PRE-TREATMENT ANALYSIS OF THE DEMOGRAPHIC AND PSYCHOSOCIAL

CHARACTERISTICS OF RURAL ALABAMA PATIENTS WITH CHRONIC PAIN

by

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A THESIS

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ABSTRACT

Rural residency and low socioeconomic status (SES) are associated with increased likelihood of chronic pain. Previous literature suggests numerous pain-related variables vary with age and sex, and research on pain and race indicates that African-Americans (AA) report greater pain in a variety of chronic pain conditions. SES, rurality, and race are correlated, and their impact on the experience of chronic pain is compounded by widespread treatment disparities. This study reports on the pre-treatment demographic and psychosocial characteristics of a virtually unstudied population of rural patients with chronic pain. One-hundred-and-six rural Alabama patients completed validated measures of pain, interference, perceived disability, depression, quality of life, and catastrophizing. Descriptive statistics, hierarchical regression analyses, and exploratory mediation analyses of their psychosocial measures and demographics are presented. Calculated means and standard deviations are reported in reference to published norms. Average age of study participants was 52-years, 78% were female, 77% were AA, 72% reported annual income between 00,000-12,999, and 60% were unemployed. Although average years of education were 12.40, average reading level percentile was 17.35. Results indicate that when the demographic variables are controlled for: 1)Depression significantly predicted quality of life; 2) Both pain intensity and depression predicted pain interference, and depression partially mediated the relation between pain intensity and pain interference; and 3) Pain intensity significantly predicted perceived disability. Surprisingly, none of the demographic variables nor catastrophizing

significantly predicted the outcome variables. These preliminary analyses provide insight

into demographic and psychosocial factors associated with chronic pain in a low-literacy,

low-SES rural population.

DEDICATION

This thesis is dedicated to my grandma, Mary Loretto Morgan. My source of strength, inspiration, and faith.

LIST OF ABBREVIATIONS AND SYMBOLS

a   Cronbach's index of internal consistency

df   Degrees of freedom: number of values free to vary after certain restrictions have been placed on the data

F   Fisher's *F* ratio: A ration of two variances

p   Probability associated with the occurrence under the null hypothesis of a value as extreme as or more extreme than the observed value

r   Pearson product-moment correlation

t   Computed value of *t* test

SD   The average distance of the scores from the mean of the probability distribution

SE   The standard deviation of the sample mean estimate of a population mean

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INTRODUCTION

Chronic pain affects over 48 million Americans annually.[48] However, this figure may be considered an underestimate as it is well established that pain is both underdiagnosed and undertreated.[109] Fundamental health, treatment, and ethnicity disparities are well documented across a broad range of samples, settings, and types of pain.[109] The major disparity stratification hierarchies are age, sex, race, and socioeconomic status (SES).[11,25,67] Rural health disparities are also of notable concern.[6]

A number of studies have reported that prevalence rates of chronic pain vary with age; however, the relationship does not appear to be linear, with documented prevalence reaching a maximum between 45 and 65 years-of-age.[7,17,89,120] Research regarding age-related psychosocial differences and pain-related outcomes is equivocal. Whereas some studies have found pain and related outcomes such as depression, pain interference, and disability increase with age, others have found that they decrease, and still others yet have demonstrated stronger similarities than differences across age groups.[84,104,115] The equivocal nature of age-related research findings suggests that mediational variables may contribute.

In an extensive review, Unruh (1996) found that women are more likely than men to experience chronic pain, and report pain of greater intensity, frequency, and duration.[116] Catastrophizing, a negative mental set about real or anticipated pain, is a robust predictor of pain-related outcomes and has been shown to be higher in women than men.[34,56,108] Furthermore, compared with men, women with chronic pain are more likely to report depression.[14,47,114]

Race remains an important differentiating factor in the pain experience. Considerable evidence suggests African Americans report greater pain intensity in acute clinical pain and

in heterogeneous chronic pain conditions.[18,23,25,29,36,95,97,99,123,124] African Americans with chronic pain report higher levels of pain catastrophizing than White Americans, which may partially account for racial differences in pain perception.[25,38,49,88] Additionally, research suggests race differences in chronic conditions may be conditional upon intervening factors such as SES.[3,63,71,126]

SES represents a dynamic, multidimensional construct that is a robust determinant of health outcomes. Low SES has been linked to maladaptive pain beliefs and coping strategies and more severe distress attributed to pain.[21,35,81,86] There is evidence that SES is a unique predictor of health, independent of other influential variables including age, sex, and race; furthermore, SES may explain previously reported differences in these factors.[25,126]

Taken together, the limited research on the experience of chronic pain in rural patients suggests annual income below $25,000, no high school diploma, and rural residency are associated with a higher incidence of chronic pain.[52,75,79] A gap in the literature exists in that relatively little research has examined the aforementioned demographic variables and the influence of psychosocial factors within a rural chronic pain population.

The current study seeks to begin to fill these gaps by reporting on a cross-sectional analysis of the pre-treatment characteristics of a rural Alabama sample. The primary aim was to explore the predictive ability of key demographic and psychosocial variables (race, sex, age, education, reading level percentile, pain intensity, depression, and catastrophizing) in relation to various pain-related variables (quality of life, pain interference, and perceived disability).

