

## ORIGINAL RESEARCH

# Healthcare use and prescription of opioids in rural residents with pain

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## ABSTRACT

**Introduction:** Chronic pain is a major public health problem. Increased healthcare utilization by individuals with pain puts enormous burden on financial and health resources. There is extremely limited understanding of psychosocial factors that affect healthcare use and prescription of opioids in individuals who experience heightened healthcare disparities associated with being African-American, having low income, and with rural residency. Health disparities research indicates that rural residency and low socioeconomic status are associated with greater self-reported pain levels. It is logical to expect then that this would be associated with increased needs for health services. However, at the same time, these very variables function as barriers in accessing health care. This disparity between greater need and limited access in turn creates greater distress. Further complicating the picture is the rapidly emerging concern about the misuse of prescription opioids in rural areas. As a result, empirical inquiry has started focusing on the variables influencing the likelihood of receiving opioid prescriptions in rural areas. The understanding of psychosocial factors affecting healthcare use and prescription of opioids in individuals who experience heightened healthcare disparities associated with being African-American, low-income, and living in rural areas remains extremely limited. The primary aim of this study was to examine the demographic and psychosocial variables that affect health services use in a rural, low-income population with chronic pain. Secondly, the influence of these same variables on receiving prescription for opioids was examined.

**Methods:** Healthcare use during a 3 month period, prescription analgesics, as well as medical comorbidities were obtained from the medical records of 64 patients with chronic pain. The participants were enrolling in an upcoming psychosocial intervention offered at two rural federally qualified health centers in a south-eastern state in the USA. For the present study, these participants consented to have their medical records reviewed for the 3 months prior to beginning the intervention protocol. Additionally, the pre-treatment (baseline) assessments were used in the present analyses. Demographic information, including age, sex, and education level, as well as measures of pain intensity, depressive symptoms, pain-related disability, and pain catastrophizing were collected.



**Results:** The participants were rural residents in medically underserved counties, primarily female (73.4%) and African-American (67.2%), and approximately 77% reported annual household income of less than \$13,000. A majority had medical comorbidities, including diabetes mellitus (46.89%), cardiovascular disorders (29.7%), chronic renal disorder (14.1%), and asthma (6.3%). Approximately 30% had a diagnosis of depression. Demographic variables such as age, sex, and ethnicity did not influence the healthcare use or prescription of opioids. Depressive symptoms uniquely influenced health services use, with higher scores predicting greater health services utilization. In addition, those with a diagnosis of depression (per medical records) and those with a higher number of medical comorbidities were more likely to receive prescription opioids.

**Conclusions:** This study adds to the current understanding of the factors affecting healthcare use and prescription of opioids in low-income individuals living in rural areas with chronic pain receiving treatment at federally qualified health centers. Since healthcare use was predicted by depressive symptoms and the prescription of opioids by a clinical diagnosis of depression, screening for depression is advised as part of the standard care of patients with pain, ideally with follow-up assessments and treatment of depression as necessary. Furthermore, making psychosocial interventions more available at rural healthcare centers may help in lowering psychological distress, which may have the ultimate effect of reducing opioid prescriptions for this subset of patients.

**Key words:** chronic pain, depression, healthcare utilization, psychosocial factors, USA.

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## Introduction

Chronic pain is a major public health problem that affects an estimated 116 million Americans and is one of the most common reasons for individuals to seek healthcare services<sup>1</sup>. It was recently reported by the Institute of Medicine that chronic pain costs approximately \$635 million annually. Most of this cost is due to increased healthcare utilization and lost productivity<sup>1</sup>. A majority of patients with chronic pain seek treatment from multiple providers and endure several surgical procedures in order to gain some relief<sup>2</sup>. This places an enormous burden on community healthcare resources as well as being a drain on the individual's emotional, physical, and financial resources. There is empirical evidence that psychological distress, pain severity, and pain-related disability predict healthcare utilization in patients with chronic pain<sup>3-6</sup>. It is noteworthy, however, that most of these studies have been conducted in large urban multispecialty hospitals. Given that urban and rural social structures and lifestyles differ significantly, it is possible that the factors affecting health services use by people living in rural areas may diverge from those in urban areas<sup>7</sup>. It is thus surprising that there is a paucity of research focused on healthcare use in underserved rural populations living with chronic pain. It is

logical to assume that in rural areas, high utilization of health services by individuals with chronic pain may multiply the burden on an already limited resource pool, leading to insufficient pain relief and frustration for both the patient and the provider.

