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Factors Influencing Chronic Pain Intensity in Older Black Women: Examining Depression, Locus of Control, and Physical Health

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ABSTRACT

Background: **Chronic pain may function uniquely within a given race group, which may affect their physical health and psychological well-being. This is particularly relevant among women from diverse race populations.**

Methods: **Hierarchical multivariate regression analysis was used to examine pain intensity and its relationship to depressive symptoms, health locus of control, life satisfaction, and various health and demographic characteristics in a cross-sectional sample of 181 black women ≥50 years old.**

Results: **Results from the multivariate model showed that age, depression, physical functioning, and locus of control explained unique variance in pain intensity (44%), suggesting that younger age, reporting more depressive symptoms, limited functional capacity, the belief that one has control over one's health, and the belief that one's health is not controlled by others were significant predictors of greater pain intensity among this sample.**

Conclusions: **These findings underscore the importance of continued research on disease processes, as well as physical and mental health outcomes of older black women reporting chronic pain. Specifically, the study demonstrates the value of research focusing on within-group factors impacting a single population, thereby understanding the myriad of factors that may explain the unique pain experience of older black women.**

INTRODUCTION

THE COLLECTIVE HEALTH OF WOMEN experiencing pain-related chronic conditions is a growing concern. Operationally defined as an unpleasant emotional experience associated with a physiological response to disease and tissue damage, pain is often secondary to physically debilitating conditions (e.g., arthritis, osteoporosis) and contributes to diminished psychological and physical health and social well-being.[1–3] It is well documented that women are more likely to report pain-related chronic conditions (e.g., osteoarthritis, fibromyalgia, migraines) than their male counterparts.[4] Despite the prevalence of these conditions, women are treated less aggressively,

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and black women in particular are at an increased risk for chronic pain conditions that are more severe, physically debilitating, and undertreated when compared with men and white women.[5–8]

Although there is limited information about the clinical pain experiences of older black people, the available research has shown disturbing racial differences in reports of the pain experience. Baker and Green[9] found that both older and younger black people reported more pain and suffering and less control over their pain than white people. Similarly, Bernabei et al.[10] have shown that pain assessment and treatment among older black people living in nursing homes was less than that for older white people.

Although there are documented inequities in treatment and outcomes by race, disparities confounded by gender are also evident. Although black women account for <7% of the total U.S. population,[11] they are disproportionately diagnosed with more chronic medical diseases, are more likely to rate their health as poor, and demonstrate diminished functional capacities compared with white women, even after statistically controlling for disparities in income, wealth, and education.[12]

Limitations to prior research

It was not until the National Institutes of Health (NIH) Revitalization Act of 1993 that NIH set forth guidelines requiring the inclusion of women and ethnic minorities in research. Prior to this, research predominantly focused on convenience samples of younger white (often male) adults.[4] As a result, both women and people of color were vastly underrepresented, rendering much of the extant literature on the physical heath (e.g., pain) and psychological well-being (e.g., locus of control, life satisfaction) inconclusive for women, particularly women of color. Further, despite considerable heterogeneity within a given racial group, suggesting variability in the social and psychological factors associated with specific health outcomes,[13] such factors have rarely been considered among racially diverse populations.[14] Together, these factors have resulted in a dearth of information that systematically examines race and gender differences in the onset, interpretation, and outcomes of the pain experience, particularly among black women.[15] Failure to address race and gender compromises the ability to generalize current findings on the experience of chronic pain to these population groups. This is significant, considering the emerging presence of women of color in the United States and the amalgam of health and social challenges this population frequently encounters (e.g., lower levels of education, poverty, poor nutrition).[16–18]