METHODOLOGY

Design

A sample of rural Alabama chronic pain patients were interviewed and assessed for potential participation in a treatment outcome study. This study was conducted in four rural Alabama counties, Greene, Pickens, Wilcox, and Walker.

Participants

A priori power calculations were conducted to determine the sample size required to detect a significant model. In order achieve adequate power to detect a medium effect size, a sample of at least 82 was required. In the current study, 106 adult chronic pain patients were recruited from the Pine Apple Rural Health Clinic, Picken's Medical Center, Greene County Hospital, and the Capstone Rural Health Center. Study inclusion criteria were: (1) age 19 years of age or older; (2) received at least one diagnosis consistent with chronic pain (due to any cause that is non-malignant) from a physician participating in the study; (3) reported having experienced pain most days of the month, for the previous 3 months. Study exclusion criteria included the following: (1) HIV-related pain and cancer pain because these are associated with malignant disease; [66] (2) significant cognitive impairment, evidenced by a positive screen on the Mini-cog; [15] (3) no history of schizophrenia, bipolar affective disorder, seizure disorder, or substance abuse as these conditions could result in psychiatric emergency during treatment.

Measures

Demographics Questionnaire. A brief demographics questionnaire was developed for this study to determine sample characteristics. The questionnaire required the participant to self-report information pertaining to race, age, sex, disability status, income, occupation (past

and present), employment status, and years of education. This study relied upon level of educational attainment as a proxy for premorbid SES. Several authors have noted education is a stable and constant measure of SES, and research suggests that it is education that shapes later occupational standing and income.[73,86]

Structured Pain Interview. This interview was adapted from Blanchard and Andrasik (1985) to determine patient report of type(s) of pain, site(s) of pain, and primary pain type and site.[12] The interview also allowed the investigator to determine any conditions that may contraindicate participation in the study, such as pain associated with malignant disease (i.e., cancer pain, HIV pain).

Wide Range Achievement Test-4 (WRAT-4) Reading/Word Decoding subtest. The WRAT-4 reading/word decoding subtest (blue form) was used to assess the reading level of participants.[125] Participants are asked to read a list of 33 words of increasing difficulty. Responses are scored on accuracy in pronunciation and grade equivalency and percentile scores are calculated. The WRAT-4 Reading subtest has been shown to have strong internal consistency ($\alpha=.91$), content validity, and construct validity.[125] Some evidence indicates that reading level may be a better reflection of true educational attainment than number of years of education.[85] Therefore, the predictive capacity of reading percentile was investigated in the statistical model.

Mini-cog. The Mini-cog was developed as a short (2-5 minutes administration time) assessment of cognitive impairment to be used in primary care settings.[15] The Mini-cog utilizes a memory recall test of three words, and a clock drawing test as a distracter. The Mini-Cog showed high sensitivity (99%) and specificity (96%) in a community sample of

ethnolinguistically diverse older adults, and specificity in a more main stream sample of adults.[15,16]

Pain severity and interference. Pain data was collected via the Wisconsin Brief Pain Inventory (BPI).[30] Respondents rate their most severe pain, least severe pain, and average pain over the past week as well as their current pain levels on an 11-point Likert scale ranging from 0 (*no pain*) to 10 (*pain as bad as you can imagine*). Participants also rate interference due to pain in activities such as mood, sleep, etc. on an 11-point Likert scale ranging from 0 (*no interference*) to 10 (*complete interference*). The BPI has adequate internal consistency ($\alpha = .85$) in a variety of pain populations and concurrent validity with other pain instruments.[30,129]

Perceived disability. Both the Roland-Morris Disability Scale-11 item version (RMDS-11) and the Disability Rating Index (DRI) were used to appraise perceived disability due to pain in terms of limitations in daily activities, help seeking, and changes due to pain in sleep, appetite and affect.[90,105] On the RMDS-11 participants endorse items that have been true over the past month, and a total score (range 0 to 11) is obtained by summing the number of items endorsed. Use of the shortest form of the scale is merited as scores on the 11-item version correlate highly with scores on longer 18 and 24-item versions (r=.949 and r=.929 respectively). The 11-item scale has been shown to have adequate reliability that is comparable to the 24-item version ($\alpha = .88$), and strong concurrent validity.[105]

The DRI is a 12-item instrument for assessment of physical disability, mainly intended for clinical settings. Patients mark on a 100-mm visual analog scale (VAS) in accordance with their presumed ability to perform the activity in question. The anchor points are 0 (*without difficulty*) and 100 (*not at all*). An index is achieved by measuring the distance

in mm between the zero points and the patient's markings on the VAS. The mean of these measurements provides the DRI expressed in percent of the highest possible rating. The DRI has high reliability, and validity tests demonstrate that the instrument is practical, acceptable, and discriminates well across a number of chronic pain conditions, ages, and genders.[90]

