patients' perceived experiences from a single assessment during the pandemic. Participants were patients enrolled in a randomized pragmatic trial for nonspecific chronic low back pain (OPTIMIZE: The Optimized Multidisciplinary Treatment Programs for Nonspecific Chronic Low Back Pain) [20]. All recruitment for the parent trial was halted in mid-March, 2020 due to the pandemic and no participant was receiving care related to the parent trial at the time of the COVID-19 impact survey. Because stress and pain are positively related [5, 6], and because neighborhood deprivation may further exacerbate this relationship [11, 12, 16, 17], we sought to address two primary aims:

> Aim 1) Is neighborhood deprivation related to worse pain-related experience perceived changes during the COVID-19 pandemic? We predicted that participants residing in neighborhoods with greater deprivation (as reflected by greater ADI) would report significantly greater negative perceived changes in pain severity, pain interference, and sleep quality.
>
> Aim 2) Is neighborhood deprivation related to worsening pain-related coping perceived changes during the COVID-19 pandemic? We predicted participants with greater neighborhood deprivation would report significantly worse perceived changes in pain coping and pain self-management ability.

A secondary goal of this study was to characterize perceived social and economic impacts, as well as self-reported general health status, coping, health behaviors, and opioid and treatment appointments during the pandemic between levels of neighborhood deprivation.

Methods

The current study was approved by the University of Utah institutional review board (IRB) acting as the single IRB for this multisite study. Recruitment and local considerations were ceded to the individual site IRBs. Written consent was documented at two participating institutions (University of Utah and Intermountain Healthcare, Salt Lake City, Utah) and waived in lieu of verbal consent at one institution (Johns Hopkins Medicine, Baltimore, Maryland). The parent trial was registered on clinicaltrials.gov (NCT03859713).

Participants

Participants included adults, aged 18 years or older, with confirmed nonspecific chronic low back pain who were actively seeking professional healthcare and reported experiencing moderate pain (≥4/10) and low back-pain related disability (Oswestry Disability Index [21] ≥24) prior to enrolling in the parent clinical trial [20]. Using the National Institutes of Health Task Force criteria, chronic low back pain was operationalized as low back pain being a problem for at least 3 months and endorsing that low back pain is an ongoing problem "almost every day" or "everyday" for the past 6 months. Exclusion criteria included: (1) cancer other than skin cancer (e.g., leukemia, lymphoma), (2) any changes in urination or bowel movement likely related to back pain, (3) non-English speaking, (4) serious pathology as a cause of low back pain, including neoplasm, inflammatory disease (e.g., ankylosing spondylitis), vertebral osteomyelitis, or other conditions; (5) having received physical therapy for low back pain during the 90 days prior to being approached for the parent trial, (6) having received Cognitive Behavioral Therapy or mindfulness therapy during the 90 days prior to being approached for the parent trial, (7) having undergone any lumbar spine surgery during the year prior to being approached; (8) current pregnancy; or (9) current receipt of treatment or counseling for substance use (not including attending meetings of recovery programs such as Alcoholics Anonymous or Narcotics Anonymous). For detailed information about the parent trial, see Skolasky et al. 2020 [20].

Study Procedures

Figure 1 presents a flow diagram of recruitment and enrollment. Participants enrolled in the parent clinical trial were contacted first by letter, then email, and then phone with up to four contacts to recruit them for the COVID-19 substudy. Participants were also asked about possible participation simultaneous with ongoing phone call assessment efforts associated with the clinical trial. Participants who agreed to participate provided informed consent and completed the COVID-19 impact survey online using REDCap or over the telephone verbally with study personnel.

The letters of invitation were sent to participants enrolled in the parent clinical trial between 9/01/2020 and 9/18/2020. If participants didn't complete the survey within a week of sending a letter, participants were then emailed. Participants were not able to respond to the survey after Thursday October 15, 2020. Participants received $25 for completing the survey.

Measures

Neighborhood Deprivation—The Area Deprivation Index

We used the Area Deprivation Index (ADI) to quantify each participant's level of neighborhood deprivation according to their current residence's 9-digit household zip code retrieved from the electronic medical record [15, 22]. The ADI is a robust measure of social deprivation that accounts for 17 social and material deprivation metrics (e.g., education, employment, housing-quality, poverty). ADI values are calculated by the sum of each socioeconomic factor multiplied by its predetermined factor coefficient for a particular geographic area. ADI scores for the entire United States are ranked from lowest to highest then divided into percentiles (1–100). In the current study, ADI values for each participant were divided into three tertiles referred to as low ADI (range 2–32), moderate ADI (range 36–65), and high ADI (range 67–100). Larger values on the ADI suggest greater neighborhood deprivation.

Demographics

Participants' self-reported demographics included age, gender, race, ethnicity, education level, time from first pain episode, body mass index, and smoking status at the time of enrollment in the parent study. Participants also reported on their finances (i.e., household financials, frequency of NOT enough money for bills, worries about finances to purchase food, ability to cover necessary expenses) and employment status before the pandemic.

Perceived Changes in Social and Economic Experiences during the COVID-19 Pandemic

Since March 1 of the pandemic, participants indicated changes in: their household financial situation, worries about finances, worries about their ability to purchase food and other necessities, their ability to cover necessary expenses, how their financial situation has been affected by the pandemic, concerns about having stable housing in the next two months, life disruption, and employment. Response options were multiple choice and are presented in Table 3.

Primary Outcomes

Aim 1—Perceived Changes in Pain-Related Experiences between Neighborhood Deprivation Levels during the COVID-19 Pandemic

Since March 1 of the pandemic, participants described perceived changes in their pain severity, pain interference, sleep quality, mood, and social support using a 7-point Likert scale of "Very much improved," "Much improved," "Minimally improved," "No change," "Minimally worse," "Much worse," and "Very much worse." Items were adapted from the previously validated Patient Global Impression of Change measure [23], which is frequently used as an indicator of meaningful change in pain-related experiences [24, 25].

Aim 2—Perceived Changes in Pain Coping and Self-Management between Neighborhood Deprivation Levels during the COVID-19 Pandemic

We also used the validated Patient Global Impression of Change to assess participants' perceived changes in pain