Theory lends to the differential effects life satisfaction, mastery (locus of control), physical functioning, and comorbid physical conditions have on the chronic pain experience and psychological well-being in older adults.[19–21] This perspective is grounded in the context of a number of theories ascribing the complexity and multidimensionality of the pain experience. The biopsychosocial approach to pain, for example, focuses on the interaction of biological (medical causing agent, e.g., arthritis, diabetes, physical functioning), psychological (depression, life satisfaction), and social (culture, gender) factors. This suggests that the illness (condition initially causing the pain) is a dynamic process, with a myriad of biological, psychological, and social factors impacting the pain experience.[22]

The biopsychosocial approach and other existing models have been extensively examined among white people, but there is a paucity of empirical research examining these important health and psychosocial factors related to the pain experience in black women, particularly older black women. Thus, the objective of this exploratory analysis was to identify characteristics that influence the pain experience and to determine the degree to which demographic (age, education, income), psychological (depressive symptoms, health locus of control, life satisfaction), and health variables (pain locations, medications, comorbidities) were associated with chronic pain intensity in a sample of older black women.

Rather than generalizing across groups, we employ an emic (i.e.,within group) research design, which involves initially studying a phenomenon within a given group (e.g., black women).[23] This analytic strategy can determine if current models adequately generalize to a particular group while enhancing our understanding of how the pain experience may be unique.

MATERIALS AND METHODS

Participants and procedures

Data for this study were collected as part of the Baltimore Study on Black Aging (BSBA). Participants were recruited from several senior high-rise facilities located in an urban city in Maryland. Fliers explaining the purpose of the project were posted in designated areas frequented by most residents (e.g., primary hallways, mailroom). Women ≥ 50 years who were cognitively intact, had a doctor-diagnosed arthritis or musculoskeletal disorder, and experienced pain for ≥3 months were eligible to participate in the study.

The sample comprised 181 community-dwelling black women, with a mean age of 71.1 ± 9.22 years and an average of 10.31 ± 2.87 years of education. Seventy-seven percent of the sample reported a monthly income of <$1000.00.

During one-on-one interviews, participants were provided with an Institutional Review Board-approved consent form and completed demographic information and measures of physical and psychological health (e.g., comorbid disorders, pain intensity, pain locations, physical impairment, and depressive symptoms). Each interview lasted approximately 1½ hours. At the end of the interview, respondents were debriefed and compensated for their participation.

Measures

Unless stated otherwise, high scores indicate a higher endorsement or greater amount of the named variable.

Pain and health variables. Pain intensity was the primary outcome variable for this study and was evaluated using the Pain Rating Index (PRI) scale from the McGill Pain Questionnaire (MPQ).[24] The PRI scale consists of 78 pain descriptors (e.g., throbbing, cramping, stabbing) that provide an overall index of pain intensity ($\alpha = 0.72$). Words for the PRI were read to each respondent by the research assistant so that, if necessary, any unfamiliar words could be explained (via a synonym of the word). A mean score value was obtained by summing the ranked intensities and then averaged to obtain a single score. Number of pain locations was assessed by asking participants if they experienced pain (yes/no) in the following locations: knees, ankles, hips, shoulders, lower back, wrists, elbows, and hands. A total pain location score was derived by a count of the total number of body locations identified.

Physical functioning was assessed using the Arthritis Impact Measurement Scale 2 (AIMS2).[25] The 25-item subscale score includes items on mobility, walking and bending, hand and finger function, arm function, self-care, and household tasks. The subscale yields a composite score ranging from 0 to 10 ($\alpha = 0.91$). The Medication Use Inventory Scale was used to determine the total number of medication categories from which the participant is taking prescribed medication (e.g., high blood pressure, diabetes). A medication score was obtained by the total number of categories of medications reported. A single item from the Self-Evaluation of Life Function (SELF) scale determined the count of comorbid illnesses.[26] A list of acute and chronic comorbid conditions assessed if the participant had been doctor-diagnosed with a specific medical condition within the past year (e.g., arthritis, bronchitis, diabetes). A final score was obtained by a count of the total number of diseases.

