Race, Age, and Gender Influences Among Clusters of African American and White Patients With Chronic Pain

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Abstract: Racial and ethnic minorities, older people, and women are differentially affected by chronic pain. This study aimed to identify the experiences of adult African Americans and whites with chronic pain while identifying patient clusters on the basis of clinical characteristics as well as race, age, and gender influences within and between clusters. Three clusters of patients with chronic pain were identified within race, age, and gender categories: chronic pain syndrome, good pain control, and disability with mild syndrome. African American and younger patients experiencing chronic pain were more likely to present with chronic pain syndrome. African American patients presenting with chronic pain syndrome or disability with mild pain syndrome reported a higher disability than their counterparts. Older patients and women within the good pain control cluster reported a lower level of (1) pain and depression and (2) depression, respectively. Older patients presenting with a disability with mild syndrome also reported lower pain and depression. Despite similar physical, emotional, and pain characteristics, this study confirmed that the chronic pain experience differs across racial and age groups. Further study is necessary to evaluate how these factors influence pain services among an ethnically diverse population across the age continuum.

Perspective: This study found important racial and age-related variability in the symptom severity of patients with chronic pain presenting with similar physical, emotional, and pain characteristics to a tertiary care pain center. These findings have important clinical implications on chronic pain assessment and management.

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Key words: Race and ethnicity, age, gender, cluster analysis, chronic pain, health, patient classification types.

Pain impairs health and well-being. Chronic pain has significant physical (eg, sleep disturbance, disability), psychological (eg, anxiety, depression), and socioeconomic (eg, lost work productivity) implications. An emerging literature suggests that demographic factors (ie, race, ethnicity, age, and gender) are important and necessary considerations when evaluating health and the pain experience. For instance, racial and ethnic minorities, older people, and women might be more vulnerable to the health effects of chronic pain. In an increasingly diverse and aging American society, there is heightened concern about the high prevalence of chronic pain as well as its differential impact on health in vulnerable populations.

At the individual level, the effects of chronic pain vary substantially. People with the same disease activity can differ greatly in the level of pain they report and its impact on their lives. The complex decision making involved in optimizing chronic pain management requires multidimensional psychometric and behavioral measures to adequately assess chronic pain’s impact on an individual’s overall health. These multidimensional health measures allow health care providers to tailor pain management regimens for the individual patient. However, the complex nature of pain management and limited information about patient characteristics might also limit the ability to appropriately and reliably predict pain treatment outcomes for the population at large. Few studies have attempted to address the effects of pain cross-culturally, across the age continuum, or included the experiences of both women and men. In addressing the complex nature of chronic pain management, there is a paucity of empirical research on the physical, social, and behavioral factors that might influence chronic pain outcomes, pain characteristics, and pain management in an ethnically diverse population.

The literature supports the differential effects of chronic pain in racial and ethnic minorities, older people, and women, when compared to whites, younger people, and men. In addition, there are data that suggest that
chronic pain might affect individuals with similar emotional, medical, physical, and behavioral backgrounds in different ways. Several authors have used taxonomic methodologies to identify subgroups of patients with chronic pain on the basis of the previously mentioned factors.\textsuperscript{5,12,14,37,46,66,73,74} Two subgroups or clusters have been consistently identified across multiple studies. The first cluster is classically characterized by high pain outcome measures (ie, high pain severity, depression, and disability). Patients in this cluster present with a full-scale chronic pain syndrome. The second cluster is characterized by low pain outcome measures (ie, low pain severity, depression, and disability). The patients described in this cluster might have excellent coping skills or might avoid reporting pain and how much pain impacts their lives. External validations for these patient profiles across multiple studies have confirmed the uniqueness of these clusters and their generalizability across patient populations.\textsuperscript{64,74} In addition, a third cluster of patients with chronic pain reflects an intermediate clinical pain outcomes profile (ie, medium pain severity, depression, and disability).\textsuperscript{12,14,35,36}