Depression. The Center for Epidemiological Studies Depression Scale (CES-D) is a 20-item questionnaire designed to detect a variety of depressive symptoms and has been validated for use in chronic pain patients.[114] Respondents are asked to rate the frequency with which each item occurred over the previous 7 days on a 4-point Likert scale ranging from 0 (*rarely or less than one day*) to 3 (*most or all of the time, 5-7 days*). Total scores range from 0 to 60, with higher scores indicating greater depression, and a score of greater than 19 is used to denote clinically relevant depression.[115] The CES-D has high internal consistency, adequate test-retest reliability, and convergent as well as discriminant validity. Reliability, validity, and factor structure of the CES-D are similar across a wide variety of demographic characteristics in the general population samples tested.[80]

Quality of life. The Quality of Life Scale (QOLS) is a 7-item scale and was used to assess the degree of participant satisfaction with various areas of their life.[24] The QOLS utilizes a 7-point Likert scale and total scores range from 7 to 49, and lower scores indicate lower quality of life. This scale has been shown to correlate moderately with distress, and weakly with measures of functioning and pain intensity, indicating the QOLS is measuring a unique construct different than pain or disability. A psychometric analysis of the QOLS showed it to be internally consistent, reliable across time, and representative of a single construct.[24]

Catastrophizing. The Pain Catastrophizing Scale (PCS) was used to measure catastrophizing.[107] The 13-item measure asks respondents to rate, using a 5-point Likert scale ranging from 0 (*not at all*) to 4 (*all the time*), the degree to which they have certain thoughts and feelings when experiencing pain. A total score for overall catastrophizing is equal to the sum of the raw scores. Higher scores indicate greater use of catastrophic thinking. The PCS has exhibited strong internal consistency (α=.93), concurrent and discriminant validity, and high test-retest reliability over a 6 wk period ($r = 0.78$).[76,107,117]

Procedure

Following telephone screening to determine initial eligibility, participants were scheduled for a 90-minute face-to-face interview during which informed consent was obtained, and a structured pain interview and standardized, validated measures of pain intensity, pain interference, perceived disability, depression, quality of life, and catastrophizing were administered. The items on all measures (except the WRAT-4 reading/word decoding subtest) were read to the participant by the study investigator conducting the interview. Demographic information including sex, race, age, disability status, income, occupation, employment status, reading level, and years of education were obtained to determine sample characteristics. Statistical analyses were then conducted.

Statistical Analyses

Descriptive statistics were obtained to determine the means and standard deviations for various demographic variables, and measures of catastrophizing, pain intensity, pain interference, depression, perceived disability, and quality of life. Pearson product moment correlations were used to determine bivariate relations among pain related variables.

Separate hierarchical regression analyses were then conducted to predict variance in each of the following criterion variables: (a) quality of life (QOLS); (b) pain interference (BPI); and (c) perceived disability (RMDS, DRI). Covariates included time since onset of pain, and disability seeking status. Nonsignificant covariates were removed from the final models. Predictors included race, sex, age, number of years of education, age-adjusted reading level percentiles, pain intensity, depression, and pain catastrophizing.

For each regression analysis, parametric assumptions of normality, equality of variances and independence were examined to ensure appropriateness of selected statistics. Omnibus tests for the regression models predicting each of the criterion variables were measured using the F statistic.

Mediation analyses were conducted to determine the nature of the relations between the independent variables in reference to the outcome variables. Mediation models to be tested were identified based on the relationships observed across the predictors for each of the hierarchical regression analyses. First, the criteria for mediation according to Baron and Kenny (1986) were tested via a series of linear regression models.[9] Referencing the paths depicted in Figures 1-4, it was determined that: 1) the independent variable was significantly related to the dependent variable (direct paths $c_1, c_2, c_3,$ and c_4); 2) the independent variable was significantly related to the proposed mediator (paths $a_1, a_2, a_3,$ and a_4); and 3) that each proposed mediator was significantly related to the dependent variable (paths b_1, b_2, b_3, and b_4,) while controlling for the effects of the independent variable. Second, the non-parametric bootstrapping procedure as described by Preacher and Hayes (2004) was implemented to test for simple mediation.[79] The indirect effect is represented by the product of the coefficients (e.g., $a_1 b_1$ in Figure 1). The bootstrapping procedure makes no assumptions about the shape

of the distributions of the variables or the sampling distribution of the statistic, thus, unlike the Sobel test, it avoids making the potentially erroneous assumption that the indirect effect is normally distributed.[103] Tests of simple mediation were based on 1000 bootstrap re-samples to describe the confidence intervals of indirect effects. The significance of bootstrap data is interpreted by determining whether zero is contained within the confidence interval. If zero is contained within the confidence interval, then it cannot be determined that the result is significantly different from zero. All bootstrap mediation analyses that were significant at the 95% confidence interval were then re-conducted to determine significance at the 99% confidence interval.

RESULTS

Descriptive statistics were obtained to determine the nature of the sample. The sample demographics are presented in Table 1. The average age of study participants was 52 years, and the vast majority was female (78%) and African American (77%). Self-reported disability status was "on disability" (44%), "seeking disability" (22%) and "not on or not seeking disability" (34%). The majority of the participants reported an income between 00,000-12,999 (72%), and slightly more than half were unemployed (60%). In this sample, the average number of years of education was 12.4, although the average reading level percentile was 17.35. Calculated means and standard deviations for the psychosocial outcomes are presented in relation to published normative data in Table 2.