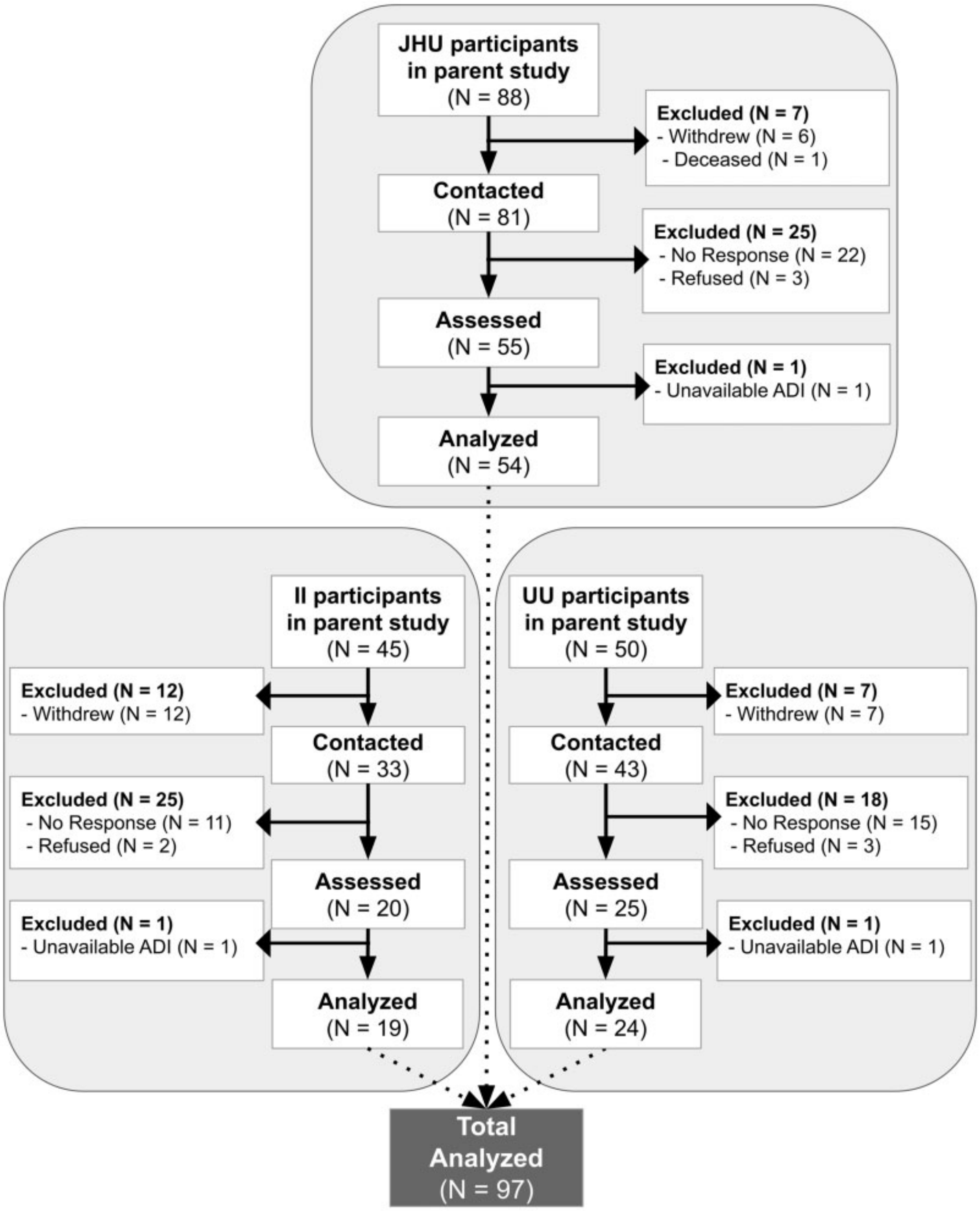

Figure 1. Flow diagram outlining the screening and participant inclusion. ADI = Area of Deprivation Index; JHU = Johns Hopkins University, Baltimore Maryland, USA; IH = Intermountain Health, Salt Lake City, Utah, USA; UU = University of Utah, Salt Lake City, Utah, USA.

coping ability since the start of the pandemic (March 1, 2020). We also assessed perceived changes in participants' ability to manage pain during the pandemic on a similar 5-point Likert of "Much worse," "Slightly Worse," "Unchanged," "Slightly Better," and "Much better." Using a list of pain coping and pain self-management strategies, we assessed participants' management of pain since the COVID-19 pandemic. Participants selected either one or multiple of the following categorical options: "Counseling or mental health treatment"; "Physical therapy"; "Opioid medication"; "Other pain medication"; "Medical marijuana"; "At-home practices (e.g., yoga, meditation, tai chi, or exercise)"; "Complementary medical treatments (e.g., massage, acupuncture, or chiropractic care)"; and "Other new treatments for pain."

Secondary Outcomes

Psychological, Physical, and Social Health Status between Neighborhood Deprivation Levels during the COVID-19 Pandemic

We assessed participant self-reported health status across mental (depression, anxiety), physical (pain interference, physical functioning, fatigue, sleep disturbance), and social (ability to participate in social roles and activities) health domains during the past seven days using the PROMIS-29 [26]. PROMIS health domain subscales were converted to T-scores ($M = 50$, SD = 10). Pain intensity was also assessed with a single 11-point numerical rating scale ranging from 0 (“no pain”) to 10 (“the worst pain imaginable”). For physical functioning and social subscales, lower scores indicate worse outcomes; otherwise, higher scores suggest greater frequency or severity of symptoms.

Perceived Changes in Health Behaviors between Neighborhood Deprivation Levels during the COVID-19 Pandemic

We assessed whether participants engaged in particular behavioral activities to cope with the pandemic’s impact, including substance use (i.e., alcohol, cannabis, other recreational drugs) and mind-body exercises (i.e., meditation, yoga, tai chi) using surveys adopted from the Understanding America Study [27]. Participants then were asked to indicate change in behavior frequency relative to before March 1,2020, using the following 5-point Likert scale: “Decreased a lot”; “Decreased a little”; “Same”; “Increased a little”; and “Increased a lot.”

We also assessed participant perceived changes in the degree to which they ate a generally healthy diet and participated in at least 2.5 hours of moderate physical activity or 1.5 hours of vigorous activity each week since March 1st 2020, using the following 5-point Likert scale: “Decreased a lot”; “Decreased a little”; “Same”; “Increased a little”; and “Increased a lot.”

Opioid Therapy and Treatment Appointment Disruptions during the COVID-19 Pandemic

We assessed participants’ access to prescription opioids and decreases or increases associated with the pandemic. Participants were asked to select from the following categorical options: “I have limited access to prescription opioid medication”; “I have access now but am concerned about access in the future”; “No impact on my opioid medication prescribed for pain”; and “Other impact.” We also assessed participants’ prescription opioid use during the pandemic, using the following categorical options: “I have been using about the same amount,” “I have been using less opioid medication,” “I have stopped using opioid medication,” or “I have been using more opioid medication.”

We also assessed the changes in participants’ mental health and physical therapy treatment appointments for back pain during the pandemic. For those that were receiving either treatment immediately prior to the pandemic, participants were asked to select from the following categorical options: “Appointments cancelled with no future sessions scheduled”; “Appointments postponed”; “Appointments changed to telehealth (sessions delivered via video or phone)”; “No impact”; and “Other impact.”

Data Analysis

Participants were divided into low, moderate, and high groups based on tertiles of the ADI national rank score. There were three participants that could not be assigned an ADI national rank score either because of missing address information or the address could not be matched with ADI addresses. These participants were not included in the analyses. Descriptive statistics were computed for participant responses for each ADI tertile and overall. Categorical variables were summarized by frequencies and proportions. Continuous variables were summarized by means and standard deviations. Difference statistics were calculated for the main outcome measures (i.e., perceived changes in pain-related experiences, pain coping, pain self-management) between ADI tertiles. The type of difference statistic was based on the measurement scale of the outcome variable. Differences for outcomes measured on a categorical or nominal scale were tested using χ^2 or Fisher Exact test for sparse data. Outcomes measured on a Likert scale or ordinal scale were tested using a trend test. Group differences for continuous normally distributed outcomes were tested using an ANOVA for differences in means between tertiles and eta squared (η2] was used to show effect size. Group differences for non-normal or skewed data were tested using the rank sum test. The main comparisons of interest were differences between the first and third tertiles of the ADI. Therefore, multiple comparison adjustments were not made. Significance was set at $\alpha < 0.05$ (2-tailed). SAS software, version 9.4 (SAS Institute) was used for all statistical analyses.