Psychological measures. The Center for Epidemiological Studies-Depression scale (CES-D) assessed symptoms of depression. The measure yields a composite score ranging from 0 to 60 ($\alpha = 0.90$).[27] Health locus of control was evaluated using the Multidimensional Health Locus of Control (MHLC) questionnaire. This 18-item scale yielded a total composite score assessing internal (individual's belief they have control over their life), powerful others (life is controlled by others), and chance (life is determined by fate or chance) locus of control.[28–30] Responses were was measured on a 6-point Likert scale (1 = strongly disagree; 6 = strongly agree) ($\alpha = 0.81$). Overall satisfaction with life was assessed using the Life Satisfaction Inventory (LSI-Z),[31] which yields total scores ranging from 13 to 36 ($\alpha = 0.74$).

Demographic characteristics. Age was scored in a continuous format. Education was assessed as a continuous variable, reflecting the total number of years of completed formal schooling. Income was coded dichotomously (earning <$1000 a month).

Statistical analysis

A cross-sectional design was used for the current study. Descriptive statistics were calculated to provide a profile of the sample's demographic characteristics and measure performance on the pain, health, and psychological variables. Pearson product-moment correlation coefficients were examined to assess the strength of the bivariate associations between the pain intensity index and each demographic, psychological, and health variable. A hierarchical multivariate regression model was estimated to determine the amount of unique variance in pain intensity accounted for by selected psychological factors while controlling for the demographic and health variables. The regression procedure entered the predictor variables in three models. Demographic variables (age, education, income) were entered first, followed by the health variables (pain locations, medications, number of comorbid conditions). Depressive symptoms, health locus of control, and life satisfaction scores were entered as the final block of predictor variables. Standardized beta coefficients were reported to describe the relative importance of the predictor variables within the regression model. All statistical analyses were performed with the Statistical Package for Social Sciences (SPSS Inc., Chicago, IL) version 14.0.

RESULTS

Health characteristics

Participants reported an average of 29.02 ± 14.26 on the pain intensity measure, 3.22 ± 1.72 comorbidities, 5.60 ± 3.26 medications, and 2.92 ± 1.46 pain locations. Pain located in the knee(s) (77%) was the most frequently reported pain location. Sixty-one percent reported pain in one or both shoulder(s), with half (50%) reporting pain in one or both hands. More than one quarter (40%) experienced pain in the lower back, followed by pain in the hip(s) (22%) and ankles (23%). Approximately 16% of the sample reported pain in a single location. Another 24% and 27% reported pain in two and three locations, respectively.

As shown in Table 1, correlation analyses indicated that increased pain intensity was associated with younger age ($r = -0.24$, $p < 0.01$) and less satisfaction with life ($r = -0.21$, $p < 0.01$). Experiencing more depressive symptoms ($r = 0.34$, $p < 0.001$), health locus of control-internal ($r = 0.16$, $p < 0.05$), pain locations ($r = 0.33$, $p < 0.001$), comorbidities ($r = 0.45$, $p < 0.01$), medications ($r = 0.26$, $p < 0.01$), and physical impairment ($r = 0.39$, $p < 0.001$) were also significantly correlated with greater pain intensity. This suggests that younger women and those less satisfied with daily life situations experienced greater pain intensity. Similarly, women experiencing more depressive symptoms and those reporting more control over their health experienced greater pain intensity.

Predictors of pain intensity

Table 2 summarizes the results of the multivariate regression model. For this analysis, model development involved entering the demographic variables (age, education, and income) in the first block, which accounted for 6% of the total pain variance. Age ($\beta = -0.25$, $p < 0.05$) was the only significant demographic predictor of pain intensity in the first model. After entering the health indicators (pain locations, physical functioning, comorbidities, medications) in the second model, physical functioning ($\beta = 0.37$, $p < 0.01$) was significant and accounted for 24% of the total variance. Age was retained when the health variables were entered. After controlling for age, education, income, and the health indicators, the psychological variables (depression, locus of control, life satisfaction) were entered. Depressive symptoms, locus of control-power, and locus of control-internal were significant and accounted for another 13% of the pain variance ($\beta = 0.25, -0.26$, and 0.21, $p < 0.01$ respectively). The effect of age and physical functioning remained significant when the final block of indicators was included in the analyses.