To explore the relationships between the predictor variables of race, sex, age, number of years of education, age-adjusted reading level percentiles, pain intensity, depression, and pain catastrophizing, and the outcome variables of quality of life, pain interference, and perceived disability, separate hierarchical regression analyses were conducted. For all

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analyses, parametric assumptions of normality, equality of variances and independence were met. The regression outcomes are presented in Tables 4-7. In each of the regression analyses, disability seeking status was entered as a covariate in step one, and was thereby statistically controlled. Time since onset of pain was a non-significant covariate, thus was removed from all models for final analyses. The order of entry of all predictor variables was determined on the basis of relative causal priority and relevant past research. Thus, race was entered in step two, followed by sex, age, education, reading level percentile, pain intensity, depression, and catastrophizing. The exact order of causal priority in reference to the constructs of depression and catastrophizing is somewhat ambiguous; in such circumstances, Cohen and colleagues (2003) suggest investigating both sequences.[27] Therefore, the sequence of entry for depression and catastrophizing was reversed in a second set of hierarchical regression analyses for each of the dependent variables. However, results of this second set of regression analyses did not differ significantly from the first set, thus further report of these results is not warranted.

The omnibus test for the quality of life regression model indicated that both age and depression contributed significantly. However, tests of the parameter estimates determine that while age was positively associated with quality of life, this relationship became non-significant when depression was entered into the model. Depression was found to predict a significant amount of the variance explained in quality of life ratings ($\beta = -.649$, $t(8) = -8.232$, $p < .001$), and the R^2 change value indicated that depression accounts for 33.6% of the variance explained in the model.

For the pain interference regression model, the omnibus test indicated that age, pain intensity, and depression all contributed significantly. Parameter estimate tests determine that

while age was negatively associated with pain interference, when pain intensity was entered into the model, this relationship became non-significant. Pain intensity significantly predicted variance explained in pain interference (β =.686, $t(7)$=8.956, $p<.001$), and the R^2 change value indicated that pain intensity accounts for 38.4% of the variance explained in the model. Depression also significantly predicted variance in pain interference (β=.351, $t(8)$=5.083, $p<.001$) and the R^2 change value indicated that after accounting for pain intensity, depression accounts for an additional 9.8% of the variance explained in the model.

Omnibus tests for the perceived disability regression models indicate that for both the RMDS and DRI measures, pain intensity was the only independent variable that contributed significantly. Tests of the parameter estimates indicate that pain intensity significantly predicted variance in perceived disability as measured by both the RMDS (β=.494, $t(7)$=5.020, $p<.001$), and DRI (β =.516, $t(7)$=4.907, $p<.001$). R^2 change values for the perceived disability regression models indicate pain intensity accounted for 19.3% of the variance explained as measured by the RMDS, and 21.4% as measured by the DRI.

Across all omnibus tests, race, sex, education, reading level, and catastrophizing were not significantly contributing to the variance explained in the regression models for each of the dependent variables. Thus, parameter estimate tests were not conducted for these predictors.

The assumptions asserted by Baron and Kenny (1986) were met for all four of the exploratory mediation models.[9] Given the observed relationships between the predictor variables of age and depression with the outcome variable quality of life, mediation was tested to investigate whether depression mediated age related differences in quality of life (see Figure 1). The effect of age on quality of life was significant (path c_1: B= .246, p =

.001); the effect of age on depression was significant (path a_1: B= -.306, p =.001); and the association between depression and quality of life was significant (path b_1: B= -.541, $p <$ .001). After controlling for depression, the effect of age on quality of life was reduced to non-significance (path c_1`: B= .081, p = .166). The 99% confidence interval generated by the bootstrapping procedure was .052 to .305, indicating that depression mediated the age-quality of life relation.

Mediation was tested to further explore the relations between the independent variables of age, pain intensity, and depression with the dependent variable of pain interference (see Figure 2 and Figure 3). The effect of age on pain interference was significant (paths c_2 and c_3: B= -.060, p = .003); age significantly predicted both pain intensity (path a_2: B= -.045, p = .005) and depression (path a_3: B= -.303, p = .001); the association between pain intensity and pain interference was significant (path b_2: B= .851, p <.001), and the association between depression and pain interference was also significant (path b_3: B= .104, $p <$ .001). After controlling for pain intensity, the effect of age on pain interference was reduced to non-significance (path c_2`: B= -.022, p = .160). The 95% confidence interval generated by the bootstrapping procedure was -.067 to -.009, indicating that pain intensity mediated the age-pain interference relation. After controlling for depression, the effect of age on pain interference was again reduced to non-significance (path c_3`: B= -.028, p = .122). The 99% confidence interval for this mediation model was -.064 to -.008, denoting that depression is also a significant mediator of the relation between age and pain interference.

Given the observed relations between the predictor variables of pain intensity and depression, with the outcome variable of pain interference, mediation was tested to explore

whether depression mediated the effect of pain intensity (see Figure 4). The effect of pain intensity on pain interference was significant (path c_4: B= .887, $p < .001$); the effect of pain intensity on depression was significant (path a_4: B= 1.757, p =.003); and the association between depression and pain interference was significant (path b_4: B= .076, $p < .001$). After controlling for depression, the effect of pain intensity on pain interference was marginally reduced, but remained significant (path c_4': B= .753, $p < .001$). The 99% confidence interval generated by the bootstrapping procedure was .039 to .256, indicating that depression partially mediated the relation between pain intensity and pain interference.

