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Ethnic Group Differences in the Outcomes of Multidisciplinary Pain Treatment

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Abstract

Objectives—The aim of this prospective investigation was to evaluate ethnic group differences in pain-related outcomes following multidisciplinary chronic pain treatment. A prospective pre- and post-treatment assessment design was employed to investigate the effects of ethnicity on changes in pain-related variables following completion of a multidisciplinary pain treatment program.

Methods—One hundred fifty five chronic pain patients participating in a multidisciplinary pain treatment program completed measures of pain and mood both prior to and following the four-week treatment. Primary outcome variables included pain severity, pain-related interference, and depressive symptoms.

Results—Baseline differences between African-Americans and Whites were observed for depressive symptoms, but not for pain severity or pain-related interference. Following multidisciplinary pain treatment, both White and African-American patients displayed post-treatment reductions in depressive symptoms and pain-related interference. However, White patients also reported reduced pain severity while African-Americans did not.

Conclusions—The treatment approach used in the present study appeared to be less effective in reducing self-reported pain severity in African-American versus White patients, though both groups benefited in terms of reduced depressive symptoms and pain-related interference. Moreover, the observation that improvements in functioning occurred without reductions in pain severity in African-American patients suggests that differences may exist in treatment processes as a function of ethnic group, and will consequently be an important area for future research.

Keywords

Ethnic differences; pain outcomes; pain treatment

INTRODUCTION

A substantial and rapidly-growing body of literature suggests that ethnic disparities exist in the prevalence, treatment, progression, and outcome of various medical conditions in the

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United States and abroad. It is therefore not surprising that in recent years, pain researchers have begun to explore the nature and mechanisms of ethnic differences in the experience of pain (1,2). Ethnic differences in pain perception have been observed in both clinical and experimental settings within the United States, with results generally indicating that African-Americans report higher levels of pain than Whites (2,3). Within a clinical setting, ethnic disparities have been found in the experience of several acute pain states, including post-operative pain (4) and acute low back pain (5), with African-Americans rating pain as more intense relative to Whites. In experimental settings, studies have shown that, when exposed to calibrated noxious stimuli, ethnic minorities reported greater pain than Whites (6–9). Ethnic disparity studies of various chronic pain conditions have reported similar findings, with African-American and Hispanic patients typically reporting more severe, frequent, or disabling pain than White patients across a number of conditions (2).

A variety of biopsychosocial factors appear to influence ethnic disparities in the perception, report, and impact of pain. For example, provider-level and even community-level decisions about treatment appear to be affected by ethnicity, with a lower availability of opioid medications, among others, for ethnic minority patients (2). Moreover, recent studies have implicated genetic factors (10), psychological variables (8), and sociocultural influences such as ethnic identity (9) as important biopsychosocial processes contributing to ethnic disparities in pain. However, while the nature of and explanations for ethnic differences in the pain experience are becoming much clearer, at least one important aspect of the pain-ethnicity link appears to have been little-studied. To date, few research studies have examined ethnic differences in outcomes following pain treatment. One report indicated that among veterans with osteoarthritis, African-American patients perceived over-the-counter analgesics as more “helpful” than White patients (11). In another such study, Kalauokalani and colleagues investigated an educational and coaching intervention for patients suffering from cancer-related pain (12). Both minority patients [who reported higher pretreatment pain levels relative to their White counterparts] and White patients reported decreases in pain levels. However, the change in pain was greater for minority patients when compared to Whites [i.e., a greater improvement in reported pain-severity following treatment], such that after treatment, pain severity did not differ across ethnic groups. These studies suggest the possibility that ethnicity may be a factor in determining pain treatment outcomes, though very little published research has addressed this question. The large literature documenting greater report and impact of pain in ethnic minority patients might lead one to expect reduced treatment benefit in this group, though the two studies above suggest the opposite [i.e., greater treatment benefit, in terms of the magnitude of pain reduction, among ethnic minorities]. In either case, more information is needed on this important topic, and thus, the present study seeks to prospectively investigate ethnicity as a factor in predicting outcomes of multidisciplinary pain treatment in Whites and African-Americans.

