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The association of perceived discrimination with low back pain

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Abstract A handful of recent studies have documented perceived discrimination as a correlate of poor physical and mental health status among ethnic and racial minority groups. To date, however, despite a proliferation of research on ethnic disparities in the severity and impact of a number of persistent pain conditions, there have been no reports on associations between perceived discrimination and pain-related symptoms. Using data from a national survey (the National Survey of Midlife Development in the United States; MIDUS), we explore the relationships between perceived discriminatory events and the report of back pain among African-American and white men and women. As expected, African-American participants reported substantially greater perceptions of discrimination than white participants. Moreover, in models that included a variety of physical and mental health variables, episodes of major lifetime discriminatory events were the strongest predictors of back pain report in African-Americans, and perceived day-to-day discrimination was the strongest predictor of back pain report specifically in African-American women. Among white participants, perceptions of discrimination were minimally related or unrelated to back pain. To our knowledge, these are the first data documenting an association between perceived discrimination and report of back pain; the fact that perceptions of discrimination were stronger predictors than physical health variables highlights the potential salience and adverse impact of perceived discrimination in ethnic and racial minority groups.

Keywords Back pain · Discrimination · Ethnicity · Race

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Introduction

Recent reviews have highlighted ethnic disparities in health in the United States, as well as the potential role of racism/discrimination in contributing to the maintenance of those disparities (Mays et al. 2007; Shavers and Shavers 2006; Williams et al. 2003). Increasingly, pain researchers have also explored ethnicity as a potentially influential variable in shaping individuals' experiences of pain. Ethnicity is a subjective and self-reported classification system referring to a social group of people sharing a common ancestral origin, culture, or sense of identity (Amaro and Zambrana 2000; Edwards et al. 2001b). As such, ethnicity may be particularly relevant in the domain of pain experiences since the biopsychosocial model (Turk 1996) posits that pain is shaped by interactions among biological, psychological, and social variables, all of which are integrally involved in an individual's identification with one or more ethnic groups.

Pain researchers have noted differences between African-Americans and whites in the reported experience of a variety of acute and chronic pain states (Edwards et al. 2001a, b), and laboratory studies have detailed ethnic differences in responses to controlled noxious stimuli (Edwards et al. 2001a, b; Edwards and Fillingim 1999). However, it is only recently that attention has been focused on individual-difference factors that may shape pain responses within particular demographic groups. For example, several reports

within the past few years have highlighted the important pain-related correlates of using particular coping strategies (Campbell et al. 2005; Edwards et al. 2005), engaging in self-care behaviors (Hastie et al. 2005), and ethnic identification (Rahim-Williams et al. 2007) within groups of minorities undergoing pain assessment.

To date, one factor that has thus far not been studied in the literature on ethnicity and pain is an individual's perception of discrimination. Individual differences in perceived discrimination have been associated with increases in breast cancer incidence (Taylor et al. 2007), with reductions in nightly slow wave sleep (Thomas et al. 2006), with unhealthy behaviors such as smoking (Landrine and Klonoff 2000), and with generally worse physical and mental health (Harrell et al. 2003; Mays et al. 2007; Williams 1999), but no published studies have evaluated associations between perceived discrimination and the report of pain. This is an important question, since painful musculoskeletal conditions afflict tens of millions of Americans each year and are associated with substantial healthcare costs, disability, and mortality (Jakobsson and Hallberg 2002; Keefe et al. 2002; Macfarlane et al. 2001; McBeth et al. 2003; Smith et al. 2004; Turk 2002).

The extant research linking discrimination with distress and decrements in mental health is quite strong (Brody et al. 2006; Dyrbye et al. 2007; Noh et al. 2007; Siefert et al. 2007), and elevated indices of chronic stress among minorities are a frequent consequence of racism and discrimination (Harrell et al. 2003; Mays et al. 2007). Moreover, negative affective states such as depression and anxiety are closely related to the report of musculoskeletal pain (Edwards et al. 2006a, b; Keefe et al. 2005; Keefe et al. 2004), providing a likely link between the experience of perceived discrimination and pain.