To facilitate interpretations for clinically meaningful perceived changes in pain related experiences during the pandemic, we decided to collapse the 7-point Likert responses to the Patient Global Impression of Change measure into 3 points: 1 = “very much improved” and “much improved”; 2 = “minimally improved,” “no change,” and “minimally worse”; 3 = “much worse” and “very much worse.” We also collapsed the 5-point Likert scale for the perceived change in pain self-management item to 3-points: 1 = “Much worse”; 2 = “Slightly Worse,” “Unchanged,” and “Slightly Better”; and 3 = “Much better.” To ensure that this did not markedly influence outcomes, we also performed a series of sensitivity analyses with fully expanded Likert responses.

Analytic Strategy

First, we described the sample overall and between neighborhood deprivation tertiles (low, moderate, high ADI) on general background characteristics (Table 1) and self-report financial and economic experiences before the pandemic (Table 2). We examined the impact of the COVID-19 pandemic on the social and economic well-being of participants by assessing change in these domains between ADI tertiles (Table 3).

To address our first and second aims for the primary goal of the study, we determined differences for perceived changes on global pain severity, global sleep quality, global pain interference, global pain coping, and pain self-management during the pandemic. We report these perceived changes between levels of neighborhood deprivation (ADI tertiles) (Figures 2 and 3).

As part of the study's secondary goals, we evaluated differences for self-report psychological, physical, and social health status between levels of neighborhood deprivation using the PROMIS-29 (Figure 4). We also characterized the sample's health behavior as perceived changes during the pandemic (Table 4), as well as their healthcare experiences including prescription opioid access, mental health and physical therapy treatment appointments (Table 5).

Results

Sample Characteristics

Table 1 provides demographics at the time of enrollment in the parent study both overall and between neighborhood deprivation levels. Participants were primarily women, of non-Hispanic origin, with a mean age of 48.5 years (SD = 11.8). The proportion of Black or African American participants was smaller for the lowest neighborhood deprivation group (Low ADI 11.9%) relative to the highest neighborhood deprivation group (High ADI 77.3%). The proportion of participants who completed a college degree was smaller for the highest neighborhood deprivation group (High ADI 18.2%) relative to the lowest neighborhood deprivation group (Low ADI 64.3%). Approximately half of the current study's participants were recruited from the Baltimore, Maryland metropolitan region (55%). The majority of participants within the highest neighborhood deprivation group resided in the Baltimore, Maryland metropolitan (86.4% in Baltimore metro, 13.6% in Salt Lake City Metro), while the majority of participants within the lowest neighborhood deprivation group resided in the Salt Lake City metropolitan (55.8% in Salt Lake City metro, 44.2% in Baltimore metro). Of the participants who had available dates for completing the COVID-19 impact survey. The average number of days from enrolling in the parent trial to completing the COVID-19 impact survey for participants was comparable between ADI levels ($M_{\text{OverallADI}} = 365$, $SD_{\text{OverallADI}} = 99$).

Participant financial experiences prior to the pandemic are presented in Table 2. There was a significant main effect of neighborhood deprivation for employment status prior to the pandemic (*P* = .01). Before the pandemic, the majority of participants reported working full-time (52.1%), with higher full-time employment among participants residing in neighborhoods with low deprivation (64.3%). However, participants residing in neighborhoods with moderate and high deprivation disproportionately reported unemployment due to their low back pain (18.8%, 27.3%, respectively), relative to those residing in neighborhoods with low deprivation (2.4%). Though not significant, similar patterns were observed for other financial experience items prior to the pandemic.

Perceived Changes in Social and Economic Experiences During the COVID-19 Pandemic

While nearly half of those residing in neighborhoods with moderate ADI (53.1%) and high deprivation (45.6%) endorsed worsened finances during the pandemic relative to approximately 30% of those living in neighborhoods with the lowest deprivation (Table 3), there were no significant difference between neighborhood deprivation levels (*P* = .168).

During this period, 80% of participants also reported some degree of financial worry with approximately 34% reporting "quite a bit of worry" or greater. However, there was no significant difference between levels of neighborhood deprivation (Table 3; *P* = .152).

Since the pandemic, 66% of participants reported some degree of worry related to procuring food and other necessities, with approximately 20% reporting quite a bit of worry or greater. Those residing in neighborhoods with moderate and high deprivation disproportionately reported significantly greater worries relative to those residing in neighborhoods with low deprivation (*P* = .016).

A significantly greater proportion of those residing in neighborhoods with moderate and high deprivation endorsed being unable to cover necessary expenses relative to those living in neighborhoods with the lowest deprivation (Table 3; *P* = .005).

While the majority of individuals denied having worries about housing, those residing in areas with moderate ADI appeared to disproportionately report greater stable housing concerns (43.8%) relative to those in high (22.7%) and low deprived (14.6%) neighborhoods (*P* = .018).

The wide majority of participants overall noted some degree of life disruption since the pandemic (94.8%). While a greater proportion of those in neighborhoods with the lowest deprivation reported "a lot" of life disruption (59.5%) relative to those in neighborhoods with the highest deprivation (36.4%), there was no significant difference between levels of neighborhood deprivation (*P* = .161).

Among the participants who were employed prior to the pandemic (N = 65), 60.3% of them overall reported some change in their employment since the pandemic. However, there was no significant difference between levels of neighborhood deprivation (*P* = .094).

Table 1. Demographics

Outcome	Low ADI N = 43	Moderate ADI N = 32	High ADI N = 22	Overall N = 97
ADI—national percentile				
Mean	20.9	47.4	83.5	–
Median	22	47	83.5	–
	N (%) or Mean (SD)	N (%) or Mean (SD)	N (%) or Mean (SD)	N (%) or Mean (SD)
Age (mean, SD)	50.3 (11.7)	44.4 (12.7)	51.5 (9.6)	48.5 (11.8)
Gender				
Female	25 (59.5%)	23 (71.9%)	19 (86.4%)	70 (70.7%)
Male	17 (40.5%)	9 (28.1%)	3 (13.6%)	29 (29.3%)
Ethnicity				
Hispanic or Latino	5 (11.9%)	3 (9.4%)	1 (4.5%)	9 (9.1%)
Not Hispanic or Latino	37 (88.1%)	29 (90.6%)	21 (95.5%)	90 (90.9%)
Race				
Asian	0	1 (3.1%)	1 (4.5%)	2 (2%)
Black or African American	5 (11.9%)	13 (40.6%)	17 (77.3%)	36 (36.4%)
White or Caucasian	33 (78.6%)	15 (46.9%)	4 (18.2%)	54 (54.5%)
More than one race	0	2 (6.3%)	0	2 (2%)
Other Race	2 (4.8%)	1 (3.1%)	0	3 (3%)
Education level				
Completed college degree	27 (64.3%)	9 (28.1%)	4 (18.2%)	42 (42.4%)
Completed high school	15 (35.7%)	19 (59.4%)	12 (54.5%)	47 (47.5%)
Did not complete high school	0	4 (12.5%)	6 (27.3%)	10 (10.1%)
Currently smoking	6 (14.3%)	6 (18.8%)	8 (36.4%)	20 (20.2%)
Time from first episode				
1 year or less	5 (11.9%)	2 (6.3%)	5 (22.7%)	12 (12.1%)
2–5 years	9 (21.4%)	10 (31.3%)	6 (27.3%)	27 (27.3%)
6–10 years	4 (9.5%)	6 (18.8%)	7 (31.8%)	17 (17.2%)
10 years or more	24 (57.1%)	14 (43.8%)	4 (18.2%)	43 (43.4%)
BMI (mean, SD)	31.7 (9.4%)	32.8 (9.5%)	34 (9.6%)	32.6 (9.5%)
Back surgery history > 1 year ago	5 (11.9%)	1 (3.1%)	0	6 (6.1%)
Site				
JHU	19 (44.2%)	16 (50%)	19 (86.4%)	55 (55%)
IH	13 (30.2%)	5 (15.6%)	1 (4.5%)	20 (20%)
UU	11 (25.6%)	11 (34.4%)	2 (9.1%)	25 (25%)
Days from parent trial enrollment to completing COVID-19 Survey#	347 (101)	393 (85)	345 (123)	365 (99)