Rural residency is associated with higher prevalence of chronic pain and other psychiatric and medical comorbidities, especially depression<sup>8,9</sup>. Rural residents with chronic pain report higher pain frequency and intensity, as well as more pain-related disability and depression than people with pain living in urban areas<sup>7,10</sup>. Healthcare disparities between rural and urban areas are widely recognized, and residents of rural areas often experience difficulties related to availability, accessibility, and affordability of health services<sup>11</sup>. This additionally puts rural patients with chronic pain at a higher risk for adverse health outcomes.

Currently, opioids are being increasingly prescribed for non-malignant chronic pain<sup>12-15</sup>. Many practitioners believe that opioids are more efficacious in providing rapid relief to individuals who are not finding relief with other analgesics for their persistent non-malignant pain<sup>13</sup>. A recent epidemiological study examining the trends of prescription analgesics indicated that 45.7% of people who reported



chronic pain were prescribed narcotic analgesics<sup>16</sup>. Indeed, at present, opioids are one of the most widely prescribed analgesics for chronic pain in the USA<sup>17</sup>. With this increasing use, there is considerable concern about the addiction potential of opioids as well as their association with increased mortality and various negative health outcomes, especially with long-term use<sup>18</sup>. Furthermore, there are increasing concerns about opioid-induced hyperalgesia<sup>19,20</sup>. This refers to a paradoxical condition wherein a patient receiving opioid analgesics experiences heightened sensitivity to pain, in relation to the underlying pain condition as well as new pains.

Previous research suggests a relationship of receiving opioid prescription on a long-term basis with psychosocial variables, including psychological distress, pain-related disability, and a history of substance abuse<sup>21,22</sup>. It is surprising though that the role of pain intensity or other pain variables such as duration or type of pain in prescription of these drugs remains inconclusive<sup>23</sup>. Merrill and colleagues found that patients on chronic opioid therapy were more likely to endorse psychosocial distress as well as meet criteria for clinical depression<sup>24</sup>. Indeed, some authors have postulated that long-term opioid use may actually be leading to or exacerbating depression<sup>25</sup>. Conversely, it is possible that the presence of depressive or distress symptoms in patients with chronic pain influences the providers' decision to prescribe opioids (considered the 'stronger' of the analgesic options). This may especially be so in geographical areas (eg medically underserved rural counties) where multidisciplinary treatment options are limited and opioids may be considered as the best of a very limited range of options for patients with chronic pain and depression. Hence, it would be prudent that appropriate psychological evaluations are completed prior to the initiation of opioids and regularly thereafter<sup>26</sup>.

The non-medical use of prescription opioids in rural areas has recently gained attention and is becoming a reason for concern<sup>27,28</sup>. A large US-based pharmacoepidemiology study comparing urban, suburban, and rural areas in their use and misuse of prescription opioids indicated that the rates of abuse of prescription opioids in rural areas was disproportionately higher<sup>29</sup>. A recent article indicated that the

rate of deaths due to drug overdoses within the rural areas in the USA has now surpassed those in the urban areas<sup>30</sup>. The authors have attributed these trends to the rapidly escalating rates of prescription of drugs such as opioids in rural areas. This has led to increased accessibility and availability of addiction-forming drugs in rural areas where street drugs such as heroin are not readily available<sup>30</sup>. Given such grave concerns, it becomes vital to gain insight into the patterns of opioid prescription in rural counties. It is important to identify the individuals who are more likely to receive such prescriptions as well as the related psychosocial variables that are potentially modifiable. Such information may help inform alternative interventions that can be employed to lower psychological distress and pain while enhancing health and wellness.

The primary aim of the present study was to explore the association of demographic, pain, and psychosocial variables with the overall healthcare use in a 3 month period in patients with chronic pain living in a rural area. These patients were receiving care at Federally Qualified Health Centers (FQHC) in two medically underserved counties of a south-eastern state in the USA. Psychosocial and demographic measures at baseline were used as predictors. Based on previous literature, the influence of pain intensity, psychological distress, pain catastrophizing, pain-related disability, and prescription opioids on healthcare use was examined. Although empirical support for the influence of demographic factors on healthcare use is inconsistent, the association of age, sex, and ethnicity with health services use was also explored in this study. As a secondary aim, the influence of these same demographic and psychosocial variables on the prescription of opioids was analyzed.

