

HEALTH CARE UTILIZATION AND OPIOID
PRESCRIPTIONS FOR CHRONIC PAIN
IN LOW-INCOME SETTINGS

by

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A THESIS

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ABSTRACT

Chronic pain is a serious health problem with high rates of health care utilization (HCU) and opioid prescriptions (OP). Many patients become stymied in a perpetual cycle of unsuccessful attempts to find relief from suffering through frequent health care visits and opioid prescriptions. Especially within low-income populations, the burdens of health care services and pain medications are especially unpleasant due to significant financial costs, barriers to transportation, and high levels of stress. Research is currently limited in examining the various factors associated with HCU and OP within low-income settings. The Learning About My Pain (LAMP) trial is a randomized comparative effectiveness study of group-based psychosocial interventions (PCORI Contract #941, Beverly Thorn, PI; [clinicaltrials.gov](https://clinicaltrials.gov/ct2/show/study/NCT01967342) identifier NCT01967342) for patients receiving care for chronic pain at low-income clinics in rural and suburban Alabama. As part of the LAMP study, medical records one-year prior to study onset were retrospectively collected for data analysis on HCU and OP. Sociodemographic traits (age, gender, race, poverty status, primary literacy, and education level), pain related variables (pain severity, pain interference, disability, number of pain sites, number of pain types, and opioid prescriptions), and psychological variables (depressive symptoms and pain catastrophizing) were entered into a hierarchical multiple regression model to predict health care utilization. Results suggested that being Black/African-American, having received an opioid prescription in the year prior to treatment onset, and higher depressive symptoms were associated with increased health care utilization for chronic pain conditions. Study findings suggest the need for a biopsychosocial approach to chronic pain management.

DEDICATION

This thesis is dedicated to my mentor, committee members, lab-mates, and all others who have helped and guided me through the process of creating this manuscript. Thank you to those who have supported me and stood by me throughout this project.

LIST OF ABBREVIATIONS AND SYMBOLS

<i>a</i>	Cronbach's index of internal consistency
CP	Chronic pain
df	Degrees of freedom: number of values free to vary after certain restrictions have been placed on the data
<i>F</i>	Fisher's <i>F</i> ratio: A ration of two variances
HCU	Health care utilization
OP	Opioid prescriptions
<i>M</i>	Mean: the sum of a set of measurements divided by the number of measurements in the set
<i>p</i>	Probability associated with the occurrence under the null hypothesis of a value as extreme as or more extreme than the observed value
<i>sd</i>	Standard deviation: the amount of variance of a set of data values
<	Less than
>	Greater than
=	Equal to
≤	Less than or equal to
≥	Greater than or equal to

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The authors report no conflicts of interest related to this work.

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1. INTRODUCTION

Chronic pain is burdensome for patients and the healthcare system. As one of the most common reasons for individuals to seek healthcare services, medical care for chronic pain costs society \$560-\$635 billion annually, due to direct medical treatment costs and lost productivity.³² Although chronic pain is rising in prevalence across all populations in the United States, there are substantial disparities in severity, prevalence, and quality of treatment among vulnerable populations, such as ethnic minorities, financially disadvantaged individuals, older adults, and individuals with low literacy and education.^{13,17,21,27,49,51,53,54} Low-income settings present complex disparities due to patterns of low literacy, low education, and higher proportions of ethnic minorities.^{13,14,17,26,29,41}

Many patients become stymied in a perpetual cycle of unsuccessful attempts to find relief from suffering through opioids and frequent health care visits. Especially within low-income populations, the burdens of pain medications and continual health care services are especially unpleasant due to significant financial costs, barriers to transportation, and high levels of stress. Health care utilization (HCU) has been shown to depend on a variety of factors, such as disability, pain severity, pain intensity, interference with daily life, income, anxiety, fear-avoidance beliefs, and catastrophizing.^{2,6,9,22,28,34,37} There is evidence that depression is a critical factor in both HCU and opioid prescriptions (OP).^{12,18,24,30,35} A study by Braden et al. (2009) found that long-term opioid use rates were three times higher in patients with noncancer pain with a history of depression versus similar patients without a history of depression.¹¹ Opioid users are also more

likely to catastrophize about pain symptoms³³. However, there is a lack of research on HCU and OP within low-income settings.