ADI = Area of Deprivation Index; BMI = body mass index; JHU = Johns Hopkins University, Baltimore Maryland, USA; IH = Intermountain Health, Salt Lake City, Utah, USA; UU = University of Utah, Salt Lake City, Utah, USA.

#Some participants had missing dates for when they completed the COVID-19 impact survey. Those with missing completion dates were not included in the duration descriptive statistics (N_{LowADI} = 36/43, $N_{ModerateADI}$ = 26/32, $N_{HighADI}$ = 6/22, $N_{OverallADI}$ = 68/97).

Aim 1 - Perceived Changes in Pain-Related Experiences Between Neighborhood Deprivation Levels During the COVID-19 Pandemic

Figure 2 depicts reported perceived changes in pain-related experiences between neighborhood deprivation levels during the pandemic. The majority of participants consistently reported minimal to no change on all pain-related experiences since the pandemic.

Figure 2A–C depict primary outcomes for aim 1: perceived changes in pain severity, pain interference, and sleep quality since the pandemic. While there was no main effect of neighborhood deprivation for these three pain-related experiences, those living in neighborhoods with greater deprivation were more likely to report much and very much worsened experiences. Sensitivity analyses with fully expanded Likert responses showed results for perceived changes in pain severity (*P* = 0.08) and sleep quality (*P* = 0.095) were robust to collapsing Likert responses because differences between neighborhood deprivation groups did not significantly vary at the 0.05 level. In contrast to the null findings when collapsing responses perceived changes in pain interference, using the full 7 response Likert scale for perceived changes in pain interference revealed a significant main effect of neighborhood. A greater proportion of those residing in neighborhoods with higher deprivation reported “much worse” and “very much worse” perceived changes in pain interference relative to those residing in neighborhoods with the least deprivation (*P* = 0.022).

Figure 2D and E depict reported perceived changes in mood and social support since the pandemic. There was a main effect of neighborhood deprivation on mood (*P* = .024) and social support change (*P* < .001) such that the proportion of much worsened and very much worsened symptoms among those living in moderate and high deprived neighborhoods was greater than the same response proportion for those living in the lowest deprived neighborhoods. Sensitivity analyses with fully expanded

Table 2. Finances and employment before the COVID-19 pandemic

Outcome	Low ADI N = 43 N (%) or mean (SD)	Moderate ADI N = 32 N (%) or mean (SD)	High ADI N = 22 N (%) or mean (SD)	Overall N = 97 N (%) or mean (SD)
Household financials				
Not enough to meet basic expenses	2 (4.9%)	4 (12.5%)	3 (13.6%)	9 (9.5%)
Just meeting basic expenses	5 (12.2%)	9 (28.1%)	5 (22.7%)	19 (20%)
Meeting basic expenses with a little left over	13 (31.7%)	12 (37.5%)	7 (31.8%)	32 (33.7%)
Living comfortably	18 (43.9%)	7 (21.9%)	6 (27.3%)	31 (32.6%)
Prefer not to answer	3 (7.3%)	0	1 (4.5%)	4 (4.2%)
Frequency of NOT enough money for bills				
Never	27 (65.9%)	12 (37.5%)	6 (27.3%)	45 (47.4%)
Rare	1 (2.4%)	5 (15.6%)	4 (18.2%)	10 (10.5%)
Sometimes	2 (4.9%)	13 (40.6%)	4 (18.2%)	19 (20%)
Often	2 (4.9%)	1 (3.1%)	8 (36.4%)	11 (11.6%)
Always	9 (22%)	1 (3.1%)	0	10 (10.5%)
Worried about finances to purchase food				
Never	33 (84.6%)	18 (56.3%)	13 (59.1%)	64 (68.8%)
Sometimes	4 (10.3%)	10 (31.3%)	9 (40.9%)	23 (24.7%)
Often	2 (5.1%)	4 (12.5%)	0	6 (6.5%)
Able to cover necessary expenses				
Yes	36 (87.8%)	22 (68.8%)	17 (77.3%)	75 (78.9%)
No	4 (9.8%)	12 (37.5%)	7 (33.3%)	23 (24.5%)
Unsure	0	3 (9.4%)	0	3 (3.2%)
Employment status				
Not employed outside the home (e.g., homemaker)	2 (4.8%)	3 (9.4%)	1 (4.5%)	6 (6.3%)
Not employed, looking for work	0	0	3 (13.6%)	3 (3.1%)
Employed part-time (fewer than 30 hours per week)	6 (14.3%)	5 (15.6%)	4 (18.2%)	15 (15.6%)
Employed full-time (30 or more hours per week)	27 (64.3%)	16 (50%)	7 (31.8%)	50 (52.1%)
Not employed because of low back condition	1 (2.4%)	6 (18.8%)	6 (27.3%)	13 (13.5%)
Retired	6 (14.3%)	2 (6.3%)	1 (4.5%)	9 (9.4%)

Likert responses showed results for perceived changes in mood ($P = .011$) and social support ($P < .001$) were robust to collapsing Likert responses because differences between neighborhood deprivation groups did not significantly vary at the .05 level.

Aim 2 - Perceived Changes in Pain Coping and Self-Management Between Neighborhood Deprivation Levels During the COVID-19 Pandemic

Figure 3A and B depict reported pain coping and pain self-management change experienced since the pandemic. There was a main effect of neighborhood deprivation for perceived changes in pain coping: a greater proportion of those residing in neighborhoods with higher deprivation reported "much worse" and "very much worse" perceived changes in pain coping relative to those residing in neighborhoods with the least deprivation ($P = .004$). While there was no main effect of neighborhood deprivation for perceived changes in pain self-management ($P = .08$), a greater proportion of those endorsing "much worse" perceived changes were for those living in neighborhoods with the highest deprivation endorsed relative to those in the lowest deprived neighborhoods. Sensitivity analyses with fully expanded Likert responses showed results for perceived changes in coping ($P = .001$) and pain self-management ($P = 0.105$) were robust to collapsing Likert responses because differences between neighborhood deprivation groups did not significantly vary at the .05 level.

