Racial Differences in the Physical and Psychosocial Health among Black and White Women with Chronic Pain

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Gender-based differences in pain epidemiology, pain threshold, attitudes toward pain management, coping styles and social roles are well described, yet little is known about the chronic pain experience in women or the role race plays. A retrospective analysis of self-reported data using a secondary clinical database was performed to elucidate the relationship between race and pain severity, depression, physical disability, posttraumatic stress disorder (PTSD) as well as affective distress in women with chronic pain. White (n=1,088) and black (n=104) adult women were compared based on their responses to the McGill Pain Questionnaire, Beck Depression Inventory, Pain Disability Index, Posttraumatic Chronic Pain Test and items from the West-Haven Yale Multidisciplinary Pain Inventory. After accounting for sociodemographic, medical, psychological and physical confounders, there was no significant race effect for pain severity or affective distress. However, black women with chronic pain experience more physical impairments than white women with chronic pain (β=4.622; p<0.005). Except for the family/home responsibilities, similar differences were found on all PDI subscales. We also found that disability mediates the race–depression relationship such that black women are comparatively more vulnerable to depression as a result of higher disability. Due to the economic, social and emotional impact that disability has on women with chronic pain and their families, these findings have significant implications for chronic pain research as well as its management in black women.

Key words: race and ethnicity ■ women ■ gender ■ chronic pain ■ disability ■ functioning

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INTRODUCTION

The multidimensional aspect of chronic pain and variations in pain syndromes based on patient demographic factors (i.e., race, gender, age) renders its management challenging.[1,2] For instance, there are important gender variations in the chronic pain experience. Chronic pain disorders, such as fibromyalgia and migraine, are more frequently found among women.[3] Women are also more negatively affected by pain than men, with increased physical, psychological and social disability.[4-6] Cultural and historical differences in social roles and responsibilities between men and women may adversely affect a woman's pain experience, more so than men's. Besides these socioepidemiological investigations, several experimental studies have demonstrated that women have lower pain thresholds, greater ability to discriminate affective from sensory pain using the McGill Pain Questionnaire (MPQ), higher pain ratings and demonstrate less tolerance to painful stimuli when compared to men.[4,7,8] In addition, Green found that racial differences in attitudes about pain care and healthcare between black and white men with chronic pain were not replicable between black and white women. This supports a race–gender variation in pain care and pain attitudes.[9]

Overall, women are more likely to suffer from chronic pain conditions than men. Despite evidence supporting a greater impact on physical and emotional health in women living with chronic pain, their acute, cancer and chronic pain complaints are often handled less effectively by physicians when compared to men,[10-16] yet there is little information on the chronic pain experience among women in an ethnically diverse population. Taken together, these studies support a need to better understand chronic pain among women in general and ethnic minority women in particular.

Besides gender-based differences in the pain experience, differences based on race and ethnicity, both historically and culturally, influence the pain experience. Racial and ethnic differences in attitudes and beliefs influence nociception, and psychological and

behavioral responses to pain.[17-23] Thus, the gender–race intersection may expose black women to different levels of physical (e.g., pain severity, disability), psychological (e.g., affective distress, depression) and social (e.g., isolation) impairment.[24-26] In addition to these individual factors, system-wide inconsistencies in pain assessment and treatment contribute to racial- and ethnic-based disparities in pain care. These disparities in health services delivery and healthcare utilization often lead to suboptimal pain management for black women, resulting in increased morbidity and mortality.[17,27]

Despite studies investigating gender or racial and ethnic variations in health among people with chronic pain, there is a paucity of research designed to examine the sociodemographic determinants of the chronic pain experience in women. Identifying the health dimensions most affected by pain in black women will have significant public health implications with regards to pain management decision-making and in developing generalized and culturally appropriate measurement tools for clinical assessment and research. We speculate that black women had worse health outcomes than white women when both had chronic pain. This study aimed to identify racial differences in the chronic pain experience in a large sample of black and white women with chronic pain across the adult lifespan (≥18 years old). Two health dimensions impacted by pain will be explored: physical health (pain severity and functional limitations) and psychosocial health [depression, posttraumatic stress disorder (PTSD) and affective distress]. Several physical, psychosocial and medical factors that may influence the pain experience will also be explored in this investigation. Understanding racial variations in the health of women affected by chronic pain may result in the ability to identify focused interventions designed to improve the quality of pain care for all.