MATERIALS AND METHODS

Design

This study employed a longitudinal, pretest-posttest, quasi-experimental design. All study procedures were approved by the Institutional Review Board. Participants provided informed consent prior to completing study questionnaires.

Participants and Procedure

Study participants were 155 chronic pain patients who completed a multidisciplinary pain treatment program affiliated with a university medical center. Patients were referred by various sources, including insurance companies, physicians, and rehabilitation nurses. Generally, the patients referred to this program had experienced pain for a number of years

and had not received adequate long-term benefit from various other treatment approaches. The primary sites of pain reported by patients in the program were low back [59.8 percent], head [13.6 percent], leg [11.1 percent], upper limb [10.9 percent], and neck pain [4.6 percent] pain. The ages of the participants ranged from 21 to 56 with a mean age of 40.2 ± 8.8 . The majority of the sample [61 percent] was male. The racial composition of the sample was 82 percent White and 18 percent African-American.

The types of interventions comprising the multidisciplinary pain treatment program included informational sessions designed to teach patients about the psychological and behavioral components of pain, cognitive-behavioral group therapy sessions conducted by a licensed clinical psychologist, physical therapy, an exercise program of increasing intensity, and medication management. Treatment lasted approximately four weeks and intervention group sizes typically consisted of between four and eight participants who were of the same treatment cohort, having entered the program at the same time. A description of this multidisciplinary intervention program has previously been reported (13,14). In the present study, which focuses on pain treatment outcomes, we included in the analyses only those subjects who provided complete pre- and post-treatment data on the study measures described below.

Prior to entry into the treatment program, the participants completed a demographic questionnaire, the Beck Depression Inventory [BDI] and the Multidimensional Pain Inventory [MPI]. Upon completion of the four week pain treatment program, participants once again completed these measures.

Measures

Demographics—Demographic information was collected from all participants for descriptive purposes. Specifically, information was gathered about sex, age, ethnicity, pain duration, number of previous surgeries, and primary pain site.

Beck Depression Inventory—The Beck Depression Inventory [BDI] is one of the most commonly-used measures of depressive symptoms; it assesses the frequency and severity of a variety of cognitive, affective, physiological, and motivational symptoms of depression (15). Each item is scored on a four-point scale [0 to 3] with higher scores reflecting more severe symptoms. The BDI has well-established psychometric properties (16).

Multidimensional Pain Inventory—The Multidimensional Pain Inventory [MPI] is a measure designed to evaluate the subjective experience of chronic pain. The measure consists of 61 items assessing pain severity, the impact of pain on a patient's life, the daily activity levels of the patient, etc. The MPI subscales of pain severity and pain interference were used to measure treatment outcome in the current study. These subscales capture multiple aspects of the chronic pain experience as it relates to the aims of this study, and are consistent with prior assessments of pain-related treatment outcome (17,18). The data from the MPI were scored using the MPI scoring program, and the scores of the subscales have been converted to *T* scores. The MPI has been shown to have excellent reliability and validity as a multidimensional measure of chronic pain (19).

Data Analysis

Preliminary analyses included t-tests to investigate ethnic group [i.e., White versus African-American] differences on various measures including depressive symptoms, pain severity, and pain interference. Three mixed between-within group analyses of variance [ANOVAs] were conducted to explore the impact of multidisciplinary pain treatment on individuals as a function of ethnicity. The independent between-groups variable was ethnicity [i.e., White

and African-American] and the independent within-groups variable was time [i.e., pretreatment and post-treatment]. The interaction of these two predictor variables served as the third independent variable and was the effect of interest [i.e., answering the question of whether pre- to post-treatment changes in pain outcomes were different across ethnic groups]. The dependent variables were pain severity, pain interference, and BDI scores. Paired samples t-tests were employed as follow-up simple effects tests in the case of significant interactions.