## Methods

### *Participants and recruitment sites*

The present analyses were based on a subset of participants recruited from FQHCs serving low-income patients in rural Alabama, and who were enrolled for a larger upcoming



randomized controlled clinical trial comparing cognitive behavioral therapy<sup>31</sup> to an education intervention<sup>32</sup> for chronic pain. Patients above 19 years of age and experiencing pain for most days in a month over the past 3 months were eligible to participate. Medical records of 64 out of 106 participants in the larger study were available for review (60.4%); the rest were not medical patients at the sites where the psychosocial interventions were to be conducted. Demographic, pain and psychosocial characteristics are shown in Table 1. The participants were recruited from Wilcox and Walker counties, Alabama. Both of these counties have been classified as medically underserved areas<sup>33</sup>.

## Procedure

Participants were recruited by healthcare providers, community flyers and patient word-of-mouth. Demographic and psychosocial measures were collected as part of the pretreatment assessment. Informed consent was obtained at the pretreatment interview. Medical records were reviewed on-site by a trained doctoral student, who is also a physician. Participants received compensation for travel expenses and for time and effort spent on the baseline assessment.

## Measures

**Demographics:** The demographic questionnaire, developed for this study, was used to collect information about age, ethnicity, sex, disability status, education, relationship status, and annual household income. In addition, accessibility to the healthcare center was calculated in terms of total distance travelled to reach the healthcare center.

**Structured pain interview:** This was adapted with permission to determine patient report of type(s) of pain, location(s) of pain, and primary pain type and site<sup>34</sup>. The interview also helped to distinguish any conditions that might contraindicate participation in the study, such as pain associated with malignant disease (ie cancer pain, HIV pain)<sup>35</sup>.

**Pain intensity and interference:** Using the Wisconsin Brief Pain Inventory, participants rated their worst pain, least

pain, and average pain over the past week, as well as their current pain levels on a 10 point Likert scale<sup>36</sup>. The participants also rated interference due to pain in their daily activities, mood, and sleep. The Brief Pain Inventory has demonstrated good internal consistency in a variety of pain populations<sup>37</sup>. The overall internal consistency for this sample as measured by Cronbach's alpha was 0.93.

## Psychosocial measures

**Catastrophizing:** The Pain Catastrophizing Scale (PCS) was used to measure pain catastrophizing<sup>38</sup>. The PCS is a 13 item measure asking respondents to rate the extent to which they have particular thoughts when they experience pain. The PCS measures catastrophizing on three dimensions, namely magnification, rumination and helplessness, and the total score for catastrophizing is the sum of the raw scores. Higher scores indicate greater catastrophic thinking. The internal consistency for this sample measured by Cronbach's alpha was 0.95.

**Depression:** The Center for Epidemiological Studies Depression Scale (CES-D) was used to assess symptoms of depression<sup>39</sup>. It is a 20 item questionnaire in which respondents rate the frequency with which each item occurred over the previous week. Higher scores indicate greater depressive symptoms. The CES-D has high internal consistency, adequate test-retest reliability, and convergent as well as discriminant validity. The CES-D has been validated for use in patients with chronic pain<sup>40</sup>. The internal consistency for this sample measured by Cronbach's alpha was 0.90.

**Perceived disability:** The Roland-Morris Disability Scale (RMDS), an 11 item scale was used to measure perceived disability due to pain<sup>41</sup>. A total score was obtained by summing the number of items endorsed (from 0 to 11). The RMDS is the most widely used scale for assessing treatment outcomes in pain management programs in terms of reduction in perceived disability<sup>41</sup>. The internal consistency for this sample as measured by Cronbach's alpha was 0.80.



**Table 1: Demographics, pain characteristics, and psychosocial measures (N=64)**

Variable	Frequency (%), mean (SD) or median†
Sex	
Male	17 (26.60)
Female	47 (73.40)
Age (years)	49.34 (12.48)
Ethnicity	
Caucasian	20 (31.30)
African-American	43 (67.20)
Other	1 (1.60%)
Disability status	
On disability allowance	21 (32.80)
Seeking disability allowance	24 (37.50)
Not seeking disability allowance	19 (29.70)
Household income	
\$0–12,999	49 (76.60)
\$13,000–24,999	8 (12.50)
\$25,000–49,000	7 (10.90)
Median number of years of education	12.00
Distance travelled (km)	42.68 (47.06)
Duration of pain (years)	12.54 (16.28)
Pain intensity	6.47 (2.25)
Median number of medical comorbidities	3.00
Self-reported Depression Scores (CES-D)	18.98 (13.18)
Pain catastrophizing (PCS)	32.84 (14.79)
Perceived disability (RMDS)	30.00 (10.60)
Healthcare use (number of visits in 3 month period prior to baseline assessment)	1.77 (1.40)

CES-D, Center for Epidemiological Studies Depression Scale; PCS, Pain Catastrophizing Scale; RMDS, Roland-Morris Disability Scale; SD, standard deviation.