METHODS

Institutional review board approval (with waived informed consent) was obtained from the University of Michigan Health System (UMHS). This retrospective observational study uses clinical data collected from adult women living with chronic pain. The sample included black and white women (≥18 years old) presenting for initial chronic pain assessment at a tertiary care pain center between 1993 and 2000. Upon initial assessment, all patients presenting to the UMHS Multidisciplinary Pain Center completed the self-administered Pain Assessment Inventory Narrative (PAN), containing previously validated surveys measuring physical and emotional health. Data on pain characteristics, depressive symptoms, pain interference with physical and social functioning, PTSD and affective distress were obtained using the MPQ, Beck Depression Inventory (BDI), Pain Disability Index (PDI), Posttraumatic Chronic Pain Test (PCPT) and items from the West

Table 1. Sample sociodemographic characteristics

Sociodemographic Characteristics	N	Black Women (8.7%)	White Women (91.3%)	OR	P Value
Age (mean years ± SD)*	1,192	41.4 ± 11	43.2 ± 14	–	0.489
Marital Status	1,192			0.3	0.000
Married/significant other (%)		41.3	70.3		
Single/divorced/separated (%)		58.7	29.7		
Education	1,192			–	0.728
Less than high school (%)		14.4	12.7		
High school graduates (%)		63.5	62.0		
College graduates (%)		22.1	25.3		
Annual median household income ($)*	1,192	$27,085 ± 8,601	$35,752 ± 10,380	–	0.000
Litigation status (% yes)	1,192	31.7	16.8	2.3	0.000
Gastric ulcer (% yes)	1,192	21.2	14.0	1.6	0.047
High blood pressure (% yes)	1,192	37.5	19.1	2.5	0.000
Pain duration (in months)*	1,192	49.4 ± 63	50.7 ± 66	–	0.612

* Mann-Whitney U for independent samples for nonnormally distributed measures

Haven-Yale Multidimensional Pain Inventory (WHYMPI), respectively.[28-35] Only subjects who completed all questions of interest, apart from PCPT, which is only completed by subjects whose pain was related to a traumatic event, were included in the analyses.

Measures

The MPQ provides a quantitative measure of pain severity and other pain characteristics. The scale includes 78 words grouped into 20 classes of single-word pain descriptors that are ranked by intensity. A total score (range: 0–78) is obtained by summing the ranked intensities for the words chosen by the respondent. MPQ also measures four dimensions of pain: sensory, affective, evaluative and miscellaneous dimensions.

The PDI evaluates the interference of pain with physical and social functioning. It is a seven-item inventory that assesses the degree to which pain interferes with seven areas of functioning: family/home responsibility, recreation, social activity, occupation, sexual behavior, self-care and life-support activity. The PDI total score (0=no disability, 10=total disability, 70=maximum disability) is computed by summing the responses to all seven items. Tait and Chibnall identified two dimensions of disability representing disability in obligatory activities with the self-care and life-support activities subscales, and disability in discretionary activities with the family/home responsibilities, recreation, social activity, occupation and sexual behavior subscales.

The BDI is a 21-item survey that assesses depressive symptoms by measuring emotions, behavioral changes and somatic symptoms specific to people who have depression. The total score (range 0–63) covers different depressive symptoms, such as sadness, pessimism, loss of pleasure, guilt feelings, expectation of punishment, self-dislike, self-accusations, suicidal ideas, crying, agitation, social withdrawal, indecisiveness, worthlessness, loss of energy, insomnia, irritability, changes in appetite, difficulties with concentration, tiredness and loss of libido.

A modified version of the PCPT was used as a screening test for PTSD. Subjects were asked to rate the frequency of PTSD symptoms on a seven-point Likert scale (0=not at all; 6=very much). Only those whose chronic pain was related to an accident or surgery completed the PCPT questions. Individuals with a total score ≥3 are at higher risk for chronic pain-related posttraumatic stress disorder.