Figure 3C depicts reported use of new pain self-management methods since the start of the pandemic. Approximately 30% of all participants endorsed using a new method, though differences for endorsements between levels of neighborhood deprivation were not observed ($P = .956$). Of the 29 who reported using new pain self-management methods, responses across all participants included at-home practices such as yoga, meditation, tai chi, or exercise (N = 17), other new treatments for pain (N = 9), physical therapy (N = 7), counseling or

Table 3. Perceived changes in social and economic experiences during the COVID-19 pandemic

Outcome	Low ADI	Moderate ADI	High ADI	Overall	*P*
Household financial change	N = 43	N = 32	N = 22	N = 97	.168
Don't know	0.0%	0.0%	4.5%	1.1%	
Worsened	29.3%	53.1%	45.5%	41.1%	
Has not Changed	58.5%	43.8%	45.5%	41.1%	
Improved	12.2%	3.1%	4.5%	7.4%	
Worried about finances	N = 43	N = 32	N = 22	N = 97	.152
Not at all	22.0%	18.8%	18.2%	20.0%	
A little bit	36.6%	28.1%	22.7%	30.5%	
Moderately	19.5%	12.5%	13.6%	15.8%	
Quite a bit	17.1%	25.0%	22.7%	21.1%	
Extremely	4.9%	15.6%	22.7%	12.6%	
Worried about food/ necessities	N = 43	N = 32	N = 22	N = 97	.016
Not at all	44.0%	25.8%	27.3%	34.0%	
A little bit	36.6%	29.0%	27.3%	31.9%	
Moderately	9.8%	16.1%	18.2%	13.8%	
Quite a bit	9.8%	12.9%	13.6%	11.7%	
Extremely	0.0%	16.1%	13.6%	8.5%	
Able to cover necessary expenses	N = 43	N = 32	N = 22	N = 97	.005
No	9.8%	41.4%	33.3%	25.3%	
Yes	90.2%	58.7%	66.7%	74.7%	
Worried about stable housing next 2 months	N = 43	N = 32	N = 22	N = 97	.018
No	77.3%	56.2%	85.4%	73.7%	
Yes	14.6%	43.8%	22.7%	26.3%	
Life disruption	N = 43	N = 32	N = 22	N = 97	.161
None	0.0%	9.7%	0.0%		
Moderately	22.7%	22.6%	22.7%		
Some	21.4%	19.4%	40.9%		
A lot	59.5%	48.4%	36.4%		
Employment status	N = 43	N = 32	N = 22	N = 97	.094
No change	46.9%	47.6%	0.0%		
Closed but working remotely	31.0%	28.6%	40.0%		
Closed but reopened and returned to work	6.3%	9.5%	30.0%		
Closed but reopened, not returned to work	9.4%	4.8%	20.0%		
Closed but can no longer work	6.3%	9.5%	10.0%		

mental health treatment (N = 5), complementary medical treatments (e.g., massage, acupuncture, or chiropractic care; N = 3), and opioid medication, medical marijuana, and other pain medications (N = 2 each). Analyses on this smaller subset of participants suggest there were no significant differences between ADI levels for any new pain self-management method (p = 0.131– 0.889).

Psychological, Physical, and Social Health Status Between Neighborhood Deprivation Levels Since the COVID-19 Pandemic

Figure 4 depicts reported general psychological, physical, and social health status by neighborhood deprivation level during the pandemic. For psychological health status, there were main effects of neighborhood deprivation level for anxiety (Figure 4A; P = .048) and depression (Figure 4B; P = .019). Pairwise comparisons found those residing in neighborhoods with the highest deprivation endorsed worse symptoms relative to those residing in neighborhoods with the lowest ADI.

For physical health status, there were significant main effects of neighborhood deprivation for pain severity (Figure 4D; P < .001), pain interference (Figure 4E; P < .001), and physical functioning (Figure 4G; P = .001). Pairwise comparisons found participants residing in neighborhoods with moderate and high deprivation endorsed worse symptoms relative to those living in neighborhoods with the lowest deprivation. There was no main effect of neighborhood deprivation for fatigue (Figure 4C; P = .125) and sleep disorder symptoms (Figure 4F; P = .128).

For social health status, there was a significant main effect of neighborhood deprivation for social role satisfaction (Figure 4H; P = .011): pairwise comparisons found participants residing in neighborhoods with high deprivation endorsed worse symptoms relative to those living in neighborhoods with the lowest deprivation.

Perceived Changes in Health Behaviors Between Neighborhood Deprivation Levels During the COVID-19 Pandemic

Table 4 displays change in general health behaviors during the pandemic between neighborhood deprivation levels. Alcohol (N = 22) and cannabis use (N = 13), along with mind-body exercises engagement (N = 13; i.e., meditation, yoga, tai chi), analyses were restricted to those participants who endorsed engaging in each specific behavior prior to the pandemic. Of those who endorsed these behaviors prior to the pandemic, there were no significant trend differences between neighborhood deprivation levels for these behavior perceived changes since the pandemic (P >.222). Moreover, there were no significant trend differences between neighborhood deprivation levels for either change in frequency for healthy eating or exercise duration (P >.422).

Opioid Therapy and Treatment Appointment Disruptions During the COVID-19 Pandemic

Table 5 displays change in opioid therapy access and use, as well as change in mental health and physical therapy appointments during the pandemic between neighborhood deprivation levels. Prescription opioid therapy use/ access (N = 27), as well as mental health (N = 24) and physical therapy appointments (N = 27) analyses were restricted to participants who endorsed engaging in each specific therapy prior to the pandemic. Given the small N per ADI tertile for all three therapies, descriptive statistics are provided in lieu of difference statistics between levels of neighborhood deprivation level.