Since back pain, in particular, is a leading cause of disability and healthcare costs (Brooks 2006; Katz 2006), the present analyses examine potential relationships between perceived discrimination and back pain. Moreover, these associations are examined within particular groups who may be at relatively higher or lower risk for discriminatory experiences (i.e., ethnic minorities compared to whites).

Materials and methods

Participants

Data from the Midlife in the United States (MIDUS) survey was used. The MIDUS was a large ($n > 3{,}000$), nationally-representative sample of non-institutionalized 25–74 year-olds, conducted from 1995–1996 via a random digit-dialed telephone sampling frame of the contiguous U.S. One randomly selected eligible individual from each household was interviewed over the telephone and then mailed a questionnaire to self-administer and return. The first stage of the survey, involving a 30-min telephone interview, had a response rate of 70%. The second component of the survey involved two mailed questionnaires and had an 86.8% conditional response rate, leading to an overall response rate of 60.8%. Further details of the MIDUS are reported in other publications (Brim et al. 2000; Kessler et al. 1999; Wang et al. 2000). In general, the MIDUS survey was a close approximation of the U.S. population, although the Midwestern region of the country was slightly over-represented, as were whites and those with some education beyond high school (Brim et al. 2000). The Johns Hopkins Institutional Review Board approved the present study, which was performed on a de-identified MIDUS data set.

Variables of primary interest

Individuals responded to the question "what race do you consider yourself to be"; we selected for analysis only those who reported their racial background as either "white" or "black and/or African-American." While other racial backgrounds were endorsed by some respondents (e.g., Asian), their numbers were too small to permit meaningful analysis. In the MIDUS study, recent back pain frequency was assessed with a single question: "During the past 30 days, how often have you experienced low back pain?" Responses were coded from zero ("not at all") to five ("almost every day"); similar measures of back pain frequency are routinely used in outcomes studies (Danielsson and Nachemson 2003; Enthoven et al. 2006). Respondents' perceived experiences with discrimination (see Mays and Cochran 2001) were measured in two domains: (1) lifetime occurrences of major events perceived as discriminatory, and (2) frequency of day-to-day discrimination. Moreover, individuals endorsing any experiences with discrimination were requested to provide their perceptions of reasons for the discrimination, including age, sex, race or ethnicity, religion, physical appearance characteristics (e.g., height, weight), physical disability, sexual orientation, or any other reason.

For lifetime occurrences, respondents were asked to indicate, in a series of 11 event domains, how many times they had been discriminated against "because of such things as your race, ethnicity, gender, age, religion, physical appearance, sexual orientation, or other characteristics." These experiences included items related to academics (discouraged from continuing education, denied a scholarship), employment (not hired or promoted,

fired), receiving financial and other services (denied a bank loan, prevented from renting or buying a home, given inferior services), and experiences with social hostility (forced out of a neighborhood, hassled by the police). Because the response distributions were positively skewed, we calculated a Lifetime Discrimination Index by recoding reports for each of the 11 types of discrimination experience into 3 categories (none, 1 experience, 2 or more experiences) and summing across all 11 domains (i.e., scores could vary from 0–22), similar to previous MIDUS studies of perceived discrimination (Mays and Cochran 2001).

Respondents also were asked to indicate how frequently they experienced each of 9 types of discrimination on a day-to-day basis. These included: being treated with less courtesy or respect than others; receiving poorer service than others at restaurants or stores; being called names, insulted, threatened, or harassed; having people act afraid of the respondent; having people act as if the respondent was dishonest, not smart, or not as good as they were. For each of the 9 items, respondents noted the frequency of occurrence using a 1–4 descriptor scale (1 = "never," 4 = "often"). Responses were averaged to form a Daily Discrimination Index.