†For sex, ethnicity, disability status, and household income, the frequency (%) statistics are reported. For age, distance travelled, duration of pain, pain intensity, depression, scores, catastrophizing, perceived disability, and healthcare use, the mean (standard deviation) statistics are reported. For number of years of education completed and number of medical comorbidities, median is reported.

**Healthcare utilization:** Healthcare use data were obtained retrospectively from manually maintained (hand-written) medical records of the participants and included the total number of visits in a period of 3 months prior to baseline. The purpose of the visits was multifaceted and included pain management as well as acute illness and chronic comorbidity management. Data pertaining to prescription analgesics, including opioids, as well as medical and psychiatric comorbidities, were also recorded.

### Data analysis

The data were analyzed using IBM SPSS Statistics v19.0 ([www-01.ibm.com/software/analytics/spss](http://www-01.ibm.com/software/analytics/spss)). Descriptive

analyses of demographics, pain characteristics, psychosocial measures, and healthcare utilization are reported as means and corresponding standard deviations or as frequency and corresponding percentages. Preliminary correlational analyses were conducted to examine association of the demographic characteristics (age, sex), pain variables (intensity, interference), number of medical comorbidities, and psychosocial variables (self-reported disability due to pain, depression, and catastrophizing) with the number of visits in a 3 month period prior to the psychosocial interventions. The number of visits was used as the variable measuring healthcare use. A Poisson regression model was utilized to analyze the variables affecting healthcare use. This



was done as the utilization data collected for this study are count data. The demographic and psychosocial variables significantly associated with number of visits were entered as independent variables in the regression model with the number of visits as the dependent variable.

To examine the factors associated with the prescription of opioids, preliminary  $\chi^2$  analyses (categorical independent variables) as well as correlational analyses (continuous independent variables) were conducted. Binomial logistic regression was conducted to analyze the predictors of receiving an opioid prescription based on the significant associations in the preliminary analyses. Potential violations of linearity, multicollinearity, or homoscedasticity were assessed in each analysis.

### *Ethics approval*

This study was approved by the Institutional Review Board at the University of Alabama, Tuscaloosa (approval number IRB# 07-003-ME).

## Results

### *Participants*

The participants were rural residents in medically underserved counties, primarily female (73.4%), African-American (67.2%), and approximately 77% reporting annual household income of less than \$13,000. Approximately 70% were either on disability allowances or seeking disability allowances. The mean self-reported pain intensity was 6.47 on a scale of 1 to 10. For further description about demographics, pain variables, and healthcare use, see Table 1. For information on medical comorbidities, see Table 2.

### *Recruitment sites*

Both of the recruitment counties have been classified as medically underserved areas<sup>31</sup>. County-specific census data, as provided by the US Census data 2010, were similar to the study sample in terms of race (Wilcox:  $\chi^2=0.90$ ,  $p>0.90$ ; Walker:  $\chi^2=1.60$ ,  $p>0.05$ )<sup>31</sup>. However, the number of

females in this sample was higher ( $\chi^2=12.26$ ,  $p<0.05$ ), which is not surprising given that more women than men suffer from or self-report chronic pain<sup>42,43</sup>.

### *Healthcare utilization*

Preliminary bivariate analyses indicated that depressive symptoms and pain catastrophizing were the only two variables significantly associated with healthcare use. There was no association of health services use with age, sex, ethnicity, opioid prescriptions, distance from the healthcare center, or perceived pain-related disability (Table 3). Self-reported depression scores and pain catastrophizing scores were entered in the Poisson regression model. Since the number of comorbidities and pain intensity were important variables of interest in regard to the frequency of visits to the healthcare center, they were entered on the first step of the Poisson regression model and the depression and catastrophizing were added next. The omnibus test indicated that only the depression scores obtained from CES-D uniquely and significantly predicted the number of visits in the 3 month period. Higher levels of self-reported depression scores (incidence rate ratio (IRR)=5.66,  $p=0.017$ , 95% confidence intervals between 0.004 and 0.038) were associated with greater number of visits (Table 4).