Bivariate correlations were also conducted within each group [i.e., White and African-American], separately, to examine the temporal relationships among the outcome measures. Specifically, correlations between pretreatment and post-treatment scores on each measure were examined separately for Whites and for African-Americans.

In order to control for the potential effect of sex on the predictor and outcomes variables of interest, three additional mixed between-within group analysis of variance ANOVAs were run. The primary purpose of these models was to test for the possible interaction between sex and race and the change in pain severity, pain interference, and BDI.

RESULTS

Patient Demographics

Demographic and clinical characteristics of the 155 patients are presented in Table 1. African-American and White patients did not differ on demographic variables [$P_s > 0.10$]. Baseline scores of the outcome variables were analyzed to detect differences between groups before treatment. Only the pretreatment BDI scores were found to be significantly different [$t(153) = 2.05$, $P = 0.04$]. African-American participants reported greater depressive symptoms before undergoing treatment [25.07 ± 10.9] than White participants [21.77 ± 9.5]. Pretreatment ratings of pain severity and pain interference did not differ significantly between groups.

Analysis of Response to Treatment

Analyses were conducted using Repeated Measures Analysis of Variance. Statistically significant main effects of time emerged for: pain interference, $F [1, 153] = 20.84$, $P < 0.001$, and for BDI scores $F [1, 153] = 45.95$, $P < 0.001$. Interactions were not found between ethnic group and time for the pain interference or BDI outcome measures. Thus, both pain interference and BDI scores declined to a similar degree in both groups. These results are depicted graphically in Figure 1. Interactions between sex and ethnic group and pain severity, pain interference and BDI were also not detected.

A significant interaction between ethnicity and time was observed for the Pain Severity outcome measure [$F(1, 153) = 4.7$, $P = 0.031$]. Simple effects testing showed that African-American participants did not report reduced pain severity [$t(27) = -0.461$, $P = 0.65$] after treatment while White subjects did report significant reductions in pain severity following treatment [$t(126) = 4.15$, $P < 0.001$], presented in Figure 1.

Temporal Relationships for Pain Severity, Pain Interference and Depression

Pearson product-moment correlations were conducted separately for the African-American and White patients to examine the pre-post relationships for each outcome variable. In the African-American subjects, no significant associations were noted between pretreatment and post-treatment values of any outcome measure [see Table 2]. In contrast, significant, positive, pre-post correlations for each variable were observed within the White group [see Table 2].

Finally, an analysis of covariance [ANCOVA] in which change in pain severity was included in the ANCOVA model as a covariate when evaluating ethnic group X time interactions for the other outcome variables. In brief, this analysis addresses the question of whether the ethnic groups would differ in treatment-related changes in pain interference and depressive symptoms, if pain severity changed equivalently in both groups. When controlling for change in pain severity, no significant interaction between ethnic group and time was detected for the pain interference outcome. However, an interaction between ethnic group and time approached significance on the depression outcome variable when controlling for the change in pain severity [$F(1,152) = 0.98, P=0.085$]. The adjusted post-treatment BDI scores, controlling for initial BDI score and change in pain severity, were as follows: for African-Americans 14.9 ± 7.6 ; for Whites 15.8 ± 8.9 .

DISCUSSION

Ethnicity refers to a social group of people who share a common ancestral origin and culture that provide a sense of group identity (2,3,20). Ethnicity is a powerful predictor of health-related outcomes in general, and accumulating evidence has indicated that pain-related outcomes, in particular, vary as a function of ethnicity. Very little of this work, however, has focused on treatment-related outcomes; indeed, the present findings are among the first to suggest that African-American and White patients, concurrently undergoing a pain management program, show somewhat different patterns of results. More specifically, the present findings reveal that at baseline African-Americans differed from Whites only on measures of depressive symptoms but not on measures of pain severity or pain-related interference. However, at the conclusion of multidisciplinary pain treatment, both Whites and African-Americans displayed decreases in depressive symptoms and pain-related interference, but only Whites reported a reduction in pain severity.