The evidence is unclear whether patients with chronic pain within the same cluster have similar pain outcome measures when stratified by demographic variables such as race, age, and gender. This is particularly salient, because there is convincing evidence that racial and ethnic minorities, older people, and women experience pain differently, which might lead to worse outcomes. Differences have been attributed to marital status, socioeconomic status, coping styles, as well as physical and sexual abuses.\textsuperscript{29,30} Similarly, there is evidence that younger (ie, younger than 50 years) and older (ie, 50 years or older) African Americans with chronic pain experience higher pain severity, depression, and disability than whites with chronic pain.\textsuperscript{27,28} Despite consistent findings confirming the crucial role of race and ethnicity, age, and gender on the pain experience; the literature is silent regarding the existence of differential chronic pain presentations in a racial and ethnically diverse population. This 2-part study was designed to examine demographic influences such as race (ie, phenotype), age, and gender on initial presentation for pain management at a tertiary care academic pain center in a racial and ethnically diverse population. This study will also examine whether there are clusters within these groups.

Part I

The first part of this study described a large population of adult African Americans and whites with chronic pain who presented for pain management at an academic tertiary care pain center. We have previously reported on 2 subsets of this population in 2 articles.\textsuperscript{27,28} In these 2 studies we described the influence of race on chronic pain in adult African Americans and whites in a younger and older population. We found that the overall health of African Americans was diminished when compared to whites for both the younger and older persons at time of initial treatment. The current work was guided by these findings. Thus, we hypothesized that African Americans with chronic pain (regardless of age) have reduced health status and quality of life (ie, physical, social, and emotional health) than whites with chronic pain. The primary objectives included comparing African Americans and whites in (1) psychological functioning as determined by the Beck Depression Inventory (BDI), the Post-Traumatic Chronic Pain Test (PCPT); a screening tool for post-traumatic stress disorder [PTSD], and the West Haven-Yale Multidimensional Pain Inventory (WHYMPI); (2) pain characteristics as determined by the McGill Pain Questionnaire (MPQ); (3) pain disability as determined by the Pain Disability Index (PDI); (4) various comorbidities and sleep problems; and (5) factors that affect coping (eg, litigation and social behaviors [ie, alcohol and tobacco use]).

Part II

The second part of this study identified empirically derived clusters among a diverse sample (ie, African Americans and whites) with chronic pain by using a multidimensional clustering technique. Part II of the study was guided by the hypothesis that African Americans, older people, and women with chronic pain have reduced health when compared to whites, younger people, and men with chronic pain, when they present with a similar depression, disability, and pain severity profile. The primary objectives for Part II were to (1) identify stable and replicable clusters (ie, similar pain severity [MPQ], depression [BDI], and disability [PDI] within the chronic pain population) and (2) identify whether there were differences in cluster composition due to racial, age, or gender influences.

Materials and Methods

Participants

This investigation was approved by the University of Michigan Medical School's Institutional Review Board. Written informed consent was waived by the Institutional Review Board. The analysis of a secondary database (containing self-reported information on pain and psychosocial variables) in patients with chronic pain surveyed on their initial assessment and treatment at the University of Michigan Multidisciplinary Pain Center between 1993 and 2000 was performed. Adult men and women older than 18 years who were either African American or white were included as subjects. Only subjects with complete responses to the MPQ, BDI, and PDI were included. Subjects reporting pain for less than 6 months' duration at their initial assessment were excluded from the analysis.

Measures

The MPQ was used to measure pain severity. It contains a list of 20 groups of 78 single word pain descriptors ranked by intensity. When the rank values for each descriptor are summed, it provides a total score and overall index of pain. The MPQ has excellent reliability and validity.\textsuperscript{48,53}

The BDI was used to measure current depression symptoms via 21 items: depressed affect, positive affect, so-
matic complaints, and interpersonal problems. It has excellent reliability and validity as an index for depression among patients with chronic pain.79

The PDI uses 7 scales to measure chronic pain’s interference with the subject’s physical and social functioning. The self-report measure uses 7 disability questions across several areas of daily functioning: family/home responsibilities, recreation, social activity, occupation, sexual behavior, self-care, life-support activity, and general health perceptions. Each item consists of an 11-point rating scale (0, no disability; 10, total disability; 70, maximum disability). The PDI possesses adequate reliability and validity as a brief measure of pain-related dysfunction.62,71,72