Three items from the WHYMPI were summed to create the affective distress scale measuring overall negative mood via questions on overall mood, irritability and tension or anxiety during the past week (scores range from 0–6).

Socioeconomic status was measured with race, age, income and education because there is a well-known association with health status. Previous research suggests that a patient's experience with pain and disability may be mediated by their involvement with pain-related legal action. Consequently, litigation status was included in the analyses.[36] Two major comorbid conditions, high blood pressure and gastric ulcer, were also included in the analyses due to their variable prevalence based on race.[37-40]

Self-report information on race (0 = Caucasian, 1 = black), age, marital status (0 = other, 1 = married or living with a significant other) and education (1 = less than high school, 2 = high school graduate, 3= at least high school graduate) was collected at initial assessment. The 1999 U.S. census data and the subjects' residential ZIP code were used to estimate the annual median household income for each participant.[41] In addition, involvement in a legal action (0 = no, 1 = yes), presence of clinician diagnosed gastric ulcer (0 = no, 1 = yes) and high blood pressure (0 = no, 1 = yes) were also collected using the standard clinical assessment tool.

Statistical Analyses

All statistical analyses were performed using the Statistical Package for Social Sciences, version 11.5 and AMOS software. The level of significance for all analyses was set at 0.05. Frequency tables were developed for sample description. T tests, Mann-Whitney U tests and Chi-squared tests were computed to compare black and white women with regard to their sociodemographic profile. Mann-Whitney U tests were also performed to compare the two groups' mean MPQ, PDI, PCPT, BDI and affective distress scores. Bivariate comparisons were run to identify independent associations between potential sociodemographic and medical confounders (age, marital status, education, median annual household income, duration of pain, litigation status, gastric ulcer and high blood pressure) and the main dependent variables. Due to the theory-driven yet exploratory nature of the analyses and the relatively high number of independent variables, five hierarchical linear regression models were fitted to the data to predict: 1) MPQ, 2) PDI, 3) PCPT, 4) BDI, and 5) affective distress. Each model included the potential confounding variables described above and a series of physical and psychosocial variables associated with the outcome in four blocks. The preceding variables (i.e., race and age) were entered in the first block. Education, marital status, income and litigation status were entered in the second block. The medical factors, including high blood pressure, gastric ulcer and pain duration, were entered in the third block. Finally, physical and psychosocial factors

were included in the final block. A more detailed description of the models for each dependent variable is provided below.

Pain severity. In the model testing the association between race and pain severity, the dependent measure was the MPQ scale, while the independent predictor and confounders were a series of sociodemographic factors (race, age, marital status, education, income, litigation) and medical factors (pain duration, gastric ulcer, high blood pressure). With regards to the physical and psychosocial variables, the diagnostic tests of multicollinearity obtained during preliminary analyses suggest they were highly correlated as supported by high and significant Pearson's correlation coefficients. Thus, a principal component analysis (PCA) was performed to determine whether PDI, BDI and affective distress loaded on one factor. A one-factor solution was found, and the component obtained was included in the model as a covariate in lieu of the individual variables.

Pain interference with functioning. In this model, the dependent measure was the PDI, and the same independent predictor and confounders used in the pain severity model were included. Here, too, based on Pearson's statistics, a PCA was performed to determine whether McGill, BDI and affective distress loaded on one factor. A one-factor solution was found, and the component obtained was included in the model as a covariate.

Depression. In the model testing the relationship between race and depression too, the same independent factors were included in the model. A one-factor solution with McGill, PDI and affective distress was obtained and was included in the model instead of the individual scales.

Affective distress. For affective distress, the same approach was adopted with the inclusion of sociodemographic and medical factors in three blocks. A one-factor solution was also obtained with McGill, BDI and PDI via PCA. It was subsequently included to prevent multicollinearity in the model.

Posttraumatic stress disorder. Since only a subset of respondents completed the PCPT questionnaire, its analysis was a little different from the other dependent variables. In the model testing the race effect on PTSD, after including the sociodemographic and medical variables in three blocks, a factor score loading for McGill, BDI, PDI and affective distress was generated via PCA and included in the model. Details from the correlations and factor analyses are presented in the results section.