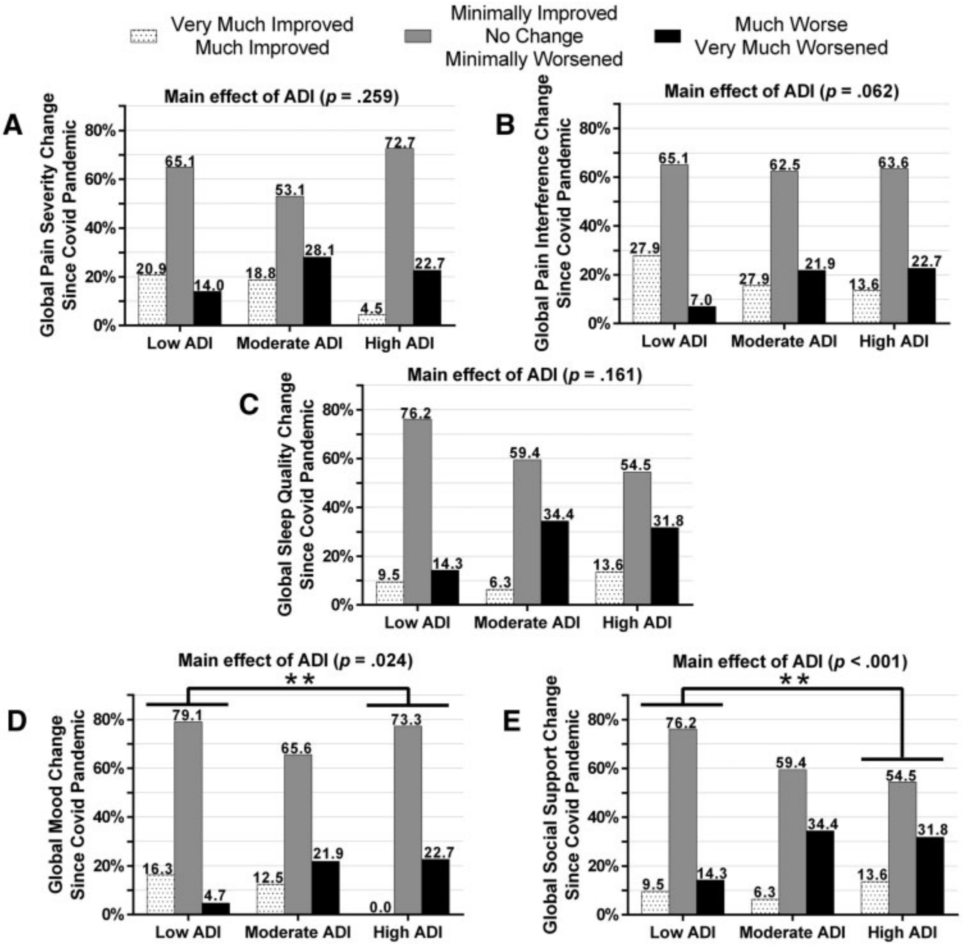

Figure 2. Perceived changes in pain-related experiences between neighborhood deprivation levels (Area of Deprivation, or ADI) during the COVID-19 pandemic. Although in the predicted direction, significant differences between ADI levels were not observed for the primary outcomes of (**A**) pain severity, (**B**) pain interference, and (**C**) sleep quality change. However, those residing in neighborhoods with higher deprivation endorsed significantly worse changes in (**D**) negative mood and (**E**) social support during the pandemic.

$^{*}P < .05$, $^{**}P < .01$.

Of the 27.8% of participants overall who endorsed prescription opioid use prior to the pandemic, 66.7% reported no changes to opioid access during the pandemic and 59.3% reported no change in prescription opioid use during the pandemic (Table 5). Of the participants participating in mental health (24.7% overall) prior to the pandemic, the majority of participants overall reported cancelling appointments being changed to telehealth during the pandemic (54.2%). Of the participants enrolled in physical therapy treatment (27.8% overall) prior to the pandemic, 33.3% reported cancelling future appointments, followed by 25.9% reporting their physical therapist cancelled future appointments.

Discussion

Perceived Changes in Pain-Related Experiences Between Neighborhood Deprivation Levels During the COVID-19 Pandemic

The study's primary goal was to characterize the relationship between neighborhood deprivation and perceived changes in pain-related experiences, pain coping, and pain self-management during September and October 2020 of the COVID-19 pandemic for community dwelling participants living with chronic low back pain. Contrary to our prediction, there were no significant differences in reported perceived changes for pain severity, pain interference, or sleep quality between neighborhood deprivation tertiles since the pandemic (Figure 2). However, participants residing in neighborhoods with moderate and high deprivation reported significantly worse pain severity, pain interference, and physical functioning status relative to those residing in neighborhoods with low deprivation (Figure 4). This finding is consistent with a growing body of literature demonstrating inverse relationships between socioeconomic resources and that of pain and physical functioning among those with chronic low back pain [28]. The current study's divergent findings between current pain status (i.e., PROMIS-29 pain severity, pain interference, physical functioning) during the pandemic versus perceived changes in pain

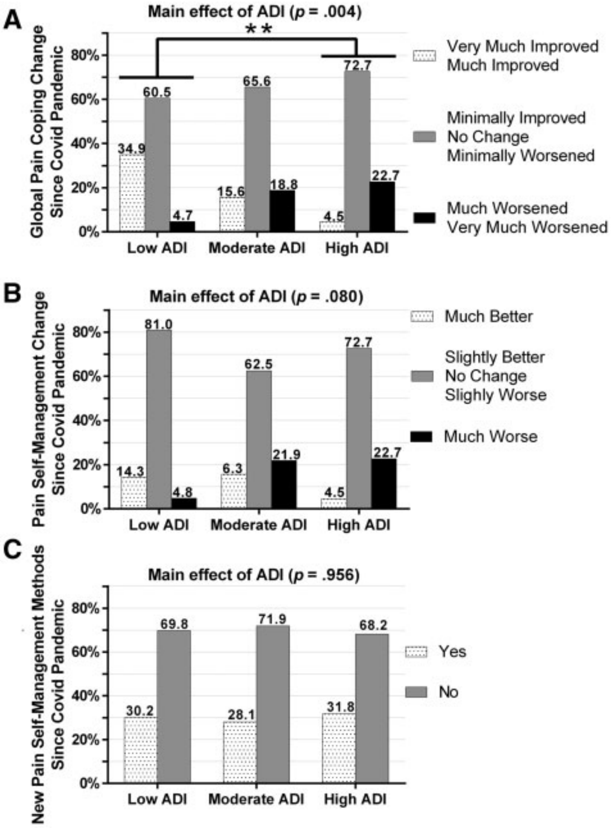

Figure 3. Perceived changes in pain coping and pain-management between neighborhood deprivation levels (Area of Deprivation, or ADI) during the COVID-19 pandemic. Those residing in neighborhoods with higher deprivation endorsed significantly worse changes in (**A**) pain coping. Though in the predicted direction, significant differences between ADI levels were not observed for (**B**) pain self-management. There were no differences in (**C**) new pain self-management methods used during the pandemic between ADI groups.

**$P < .01$.

experiences since the pandemic may suggest that while individuals with chronic low back pain living within more deprived neighborhoods are indeed experiencing greater pain relative to those living in more affluent areas during the pandemic, the strain from the pandemic has not disproportionately exacerbated their pain-related experiences during this period to a greater degree relative to those living in more affluent areas.

One possible explanation for the lack of significant differences in perceived changes for pain severity, pain interference, or sleep quality during the pandemic between levels of neighborhood deprivation may be that by September and October 2020, those living in moderate and high deprived neighborhoods in the current sample may not have disproportionately experienced significantly greater life disruptions relative to those in less deprived areas. Although our current cross-sectional study cannot directly examine the causal relationship between social and economic changes for pain-related experiences, we found those residing in highly deprived neighborhoods perceived significantly greater changes for only two of the seven social and economic indexes during the pandemic (i.e., procuring food and necessitates, the ability to cover necessary expenses). Another possible explanation for the lack of significant differences in pain-related perceived changes between neighborhood deprivation levels could be that differences may not be experienced until later. For instance, a previous study found sudden unemployment and greater immediate socioeconomic resource deficits after August 2005's Hurricane Katrina predicted greater odds of pain symptoms and chronic pain development among those living in the New Orleans, Louisiana metropolitan area five years later [29]. Future longitudinal research should examine whether a more marked impact of the pandemic on pain severity, pain interference, or sleep quality occurs in the long term for those residing in neighborhoods with greater deprivation, as life disruptions and social and economic impacts become exacerbated.

Perceived Changes in Pain Coping and Self-Management Between Neighborhood Deprivation Levels During the COVID-19 Pandemic

Significant differences between neighborhood deprivation levels were observed for perceived changes in pain coping since the pandemic (Figure 3). However, no significant differences between neighborhood deprivation levels were observed for perceived changes in pain self-management since the pandemic. Thus, there is some evidence in the current study to suggest those living in greater socially deprived areas (high ADI) are disproportionately reporting greater difficulty dealing with pain since the onset of the pandemic relative to those residing in areas with less deprivation (low ADI).