Other Measures

The PCPT, a screening test for PTSD, uses 6 scales on a 7-point Likert scale (0, not at all; 6, very much).28 Affective distress was measured via 3 items from the WHYMPI: pain severity, mood, and coping.45 These items were on a 7-point Likert scale (pain: 0, no pain; 6, excruciating pain; mood: 0, extremely low; 6, extremely high; coping with stressful situations: 0, not at all successful; 6, extremely successful). Control of pain was measured by using a 7-point Likert scale (0, no control at all; 6, extremely successful). Pain duration was measured in months. Information on sleep patterns, comorbidities, demographics, and social habits was also obtained by using categorical variables. United States census data and zip codes were used to estimate the median income for each participant.27,28

Materials

Data analyses were conducted in several stages for each part of the study. All statistical analyses were performed with the Statistical Package for Social Sciences (SPSS, Inc, Chicago, Ill), version 10.0 software. Statistical significance for all analyses was determined by using 2-tailed tests, with the probability of Type I error equal to P less than .05. Specific details regarding the data preparation and analysis are provided for each part of the study.

Part I

Descriptive statistics were calculated to establish the sample’s demographic characteristics. Then parametric and nonparametric tests were performed to test the null hypotheses of no difference between the mean scores for the whites and African Americans on the BDI, PDI, PCPT, and MPQ. Measures of association (odds ratios) were also calculated to compare comorbidity frequencies. Means and confidence intervals were reported for questions rated on a Likert scale. All categorical data were analyzed by using chi-square or Fisher exact test statistic.

Part II

To identify homogenous clusters of patients, cluster analysis was performed in each race, age, and gender category. Three classification measures were used: pain severity (MPQ), depression (BDI), and pain interference with functioning (PDI), as previously proposed by Klapow et al.46 In their description, pain outcomes were identified as intrinsically different from process factors or dimensions such as coping, personality, and physical pathology. The latter (process factors) are thought to influence pain outcomes and are not recognized as outcomes themselves.

By using the means and standard deviations for the total population, Z score transformations were performed for pain severity (MPQ), depression (BDI), and disability (PDI) scores. The entire study sample was divided into several cohorts on the basis of (1) race (African Americans vs whites), (2) age (<60 years vs ≥60 years), and (3) gender (women vs men). Separate cluster analyses were performed in each cohort. A K-means iterative partitioning procedure was used to generate a 3-cluster solution within each cohort. When the clusters were compared graphically, 3 similar clusters appeared in all cohorts. Cluster analysis was then performed for the entire population. Three clusters were also found, similar in appearance to each cluster found in the subpopulation cohorts. Agreement between cluster membership within the entire population and cluster membership within each cohort was measured by Cohen’s kappa. Because there was high agreement between the cohort clusters and the population clusters, all subsequent analysis was carried out for the overall population clusters. Mean values within each cluster for pain severity, depression, disability, affective distress, PTSD score, pain duration, age, median income, control over pain, ability to cope, and year of visit were compared to other clusters by using the Kruskal-Wallis Test to test for an overall association and Mann-Whitney U test to compare individual clusters. Clusters were compared by using the Pearson chi-square for the following variables: race, age, gender, education, marital status, alcohol use, smoking, caffeine use, litigation status, trouble falling asleep, trouble staying asleep, pain duration, year of visit, asthma, and comorbidities (ie, chest pain, colitis, gastric ulcer, and high blood pressure). Within each cluster, mean depression and disability scores were compared with regard to race, age, gender, and pain duration by using the Mann-Whitney U test. Mean pain scores were compared with regard to race, pain duration, and age via the Mann-Whitney U test within each cluster. The mean pain scores for women and men within each cluster were compared by using the independent samples t test. Three linear regressions were performed within each cluster, with pain severity, depression, and disability as the dependent variables and race, age, and gender as the primary independent variables, respectively. Race, age, gender, pain duration, income, and litigation were entered into the corresponding models as possible confounders if they were associated (P < .25) with the dependent variable within each cluster, as shown by the Mann-Whitney U or independent samples t test.
Table 1. Demographic and Socioeconomic Characteristics for the Population by the Subject’s Ethnicity