RESULTS

Complete responses were provided by 40% of the women. The total sample (N=1,192) included 1,088 white (91.3%) and 104 black women (8.7%). Most participants were married or were in a long-term relationship (67.8%) and graduated from high school (75.0%). The age range for the sample was 18–75 (mean ± SD, 43 ± 13) with an annual ZIP code median household income ranging $24,474–$45,518 ($34,996 ± 10,522). Nearly 20% (18.1%) reported being involved in legal action related to their pain at initial assessment, while the most common comorbid condition reported was high blood pressure (20.7%). On average, the women reported suffering from pain for more than four years prior to their initial assessment at the pain center (50.6 ± 66 months).

At univariate analysis, the two groups did not differ by age, education or pain duration. Black women were less likely to be married or to have a significant other. They were also more likely to live in areas with lower income, to be involved in legal action and to have a higher frequency of comorbid conditions. Table 1 provides additional sociodemographic and health information for the sample. Using the MPQ, black women reported a significantly higher total pain severity score (30.7 ± 12 vs. 27.5 ± 12, p=0.008) and a higher score on both the sensory (16.1 ± 6 vs. 14.5 ± 7, p=0.010) and miscellaneous pain rating indices (6.5 ± 3 vs. 5.7 ± 3, p=0.008) than white women. Race was not significantly associated with the affective or the evaluative pain rating indexes (PRI, p=0.337 and p=0.351, respectively). Black women reported more disability due to pain than white women (44.1 ± 13 vs. 37.1 ± 14, p<0.005). They were also more likely to report that pain interfered with recreational (8.1 ± 2 vs. 7.1 ± 2, p<0.005), sexual (7.4 ± 2 vs 6.1 ± 3, p<0.005), social (7.0 ± 2 vs.

Table 2. Psychological factors among black and white women with chronic pain

Physical and Psychological Variables	N	Total Sample (Mean ± SD)	Black Women (Mean ± SD)	White Women (Mean ± SD)	P Value
Posttraumatic Stress Disorder (PCPT)†	580	8.7 ± 10	12.9 ± 11	8.1 ± 10	0.002
Depression (BDI)‡	1,192	17.1 ± 11	19.4 ± 12	16.9 ± 11	0.030
Affective distress (WHYMPI)*	1,192	3.1 ± 1	3.5 ± 1	3.1 ± 1	0.003

† Range: 0–36; ‡ Range: 0–63; * Range: 2–4; PCPT: Posttraumatic Chronic Pain Test; BDI: Beck Depression Inventory; WHYMPI: West-Haven Yale Multidisciplinary Pain Inventory

5.9 ± 3, p=0.001), occupational (7.7 ± 3 vs. 6.9 ± 3, p<0.005), self-care (5.0 ± 3 vs. 3.8 ± 3, p<0.005) and life support activities (5.3 ± 3 vs. 3.9 ± 3, p<0.005) than white women. Pain scores were not different between the two racial groups as it relates to family and home responsibility activities (3.5 ± 1 vs. 3.3 ± 1, p<0.103). Black women also reported more psychological distress due to pain, with significantly higher PTSD, depression and affective distress scores at univariate analysis (Table 2).

The physical and psychosocial variables were highly correlated via Pearson's correlations, as shown in Table 3 (r^2=0.260–0.578). The principal component analyses performed to account for the existence of multicollinearity in the multivariate models produced five one-item factors with an eigenvalue above 1 for the models predicting disability, pain severity, depression, affective distress and PTSD. These scales explained between 57% and 65% of the factors variance. More details about the factors obtained are displayed in Table 4.