Naturally, due to the greater health disparities associated with low-income rural and suburban settings, the factors related to HCU and OP likely vary from the large urban medical centers, where research tends to be conducted. A study by Kapoor and Thorn (2014), is one of the first studies to focus on HCU and OP in low-income rural patients with chronic pain. The study found that depression was uniquely predictive of HCU. Additionally, depression and number of medical comorbidities predicted OP. About 40% of chronic pain participants were prescribed opioids for their chronic pain, and those with a clinical diagnosis of depression were more than three times likely to receive opioid prescriptions for their chronic pain. However, the low number of participants in the study ($N = 64$) limited statistical power to find other potentially important relationships. Further, HCU and OP data were collected using a 3-month period in the study, rather than a 12-month time frame prior to trial entry used in the current study, which is likely to increase reliability of findings.

This study aims to examine HCU and OP in rural and suburban low-income areas through medical records over a one-year period. Due to the burdens associated with frequent health care use and the potential side-effects, addictive factors, and long-term health concerns associated with narcotic pain medication, understanding the conditions that drive the prescription of opioids and frequent utilization of health care would help enhance more appropriate and efficient chronic pain management. We hypothesized that depressive symptoms and pain catastrophizing are positively associated with health care utilization and opioid prescriptions within a low-income setting.

2. METHODS

Participants

Design

Medical records and pre-treatment data from the Learning About My Pain (LAMP) trial, a randomized comparative effectiveness study of group-based psychosocial interventions (PCORI Contract #941, Beverly Thorn, PI; clinicaltrials.gov identifier NCT01967342) for patients receiving care for chronic pain at low-income clinics in rural and suburban Alabama.²³ The University of Alabama Institutional Review Board approved the conduct of the study.

Setting

A total of 290 participants with chronic pain were recruited within a network of Community Health Centers administered by Whatley Health Services (WHS), a privately-owned, nonprofit corporation serving low-income patients in West and Central Alabama. Participant coordinators employed from within the community facilitated communication between potential participants and the research team, working as primary recruiters and scheduling coordinators. Participants were additionally recruited by means of flyers, “snow-balling” (participants telling other participants), and other verbal supplementary recruitment methods. Participant coordinators at WHS had access to Protected Health Information (PHI) records of study participants and were trained by the PI to assess for inclusion and exclusion criteria. Participants were compensated \$45 at the conclusion of the pre-randomization assessment.

2.3 Inclusion Criteria

Participants (a) were at least 19 years of age; (b) had at least one chronic pain diagnosis;

(c) experienced pain for more than half of the days for at least 3 months (but not malignant pain such as from cancer or HIV); (d) were able to speak and understand English; and (e) had access to a method of communication for contact, such as a telephone, for study purposes.

2.4 Exclusion Criteria

Participants were excluded if any of the following criteria were met; (a) significant cognitive impairment, as measured by the Short Portable Mental Status Questionnaire⁴⁶; (b) current uncontrolled serious psychological issues (e.g., schizophrenia, bipolar disorder) or active substance abuse; (c) below first-grade literacy levels; (d) major changes in the past four weeks prior to pre-treatment assessment in current pain or psychotropic medication regimen; or (e) current external psychosocial treatments for any pain condition (though psychotherapy for non-pain issues was allowed).

Measures

Data Collection

Medical records at Whatley Health Services were reviewed by Participant Coordinators. The medical data were reviewed retrospectively from the 12 months prior to study onset (see figure 1). Data on demographic, economic/educational, pain, and psychological variables were collected through pre-treatment (baseline) measures. All assessment data were collected by trained assessors. Measures were read out loud to study participants, except for the primary and health literacy measures. Data were recorded on portable electronic tablets or paper backups. The Brief Demographics Questionnaire (BDQ) collected information on sex, age, income, highest level of educational attainment, and race. Educational attainment was measured by self-reported highest school grade. Other measures utilized in this study are described below.