<table>
<thead>
<tr>
<th>SOCIOECONOMIC AND DEMOGRAPHIC INFORMATION</th>
<th>AFRICAN AMERICANS</th>
<th>WHITES</th>
<th>STATISTIC* AND P VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (mean y ± SD)</td>
<td>42.4 ± 10.8</td>
<td>42.4 ± 11.7</td>
<td>.824</td>
</tr>
<tr>
<td>Gender (% female)</td>
<td>70.4</td>
<td>58.2</td>
<td>.001</td>
</tr>
<tr>
<td>Marital status (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married/significant other</td>
<td>50.6</td>
<td>70.1</td>
<td>.001</td>
</tr>
<tr>
<td>Single/divorced/separated/widow(er)</td>
<td>49.4</td>
<td>29.9</td>
<td>.001</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; High school</td>
<td>19.1</td>
<td>15.7</td>
<td>.092</td>
</tr>
<tr>
<td>High school graduates</td>
<td>61.7</td>
<td>61.3</td>
<td>.001</td>
</tr>
<tr>
<td>College graduates</td>
<td>19.1</td>
<td>22.9</td>
<td>.001</td>
</tr>
<tr>
<td>Annual median household income (mean $ ± SD)</td>
<td>27,049 ± 8,208</td>
<td>35,360 ± 10,276</td>
<td>&lt;.0005</td>
</tr>
<tr>
<td>Number of months with pain (mean ± SD)</td>
<td>51.8 ± 60.5</td>
<td>59.4 ± 74.1</td>
<td>.393</td>
</tr>
<tr>
<td>Litigation status (% yes)</td>
<td>34.4</td>
<td>19.7</td>
<td>.001</td>
</tr>
<tr>
<td>Alcohol use (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>59.1</td>
<td>49.8</td>
<td>.100</td>
</tr>
<tr>
<td>Sometimes</td>
<td>36.4</td>
<td>46.9</td>
<td>.001</td>
</tr>
<tr>
<td>Frequently</td>
<td>4.5</td>
<td>3.3</td>
<td>.001</td>
</tr>
<tr>
<td>Caffeine (% reporting frequent use)</td>
<td>33.3</td>
<td>42.9</td>
<td>.114</td>
</tr>
<tr>
<td>Tobacco (% reporting use)</td>
<td>38.1</td>
<td>43.1</td>
<td>.129</td>
</tr>
</tbody>
</table>

SD, standard deviation.
*Mann-Whitney U for independent samples.

Table 2. Patient Report of Pain Characteristics, Disability, and Intensity

<table>
<thead>
<tr>
<th>PAIN OUTCOMES</th>
<th>AFRICAN AMERICANS (MEAN ± SD)</th>
<th>WHITES (MEAN ± SD)</th>
<th>P VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>McGill Pain Questionnaire (MPQ)</td>
<td>31.8 ± 12.6</td>
<td>28.9 ± 12.0</td>
<td>.001</td>
</tr>
<tr>
<td>Pain Disability Index (PDI)</td>
<td>44.0 ± 11.6</td>
<td>40.9 ± 12.9</td>
<td>.001</td>
</tr>
<tr>
<td>Post-Traumatic Stress Disorder (PTSD)</td>
<td>13.9 ± 11.6</td>
<td>8.1 ± 9.6</td>
<td>.001</td>
</tr>
<tr>
<td>Beck Depression Inventory (BDI)</td>
<td>21.4 ± 11.3</td>
<td>18.8 ± 11.2</td>
<td>.001</td>
</tr>
<tr>
<td>Pain score at present*</td>
<td>3.96 ± 1.42</td>
<td>2.55 ± 1.31</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Control over pain†</td>
<td>1.21 ± 1.69</td>
<td>2.55 ± 1.32</td>
<td>&lt;.0001</td>
</tr>
</tbody>
</table>

SD, standard deviation.
*0, no pain; 6, excruciating.
†0, no control at all; 6, a great deal of control.