Selected control variables

As noted above, the question of interest related to whether individual differences in discriminatory experiences were associated with individual differences in the report of back pain. A variety of potentially confounding variables, that might be related to both perceived discrimination and pain (e.g., global physical health), were identified and utilized as covariates within the analytic models described below. These included demographic variables such as age, educational attainment (operationalized as years of schooling), and marital status (operationalized as living with a spouse or partner versus living alone). Moreover, the following 3 variables were included as measures of physical health: (1) self-rated physical health on a 1–5 scale (1 = poor, 5 = excellent); (2) The total number of chronic conditions reported from a list of 27 (e.g., stroke, asthma, cardiovascular disease, etc.; see (McWilliams et al. 2004), and (3) Body Mass Index (BMI). Distress and emotional functioning were assessed with a global self-rating of "mental health" on a 1–5 scale (1 = poor, 5 = excellent), and with the presence or absence of a depressive disorder, which was assessed using questions based on the short form of the Composite International Diagnostic Interview scale for depression, an approach adopted and validated in previous MIDUS studies (see (McWilliams et al. 2004).

Data reduction and analysis

All data were analyzed using SPSS. Analyses were performed on individuals with complete data. We elected not to impute missing data since there was relatively little of it. All respondents provided demographic data such as sex, and of the 3,397 participants, only 164 (4.8%) were missing data for one or more study variables (e.g., measures of back pain, discrimination, etc.). Descriptive data for the sample are presented as percentages or as means and standard deviations. Group differences on categorical variables were assessed using chi-square tests, while group differences on continuous variables were assessed using analysis of variance (ANOVA). Follow-up least significant difference (LSD) tests were applied to elucidate significant omnibus group differences. Inter-relationships among perceived discrimination and back pain were examined using separate hierarchical regression analyses within each group. We used hierarchical linear regression methods because these are the most commonly-used in the pain literature, they produce easily-interpretable standardized beta-weights, they are robust to violations of normality assumptions, and a recent report suggests that linear and ordinal regression techniques both produce comparably stable parameter estimates which are preferable to those derived from logistic regression methods (Norris et al. 2006). On the first step of the model, demographic variables were entered; on the second step, physical health variables were entered; on the third step, mental/emotional health variables were included; on the fourth step, the indices of lifetime and daily perceived discrimination were entered, and on the fifth step, interactions between discrimination and sex were entered. These regression models were applied separately to black and white participants. Finally, an additional regression analyses were performed after excluding those who reported only non-racial forms of discrimination. This allowed us to evaluate the specific associations between perceived racial discrimination and back pain.

Results

For presentation purposes, participants were divided into four categories as a function of sex and ethnicity (African-American women, African-American men, white women, and white men). A large majority (i.e., nearly 93%) of individuals classified in this way were white, and the sample was fairly evenly split between men and women. Table 1 provides information on every study variable for each of the four groups. Because of the large overall sample size, ANOVAs and chi-square tests yielded statistically significant omnibus tests of overall group differ-

Table 1 Demographic and health-related data for all groups

Variables	White men (n = 1,589)	Black men (n = 102)	White women (n = 1,561)	Black women (n = 145)	All White	All Black
Age[a]	47.4 ± 13.3	46.0 ± 12.2	47.8 ± 13.3	44.2 ± 12.3	47.6 ± 13.3	44.9 ± 12.3
% Married or cohabiting[b]	77.0	69.6	62.8	43.5	70.0	54.3
Education[c]						
% With ≤high school	33.4	46.1	39.7	44.1	36.5	44.8
% With some college	21.0	25.5	24.1	27.6	22.5	26.9
% With college degree	45.6	28.4	36.3	28.3	41.0	28.3
Physical health (1–5)[d]	3.5 ± 1.0	3.5 ± 1.1	3.5 ± 1.0	3.2 ± 0.9	3.5 ± 1.0	3.3 ± 1.0
Mental Health (1–5)[e]	3.8 ± 0.9	3.7 ± 1.0	3.7 ± 0.9	3.6 ± 0.9	3.8 ± 0.9	3.6 ± 1.0
% With depressive disorder[f]	10.2	7.8	16.7	11.7	13.4	10.1
Body mass index[g]	27.0 ± 4.3	27.4 ± 4.8	26.1 ± 6.0	29.8 ± 7.0	26.6 ± 5.2	28.8 ± 6.3
# Chronic conditions[h]	2.1 ± 2.4	2.1 ± 2.7	2.9 ± 2.7	2.7 ± 3.0	2.5 ± 2.6	2.5 ± 2.9
Back pain frequency[i]	1.4 ± 1.6	1.0 ± 1.4	1.5 ± 1.6	1.3 ± 1.6	1.4 ± 1.6	1.2 ± 1.6
Life discrimination events[j]	0.9 ± 1.9	4.4 ± 4.3	1.1 ± 2.0	2.5 ± 3.5	1.0 ± 1.9	3.2 ± 4.0
Daily discrimination index[k]	1.4 ± 0.5	2.3 ± 0.7	1.4 ± 0.5	2.1 ± 0.7	1.4 ± 0.5	2.2 ± 0.7