DISCUSSION

The study results point to the specific variables that may play the most important roles in the experience of chronic pain within a population that has been virtually unstudied in the literature. The present findings determine the relative influence of key demographic variables and whether this influence is sustained when psychosocial variables are concurrently investigated. Furthermore, the order of entry of the predictor variables into the statistical regression model allows for investigation into the predictive ability of psychosocial variables whilst controlling for the demographics.

This rural sample is primarily composed of low income, mostly unemployed, African American females, and while the majority of participants had a high school education, their reading proficiency was low (see Table 1). Based on previous research, the overarching nature of these demographic characteristics correspond with elevated risk for poor psychosocial and pain-related outcomes.[18,25,43,52,67,73,75,78,97,108,124] However, in the current study, race, sex, education, nor reading level were significant predictors of the criterion variables. This counterintuitive finding may be due to the relative lack of variability within

the sample's demographic characteristics, which may have potentially limited the power to detect differences across these stratifications. Conversely, the homogenous nature of the sample's demographics allows for exploration of the psychosocial variables that are most salient for a population that past research would deem high risk.

In reference to the available normative data (see Table 2), participants in this study report comparable pain intensity ratings, however levels of catastrophizing and depression are elevated.[30,80,107] Thus, while pain intensity ratings are similar to published normative values, it appears that living with chronic pain for this sample of rural patients may entail a strong emotional component. This finding may also be related to the fact that the majority of participants were African American females as past research suggests that these characteristics correspond with higher reported levels of depression and catastrophizing in comparison to White American males.[14,25,34,38,47,49,56,88,108,114] It is also interesting to note that the current sample perceives themselves as highly disabled, yet pain interference scores are somewhat lower than the published normative data.[30,46,90,105] Both measures of perceived disability utilized in the current study pertain purely to the domain of physical functioning and mobility, whereas the pain interference measure relates to a broader spectrum of domains including social, psychological, and occupational functioning. Thus, while participants perceive their pain to be physically disabling, this perception does not carry over into other areas of functioning, such as their mood, relations with other people, and enjoyment of life. Perhaps this may also explain why quality of life ratings within this sample are higher than the published normative data.[24]

While the findings of past research regarding age and psychosocial outcomes has been inconsistent, it is interesting to note that a number of researchers have found that older

age groups report higher quality of life scores than both younger and middle age groups.[44,89] In the current study, this finding was initially supported in that as age increased, perceived quality of life also increased. However, when depression was included in the regression model this age-related finding became non-significant, suggesting that quality of life is more strongly associated with depression (such that as depression increases, quality of life decreases). This association was further supported by the exploratory mediation analysis depicted in Figure 1, which demonstrated that depression fully mediated the relationship between age and the dependent variable of quality of life. These findings indicate that to improve the overall quality of life for patients living with chronic pain, it may be advantageous to routinely assess for depression, and when appropriate, to target the treatment approach towards not only the alleviation of pain, but also depressive symptomology.

The present findings also suggest that potential age-related differences in pain interference may be better accounted for by pain intensity ratings and depression. In the pain interference regression model, age was initially a significant predictor; however, with the inclusion of pain intensity and depression, this relation was rendered non-significant. These results were further supported by the mediation models depicted in Figures 2 and 3 where both pain intensity and depression significantly mediated the age-pain interference relation. Thus, apparent decreases in self-reported pain interference with age may be better explained by decreases in pain intensity and depression. Although the cross-sectional design of the current study limits the strength of the conclusions that can be obtained, the observation that depression was a stronger mediator of the relationship between age and pain interference (than was pain intensity) may be meaningful in terms of development of comprehensive treatments for chronic pain.

It is also important to note that while pain intensity remained a unique, significant predictor of pain interference, depression partially mediated this relation (see Figure 4).This finding supports the contention noted by McCracken and Turk (2002) that "even the most prototypical pain outcome, the patient's report of pain severity, is a behavior and is therefore influenced by past experience and the current situation (p.2565)."[70] Within this context, it is interesting to consider that as depression is associated with aches and pains, and feelings of lethargy and irritability, the potential interplay of these factors may function to increase sensitivity to pain and lead to the patient's interpretation of increased interference due to persistent pain. Notably, previous research has found that poorer outcomes are associated with the treatment of pain when underlying depression goes undiagnosed and untreated.[100]

According to Sullivan and colleagues (2001), in the context of persistent chronic pain, the intensity of the pain is considered the primary impairment that contributes to disability.[108] This conclusion was supported in the present findings as pain intensity was the only independent variable that significantly predicted perceived disability. Notably, past research suggests that functional disability is associated with loss of independence and the need for costly interventions and care.[22,119] Thus, multidisciplinary treatment aimed towards controlling pain intensity may offset both the costs of chronic pain and also the negative trajectory from the experience of a chronic pain condition to functional disability.[19]