Table 3 Mean Values Within Each Cluster

<table>
<thead>
<tr>
<th>VARIABLES (MEAN ± SD)</th>
<th>CLUSTER I (29.3%)</th>
<th>CLUSTER II (28.9%)</th>
<th>CLUSTER III (41.7%)</th>
<th>TOTAL POPULATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>MPQ (pain severity)*</td>
<td>19.5 ± 9.3</td>
<td>40.0 ± 9.0</td>
<td>24.4 ± 8.7</td>
<td>27.5 ± 12.2</td>
</tr>
<tr>
<td>BDI (depression)*</td>
<td>8.7 ± 5.6</td>
<td>29.4 ± 10.2</td>
<td>15.9 ± 7.1</td>
<td>17.7 ± 11.2</td>
</tr>
<tr>
<td>PDI (disability)*</td>
<td>21.9 ± 8.6</td>
<td>49.1 ± 8.9</td>
<td>43.8 ± 7.9</td>
<td>38.9 ± 14.0</td>
</tr>
<tr>
<td>PCPT (PTSD)*</td>
<td>3.8 ± 6.2</td>
<td>13.5 ± 11.2</td>
<td>7.3 ± 9.0</td>
<td>8.7 ± 10.1</td>
</tr>
<tr>
<td>Pain duration</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean months ± SD†</td>
<td>55.2 ± 67.5</td>
<td>62.2 ± 70.5</td>
<td>58.9 ± 78.2</td>
<td>58.8 ± 73.0</td>
</tr>
<tr>
<td>% ≥ 30 months</td>
<td>47.6</td>
<td>55.6</td>
<td>47.7</td>
<td>49.9</td>
</tr>
<tr>
<td>Affective distress*</td>
<td>7.2 ± 3.4</td>
<td>12.0 ± 3.3</td>
<td>9.3 ± 3.4</td>
<td>9.5 ± 3.8</td>
</tr>
<tr>
<td>Ability to cope*</td>
<td>4.0 ± 1.4</td>
<td>2.6 ± 1.6</td>
<td>3.4 ± 1.4</td>
<td>3.4 ± 1.6</td>
</tr>
<tr>
<td>Control over pain*</td>
<td>1.8 ± 1.6</td>
<td>1.2 ± 1.5</td>
<td>1.5 ± 1.5</td>
<td>1.5 ± 1.5</td>
</tr>
</tbody>
</table>

MPQ, McGill Pain Questionnaire; BDI, Beck Depression Inventory; 0-9, none or minimal, 10-18, mild to moderate, 19-24, moderate to severe, > 30, severe; PDI, Pain Disability Index; 0, none, 70, maximum disability; PCPT, Post-Traumatic Chronic Pain Test; 0, none, 36, maximum distress; Affective distress; Control over pain: 0, no control at all, 6, a great deal of control; Ability to cope with stressful situations: 0, not at all successful, 6, extremely successful.
*All individual clusters are significantly different from all other individual clusters (P < .05).
†Cluster II is significantly different than Cluster I and III (P < .05); Clusters I and III are not significantly different.
Results

Characteristics of the Entire Population

Overall, the total sample (N = 2975) consisted primarily of whites (91.5%), married people (68.4%), and women (59.2%) with an age range from 18 to 91 years. When compared to whites, African Americans were more likely to be women (70.4% vs 58.2%; \( P < .0001 \)) and had a lower median household income (\( P < .0005 \)). Education was not significantly associated with race (\( P = .09 \)). Table 1 provides demographic information for the entire sample by race. As shown in Table 2, African Americans reported significantly more pain and suffering as well as less control over pain than whites (\( P < .05 \)). The entire population reported significant physical and psychological impairment as a result of pain. However, African Americans reported higher pain severity and disability, as well as significantly more depression and PTSD symptoms than whites (\( P < .05 \)). When compared to whites, more African Americans reported having trouble falling asleep (79.6% vs 71.7%; \( P < .05 \)). African Americans had a higher prevalence of gastric ulcers (19.3% vs 14.7%; \( P < .05 \)), chest pain (35% vs 23.4%; \( P < .05 \)), and high blood pressure (35.0% vs 24.1%; \( P < .05 \)) than whites.