One possible reason for why there was no difference between levels of neighborhood deprivation for perceived changes in pain self-management since the pandemic may be due to the lack of proportional significant differences for changes in either employed pain self-management strategies, changes in health behaviors (Table 4), and disruptions in therapies for prescription opioids, mental health, or physical therapy (Table 5) between levels of neighborhood deprivation (ADI). These findings may suggest that healthcare patients with chronic pain residing in deprived neighborhoods are not experiencing unequal impacts for self-management behaviors or services since the pandemic relative to those residing in less deprived areas. However, it is important to clarify that these findings relate to perceived changes in pain self-management since the pandemic among the current sample and do not speak to either parity or differences in self-management behaviors and service use between levels of neighborhood deprivation prior to the pandemic. To reduce the burden of the pandemic on pain-related experiences for those residing in deprived areas, future research should identify risk and protective factors

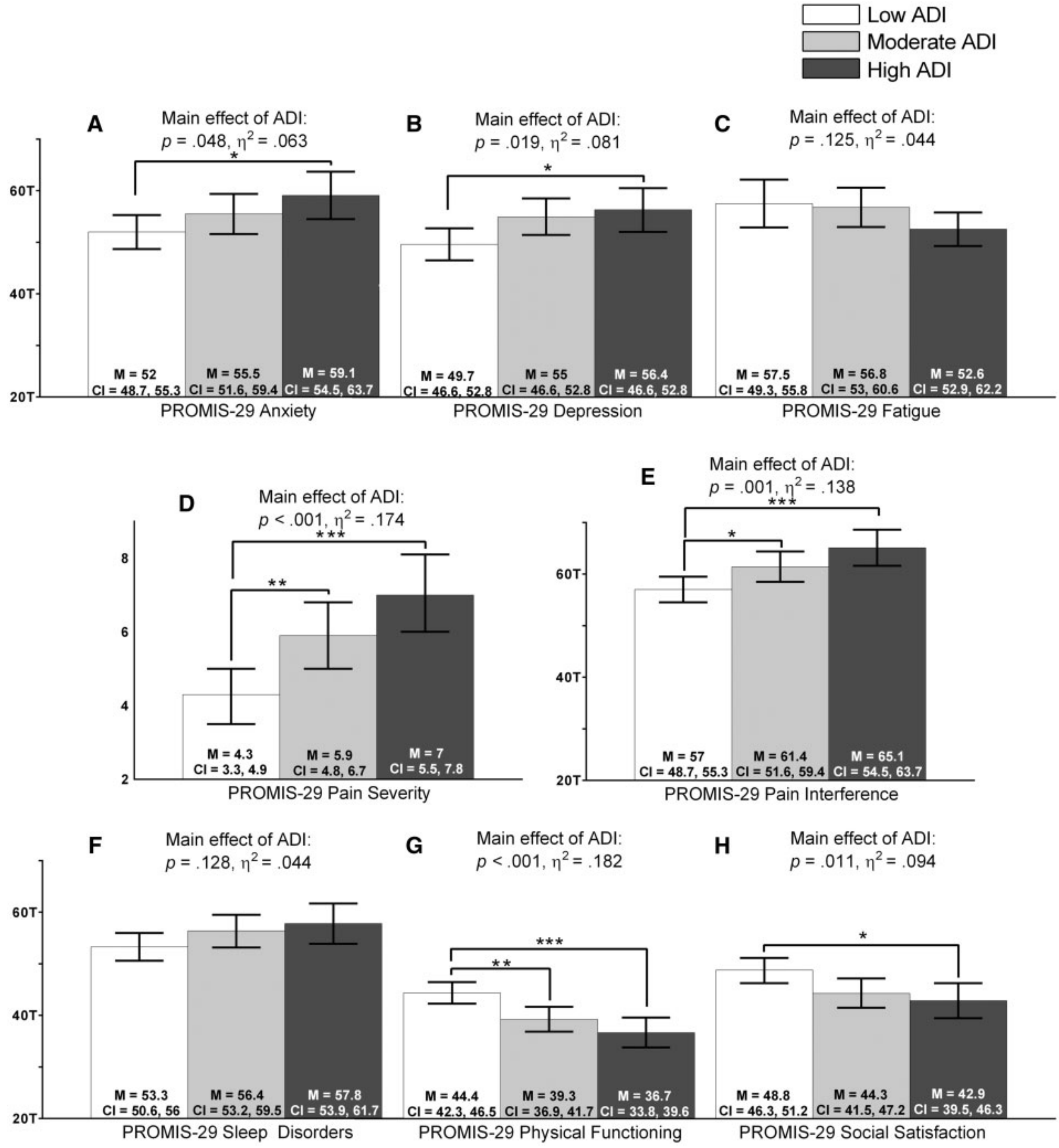

Figure 4. Psychological, physical, and social health status between neighborhood deprivation levels (Area of Deprivation, or ADI) during the COVID-19 pandemic. Each health status variable trended toward greater burden for those residing in neighborhoods with higher deprivation. Significant differences were observed for (**A**) depression, (**B**), anxiety, (**D**) pain severity, (**E**) pain interference, (**G**) physical functioning, and (**H**) social role satisfaction. Significant differences were not observed for (**C**) fatigue or (**F**) sleep disorders. ADI = Area of Deprivation Index. Panels **A–C** and **E–H** convey T-Score Means ± 95% Confidence Intervals (CI). Panel **D** conveys Mean ± 95% CI.
$*P < .05$, $**P < .01$, $***P < .01$.

influencing the use of self-management behaviors and services during the pandemic.

Although speculative, one hypothesis for why those residing in neighborhoods with moderate and high deprivation are reporting greater perceived changes in difficulty for coping with pain since the pandemic relative to those from neighborhoods with low deprivation may be due the greater negative perceived changes in social support and greater difficulty participating in social activities with others. Karos and colleagues (2020) recently proposed that the COVID-19 pandemic has the potential to promote social threats (i.e., social disconnection) that could induce social challenges (i.e., reduced social support) and ultimately exacerbate chronic pain experiences

Table 4. Perceived changes in health behaviors during the COVID-19 pandemic

Outcome	Low ADI	Moderate ADI	High ADI	Overall	Trend Test value
Alcohol consumption change during COVID-19 pandemic	N = 10	N = 4	N = 8	N = 22	0.879
Decreased a lot	10.0%	25.0%	0.0%	9.1%	
Decreased a little	30.0%	25.0%	12.5%	22.7%	
Same	10.0%	0.0%	50.0%	22.7%	
Increased a little	50.0%	25.0%	37.5%	40.9%	
Increased a lot	0.0%	25.0%	0.0%	4.5%	
Cannabis consumption change during COVID-19 pandemic	N = 6	N = 5	N = 2	N = 13	0.583
Decreased a lot	0.0%	0.0%	0.0%	0.0%	
Decreased a little	0.0%	40.0%	0.0%	15.4%	
Same	16.7%	0.0%	50.0%	15.4%	
Increased a little	66.7%	40.0%	0.0%	46.2%	
Increased a lot	16.7%	20.0%	50.0%	23.1%	
Mind-body exercise change during COVID-19 pandemic	N = 16	N = 14	N = 4	N = 34	0.222
Decreased a lot	0.0%	14.3%	25.0%	8.8%	
Decreased a little	12.5%	21.4%	50.0%	20.6%	
Same	43.8%	14.3%	0.0%	26.5%	
Increased a little	31.3%	21.4%	25.0%	26.5%	
Increased a lot	12.5%	28.6%	0.0%	17.6%	
Healthy diet frequency during COVID-19 pandemic	N = 43	N = 32	N = 22	N = 97	0.539
Decreased a lot	11.6%	12.5%	9.1%	11.3%	
Decreased a little	9.3%	0.0%	9.1%	6.2%	
Same	46.5%	37.5%	40.9%	42.3%	
Increased a little	25.6%	40.6%	31.8%	32.0%	
Increased a lot	7.0%	9.4%	9.1%	8.2%	
≥2.5 hours of moderate exercise OR ≥1.25 hours of vigorous exercise during COVID pandemic	N = 43	N = 32	N = 22	N = 97	0.422
Decreased a lot	9.3%	15.6%	4.5%	10.3%	
Decreased a little	9.3%	18.8%	18.2%	14.4%	
Same	46.5%	37.5%	50.0%	44.3%	
Increased a little	25.6%	21.9%	18.2%	22.7%	
Increased a lot	9.3%	6.3%	9.1%	8.2%	