In the five hierarchical linear regression models accounting for sociodemographic factors (age, income, education and litigation), medical factors (high blood pressure, gastric ulcer and pain duration), physical and psychosocial factors, we found a strong association between race: 1) disability (ß=4.622, p<0.005); 2) depression (ß=-0.235, p<0.035); and 3) posttraumatic stress disorder (ß=2.822, p<0.023; Table 5). When all the variables in the respective models are taken into account, black women reported higher PDI scores. Among women whose pain was related to a traumatic event, black race was also associated with higher PCPT scores (i.e., PTSD). We also found that black race was associated with *less* depression among women in the multivariate analysis. This reverse association between race and depression was observed after including the factor score in block 4, with an unstandardized regression coefficient going from ß=0.007 (p=0.960) to ß=-0.235 (p=0.035). Thus, we performed individual hierarchical models with MPQ, PDI and affective distress entered in block 4, one at a time. Our findings suggest that each physical and psychological factor individually reverses the race–depression relationship from a positive to a negative association ($ß_{\text{Model with MPQ}}$=-0.048, p=.725; $ß_{\text{Model with affective distress}}$=-0.121, p=0.307; $ß_{\text{Model with PDI}}$=-0.231, p=0.067); however, the relationship was significant at a trend level only for the model with PDI. We further included MPQ, PDI and affective distress consecutively in the same model, to assess their combined effect regardless of their collinearity. The sequence for entering these variables was dictated by the assumption that there is a temporality in their occurrence with pain severity preceding disability, leading to psychological impairments, such as affective distress. In these analyses, we found that the MPQ, PDI and affective distress effects on the negative relationship between race and depression were synergistic ($ß_{\text{Model with MPQ, affective distress and PDI}}$=-0.255, p=0.017). Thus, controlling for the MPQ, PDI and affective distress effects and their correlations demonstrates the existence of a negative relationship between race and depression among women with chronic pain. The mediating role of MPQ, PDI and affective distress in the race–depression relationship was confirmed via path analysis using AMOS software.

There was no statistical difference in the relationship between race, pain severity and affective distress in our sample after accounting for the covariates (Table 5). The race effect on pain severity became nonsignificant in block 2 when the enabling sociodemographic factors were entered. The unstandardized regression coefficient went from ß=2.996 (p=0.014) to ß=1.489 (p=0.233) and remained insignificant throughout the subsequent blocks. As for affective distress, the relationship remained at a trend level in blocks 2 and 3 but became nonsignificant in block 4 after entering the physical and psychosocial factors in the model (block 2: ß=0.194, p=0.140; block 3: ß=0.200, p=0.132; block 4: ß=0.072, p=0.530).

DISCUSSION

Epidemiological and clinical studies have demonstrated individual differences in pain severity, pain perceptions and beliefs, and differences in coping mechanisms based upon a patient's gender and cultural

Table 3. Physical and psychological measures correlation matrix

	Pain Severity	Depression	Functional Limitation	Affective Distress
Depression (BDI)	0.406*	–	–	–
Functional limitation (PDI)	0.422*	0.509*	–	–
Affective distress (MPI)	0.320*	0.578*	0.341*	–
PTSD (PCPT)	0.339*	0.393*	0.260*	0.373*

* Correlation is significant at the 0.01 level (two-tailed)

background.[1,5] Similarly, there are variations in how healthcare providers and the healthcare system respond to chronic pain patients.[12] However, the unique impact that chronic pain has on women (especially black women) is often overlooked.[6] To our knowledge, this investigation is the most comprehensive study examining the relationship between race and health in adult women with chronic pain. It accounts for sociodemographic (age, education, marital status, income and litigation status), medical (high blood pressure, gastric ulcer and pain duration), physical (functional limitation and pain severity) and psychological factors (depression, affective distress and posttraumatic stress disorder) in that relationship. In contrast with studies examining racial disparities in mixed-gender samples[9] and in agreement to Jordan, Riley and Strawbridge's results, we did not find any racial differences in pain severity or affective distress among women.[24-26] These previous studies of women's pain experience did not distinguish between the different dimensions of pain. Our results support the existence of racial differences on the sensory but not the affective dimension of pain in women. However, this race effect on sensory pain was mostly explained by the psychosocial and physical factors included in the analyses.