Characteristics for Each Cluster

Cluster analysis for the entire population produced 3 clusters: Cluster I, with a higher pain severity, depression, and disability profile; Cluster II, with a lower pain severity, depression, and disability; and Cluster III, with an intermediate profile with medium pain and depression and high disability (Table 3). Clusters were also identified within each race category (African Americans and whites), gender (men and women), age (subjects \( \geq 18 \) to \( < 60 \) years old and subjects \( \geq 60 \) years old). Similar clusters were identified both in the overall population and within each race, age, and gender category (Fig 1). A comparison between the overall population clusters and the African American (kappa = .902), white (kappa = .944), age \( < 60 \) years (kappa = .982), age \( \geq 60 \) years (kappa = .782), male (kappa = .903), and female (kappa = .958) clusters showed excellent agreement in cluster assignment. A detailed description of sociodemographic variables for each overall cluster is provided in Table 4.

Cluster Descriptions

Cluster I Of the total population, 29.4% were in Cluster I. Within Cluster I, age was significantly associated with pain severity and depression (Mann-Whitney U; \( P < .05 \))
Pain duration was significantly associated with pain severity (Mann-Whitney U; \( P < .05 \)) but not with depression or disability. Race and gender were not significantly associated with pain severity, depression, or disability. Linear regression showed that within Cluster I, after adjustment for possible confounders, race was not significantly associated with pain severity, depression, or disability. Within Cluster I, people 60 years or older were more likely to have lower pain (\( P = .001 \)) and lower depression (\( P = .006 \)) scores than people younger than 60 years. Finally, people in pain for 30 months or more were more likely to have higher pain scores than people in pain less than 30 months (\( P = .016 \)), and people in litigation were also more likely to report disability (\( P > .005 \)).

Cluster II

Nearly 30% of the population (28.9%) were in Cluster II. Within Cluster II, race was significantly associated with disability (Mann-Whitney U; \( P < .05 \)) but not with pain severity or depression. Age, gender, and pain duration were not significantly associated with pain severity, depression, or disability within Cluster II. After adjusting for possible confounders, African Americans were more likely to have higher disability than whites (\( P = .028 \)); race was not significantly associated with pain or depression. People 60 years or older experienced less disability than people younger than 60 years. Pain duration was not significantly associated with disability within Cluster II after adjusting for possible confounders. Litigation was also associated with a higher disability score in Cluster II.

Cluster III

Cluster III consisted of 41.7% of the population. Within Cluster III, race (ie, being African American) was significantly associated with disability (Mann-Whitney U; \( P < .05 \)). Age was significantly associated with pain severity and depression (Mann-Whitney U; \( P < .05 \)). Pain duration was significantly associated with depression (Mann-Whitney U; \( P < .05 \)). Gender was not significantly associated with pain severity, depression, or disability within Cluster III. After adjusting for possible confounding factors, African Americans were more likely to have higher disability than whites (\( P < .0005 \)); people 60 years or older were more likely to have lower pain (\( P = .001 \)), lower depression (\( P = .024 \)), and higher disability (\( P = .027 \)) than people younger than 60 years; litigation was significantly associated with more depression and disability (\( P = .044 \)); and higher income was significantly associated with higher pain severity (\( P = .028 \)).