The full regression model was significant and accounted for 44% of the total variation in pain intensity. In the final analysis, age ($\beta = -0.20$, $p < 0.05$), physical functioning ($\beta = 0.26$, $p < 0.01$), depression ($\beta = 0.25$, $p < 0.05$), locus of control-internal ($\beta = 0.21$, $p < 0.05$), and locus of control-power ($\beta = -0.26$, $p < 0.05$) emerged as significant indicators of pain intensity. When all the variables in the respective models were taken into account, participants reporting greater pain intensity were younger, experienced more depressive symptoms and functional limitations, and believed they had more control over their health and that others did not.

DISCUSSION

This study aimed to determine the various psychological and physical health factors that influence the pain experience among older commu-

Table 1. Correlations among Pain Intensity and Measured Behavioral and Clinical Variables

	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*
1 Pain intensity		−0.24**	0.00	−0.03	0.45**	0.33***	0.26**	0.39***	−0.21**	−0.05	0.10	0.16*	0.34***
2 Age			−0.21**	−0.05	−0.27	−0.21*	−0.09	−0.00	0.27**	0.09	0.34**	−0.00	−0.05
3 Education				0.46**	−0.19**	0.00	−0.19*	−0.14	0.12	−0.24**	−0.29**	−0.02	−0.13
4 Income					−0.30**	−0.04	−0.18*	−0.16	0.16	−0.05	−0.02	0.07	−0.10
5 Comorbidities						0.20*	0.64**	0.34**	−0.14	0.20**	0.00	0.03	0.14
6 Pain locations							0.33**	0.34**	−0.07	0.02	−0.10	−0.07	0.11
7 Medications								0.46*	−0.25**	0.15*	−0.05	−0.07	0.18*
8 Physical impairment									−0.17*	0.13	0.13	−0.03	0.26**
9 Life satisfaction										−0.03	0.08	0.03	−0.57**
10 LOC[b]-powerful											0.68**	0.19**	0.10
11 LOC-chance												0.20**	0.09
12 LOC-internal													0.05
13 Depressive symptoms													

$^{*}p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$.

[b] LOC, locus of control.

Table 2. Multivariate Regression Model of Pain Intensity, Behavioral, and Clinical Factors[a]

Step	*Predictor*	β	*F ratio*	R^2	ΔR^2
1	Age	−0.20*	1.93	0.06	0.06
	Education	−0.03			
	Income	−0.02			
2	Comorbidities	−0.04	5.38***	0.31	0.24
	Pain locations	0.12			
	Medications	0.18			
	Physical functioning	0.26**			
3	Depressive symptoms	0.25*	5.25***	0.44	0.13
	Life satisfaction	−0.01			
	LOC-chance	0.08			
	LOC-powerful	−0.26*			
	LOC-internal	0.21*			

[a] The regression model shown is hierarchical, and the β represents standardized regression coefficient controlling for prior sets of predictors.

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

nity-dwelling black women. For the current sample, women who reported greater pain intensity tended to be younger, reported more depressive symptoms, and experienced more functional limitations than women who reported lower pain intensity. We also found that those reporting greater pain intensity were also more likely to believe that they, and not others, were in control of their health.

Although much of the literature documents the impact of pain on the physical, psychological, and social well-being of white people, factors related to pain in older black people, particularly black women, have not been adequately addressed. Our findings begin to address this need and have important implications for research and clinical practice.