[a] Black women < white women and white men

[b] Black women < all other groups; white men >white women

[c] All group differences are significant with one exception: black men and women do not differ

[d] Black women < all other groups

[e] White men > white and black women

[f] White women > white and black men

[g] White women < all other groups; black women > all other groups

[h] White men differ from white women and black women; black men differ from white women and black women

[i] White men < white women and black men; black men < white women

[j] All group differences are significant

[k] All group differences are significant with one exception: white men and women do not differ

ences, even when the actual magnitude of those group differences is small. For example, all of the variables in Table 1 differ across groups at $p < .01$; follow-up LSD tests are presented for each variable. Of primary interest in this study are the group differences in report of perceived discrimination; the magnitude of these differences is substantially larger than that of the other variables in Table 1. For measures of both daily and lifetime discrimination, black men report higher scores than any other group, and black women report higher scores than white women or white men (see Table 1). It is also noteworthy that, in terms of pain, white women report the highest back pain frequency and black men report the lowest.

Table 2 lists respondents' perceptions regarding the basis of the discrimination that they had experienced. Chi-square tests in the full sample revealed significant omnibus group differences ($p < .05$) on three categories of perceived discrimination: white women reported more sex/gender discrimination than any other group, black men reported more racial/ethnic discrimination than any other group, and black women reported more appearance-based discrimination than any other group (see Table 2).

Measures of lifetime and daily discrimination were positively related to one another ($r = .48$) and were correlated with most other study variables, though these relationships were generally modest. For example, lifetime and daily discrimination were inversely associated with age ($r = -.13$ and $-.18$, respectively), physical health ($r = -.05$ and $-.10$), and mental health ($r = -.08$ and $-.12$), and were positively associated with BMI ($r = .05$ and $r = .09$), the number of chronic conditions ($r = .13$ and .11), and a diagnosis of depression (r's for both measures = .10); all p's < .05.

In examining the associations between perceived discrimination and low back pain, we evaluated two hierarchical linear regression models, one including all African-American participants (both men and women), and one including all white participants. Demographic variables were entered first as predictors, followed by physical health variables, then mental/emotional health variables, and fi-

Table 2 Cited reasons for perceived discrimination (data expressed as percentages)

Variables	White men		Black men		White women		Black women	
	Full sample (%)	Reporters only (%)	Full sample (%)	Reporters only (%)	Full sample (%)	Reporters only (%)	Full sample (%)	Reporters only (%)
Age	9.9	32.0	16.7	20.2	11.4	27.6	8.3	12.9
Sex/gender[a]	4.8	15.4	6.9	8.3	26.5	63.9	12.4	19.4
Race/ethnicity[b]	11.6	37.3	78.4	95.2	4.9	11.9	56.6	88.2
Religion	3.5	11.4	2.0	2.4	2.8	6.8	3.4	5.4
Appearance[c]	9.9	32.0	9.8	11.9	11.1	26.9	17.2	26.9
Phys. Disability	1.0	3.2	0.0	0.0	1.6	3.9	2.1	3.2
Sex. Orientation	1.6	5.1	1.0	1.2	2.1	5.1	2.8	4.3

Note: Respondents were permitted to endorse more than one reason for any perceived discrimination. For each demographic group, the column on the left indicates the percentage of respondents within the entire group (some of whom either reported no discrimination or did not endorse any reason for the discrimination) who endorsed a given reason for discrimination, while the column on the right denotes the percentage within the subset of individuals who reported at least one reason for discrimination

[a] White women > all other groups; black women > white men

[b] All group differences are significant

[c] Black women > all other groups

nally the indices of lifetime and daily perceived discrimination. In addition, interactions between discrimination and sex were entered in a last step.