Comparing the Clusters

Overall, all clusters were significantly different from other clusters with regard to the mean values for pain severity, depression, and disability. Race was significantly associated with disability (Mann-Whitney U; \( P < .05 \)) but not with pain severity or depression. Age, gender, and pain duration were not significantly associated with pain severity, depression, or disability within Cluster II. After adjusting for possible confounders, African Americans were more likely to have higher disability than whites (\( P = .028 \)); people 60 years or older were more likely to have lower pain (\( P = .001 \)), lower depression (\( P = .024 \)), and higher disability (\( P = .027 \)) than people younger than 60 years; litigation was significantly associated with more depression and disability (\( P = .044 \)); and higher income was significantly associated with higher pain severity (\( P = .028 \)).
severity, depression, disability, affective distress, PTSD, median income, control over pain, and coping success (Mann-Whitney U; P < .05). It is important to note that the BDI score for Cluster III (mean ± standard deviation, 15.9 ± 7.1) is consistent with mild depression. Thus, when examining the BDI range for Cluster III (8.8 to 22.0), clinical depression could be present in some individuals.

All clusters were significantly different (P < .05) from other clusters with regard to race, age, education, marital status, depression classification, smoking, caffeine use, litigation, trouble falling and staying asleep, chest pain, and gastric ulcers (P < .05). They were not significantly different with regard to gender, colitis, or year of visit. With regard to alcohol use, asthma, and high blood pressure, Cluster I was significantly different from both Clusters II and III (Pearson chi-square; P < .05), but Clusters II and III were not significantly different from each other. Within Cluster II, subjects had significantly higher mean pain duration and lower age than Clusters I and III subjects (Mann-Whitney U; P < .05), although Clusters I and III were not significantly different from each other. With regard to pain duration, Cluster II was significantly different from both Clusters I and III (Pearson chi-square; P < .05), but Clusters I and III were not significantly different from each other.

**Discussion**

The literature supports the existence of differences in overall health and well-being based on demographic variables. More specifically, significant differences have been noted in the pain experience for racial and ethnic minorities, older people, and women with chronic pain. Consistent with the health care disparities literature, we found that African Americans with chronic pain had higher pain severity, depression, and disability when compared to whites with chronic pain. In the entire sample of patients coming to a pain center for initial assessment, higher pain intensity and depression were associated with being African American, younger, and having a longer pain duration (30 months or more). Higher disability was only associated with being African American and younger age. These results are consistent with our previous work, which showed that chronic pain had more adverse health effects on younger African Americans when compared to older African Americans. After confirming these racial and ethnic differences, we sought to identify similarities and differences within clusters of patients with similar clinical profiles developed by using well-validated measures of pain intensity, depression, and physical and social disability. Although subgroups of patients with
chronic pain have been defined previously, there is no information on how demographic variables influence these subgroups. Our results support the existence of 3 chronic pain subgroups and further extend the literature by identifying variability within these subgroups on the basis of race and age.

The classification of patients with chronic pain is fairly complex. Several authors have presented arguments regarding previous classification methods and their feasibility when used in clinical settings: (1) the International Association for the Study of Pain (IASP) classification is dependent on pain site only, (2) the Diagnostic and Statistical Manual of Mental Disorders (DSM-III) emphasizes the assessment of mental functioning and psychopathology, and (3) the Minnesota Multiphasic Personality Inventory (MMPI) was not devised to assess functioning in patients with chronic pain. Sanders and Brena compared the pain-related outcomes in subgroups of patients with chronic pain by using a disability measure and medical conditions, but pain and depression were not included as clustering factors. However, the strong relationship between pain severity, depression, and disability suggests the need for multiple measures to identify clinical groups of patients with chronic pain.

Our study confirms the existence of a good pain control profile in Cluster I (low pain, depression, and physical and social disability) and a chronic pain syndrome profile in Cluster II (high pain, depression, and physical and social disability) among patients with chronic pain. Several authors have identified similar profiles with high and low pain-related outcomes by using different measures. Both clusters have been repeatedly identified in the literature among patients with chronic pain and also among patients with more specific etiology such as low back pain, spinal pain, temporomandibular joint disorders, and headache. Rudy et al identified a dysfunctional profile (42.6%, all high) and a minimizer/adaptive copier profile (29.5%, all low), similar to our findings. When tested, their clusters were not related to gender, age, pain duration, or number of medical conditions by using the IASP classification. Three significant limitations of their work were that (1) potential racial influences were not examined, (2) only 1 instrument was used (WHYMPI), and (3) outcome and process factors were all included in the classification.