First, findings from this investigation showed that age was a significant indicator of pain intensity, suggesting that younger participants reported greater pain intensity than older participants. Examination of the underlying determinants of this relationship are beyond the scope of this paper; however, there are plausible explanations for this finding. It has been suggested that older adults are more likely than their younger counterparts to develop more effective coping skills and strategies (e.g., medication use, informal and formal support systems) when faced with various psychological and physical health issues. These may serve as protective factors decreasing psychological distress and physical illness while improving their overall quality of life.[32] Conversely, older adults may have acclimated to higher pain thresholds and limited physical abilities, thereby decreasing their perceptions of pain intensity.[33] Another explanation for this finding is the possibility of a cohort effect, suggesting that older women who reach old age may ultimately be healthier than their younger counterparts. This is known as a crossover effect or phenomenon, where an older minority who reaches advanced age displays a combination of biological vitality, psychological strength, and exceptional resources for coping. These strengths emerge as a source of resilience that mitigates the negative impact of disease, thus representing a healthier cohort than their younger or majority race counterparts.[34] This effect has been demonstrated in the medical (e.g., age-specific rates of breast cancer incidence), behavioral (e.g., cognitive performance), and social sciences.[35]

We further established that decreased physical functioning was significantly associated with greater pain intensity in our sample of black women. These findings have broad implications considering that many black people rate their physical and mental health based on their ability to perform physical tasks.[36] Our findings suggest that for older Black women, declining physical abilities are associated with perceiving the pain experience as being more intense.

Beyond the obvious physical manifestations and limitations of the pain experience, there is a growing body of research illustrating the robust relationship between depression and pain.[9,37–39] Consistent with the current literature, we found that increased depressive symptoms were associated with greater pain intensity among this sample of black women. Currently, there is some discussion about the interpretation, definition, and diagnosis of psychological conditions, such as depression, in black people regardless of the diagnostic method used to assess these symptoms. Previous studies examining depression among black people focused primarily on institutionalized samples, making extrapolation to the general black population difficult.[40,41] Furthermore, examination of these conditions has focused on comparisons between black and white people, without investigating the heterogeneity within the black population.[42–44] More research is needed to understand the underlying processes that account for within-group differences, such as gender, in depressive syndromes and how these symptoms may change over time. Consequently, our findings make a clear contribution to this body of research by documenting the connection between pain and depressive symptoms with an understudied population (older black women).

It is important to note that some chronic conditions (e.g., arthritis, diabetes) may manifest as somatic symptoms, making it difficult to disentangle somatic symptoms of depression and those secondary to a medical illness.[45,46] Arguably, symptoms of depression may be underexamined as a psychological phenomenon among black people because these symptoms are attributed to a chronic medical condition. The connection to depressive symptoms observed in this study clearly underscores the importance of examining multiple health factors among black people, given that this population is disproportionately afflicted and diagnosed with more severe and debilitating illnesses than white people.[47,48]

Finally, our findings suggest an interesting pattern regarding the locus of control indicators among black women, particularly those diagnosed with pain-related medical illnesses. In this community-based sample of women, the belief that they had control over their health and that others did not was associated with greater pain intensity. Our findings suggest that when black women see themselves as having control over their health, it can negatively alter their perception of pain, particularly during times of failing health. These findings were surprising, given that the literature clearly defines the protective nature of perceived control over one's physical and mental health.[49–51] It is possible that for black women coping with consistent negative experiences, such as chronic pain, a sense of internal locus of control causes one to feel responsible for the condition. This is an important observation, considering that persons who endorse a higher internal locus of control may perceive their outcomes (positive or negative) to be the result of their own behaviors. Thus, the women in this sample may blame themselves for their inability to overcome their condition, and it is possible that self-blame may be contributing to the negative outcomes found in this study. This finding demonstrates that the processes for older black women's pain experiences may be unique from those of other gender/race groups, reifying the need to study this population directly.