In previous research spanning across the last two decades, catastrophizing has emerged as one of the most robust psychological predictors of the pain experience.[108] However, no research was found investigating this cognitive construct within a rural setting. Surprisingly, among this rural Alabama chronic pain population, pain catastrophizing did not significantly predict variance in quality of life, pain interference, nor perceived disability. It

is possible that the cross-sectional nature of the current study precluded accurate investigation of this construct, and it may be that over time catastrophizing is an important predictor of various pain-related outcomes within this population. Past research suggests that initial (pre-treatment) levels of catastrophic thinking predict poor adjustment to chronic pain, over and above other factors, such as disease severity, pain intensity, depression, anxiety, fear of pain, and neuroticism.[108] Thus, given both the proliferation of literature reporting on the importance of pain catastrophizing, and the alarmingly high catastrophizing levels of the present population, future research should continue to investigate this construct within rural settings. Furthermore, an emphasis should be placed on exploring the predictive ability of catastrophizing across multiple time points.

While a major strength of this study is the insight it provides into a virtually unstudied, high risk population, paradoxically, the sample's demographic homogeneity is a potential limitation. The limited variability in terms of race, gender, and SES indicants within the current sample impedes in-depth analysis of their predictive capabilities. However, given the well documented connection of these demographic variables with fundamental health and treatment disparities, further research is needed to more accurately determine their influence within rural chronic pain populations. Specifically, future studies should be directed towards investigating rural samples that have more diversity in terms of SES indicants, and variability in factors such as race and sex. Additionally, to determine whether rurality itself is an important predictor of poorer pain outcomes, it would be interesting to compare the findings of this low SES, rural population, with an urban population of similar demographic make-up.

This cross-sectional study examined the pre-treatment demographic and psychosocial characteristics of a unique sample of rural chronic pain patients. While numerous

psychosocial variables have been repeatedly demonstrated to influence the experience of chronic pain in urban samples, few studies have investigated their influence in rural populations. These results underscore the biopsychosocial nature of chronic pain and the necessity for a multidisciplinary focused treatment approach. While various cognitive and behavioral interventions have been successfully applied in the treatment of pain intensity, depression, catastrophizing and other pain-related outcomes, research investigating the feasibility and acceptability of psychosocial approaches within a rural setting is limited. Currently we are conducting a randomized controlled trial (RCT) with a subsample of the population reported herein to investigate the efficacy of a cognitively-focused Cognitive Behavioral Therapy (CBT). This treatment approach targets both depression and catastrophizing and given the highly affective nature of this population of chronic pain patients, it will be interesting to examine whether treatment-related reductions in these variables are related to decreases in pain intensity. Continued research within rural chronic pain populations may lead to more effective, specific, and culturally sensitive interventions designed to alleviate the suffering and functional limitations associated with living with chronic pain. Since treatment disparities for pain management are pervasive, a more thorough understanding of the salient, changeable psychosocial variables associated with rural populations will likely enhance and motivate a movement toward reducing and eventually eliminating treatment disparities.

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Table 1

Demographics

Variable	Mean (SD)	%
Age	52.11 (+/- 13.22)	
Sex		
Male		22
Female		78
Race		
White		22
African American		77
Other		1
Disability Status		
On disability		44
Seeking disability		22
Not on, not seeking		34
Income		
$0 to $12,999		72
$13,000 to $24,999		15
$25,000 to $49,000		12
$50,000 & above		1
Employment Status		
Employed		14
Unemployed		60
Retired		21
Home-maker		4
Student		1
Education	12.40 (+/-2.37)	
WRAT (Percentile)	17.35 (+/- 21.10)	

Table 2

Means and standard deviations of psychosocial variables

Measure	Current Sample Mean (SD)	Normative Data Mean (SD)[1]
QOLS	30.41 (10.42)	24.0 (9.0)
RMDS-11	9.10 (2.53)	7.17 (3.57)
DRI	62%	39%
Pain Interference	5.73 (2.73)	7.56 (2.01)
Pain Intensity	6.05 (2.14)	6.98 (1.79)
CESD	20.28 (12.87)	14.93 (10.72)
PCS	31.88 (14.61)	27.96 (12.78)

[1]All normative data obtained with chronic pain patients, except for the CESD, which was normed with the general population.

Table 3

Correlation matrix

	1	2	3	4	5	6	7
1. QOLS	-	-	-	-	-	-	-
2. RMDS	-.12	-	-	-	-	-	-
3. DRI	-.34**	-.48**	-	-	-	-	-
4. BPI Interference	-.44**	.43**	.58**	-	-	-	-
5. BPI Intensity	-.24*	.48**	.52**	.70**	-	-	-
6. CESD	-.70**	.13	.22*	.53**	.29**	-	-
7. PCS	-.45**	.30**	.25*	.55**	.51**	.58**	-

*p < .05
**p < .01

Table 4

Prediction of Quality of Life (as measured by the QOLS)

Model	*B* (SE)	*β*	R^2	Sig.
1 [a]	-8.303 (2.389)	-.329	.108	.001
2 [b]	1.368 (1.697)	.076	.114	.422
3 [c]	-.654 (2.462)	-.026	.115	.791
4 [d]	.198 (.076)	.248	.172	.010
5 [e]	-.099 (.416)	-.022	.172	.813
6 [f]	.035 (.050)	.071	.177	.482
7 [g]	-.683 (.498)	-.139	.192	.173
8 [h]	-.528 (.064)	-.649	.529	.000
9 [i]	-.023 (.071)	-.033	.529	.743