Cluster III, on the other hand, might be clinically labeled as disability with mild pain syndrome profile because of the significant emotional distress experienced by some of its members. It is important to note that although most individuals in Cluster III had symptoms consistent with mild depression, there were individuals who meet the criteria for clinical depression. Klapow et al used similar dimensions to classify their study sample and identified a group of patients with high pain, low depression, and low pain impact.
ences based on race, age, and gender, our study serves as a platform for future investigations in complex chronic pain populations.18,40,54,57,77,82

The results by Rudy et al,64 confirmed by Jamison et al,45 showed the existence of a third cluster characterized by moderate pain intensity, emotional health and disability labeled as an interpersonally distressed profile (27.9%). The presence of some emotional distress in our Cluster III suggests that this cluster might be somewhat comparable to the interpersonally distressed profile of Rudy et al. This group was primarily characterized by low social support, which was not measured in our study.73 More research is necessary with validated social support measures to determine whether our Cluster III is indeed a newly identified profile specific to certain chronic pain populations or is the interpersonally distressed profile of Rudy et al.

We found a smaller percentage of patients in Cluster II (28.9%) than what is reported in the literature. Cluster II had the highest pain duration, outcome scores, comorbidities, as well as worst coping scores. The reasons for these differences are unclear but might reflect referral patterns, as well as health care access and utilization issues. The observation that Cluster II had the worst outcomes, a delayed access to the tertiary care pain center, and that African Americans were represented in higher numbers in Cluster II is consistent with the literature, suggesting that African Americans receive treatment later for many chronic conditions when compared to whites.

Sociodemographic differences were identified between clusters in this study. Overall, Cluster II was younger than the other 2 clusters. One possible hypothesis is that trauma is more prevalent in the younger population. Beyond having more African Americans, individuals in cluster II were less educated, less likely to be married, and used less alcohol. They also reported more litigation, smoking, comorbidities, and sleep disturbance compared to the other clusters. Overall, gender differences were not found within or between clusters.

In a study with limited sample size by Hall-Lord et al,36 they found 3 clusters in elderly patients with chronic pain in whom the high disability, low pain, and affective distress cluster was older than the other 2 clusters (ie, all low and all high). Whereas Sorkin et al70 found no age-based differences in pain-related outcome, we identified differences regarding pain’s impact on the lives of people 60 years or older when compared to the young group. The small sample size of Sorkin et al might have decreased the chances of detecting a statistical difference. Corran et al13,14 found that older patients report less pain and depression while identifying 3 clusters: (1) positive adaptation to pain (high pain, low depression and functional impact, 25%), (2) high impact (low pain, high depression, and high impact, 25%), and (3) good pain control (all low, 50%). Again, race was not accounted for in any of these studies. Further study is needed to understand racial and ethnic differences within this cluster and to further validate these findings.

Our study has 3 potential limitations: (1) it uses retrospective data designed for clinical care in a heterogeneous patient population with mixed pain etiologies, (2) it uses self-report information, (3) there might be an important selection bias related to access to a tertiary care pain center, and (4) the relatively small number of African Americans compared to whites (particularly in Cluster I) might have reduced our power to detect associations between race and clinical measures.

Overall, we found the same 3 clusters among African Americans, whites, women, men, patients 60 years of age or older, and patients younger than 60 years. The same 3 clusters were also identified in the total sample. It was particularly interesting that the same clusters were found among African Americans and whites. Although there are essentially 3 profiles for patients with chronic pain presenting to the Multidisciplinary Pain Center, this study provides evidence for variations on the basis of race and age within each profile that need to be addressed by health care providers. In addition, this study provides new knowledge on racial and age variations within patient profiles. From a societal perspective there are tremendous benefits in clarifying some complexities in diagnosing and treating patients with chronic pain. These findings might have significant implications on pain treatment choices and pain management outcomes.

To improve quality of life and quality of care, future prospective studies are necessary to (1) validate these findings, (2) evaluate the differential efficacy of treatments tailored to specific chronic pain profiles, and (3) demonstrate their utility in predicting treatment outcomes.

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