### *Prescription opioids*

Approximately 40% ( $n=26$ ) of the participants received opioid prescription in the 3 month period included in the chart review. The rest received prescription non-steroidal anti-inflammatory drugs (NSAIDs;  $n=38$ ; 59.4%). A  $\chi^2$  analysis indicated a near-significant trend of males being approximately three times more likely to receive a prescription of opioids than females ( $\chi^2=3.513$ ,  $p=0.05$ , odds ratio (OR)=2.99). In addition, the patients with a clinical diagnosis of depression based on chart review were 3.4 times more likely to get opioids ( $\chi^2=4.608$ ,  $p=0.032$ , OR=3.42). The association of race or age with receiving a prescription of opioids was non-significant. Similarly, there was no association with pain intensity, pain interference, perceived pain-related disability, and pain catastrophizing with receiving an opioid prescription.





**Table 2: Medical comorbidities**

Type of medical comorbidity	Frequency (%) (N=64)
Diabetes mellitus	30 (46.89%)
Cardiovascular disorder	19 (29.70%)
Chronic renal disorder	9 (14.10%)
Asthma	4 (6.30%)

**Table 3: Correlation between demographic, psychosocial variables, number of visits pretreatment, and opioid prescription**

	1	2	3	4	5	6	7	8
1 Prescription opioids	–	0.189	–0.333*	0.089	0.198**	0.141	0.209	–0.096
2 Number of visits in the 3 month period		–	–0.083	0.001	0.143	–0.399***	–0.260*	–0.070
3 Number of medical comorbidities			–	0.270*	–0.073	0.356***	–0.360*	0.013
4 Age				–	–0.104	–0.270*	–0.237	0.155
5 Self-reported pain intensity					–	0.250*	0.416***	0.406***
6 Self-reported depression scores on CES-D						–	0.614***	–0.049
7 Catastrophizing							–	0.212*
8 Pain disability (self-reported on RMDS)								–

\* $p < 0.05$ ; \*\* $p < 0.02$ ; \*\*\* $p < 0.001$ .

CES-D, Center for Epidemiological Studies Depression Scale; RMDS, Roland–Morris Disability Scale.

**Table 4: Poisson regression for the association of healthcare utilization with pain intensity, number of comorbidities, self-reported depression scores (CES-D), and pain catastrophizing scores (N=64)**

Independent variable	Incident rate ratio (SE)	Significance <i>p</i> -value	95% confidence intervals	
			Lower	Upper
Comorbidites	0.067 (0.0635)	0.412	–0.072	0.177
Pain intensity	0.026 (0.0125)	0.871	–0.022	0.026
Depression (CES-D)	5.66 (0.0087)	0.017	0.004	0.038
Catastrophizing	0.22 (0.0092)	0.639	0.022	0.220

CES-D, Center for Epidemiological Studies Depression Scale; SE, standard error.

Based on the significant and near significant associations (0.05–0.2) as indicated by the preliminary bivariate correlation analyses, sex, pain intensity, number of medical comorbidities, and the diagnosis of clinical depression were entered in the listed order to the binary logistic model examining the predictors of receiving an opioid prescription.

The results indicated that a clinical diagnosis of depression as well as the number of medical comorbidities significantly and uniquely predicted opioid prescriptions ( $\chi^2(1, N=64)=4.964$ ;  $p < 0.026$ ). Pain intensity and sex did not contribute significantly to the model (Table 5).



**Table 5: Binary logistic regression predicting opioid prescription (N=64)**

	Unstandardized $\beta$ coefficient	Standard error	Wald statistic	Degrees of freedom	p-value	Exponentiated $\beta$ coefficient
Pain intensity	0.040	0.035	1.331	1	0.249	1.041
Sex	0.905	0.658	1.894	1	0.169	2.472
Diagnosis of depression	-1.413	0.658	4.611	1	0.032	0.243
Medical comorbidities	-0.499	0.211	5.578	1	0.018	0.607

Model:  $\chi^2(1, N=64)=4.964; p<0.026$ .

## Discussion

The present study is one of the first to focus on healthcare use in low-income rural patients with chronic pain living in medically underserved areas. This provides a rare examination of a unique and understudied population with gross disparities in treatment access and health outcomes. The results suggest that higher scores on self-reported depressive symptoms were associated with greater health services use. This is consistent with previous literature that shows psychological distress is associated with increased healthcare use in patients with chronic illnesses, including chronic pain, and has important clinical implications<sup>44,45</sup>. The results highlight the need for healthcare providers to evaluate symptoms of depression in patients presenting with chronic pain in rural FQHCs, especially as access to specialized mental health services in such locations is extremely restricted<sup>46</sup>.