Given the multitude of factors impacting the pain experience, our study provides several contributions to the existing pain literature. Perhaps the most important contribution is the inclusion of a sample comprised entirely of older black women. Our findings represent a population that has traditionally been overlooked in medical and psychological research. As a result, little is known of their unique needs and concerns regarding the pain experience. More importantly, we have provided comprehensive empirical data on variables that have not been thoroughly examined in older community-dwelling black women experiencing chronic pain (e.g., life satisfaction, locus of control). The ability to generalize our findings can be expanded as future studies validate these results among women from various racial backgrounds.

This study also highlights the fact that social and demographic factors are important areas for future pain-related research. For example, because race and class are frequently confounded,[52] it can be difficult to discern whether the demonstrated effects in pain perceptions are related to race, poverty, or both. However, previous research has shown that even when demographic factors are statistically controlled, disparities in symptom severity and access to healthcare persist across economic and social classes.[53] Given that the majority of our sample earned <\$12,000 a year, which places them below the United States federal poverty thresholds of earning <\$12,500 annually,[54] it is possible that the results of this study may have differed if this had been an upper middle class sample of older black women. Therefore, the ability to distinguish the causal inferences of these variables is critical.

Together with these economic concerns, psychosocial factors, such as social disadvantage and discrimination, may have detrimental effects on one's physical health and emotional well-being.[55] For example, research has documented detriment to one's physical and psychological health associated with discrimination,[56] harassment,[57,58] and race-related daily hassles.[59] Therefore, to truly understand race group differences in the outcomes of pain-related medical conditions, future studies will need to address issues of discrimination and socioeconomic stress, as they may have differential effects across the race groups.

Although this study provided important findings on the psychosocial and health predictors of chronic pain in black women, there are several limitations that should be acknowledged. First, the method for recruiting participants (e.g., fliers in public spaces) may have inadvertently biased the sample, such that those most incapacitated by pain might not have seen the fliers and, therefore, were not included in the study, which may have restricted the range of responses on variables. If this is the case, the relationships among the variables would be attenuated, and the strength of their relationships may be lost or understated. It is possible that including more severe cases would reveal additional significant relationships or strengthen the associations found with this study. Second, analyses were based on self-report data, which can be a source of intentional or unintentional bias. Despite this concern, the measures used in this study are appropriate for the constructs examined, are well-developed with established discriminant validity, and demonstrated strong internal reliability with this sample. Although this is not sufficient for establishing their validity for a particular population, it does support their use.

Third, the current investigation was cross-sectional and correlational in design, thereby limiting our ability to assert causal relationships between variables. Comprehensive longitudinal studies that begin prior to the onset of pain-related conditions and include diverse gender and race populations are needed to determine causality among variables, such as depressive symptoms, locus of control, and pain. The longitudinal nature of such a study would provide insight into the premorbid factors predicting the onset and exacerbation of chronic pain-related conditions, thus accounting for the variability in the women's responses to pain across race groups.

Although we contend that this is also a strength of this study, we should note that this was an all female sample, comprised of a single race group from an urban dwelling. These results may not adequately generalize to men, other race groups, or individuals from other geographic areas. Specifically, emic research is deliberately not comparative in nature; therefore, the goal of this research design was to thoroughly explore a construct within a group prior to generalizing across populations. Thus, the observed results may or may not be significantly different from those of other race groups. Nevertheless, one benefit of this research design is that it provides detailed data about a group of interest and can illuminate relationships that have not been addressed in the past.

Our findings underscore the importance of continued research on disease processes, as well as physical and mental health outcomes both within and between samples of older adults. The study also demonstrates the value of research focusing on within-group factors impacting a single population. Specifically, we were able to provide unique empirical data on the pain experience among older black women. This is important, considering the dearth of literature capturing the pain experience among this marginalized population. Future research on older black women must begin to actively incorporate their pain experience into applicable theories defining their clinical and behavioral experiences not only as patients but as a group grounded in their identities as black women. Such an approach will begin to augment research on their lived experiences and more accurately reflect the race and gender context of their lives.

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