While numerous studies have documented that ethnic minority and White patients in pain are assessed and treated differently by healthcare providers (21–24), only a few reports have described ethnic disparities in pain outcomes after applying similar treatments to both groups. In partial contrast to the present findings, both of those reports suggested greater pain reduction among ethnic minorities compared to Whites in the context of over-the-counter analgesics (11) and cancer pain education (12). However, the latter study utilized a tailored, coaching-based approach designed particularly to reduce disparities, which could account for their observations of larger reductions in pain among ethnic minorities.

It is important to emphasize that in the present study, treatment was not globally ineffective among African-Americans, who demonstrated reductions in pain interference and depressive symptoms that were comparable to those observed in the white patients. Rather, it is noteworthy that those gains were made in the context of no reduction at all in the reported severity of pain. Indeed, controlling for group differences in the change in pain severity, African-American patients evidenced a not-quite significant, but relatively larger improvement in depression scores. Thus, we may be observing ethnic differences in the process of treatment-associated reduction in chronic pain-related sequelae, with White patients showing treatment benefits that are at least partially attributable to reduced pain severity, and African-American patients showing treatment benefits that are not at all attributable to reductions in the perceived severity of pain. Additional evidence for ethnic differences in the process of treatment-related improvements is found in the relationship between the pretreatment and post-treatment measures. For White patients, a distinct linear relationship exists between pretreatment and post-treatment scores on each of the measures; however, the same relationships are not observed among African American patients. It is unknown whether the test-retest stability of these assessment instruments differs across ethnic groups, or whether ethnic differences happened to be present in the stability of the

underlying constructs [e.g., pain intensity or depressive symptoms varied more across time in the African-American patients], though either of these could explain the present pattern of findings.

Collectively, there are numerous potential explanations for the observation that, on some variables, treatment-related improvements in chronic pain outcomes differed as a function of ethnic group. Differences at the patient level may have played a role; for example, ethnic minority patients have been shown to have differing preferences for care (24,25), and to engage less in self-care activities in response to pain (26). Moreover, minority patients may disproportionately lack self-efficacy (2) and have lowered perceptions of control over pain (27,28). Finally, prior research suggests that minority patients have lower trust in their physicians than do white patients (29). Each, or all, of these factors may operate to reduce the participation and engagement of ethnic minority patients in various aspects of a multidisciplinary treatment program, which presumably would alter the effectiveness of these components. Relatedly, processes at the provider level may be operative, with similar potentially deleterious effects. Healthcare professionals have repeatedly been shown to underestimate pain in ethnic minority patients (24), to recommend different treatments for minority patients (1,30), to ascribe different preferences to patients of different ethnic backgrounds (31), and to have less interactive encounters with patients of ethnic minority backgrounds (32). To the extent that any or all of these factors may have affected the provision of multidisciplinary treatment to participants within this program, ethnic minority patients may have received subtly different, potentially less intensive interventions. Unfortunately, however, we do not have either objective data on providers' actions or subjective data on their impressions of patients, making this hypothesis speculative at present.

However, despite potential group differences in the content of the intervention, both African-American and White patients reported less depression and less pain-related interference following treatment. A potential explanation for the similar levels of improvement may speak to the effectiveness of the cognitive behavior therapy component of the multidisciplinary treatment program. Many studies have shown that cognitive-behavioral treatments administered to chronic pain patients lead to changes in cognitions and coping strategies related to the pain experience which translate into reduced depression and pain-related disability (33,34). The improvements reported by the patients in our study seem to be consistent with the findings reported in the other studies.