[4]. Prior evidence suggests social inclusion activities [30] and social support [31] reduce pain sensitivity, whereas social exclusion increases pain sensitivity among individuals without pain [32]. For those living with chronic pain, previous studies also suggest social isolation and support not only predict pain severity and interference directly [33, 34], but that social support may indirectly impact pain severity through influencing the use of specific pain coping strategies [35]. This is also consistent with recent findings suggesting those that experienced social disruption due to pandemic lock down policies reported increased chronic pain severity [7]. Social isolation during the pandemic may be more adverse for those living in socially deprived areas with fewer means and resources to maintain social connection at a physical distance. It is important to reiterate that our current cross-sectional study cannot make causal interpretations for the relationships between that of perceived changes in pain coping and perceived changes in social support and social activities among those from deprived areas during the pandemic. Nevertheless, the collective findings may imply that addressing social isolation for this vulnerable population during the pandemic may be relevant for addressing immediate pain coping concerns and long-term consequences for pain-related experiences.

Clinical Implications

Those living in socially deprived neighborhoods in the current study are not only reporting disproportionally worse pain-related experiences during the pandemic (i.e., pain severity, pain interference, physical functioning), but also worse perceived changes in pain coping. Considering the relevance of ADI to pain related experiences in the current study, the findings suggest neighborhood deprivation is likely related to several aspects of health and, as a result, calls for consideration when developing and implementing interventions aimed at addressing pain related experiences for this vulnerable population. Specifically, the current findings may help guide treatment targets for factors either relating or

Table 5. Opioid therapy and treatment appointment disruptions during the COVID-19 pandemic

Outcome	Low ADI	Moderate ADI	High ADI	Overall
Prescription opioid therapy access during COVID-19 pandemic				
Using prescribed opioids month prior to the pandemic	N = 7	N = 13	N = 7	N = 27
Limited access to fill prescription	0.0%	7.7%	14.3%	7.4%
Access to fill prescriptions now, but future concerns	14.3%	23.1%	0.0%	14.8%
No access impact	71.4%	53.8%	85.7%	66.7%
Prescription opioid therapy use during COVID pandemic				
Using prescribed opioids month prior to the pandemic	N = 7	N = 13	N = 7	N = 27
I have been using about the same amount	28.60%	76.90%	57.10%	59.30%
I have been using less opioid medication	42.90%	7.70%	14.30%	18.50%
I have stopped using opioid medication	28.60%	15.40%	14.30%	18.50%
I have been using more opioid medication	0.00%	0.00%	14.30%	3.70%
Mental health treatment for chronic pain during COVID-19 pandemic				
Receiving services month prior to the pandemic	N = 9	N = 9	N = 6	N = 24
Therapist canceled with no future session scheduled	22.2%	11.1%	33.3%	20.8%
Patient canceled with no future session scheduled	22.2%	22.2%	16.7%	20.8%
Postponed until we can meet in-person	0.0%	0.0%	33.3%	8.3%
Changed to telehealth	55.6%	55.6%	50.0%	54.2%
Physical therapy treatment for chronic pain during COVID-19 pandemic				
Receiving services month prior to the pandemic	N = 11	N = 7	N = 9	N = 27
Therapist canceled with no future session scheduled	27.3%	28.6%	22.2%	25.9%
Patient canceled with no future session scheduled	27.3%	42.9%	33.3%	33.3%
Postponed until we can meet in person	18.2%	14.3%	33.3%	22.2%
Changed to telehealth	27.3%	0.0%	33.3%	22.2%

contributing to pain for patients with chronic low back pain living in areas with greater neighborhood deprivation during the COVID-19 pandemic.

Fortunately, the pandemic has ushered rapid adoption of telemedicine and eHealth strategies to facilitate continuity of care for those living with chronic pain [36]. Recent literature also suggests internet-based self-guided programs are acceptable and accessible for managing chronic pain [37], including for those with lower income [38]. When surveyed in 2019, over 70% of individuals with incomes under $30,000 have access to smartphones [39], suggesting telemedicine and eHealth interventions may be a promising way to maintain access to pain services and address pain coping for those with chronic low back pain living in areas with greater deprivation both during and after the COVID-19 pandemic.

Potential Limitations

The present study benefited from assessing a diverse sample of adults recruited from two US states (Utah and Maryland) and three separate healthcare systems during the COVID-19 pandemic. However, a potential limitation of the study is the sample does not represent those living with chronic pain within the greater United States and therefore will limit the generalizability of the findings. For instance, the current sample comprised of treatment-seeking patients possessing health insurance, which may not provide an accurate estimate of the magnitude of changes in pain-related experiences and pain coping since the pandemic for those living in deprived areas within the general US population who may not even have the resources (e.g., time, finances, transportation) to seek care. Another potential limitation is this study was part of a larger, pragmatic randomized trial examining the impact of non-pharmacological treatments for chronic, nonspecific low back pain [20]. In the parent trial, participants were randomized to non-pharmacological treatments and recruitment occurred across the three healthcare sites simultaneously. Such efforts most likely equated treatment distribution between ADI levels. However, some participants in the current study may be waiting to take part in a treatment, while others have already completed one or more treatments, which may influence the current results. However, all recruitment for the parent trial was halted in mid-March, 2020 due to the pandemic and no participant was receiving care related to the parent trial at the time of the COVID-19 impact survey. Regardless, more research assessing the relationship between neighborhood deprivation and pain-related experiences among a chronic low back pain population is warranted. An additional potential limitation is using participants' listed home addresses in the electronic medical record to derive ADI. Considering socioeconomic and related housing instability concerns of the COVID-19 pandemic, listed addresses in the medical record may have changed during the early pandemic. Finally, the cross-sectional design of the study focuses on patients' perceived experiences during the pandemic and thus limits explicit causal interpretations about the effect of the pandemic on pain-related experiences.

Conclusion

The primary goal of this study was to characterize the relationship between neighborhood deprivation and perceived changes in pain-related experiences and pain coping during the first six months of the COVID-19 for participants living with chronic low back pain. The current findings offer evidence that changes in pain coping during the COVID-19 pandemic may be disproportionately worse for those living in socially deprived areas with less access to resources. As the pandemic continues and causes added strain, exacerbation of pain coping may contribute to worsened pain-related experiences in the long-term. Therefore, further attention and intervention is needed for patients with chronic health concerns from lower socioeconomic strata to provide more equitable pain care to individuals affected by the COVID-19 pandemic.

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