[a] Predictor: Disability seeking status

[b] Predictors: Disability seeking status, race

[c] Predictors: Disability seeking status, race, sex

[d] Predictors: Disability seeking status, race, sex, age

[e] Predictors: Disability seeking status, race, sex, age, education

[f] Predictors: Disability seeking status, race, sex, age, education, WRAT %tile

[g] Predictors: Disability seeking status, race, sex, age, education, WRAT %tile, pain intensity

[h] Predictors: Disability seeking status, race, sex, age, education, WRAT %tile, BPI intensity, CESD

[i] Predictors: Disability seeking status, race, sex, age, education, WRAT %tile, pain intensity, CESD, PCS

Table 5

Prediction of Perceived Disability (as measured by the RMDS)

Model	*B* (SE)	*β*	R^2	Sig.
1 [a]	1.425 (.602)	.233	.054	.020
2 [b]	.283 (.426)	.066	.058	.508
3 [c]	-.338 (.619)	-.055	.061	.587
4 [d]	.006 (.020)	.033	.062	.747
5 [e]	-.210 (.108)	-.196	.099	.055
6 [f]	-.006 (.013)	-.051	.101	.638
7 [g]	.597 (.119)	.494	.294	.000
8 [h]	-.008 (.019)	-.039	.295	.693
9 [i]	.029 (.022)	.166	.309	.186

[a] Predictor: Disability seeking status

[b] Predictors: Disability seeking status, race

[c] Predictors: Disability seeking status, race, sex

[d] Predictors: Disability seeking status, race, sex, age

[e] Predictors: Disability seeking status, race, sex, age, education

[f] Predictors: Disability seeking status, race, sex, age, education, WRAT %tile

[g] Predictors: Disability seeking status, race, sex, age, education, WRAT %tile, pain intensity

[h] Predictors: Disability seeking status, race, sex, age, education, WRAT %tile, BPI intensity, CESD

[i] Predictors: Disability seeking status, race, sex, age, education, WRAT %tile, pain intensity, CESD, PCS

Table 6

Prediction of Perceived Disability (as measured by the DRI)

Model	B (SE)	β	R^2	Sig.
1 [a]	.119 (.047)	.269	.072	.013
2 [b]	.010 (.047)	.023	.073	.835
3 [c]	-.054 (.053)	-.120	.085	.305
4 [d]	-.002 (.002)	-.152	.106	.174
5 [e]	-.004 (.011)	-.042	.108	.717
6 [f]	.001 (.001)	.058	.110	.657
7 [g]	.046 (.009)	.516	.324	.000
8 [h]	.001 (.002)	.041	.325	.705
9 [i]	-.001 (.002)	-.093	.330	.502

[a] Predictor: Disability seeking status
[b] Predictors: Disability seeking status, race
[c] Predictors: Disability seeking status, race, sex
[d] Predictors: Disability seeking status, race, sex, age
[e] Predictors: Disability seeking status, race, sex, age, education
[f] Predictors: Disability seeking status, race, sex, age, education, WRAT %tile
[g] Predictors: Disability seeking status, race, sex, age, education, WRAT %tile, pain intensity
[h] Predictors: Disability seeking status, race, sex, age, education, WRAT %tile, BPI intensity, CESD
[i] Predictors: Disability seeking status, race, sex, age, education, WRAT %tile, pain intensity, CESD, PCS

Table 7

Prediction of Pain Interference (as measured by the BPI)

Model	*B* (SE)	*β*	*R²*	Sig.
1 [a]	1.884 (.620)	.288	.083	.003
2 [b]	.393 (.446)	.085	.090	.380
3 [c]	-.140 (.648)	-.021	.090	.829
4 [d]	-.047 (.020)	-.226	.137	.022
5 [e]	.159 (.109)	.140	.156	.147
6 [f]	.000 (.013)	.000	.156	.994
7 [g]	.873 (.097)	.686	.540	.000
8 [h]	.074 (.015)	.351	.638	.000
9 [i]	.018 (.016)	.097	.643	.261

[a] Predictor: Disability seeking status
[b] Predictors: Disability seeking status, race
[c] Predictors: Disability seeking status, race, sex
[d] Predictors: Disability seeking status, race, sex, age
[e] Predictors: Disability seeking status, race, sex, age, education
[f] Predictors: Disability seeking status, race, sex, age, education, WRAT %tile
[g] Predictors: Disability seeking status, race, sex, age, education, WRAT %tile, pain intensity
[h] Predictors: Disability seeking status, race, sex, age, education, WRAT %tile, BPI intensity, CESD
[i] Predictors: Disability seeking status, race, sex, age, education, WRAT %tile, pain intensity, CESD, PCS