Although women are at greater risk for developing chronic pain conditions, the participants treated at the multidisciplinary treatment center and who participated in this study were predominantly male. One possible explanation for this discrepancy is that health care providers prescribe less aggressive treatments to female pain sufferers than their male counterparts. The most commonly cited literature examining sex differences in pain treatment typically focuses on the administration of pain medications (35); however, some evidence exists that suggests these differences extend to referrals to pain specialty clinics. The suggestion is that women must often convince providers of the true extent of their illness before receiving treatment which is more readily recommended to similarly afflicted male patients (36). A study performed by Weir and colleagues (37) looked at referrals to specialty pain clinics. They found that women were more likely to have been referred to clinics by specialists while men had been referred more often by general practitioners. This finding suggests that women must take extra steps before receiving equal treatment. This barrier may lead to under treatment of women for chronic pain conditions and may also help to explain the sex discrepancy in our study sample.

The present study possesses a number of limitations that necessitate caution when interpreting the findings. First, neither the treatment provided to the chronic pain patients, nor the training of the clinicians delivering the treatment was standardized. For example, it is unclear how medications were administered during treatment, and it is not known whether African-American and White patients, at a group level, were provided different analgesic regimens. Another limitation is that patients self-reported their ethnic background using extremely broad categories; further subdivision of individuals' perceived ethnicities may provide additional valuable information. In addition, while all participants' primary medical condition was chronic pain, other potential comorbid medical conditions were not assessed. Also, while the current study provides new information on ethnic differences in pain-treatment-related outcomes, it is restricted to only two ethnic groups, with a rather small sample size in the African-American group. Consequently, future investigators may wish to actively recruit larger, more ethnically-diverse samples. It is also likely that our sample is subject to multiple selection biases (14); since little is known about referrals to pain management clinics such as this one, any ethnicity-related effects may partially be a subtle consequence of differential referral patterns. Furthermore, no data was collected on mediating factors such as patient attitudes, treatment participation, or provider attitudes which might help account for some of the observed findings. Another limitation of the present study is that the educational levels of the participants are unknown. Prior research has shown that education may be an important factor in managing chronic pain (38). Lastly, the findings of this study relied on data collected from a single multidisciplinary treatment center and may not generalize to the population at large. In the future, it may be beneficial to perform a more controlled trial utilizing multiple sites to determine if the findings extend beyond the original region.

In spite of these limitations, the present investigation adds to the emerging body of knowledge relating to ethnic similarities and differences in the experience of chronic pain. Continued investigation of ethnic differences in pain treatment outcomes appears warranted, and may eventually contribute toward efforts to tailor interventions based on individual characteristics in order to maximize treatment benefits.

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Figure 1.
Pre- and post-treatment differences as categorized by ethnicity

Table 1

Basic Patient Characteristics by Ethnic Group

Basic Patient Characteristics			
Patient Characteristics	White [N = 127]	African- American [N = 28]	P
Sex			0.237 ^a
Male, no. [%]	80 [63]	15 [54]	
Female, no. [%]	47 [37]	13 [46]	
Age [years], mean	41	39	0.301 ^b
Pain Duration [months], mean	30	21	0.066 ^b
Baseline pain severity from MPI, mean [SE]	53.2 [0.7]	53.6 [1.2]	0.784 ^b
Baseline pain interference from MPI, mean [SE]	53.8 [0.6]	55.5 [1.3]	0.226 ^b
Baseline depression from BDI, mean [SE]	21.1 [0.8]	25.1 [2.1]	0.042 ^b

^a Fishers exact test,

^b t-test, MPI = Multidimensional Pain Inventory, BDI = Beck Depression Inventory, SE = Standard Error

Table 2

Correlations for Pre- and Post-treatment Variables as Categorized by Ethnicity

Pre-Treatment with Post-Treatment Correlations			
	Pre-Treatment Pain Severity with Post- Treatment Pain Severity	Pre-Treatment Pain Interference with Post- Treatment Pain Interference	Pre-Treatment BDI with Post-Treatment BDI
White African-American	0.514**	0.420**	0.483**
	0.215	0.239	0.143

BDI = Beck Depression Inventory,

*
P<0.05,**
P<0.01