An important finding of the study suggests that 40% of the participants were prescribed opioids for their chronic pain. This finding is consistent with epidemiological studies examining the proportion of individuals with chronic pain taking prescription opioids<sup>47</sup>. It is noteworthy that those with a clinical diagnosis of depression were more than three times likely to receive opioid prescriptions for their chronic pain. The results are consistent with the suggested role of depression and psychological distress in the likelihood of receiving opioid therapy. Similar results have been found in different clinical populations with non-malignant chronic

pain, including veterans with chronic pain, patients with back pain and patients experiencing whiplash injuries<sup>48,49</sup>. It is plausible that individuals with higher pain levels are experiencing heightened distress and receive more opioid medication. A recent survey examined concerns and problems of patients with non-cancer chronic pain on long-term opioid therapy related to their prescription drugs. The results suggested that patients who were prescribed higher opioid doses reported slightly higher pain intensity and pain-related impact on life than those on lower doses<sup>24</sup>. In addition, patients who were on higher doses reported higher levels of clinically diagnosed depression. It is plausible then that opioids increase the risk of psychiatric illness, thus exacerbating the problem. In this context, there may be additional variables, such as opioid-induced hyperalgesia that contribute towards exacerbating psychological distress<sup>19</sup>. On the other hand, it may be that in rural FQHCs with limited treatment options, distress and depression may be cues for finding a 'stronger' medication option (such as opioids). Additionally, it is possible that the participants of the present study had poorly managed pain, leading to heightened psychological distress.

There is evidence that among individuals with no substance abuse history, those who are clinically diagnosed with depression and prescribed opioids for their pain are more likely to misuse prescription opioids than those who are not<sup>50</sup>. Indeed, it has been reported that individuals with coexistent psychiatric and medical comorbidities such as cardiovascular disorders are at a greater risk for prescription opioid abuse<sup>51</sup>. Given that a high number of the participants





in the present study had comorbid depression (approximately 30%) and medical comorbidities (approximately 86%), opioid prescription is all the more concerning. Furthermore, given that the participants of the present study are medically underserved, it is possible that such FQHCs are the most or only accessible source of health care. Thus, it would be beneficial for the primary healthcare providers at such low-income rural healthcare centers to routinely evaluate a patient with chronic pain for associated psychological distress and mental health status, especially prior to initiating opioid therapy. Offering and providing psychosocial treatments, such as adapted cognitive behavioral interventions, could prove helpful in reducing the need for opioids<sup>52,53</sup>.

There were limitations to the present study. The visits were cumulative of all the visits made to the community care center and not specifically pain-related visits. Furthermore, it is possible that the reported pain intensity, pain-related disability, and opioid prescriptions were additionally influenced by the level of service availability as well as rurality. These data were not available for the present study, hence could not be analyzed. However, it would be useful to analyze these potential variables in the future. Although data pertaining to self-reported depression as well as a diagnosis of depression were collected and analyzed, additional data were not available for other psychiatric comorbidities, such as anxiety, which may have influenced the participants' psychological distress. The sample size was restricted due to the limited availability of medical records at the health centers. Also, due to limited resources, it was not possible to conduct fidelity checks to ensure the accuracy of medical records. For future studies, it would be worthwhile to formally assess other types of healthcare visits, including emergency visits and visits to specialists in rural people with pain to see how much these outlets meet the health services needs of this underserved population.

## Conclusions

Pain in rural areas is an extremely understudied area of research. Patients with pain living in rural areas are often underserved and

poor<sup>31</sup>. They report more pain severity and co-occurring psychological distress with lower or limited access to healthcare services than individuals with chronic pain living in urban areas<sup>7</sup>. The study highlights the association of psychological distress with healthcare use in rural patients. In addition, the patients who were diagnosed with depression and those with a greater number of medical comorbidities were more likely to be prescribed stronger painkillers, opioids, notwithstanding the pain severity. This emphasizes the need to integrate medical and psychological care for such patients at rural healthcare centers. Psychosocial interventions may provide a feasible and cost-effective source of health care that may translate into decreased psychological distress and improved quality of life. Furthermore, alternative interventions for pain may help reduce the perceived need for opioid medications, thus decreasing the associated risk factors. Towards this end, the integration of mental health professionals into primary care, when enacted, may increase access to such services. Other innovative care models, such as group medical visits<sup>54</sup> or peer-led or lay-led self-management and psychosocial intervention groups<sup>55</sup>, may be a way to penetrate limited access areas and offer at least limited services.

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