Literacy

Primary literacy was assessed through the Wide Range Achievement Test-4 Word-Reading subtest (WRAT).⁵⁹ Participants read a list of up to 55 words on paper ordered by increasing complexity. Each response was scored as 0 or 1 based on correct or incorrect pronunciation. Scores were converted into grade level equivalency (WRAT GLE) based on a normative sample. The WRAT4 demonstrates excellent internal consistency reliability ($\alpha = .92$) and alternate-form test-retest (.85) reliabilities.⁵⁹

Pain Severity and Interference

Pain Severity and Interference were assessed through the Brief Pain Inventory (BPI).¹⁶ Pain severity scores were calculated from the mean of four items asking participants to rate the most severe pain, least severe pain, and average pain over the past 7 days, and current pain on an 11-point Likert Scale ranging from 0 (no pain) to 10 (pain as bad as you can imagine). Pain interference scores were calculated from the mean of 7 items asking participants to rate interference due to pain in various domains on an 11-point Likert scale ranging from 0 (no interference) to 10 (complete interference). The BPI shows excellent internal consistency in a variety of pain populations and concurrent validity with other pain instruments⁵⁰, and the internal consistency (Cronbach's α) in the current sample was $> .90$. The sample mean for the BPI Intensity scale at baseline was 6.5 ($SD = 1.6$), which is considered moderate to severe pain warranting analgesic intervention.¹⁵ The sample mean for the BPI Interference scale at baseline was 6.6 ($SD = 2.0$).

Disability

Disability was assessed through the Patient-Reported Outcomes Measurement Information System Physical Function v1.0 Short Form 20a (PROMIS PF-20). Developed by the National Institutes of Health (NIH) to measure self-reported capability in performing various

activities, such as walking, self-care, climbing stairs, exercise, and carrying groceries, among others, the PROMIS PF-20 is a 20-item module with possible total scores ranging from 20 to 100. Fourteen items ask how much difficulty an individual has with performing certain activities on a scale from 1 (unable to do) to 5 (without any difficulty). The last 6 items ask how much their health limits certain activities on a scale from 1 (cannot do) to 5 (not at all). For the current study, the PROMIS PF-20 was reverse scored to indicate greater impairment or disability in physical functioning with higher scores. Total scale scores range from 20 (highest functioning, lowest disability) to 100 (lowest functioning, highest disability). The PROMIS PF-20 demonstrates excellent internal consistency (Cronbach $\alpha > .90$) in previous research⁵ and within the current sample (Cronbach's $\alpha > .90$).

Depressive Symptoms.

The Patient Health Questionnaire-9 (PHQ-9) is a 9-item self-report module created from the full PHQ to measure depressive symptoms.³⁹ Each item is measured on a scale of 0 (not at all) to 3 (nearly every day). Scores can range from 0 to 27 in severity with higher scores indicating greater severity of depressive symptoms. The internal reliability of the PHQ-9 is high, with Cronbach's alpha of .89. Test-retest reliability is also reported as excellent.³⁹ Within the current sample, PHQ-9 demonstrates high internal consistency (Cronbach's $\alpha = .87$). The average score on the PHQ-9 was 12.1 ($SD = 6.4$), representing moderate to moderately severe levels of depression.³⁹

Pain Catastrophizing.

The Pain Catastrophizing Scale (PCS) measures levels of catastrophic thinking about pain.⁵⁷ Pain catastrophizing can be described as highly negative thoughts about pain and its impact on one's life.⁴⁸ There are 13 items, measured using a 5-point Likert scale ranging from 0

(not at all) to 4 (all the time), indicating the degree to which participants have specific thoughts and feelings related to experiencing pain. An example statement is, “When I have pain I feel I can’t go on.” Higher scores indicate higher levels of catastrophic thinking. The internal reliability of the PCS is excellent, with Cronbach’s alpha of .87.⁵⁷ Within the current sample, PCS demonstrates excellent internal consistency (Cronbach’s $\alpha = .94$). The average score on the PCS was 30.6 ($SD = 13.2$), suggesting clinically significant levels of pain catastrophizing.⁵⁷

Number of pain sites and number of pain conditions.