Figure 1

Depression as a mediator of the relationship between age and quality of life
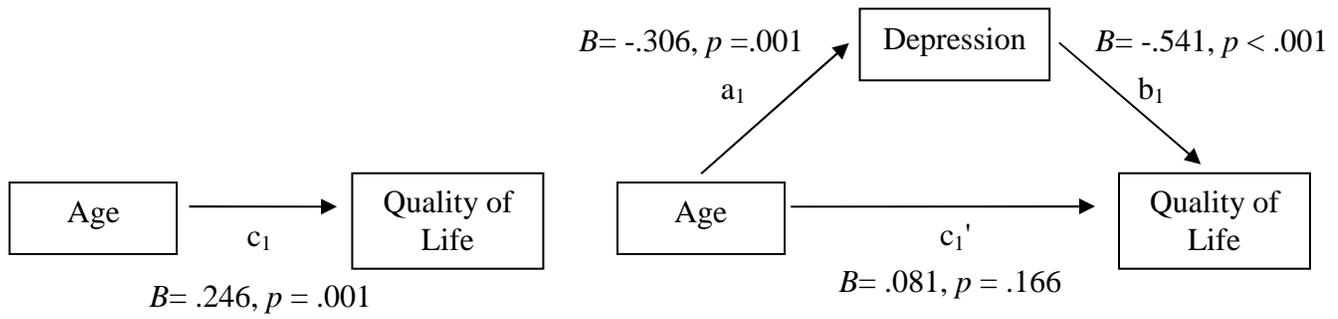

$B= -.306, p =.001$ | Depression | $B= -.541, p < .001$

a_1 | | b_1

Age | c_1 | Quality of Life | | Age | c_1' | Quality of Life

$B= .246, p = .001$ | | $B= .081, p = .166$

Figure 2

Pain intensity as a mediator of the relationship between age and pain interference

$B = -.045, p = .005$

Pain Intensity

$B = .851, p < .001$

a_2

b_2

Age

Pain Interference

c_2

Age

Pain Interference

c_2'

$B = -.060, p = .003$

$B = -.022, p = .160$
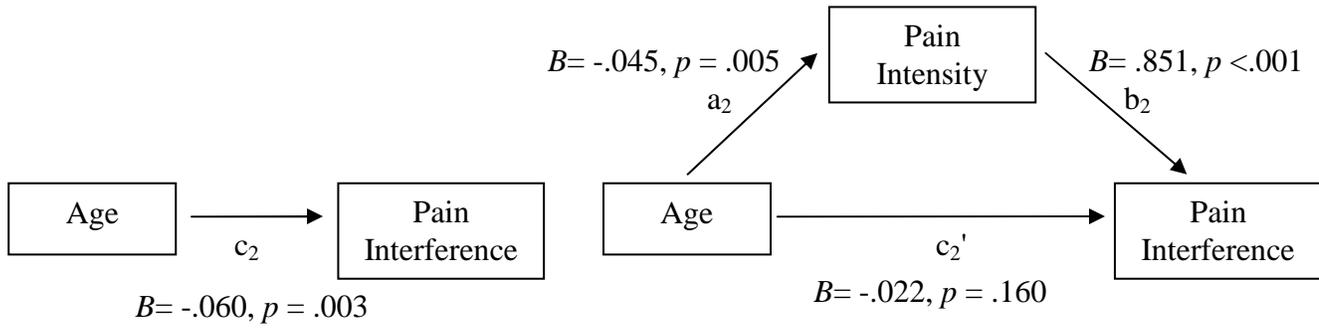
Figure 3

Depression as a mediator of the relationship between age and pain interference

B= -.303, p = .001

Depression

B= .104, p < .001

a_3

b_3

Age

Pain Interference

c_3

B= -.060, p = .003

Age

Pain Interference
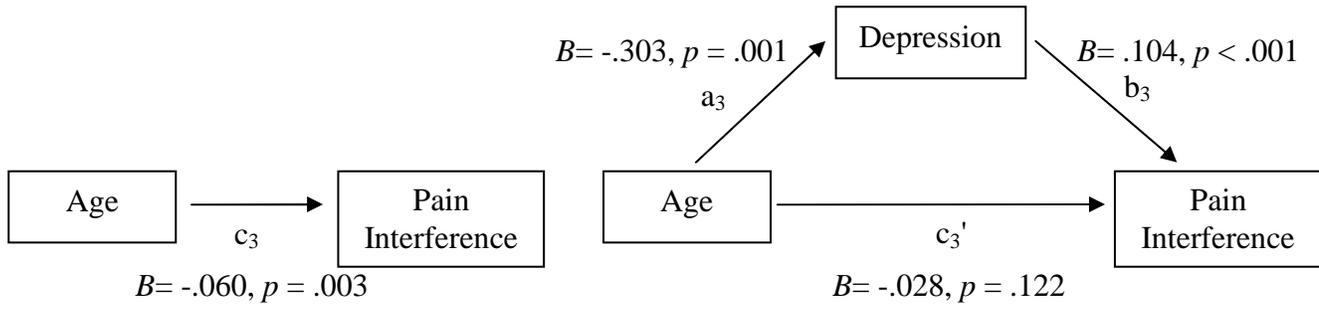
c_3'

B= -.028, p = .122

43

Figure 4

Depression as a mediator of the relationship between pain intensity and pain interference

$B= 1.757, p =.003$ | Depression | $B= .076, p < .001$
a_4 b_4

| Pain Intensity | c_4 | Pain Interference |
$B= .887, p < .001$

| Pain Intensity | c_4' | Pain Interference |
$B= .753, p < .001$