Among whites, the single strongest predictor of back pain was the number of chronic medical conditions reported (i.e., showing a positive association with back pain), followed by educational achievement (i.e., demonstrating an inverse association, as in prior studies (Edwards et al. 2006a, b), and global ratings of physical health (also an inverse association) as the second- and third-strongest predictor variables (see Table 3). Among whites, despite the large sample size, associations between perceived discrimination and low back pain were minimal. The number of lifetime experiences of discrimination was unrelated to individual differences in the report of back pain, and perceptions of greater day-to-day discrimination were predictive of higher back pain reporting, but this effect was quite small, with the association accounting for less than 1% of the person-to-person variance in back pain. Finally, neither interaction between sex and discrimination was significant (p's > .10), suggesting similar patterns of effects for white men and women.

These findings contrast to some degree with those among the African-American participants (see Table 4). Among African-Americans, the number of chronic conditions and global physical health ratings were also significant predictors of back pain, similar to the patterns of association among whites. However, significant relationships also emerged on measures of mental health among the African-American participants. Finally, the single

Table 3 Hierarchical linear regression model predicting back pain frequency among white participants

Variable	White participants			
	Step R^2	β	t	p
Age	0.02	−0.07	−3.5	<0.001
Marital status		0.01	0.4	0.67
Education		−0.13	−6.8	<0.001
Sex		0.03	1.2	0.19
Physical health rating	0.13	−0.1	−4.9	<0.001
Body mass index		−0.01	−0.4	0.67
# Chronic conditions		0.33	16.7	<0.001
Depressive disorder	0	0.03	1.4	0.15
Mental health rating		−0.02	−0.8	0.45
Life discrimination	0	−0.02	−1	0.29
Daily discrimination		0.05	2.5	0.02
Sex × lifetime discrimination	0	−0.01	−0.2	0.87
Sex × daily discrimination		0.09	1.1	0.26

Table 4 Hierarchical linear regression model predicting back pain frequency among black participants

Variable	Black participants			
	Step R^2	β	t	p
Age	0.01	0.02	0.2	0.49
Marital status		−0.01	−0.2	0.87
Education		−0.02	−0.3	0.79
Sex		0.1	1.4	0.16
Physical health rating	0.11	−0.21	−2.5	0.01
Body mass index		−0.02	−0.2	0.84
# Chronic conditions		0.19	2.5	0.01
Depressive disorder	0.05	0.15	2.1	0.04
Mental health rating		0.18	2.3	0.02
Life discrimination	0.08	0.24	2.9	0.004
Daily discrimination		0.14	2	0.05
Sex × lifetime discrimination	0.05	−0.18	−0.8	0.41
Sex × daily Discrimination		1.1	3.6	<0.001

strongest individual predictor (as index by standardized beta-weights) of back pain report was the degree of lifetime discriminatory experiences reported, which showed a positive association with the degree of back pain. The degree of perceived daily discrimination was also predictive of back pain, though this was qualified by a significant interaction with sex (Standardized Beta = 1.1, $T = 3.6$, $p < .001$). Separating participants by sex, it emerged that this association was strongest among African-American women; indeed, the sole statistically significant predictor of back pain report in this group was the frequency of perceived daily discrimination. Collectively, perceived discrimination explained 13% of the variance in back pain among African-American women (see Table 5).

Finally, we re-ran the regression analyses including only participants who reported racial forms of discrimination. These regression models are virtually identical to those described above. Among whites, no associations between perceived racial discrimination and low back pain were observed (data not shown), while lifetime discrimination and daily discrimination significantly predicted back pain frequency among black men and women respectively (see Table 6).