A Structured Pain Interview evaluated the number of anatomical sites in which participants experienced pain. Study participants circled all sites in which they experienced pain from a list of bodily locations (e.g. head, face or jaw, neck). Number of pain sites were calculated by the sum of pain sites endorsed. Study participants were also asked for the types of pain they experience (e.g. arthritis, low back pain, fibromyalgia). Number of pain conditions was calculated by the sum of pain conditions endorsed.

Medical Records.

Health care utilization and pain related medications were collected through medical records obtained at WHS (see Figure 1). Participant Coordinators at WHS retrospectively transcribed participant data on number of medical visits one year prior to entering the study as the measure of HCU. All participant visits to WHS were related to pain management. Opioid prescriptions were retrospectively transcribed by Participant Coordinators over the same one-year period.

Statistical Analyses

The study examines potential factors associated with HCU and OP. SPSS version 23.0³¹ was used to analyze the data. Since 52% of the study population reported having an annual income below \$11,490, suggesting a lack of variability in income, self-reported income was

dichotomized into below and above poverty line according to the Department of Health and Human Services household-size adjusted poverty threshold [<https://aspe.hhs.gov/poverty-guidelines>]. Pearson product-moment correlations examined the relations between all continuous variables. Point-biserial correlations examined dichotomous with continuous variables. Phi correlations examined the relations between dichotomous variables.

Hierarchical multiple regressions examined the main effects of demographic, socio-economic, pain-related, and psychological variables on health care utilization and opioid prescriptions. Race, sex, poverty status, and opioid prescriptions were dummy-coded with higher values assigned to Black/African-Americans, Females, below poverty status, and prescribed opioid(s) one year prior to treatment onset, respectively. Outliers beyond three standard deviations from the mean number of health care visits were determined to be spurious and were excluded from analyses ($n = 5$). The assumptions for these models were examined and confirmed.

3. RESULTS

Participant Results

Descriptive details of the 290 study participants are included in Table 1. The sample is characterized by high rates of poverty in which 72.4% of the sample is below the poverty line. The majority of study participants were female (70.7%) and Black/African-American (66.9%). Study participants tend to have extensive histories of chronic pain, with an average pain duration of 16.6 years ($SD = 12.2$), and with multiple pain types and pain sites. Over a one-year period prior to treatment onset, 191 study participants (67.5%) were prescribed at least one opioid medication. Study participants went an average of five to six times to WHS for health care services related to chronic pain treatment and management over this one-year period. Pearson product-moment, point-biserial, and phi correlations for all variables are presented in Table 2.

Hierarchical Multiple Regression Results

Due to the lack of significant correlations, OP was not examined as a dependent variable. A hierarchical multiple regression examined HCU as the dependent variable. Demographic variables (race, sex, and age) were entered on block 1. Socio-economic variables (poverty status, education, and WRAT) were entered on block 2. Pain-related variables were entered on block 3 (PROMIS PF-20, BPI Severity, BPI Interference, number of pain sites, number of pain types, and opioids). Psychological variables (depressive symptoms and pain catastrophizing) were entered on block 4. The overall model was significant, $F(14, 251) = 2.67, p < .01$, accounting for a total of 13% of variance. Demographic, socio-economic, pain-related, and psychological variables accounted for a total of 2.9%, .2%, 6.2%, and 3.7% of unique variance, respectively.

Analyses indicated that race, opioids, and depressive symptoms (PHQ-9) were significantly related to HCU, such that Black/African-American participants, participants who received at least one opioid prescription in the year prior to treatment onset, and participants with higher depressive symptoms tended to have a greater number of health care visits.