We also provide quantitative evidence for racial disparities on physical and social functioning among black and white women with chronic pain. After accounting for physical, psychosocial, medical and sociodemographic factors, black women reported more functional impairment than white women as measured by the PDI.[25,42] Except for family and home responsibilities, black women also reported more impairment in all obligatory and discretionary functions. These results may support the existence of racial differences in overall social/household activity level.[25] The impact of higher functional limitations due to chronic pain in black women is three-fold: 1) social disruption, 2) emotional distress, and 3) economic challenges. Diminished functioning has a tremendous impact on black women's social lives, emotional health and their families. Makela suggested that the risks of social isolation and severe emotional distress are increased among black women with chronic pain and their families when compared to white women with chronic pain.[43] Functional limitations also have significant socioeconomic implications for black women and their families in terms of disability, absenteeism and work productivity. These economic hardships are particularly important in the context of their multiple social roles, particularly when a woman is the sole provider for her family.[44] Finally, functional impairments are directly associated with an increase in healthcare utilization and costs.[45]

This study provides an important observation that race is not specifically associated with women's family and home responsibilities. However, this study does show that race is associated with their other physical and social activities. Regardless of race, family and home responsibilities fall within a woman's traditional gender-assigned tasks. However, within the sociocultural framework specific to the United States, black women have historically held multiple roles.[46] When compared to white women, black women are more likely to seek employment to provide additional financial support for the nuclear family as well as multigenerational households and to live without the financial and psychological benefits often associated with marriage.[47] We expected that with reduced functioning, black women will experience increased difficulties performing their household responsibilities as caregivers, mothers and wives in the presence of chronic pain. Surprisingly, we did not find racial differences in the family and home responsibility dimension of functioning.

Several authors have proposed psychological factors (e.g., coping strategies) as the preeminent predictors of chronic pain and disability.[48,49] Consequently, racial differences and similarities in functional limitations observed in our study could be attributable to differences in coping. Since the disability measures are self-assessed by patients, these differences and similarities may reflect variations in pain perception, opportunity or expectation for activity between the two racial groups.[25] Further studies directly examining coping strategies and variations in perceived disability in an ethnically diverse population of women are necessary.

Table 4. Unrotated factor coefficients of the one-factor solutions

	Factor Used in the PDI Model	Factor Used in the BDI Model	Factor Used in the MPQ Model	Factor Used in the AD Model	Factor Used in the PCPT Model
Variance explained (%)	63%	57%	65%	63%	57%
Disability (PDI)	–	0.786	0.748	0.818	0.749
Depression (BDI)	0.857	–	0.876	0.809	0.841
Pain severity (MPQ)	0.693	0.773	–	0.755	0.690
Affective distress (WHYMPI)	0.816	0.712	0.795	–	0.742

PDI: Pain Disability Index; BDI: Beck Depression Inventory; MPQ: McGill Pain Questionnaire; WHYMPI: West-Haven Yale Multidisciplinary Pain Inventory; PCPT: Posttraumatic Chronic Pain Test

This study also demonstrates that while black women seem to suffer from more depression, this relationship was mediated mostly by disability and secondarily by pain severity and affective distress. When disability, pain severity and affective distress are not considered, black women seem to suffer more from depression when compared to white women. However, when those factors are accounted for, black women suffered significantly less depression than white women. These findings have important clinical implications and support managing physical symptoms early (especially disability) to effectively reduce the racial gap in long-term mental sequelae commonly associated with chronic pain. From a research perspective, understanding the emotional impact of physical symptoms on health in black women with chronic pain may help researchers better design outcome studies such that appropriate medical interventions are designed to improve their health.

Previous research has provided conflicting results regarding how race influences PTSD. For instance, Norris reports that African-American men tended to display the greatest vulnerability to PTSD, while Perry found that women were at greater risk. None of these studies report racial differences among women.[50,51] We found that black women with chronic pain were significantly more vulnerable to PTSD than white women regardless of the comprehensive physical, psychological and medical factors considered in the current investigation. Therefore, the racial difference in PTSD scores found was not attributable to factors known to impact people's reports of pain-related trauma, such as litigation, pain severity or affective distress.[35] In the absence of being able to provide a genetic, sociocultural or environmental rationale for these differences, further studies are needed to elucidate the relationship between race and PTSD among women with chronic pain.