4. DISCUSSION

This study examines factors related to HCU and OP. Due to the lack of correlations between variables and opioid prescriptions, HCU was the only dependent variable examined by means of hierarchical multiple regression. Results suggest that depressive symptoms, opioid prescriptions, and race are associated with higher health care visits in low-income settings for chronic pain conditions. The majority of study participants (68%) visited WHS for chronic pain between 0 to 11 times in one year. HCU in this study sample was similar to that reported in rural settings³⁶, about one health care visit every two months on average. Due to the data collection of OP as a dichotomous variable over a one year duration, comparison of opioid rates with other studies is difficult. In a study of 2,104 participants, 55.89% reported current opioid use for non-cancer chronic pain at the time of patient visit.²⁴ In contrast, our study found 67.5% participants were prescribed an opioid over an entire year duration. Although the data collection of opioid prescriptions in this study does not allow for analysis of opioid use at specific time points, the contrast between 55.89% current opioid use and 67.5% over a year suggests substantially lower rates of opioid prescriptions in this low-income setting. Access to opioid medications has been shown to be limited in communities with a high proportion of minority inhabitants⁴³.

Sociodemographic Factors

Among demographic and socio-economic factors, race was the only factor significantly related to HCU. Previous research has demonstrated that race was either not associated with HCU^{42,45}, or visits were less frequent among Black/African-Americans, especially among low-income Black/African-American males.⁴⁵ Studies have also found that African-American

individuals are more likely than White individuals to obtain care in emergency departments rather than clinics.⁸ This study found that Black/African-American individuals were more likely to seek health care services than White/Caucasian individuals. In this setting, the closest emergency departments tend to be farther away than Community Health Centers (CHC's), potentially increasing the likelihood of seeking health care services from CHC's. It also may be the case that Black/African-American individuals in this low-income setting are more willing to receive services from CHC's due to fee adjustments based on income. In contrast, fee adjustments do not typically occur for low-income or uninsured individuals in private medical clinics. Future research is needed to examine potential variables to explain the relationship between race and HCU in low-income settings.

Many studies have established relationships between HCU and various sociodemographic factors. In particular, research has demonstrated different predictors of HCU among men and women.³⁴ Therefore, it might be useful in future analyses to examine men and women separately. Older age has been found to be associated with increased HCU.² Education and employment have also been found to correlate positively with HCU.⁴⁵ The lack of significant relationships with sociodemographic factors besides race suggest that within this low-income setting, other factors such as depressive symptoms and OP may better account for the variability in HCU.

Pain-related Factors

Many studies have reported strong relationships between pain severity, pain interference, and disability with HCU.^{2,4,6,9,34} In contrast to prior research, this study did not find significant relationships between pain-related variables and number of health care visits. However, the non-significant relation between pain and HCU was also reported by Kapoor and Thorn (2010). Due to a long history of chronic pain (average pain duration is 16.6 years), participants in this study

may no longer be motivated by pain to seek health care services. Given the barriers in access and inadequacy of chronic pain treatment in low-income settings, as well as high levels of perceived invalidation, stigma, and discrimination in health care settings^{1,19,20,58}, pain itself may not be a strong enough motivator to seek health care services.

Having an opioid prescription one year prior to treatment onset was associated with increased HCU. This is consistent with prior research.²⁵ Opioids logically necessitate more frequent health care visits due to close monitoring of potential adverse events and potential misuse associated with opioid usage. At the same time, it may be the case that participants who more frequently visit physicians are more likely to receive opioid prescriptions due to perhaps established rapport with the physician and physician perceptions of the patients' greater difficulty with the chronic pain condition. Studies have shown that opioid users have more severe phenotypic profiles than nonopioid users, with higher rates of depression, anxiety, and pain severity.²⁴ However, due to the categorical nature of opioid prescriptions over a lengthy period (versus current opioid usage), potential relations between opioids and other variables may have been diminished. Therefore, the relation between OP and HCU may be explained by other factors that were not possible to explore given the data collection methods of this study.

Psychological Factors

The role of psychological factors in chronic pain has been an area of substantial research. In particular, depression is highly co-morbid with chronic pain.^{38,40,41} Depression has been shown to be associated with higher HCU.^{2,6,37} Although pain catastrophizing was non-significant, there is research to suggest that individuals with depression and pain-related fear have even higher health care use than individuals with just depression.¹⁰ Therefore, future research should examine potential mediation relations between depressive symptoms and pain catastrophizing with HCU.

Since the pain-related variables were not related to HCU, results suggest that the appraisal of pain might be more important than the pain condition itself. Patients with depressive symptoms are more likely to engage in maladaptive coping strategies that negatively influence pain management, perhaps leading to greater HCU. At the same time however, it is possible that patients who frequent health care facilities become more depressed due to the frustrations of unsuccessful treatments, and perceived invalidation, stigma, and discrimination.

Limitations

Although this study offers an examination of variables related to HCU and OP in an underserved and unexamined population with chronic pain, the study has several limitations. Due to potential complications in pain management associated with comorbidities, this study is limited in not accounting for comorbid illnesses, such as obesity and diabetes. The study was hindered by the data collection methods of OP, in which information on number of tablets and refills were not collected, rendering it impossible to calculate total and daily morphine equivalents. The categorical nature of the opioids variable likely rendered many analyses non-significant. In particular, a dichotomous opioid variable may not be appropriate over a one-year duration, in which a participant having received an opioid prescription 11 months prior to treatment onset may look entirely different from a participant having received opioids multiple times over a one year period. These analyses are also conducted in retrospect. Therefore, we are not able to say that sociodemographic, pain-related, or psychological variables predicted HCU. The direction of relationships, and causality, are not possible in this study.

HCU and OP may have also been influenced by a change in policy at WHS. In June 2014, WHS sent a notice throughout its clinics instructing prescribers to not treat pain conditions with opioids. Even though many physicians were still prescribing opioids, and seeing patients for

their pain conditions, it is possible that study participants experienced changes in the number of health care visits and opioid prescriptions due to this change in policy. We unfortunately do not have a way to directly measure the changes in health care services caused by the change in Whatley's new policy. Therefore, we cannot eliminate the potential effects on the validity of the study.

Conclusions

Chronic pain is a costly and stressful condition that is difficult to manage and is one of the most common reasons for seeking health care services³². With an expected increase in chronic pain due to a growing older adult population, there is an urgency to bring health care costs into a sustainable range.^{7,32,44} Many patients are angry and frustrated with the numerous unsuccessful interventions, missed workdays, lost wages, decreased productivity, and exorbitant fees spent on medical visits, medications, and surgeries.^{47,52} There are also many potential harms from diagnostic assessments, medications, and surgeries.^{7,56} Opioids have many potential side-effects, risk of tolerance, drug dependence, and addiction.⁵⁵ Within low-income settings, health care related issues are compounded by already high stress levels, transportation barriers, and financial constraint.

According to a biopsychosocial model, focusing solely on the biological and physical symptoms of chronic pain is not sufficient management due to the interaction of physical factors with social and psychological factors. The combination of a long history of chronic pain and frequent health care visits (about one visit every other month) suggests that biomedical interventions are not sufficient in targeting pain management. Based on the results from this study and previous research, we recommend a biopsychosocial approach for chronic pain management. Targeting psychosocial factors are likely to benefit patients by providing essential

coping skills, increasing self-efficacy, reducing illness related stigma, improving quality of life, all perhaps reducing health care utilization.³⁷

Figure 1. Timeline of retrospective data collection of medical records.