Although these results support racial differences in the health of black and white women with chronic pain, there are a few limitations. First, alternative explanatory factors, including the higher prevalence of disabling conditions (e.g., as osteoarthritis, sickle cell anemia) among blacks, were not ruled out, since pain etiology was not available in the dataset. Secondly, this study was limited to a clinical population with access to a tertiary care pain center and those who provided complete data. Thus, our results may not be generalizable to other populations. Finally, this retrospective and clinically based study design has important limitations related to the quality of clinical data and the temporality of the relationships observed. Future prospective studies using population-based design will need to address these potential methodological concerns.

Overall, this study has significant public health implications given the healthcare disparities literature. This investigation is the first to show that black women report more functional impairment, more PTSD and less depression than white women when both have chronic pain. However, these racial differences were not found for their family and home functions, pain severity or affective distress. We further found that disability mediates the race–depression relationship, such that higher disability yields more emotional impairment in black women when compared to whites. Due to the significant economic, social and emotional impact that physical disability and emotional impairment have on the lives and families of women with chronic pain, these findings have significant implications when studying and managing chronic pain in black

Table 5. Results of the multivariate analysis among black and white women with chronic pain†

Independent Variables	MPQ (n=1,192; r^2=0.241)†			PDI (n=1,192; r^2=0.350)†			BDI (n=1,192; r^2=0.420)†			AD (n=1,192; r^2=0.311)†			PTSD (n=580; r^2=0.281)†		
	Beta	SE	p	Beta	SE	p	Beta	SE	p	Beta	SE	p	Beta	SE	p
(Constant)	32.140	1.883	0.000	37.282	2.074	0.000	4.146	0.185	0.000	3.807	0.190	0.000	12.376	2.278	0.000
Race	0.264	1.133	0.816	3.808	1.241	0.002	-0.235	0.111	0.035	0.072	0.115	0.530	2.822	1.235	0.023
Age	-0.044	0.024	0.072	0.178	0.027	0.000	-0.003	0.002	0.227	-0.016	0.002	0.000	-0.058	0.033	0.074
Education	-1.162	0.521	0.026	-2.862	0.569	0.000	-0.020	0.051	0.696	0.028	0.053	0.595	-0.446	0.628	0.478
Marital status	0.524	0.669	0.434	-0.834	0.734	0.256	-0.129	0.066	0.049	-0.023	0.068	0.738	0.054	0.796	0.946
Income	-4.6e-05	0.000	0.126	-4.2e-05	0.000	0.201	-4.2e-07	0.000	0.886	9.3e-07	0.000	0.761	-5.3e-05	0.000	0.156
Litigation status	1.584	0.814	0.052	3.513	0.890	0.000	0.096	0.080	0.230	0.004	0.083	0.960	3.628	0.810	0.000
High blood pressure	0.629	0.803	0.434	-0.543	0.882	0.538	0.209	0.079	0.008	-0.126	0.081	0.122	-0.551	0.966	0.569
Gastric ulcer	0.374	0.873	0.668	0.701	0.958	0.464	0.013	0.086	0.879	0.028	0.088	0.754	-2.736	1.020	0.008
Pain duration	0.016	0.005	0.001	-0.002	0.005	0.682	0.000	0.000	0.552	0.000	0.000	0.336	-0.004	0.007	0.568
Factor score‡	5.261	0.318	0.000	7.170	0.348	0.000	0.915	0.031	0.000	0.662	0.033	0.000	4.261	0.396	0.000

† Final linear regression model: n: sample size; r^2: R square; ‡ Factor score composition: model with MPQ: PDI, BDI and affective distress; model with PDI: MPQ, BDI and affective distress; model with BDI: MPQ, PDI, and affective distress; model with affective distress: MPQ, BDI and PDI; Model with PTSD: MPQ, BDI, PDI and affective distress

women since they have worse outcomes. In addition to ensuring adequate access to quality pain care and improving pain assessment, optimizing pain management, especially physical symptoms, has the potential to significantly reduce the mental health gap between black and white women with chronic pain. Future investigations should focus on understanding why black women report more functional impairment and PTSD while exploring the reasons why black and white women report little interference in their family and home/responsibility in the context of their social roles.

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