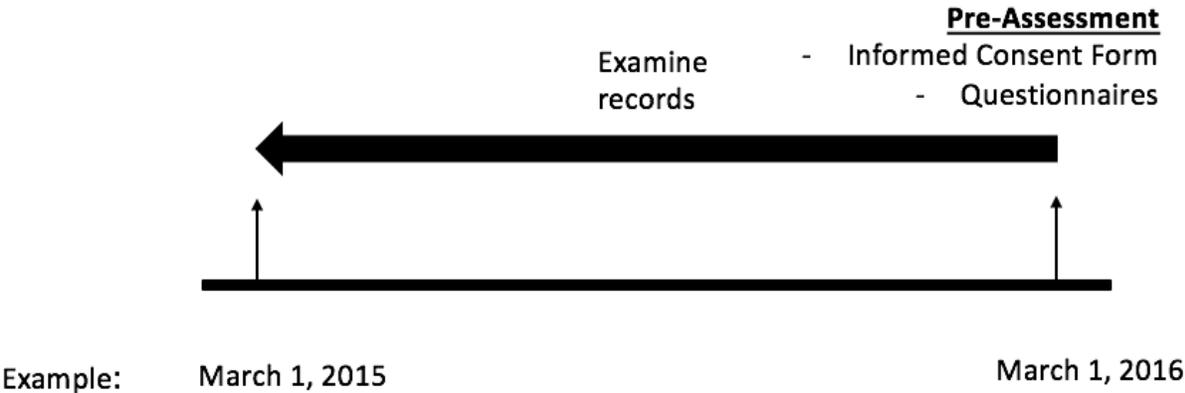


Table 1. Sociodemographic, pain, and psychological characteristics of study participants ($N = 290$).

Sociodemographic Characteristics

Gender, n (%)	
Male	85 (29.3)
Female	205 (70.7)
Age (years), mean (SD)	
	50.6 (8.9)
Race, n (%)	
White	96 (33.1)
Black or African American	194 (66.9)
Highest grade completed, n (%)	
Grades 8 and below	21 (7.3)
Grades 9-11	78 (27.1)
Grade 12	107 (37.2)
Grades 13+	82 (28.5)
Poverty Status, n (%)	
Below poverty threshold	210 (72.4)
Above poverty threshold	70 (24.1)
Grade level equivalent literacy level, n (%)	
1 st - 2 nd grade	25 (8.6)
3 rd - 4 th grade	79 (27.2)
5 th - 6 th grade	52 (17.9)
7 th - 8 th grade	24 (8.3)

9 th - 10 th grade	37 (12.8)
11 th - 12 th grade	33 (11.4)
Above 12 th grade	40 (13.8)
Chronic Pain History	
Pain Duration (years), mean (SD)	16.6 (12.2)
Number of Reported Pain Sites, mean (SD)	6.2 (3.1)
Type of Pain, <i>n</i> (%)	
Musculoskeletal	258 (89.0)
Arthritis	220 (75.9)
Headache	135 (46.6)
Pelvic Pain	96 (33.1)
Nerve Pain	92 (31.7)
Number of Reported Pain Types, mean (SD)	4.7 (2.7)
Opioids, <i>n</i> (%)	
Prescribed	191 (67.5)
Not prescribed	92 (32.5)
Number of health care visits, mean (SD)	5.59 (5.79)
BPI Severity, mean (SD)	6.5 (1.6)
BPI Interference, mean (SD)	6.6 (2.0)
PROMIS PF-20, mean (SD)	59.6 (12.6)
Psychological Characteristics	
PHQ-9, mean (SD)	12.1 (6.4)
PCS, mean (SD)	30.6 (13.2)

Table 2. Correlation matrix for sociodemographic, psychological, and pain-related variables.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Race	–	–	–	–	–	–	–	–	–	–	–	–	–	–
2. Sex	.00	–	–	–	–	–	–	–	–	–	–	–	–	–
3. Age	.11	.10	–	–	–	–	–	–	–	–	–	–	–	–
4. Poverty status	.05	.01	-.24**	–	–	–	–	–	–	–	–	–	–	–
5. Education	.10	.10	-.03	-.09	–	–	–	–	–	–	–	–	–	–
6. WRAT	-.40**	.11	-.16**	-.03	.33**	–	–	–	–	–	–	–	–	–
7. Number of pain sites	-.08	.00	.01	.07	.10	.07	–	–	–	–	–	–	–	–
8. Number of pain types	-.11	.05	-.08	.09	.23**	.15*	.62**	–	–	–	–	–	–	–
9. BPI Severity	.16**	-.02	-.14*	.10	.07	-.20**	.11	.17**	–	–	–	–	–	–
10. BPI Interference	.01	-.07	-.21**	.09	.02	-.12*	.26**	.21**	.59**	–	–	–	–	–
11. PROMIS PF-20	.08	.02	.00	.07	.09	-.03	.26**	.23**	.43**	.58**	–	–	–	–
12. PHQ-9	-.07	.03	-.20**	.09	-.04	-.06	.21**	.25**	.36**	.53**	.47**	–	–	–
13. PCS	.10	-.06	-.17**	.18**	-.06	-.23**	.14*	.16**	.45**	.53**	.41**	.64**	–	–
14. Opioids	-.01	.01	.03	-.09	-.09	-.04	-.02	.07	.01	.03	.04	.03	.03	–
15. HCU	.13*	-.04	-.10	.05	-.01	-.07	.07	.09	.11	.16**	.19**	.26**	.23**	.17**

* Significant at the .05 level.

** Significant at the .01 level.

Table 3. Summary of hierarchical multiple regressions of health care utilization on sociodemographic, pain-related, and psychological variables.

Predictors	ΔR^2	B	Std. Error	Beta	P-value
Step 1	.031*				
Race		1.17	.52	.14	.03
Sex		-.23	.54	-.03	.68
Age		-.05	.03	-.11	.08
Step 2	.001				
Race		1.05	.60	.12	.08
Sex		-.18	.55	-.02	.75
Age		-.05	.03	-.11	.09
Poverty Status		.15	.59	.02	.80
Education		-.02	.13	-.01	.90
WRAT		-.04	.08	-.04	.62
Step3	.071**				
Race		1.11	.60	.13	.06
Sex		-.23	.54	-.03	.68
Age		-.05	.03	-.11	.11
Poverty Status		.17	.59	.02	.78
Education		-.04	.13	-.02	.78
WRAT		-.03	.08	-.03	.72
PROMIS PF-20		.05	.03	.14	.06
BPI Severity		-.08	.19	-.03	.67

BPI Interference	.10	.17	.05	.58
Number of pain sites	.02	.10	.01	.86
Number of pain types	.06	.12	.04	.60
Opioids	1.39	.53	.16	.01
Step 4	.041**			
Race	1.27	.59	.15	.03
Sex	-.35	.54	-.04	.52
Age	-.03	.03	-.07	.27
Poverty Status	.13	.59	.01	.83
Education	.00	.13	.00	.98
WRAT	.00	.08	.00	.98
PROMIS PF-20	.03	.03	.08	.31
BPI Severity	-.12	.19	-.05	.54
BPI Interference	-.06	.18	-.03	.72
Number of pain sites	.03	.10	.02	.80
Number of pain types	.02	.12	.01	.90
Opioids	1.41	.52	.16	.01
PHQ-9	.13	.05	.21	.02
PCS	.02	.03	.06	.49

* Significant at the .05 level.
 ** Significant at the .01 level.

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APPENDIX

Office for Research
Institutional Review Board for the
Protection of Human Subjects

July 12, 2013



Beverly Thorn, Ph.D.
Department of Psychology
College of Arts & Sciences
The University of Alabama

Re: Medical IRB Protocol # 10-021-ME-R3
"Reducing Disparities with Literacy-Adapted Psychosocial
Treatments for Chronic Pain: A Comparative Trial"

Dr. Thorn:

The University of Alabama Medical IRB has received the revisions requested by the full board on 6/14/13. The board has reviewed the revisions and your protocol renewal application is now approved for a one year period.

Your application will expire on June 13, 2014. You will receive a notice of the expiration date 90 days in advance. If your research will continue beyond this date, complete the renewal portions of the FORM: IRB Renewal Application. If you need to modify the study, please submit FORM: Modification of An Approved Protocol. Changes in this study cannot be initiated without IRB approval, except when necessary to eliminate apparent immediate hazards to participants. When the study closes, please complete the FORM: Request for Study Closure.

Should you need to submit any further correspondence regarding this application, please include the above application number.

Good luck with your research.

Sincerely,

A blue ink handwritten signature of John C. Higginbotham.

John C. Higginbotham, Ph.D., MPH
Medical IRB Chair
The University of Alabama



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