Discussion

A growing body of evidence suggests ethnic disparities in the prevalence and course of many painful conditions (Carey and Garrett 2003; Edwards et al. 2001a, b), as well as in pain-related psychosocial processes such as beliefs about the nature of pain (Green et al. 2003), preferences for pain treatment (Anderson et al. 2000; Gifford et al. 2000), and the use of prayer in response to the experience of pain (Ang et al. 2002; Edwards et al. 2005; Jordan et al. 1998). In this study, we document ethnic differences in the association between perceived discrimination and pain, with substantial positive associations between the degree of

Table 5 Separate hierarchical linear regressions predicting back pain frequency among black men and women

Variable	Black men				Black women			
	Step R^2	β	t	p	Step R^2	β	t	p
Age	0.02	−0.03	−0.2	0.81	0.01	0.01	0.1	0.91
Marital status		0.14	1.3	0.21		−0.1	−1	0.31
Education		−0.05	−0.5	0.64		−0.01	−0.1	0.89
Physical health rating	0.18	−0.31	−2.6	0.01	0.07	−0.09	−0.8	0.44
Body mass index		−0.03	−0.3	0.78		0	0	0.97
# Chronic conditions		0.22	2.1	0.04		0.21	1.9	0.06
Depressive disorder	0.08	0.22	2.1	0.04	0.03	0.11	1	0.32
Mental health rating		0.26	2.2	0.03		0.22	1.9	0.07
Life discrimination	0.1	0.34	3.3	0.002	0.13	0.19	1.7	0.09
Daily discrimination		−0.1	−1	0.28		0.31	3.2	0.002

Table 6 Hierarchical linear regressions predicting back pain frequency among black participants, including only racial discrimination

Variable	Black men				Black women			
	Step R^2	β	t	p	Step R^2	β	t	p
Age	0.02	−0.02	−0.1	0.89	0.01	0.03	0.3	0.76
Marital status		0.15	1.4	0.18		−0.1	−1	0.31
Education		0.01	0.1	0.91		0.05	−0.5	0.66
Physical health rating	0.19	−0.34	−2.8	0.007	0.08	−0.1	−0.8	0.44
Body mass index		−0.03	−0.3	0.81		0.01	0.1	0.92
# Chronic conditions		0.21	1.9	0.06		0.22	1.9	0.07
Depressive disorder	0.09	0.22	2.1	0.04	0.05	0.13	1.2	0.23
Mental health rating		0.28	2.4	0.02		0.28	2.3	0.03
Life discrimination (racial)	0.09	0.3	2.8	0.007	0.11	0.19	1.8	0.07
Daily discrimination (racial)		−0.11	−1.1	0.3		0.27	2.6	0.01

perceived discrimination and the reported frequency of recent back pain only among African-American respondents. Collectively, the biopsychosocial model of pain incorporates a number of pathways through which factors such as perceived discrimination might impact the experience and report of pain. Individuals' cognitions and emotions are integrally involved in shaping pain experiences (Keefe et al. 2004), as are biological processes such as stress responses, social interactions (both positive/supportive and negative/detrimental), economic and healthcare system factors that determine access to effective treatments, etc.

It is important to note that African-Americans as a group did not report, in the present study, higher levels of back pain than white respondents. Indeed, the reported frequency of recent back pain was lower among African-Americans as a group, despite higher levels of perceived discrimination. Rather, these findings suggest that individual differences in perceived discrimination may be an influential contributor to variability in the report of back pain within the African-American group, and that this association is minimal or nonexistent among whites (e.g., although individual differences exist among whites in the degree of perceived discrimination they report, this variability is essentially independent of the report of recent back pain).

Moreover, it is interesting to note that the type of reported discrimination that was most closely associated with the report of back pain differed in African-American women and men. Prior research has suggested that perceived discrimination may have similar adverse effects in ethnic minority men and women (Levin et al. 2002), and our results reveal that strong relationships between perceived discrimination and pain are present in both black men and black women. However, previous studies have also shown that daily experiences of discrimination are most closely tied to negative outcomes such as distress (Banks et al. 2006; Wamala et al. 2007a, b, and reduced healthcare-seeking (Wamala et al. 2007a, b) among women, consistent with our findings that daily experiences of discrimination predicted greater back pain among African-American women. In contrast, major lifetime discriminatory experiences such as being fired from a job or being denied a bank loan may be more threatening for men relative to women (Thapa and Hauff 2005).

A number of possible explanations may underlie the present findings of an association between perceived discrimination and back pain among African-Americans, although this cross-sectional study is configured neither to demonstrate causal relationships nor to definitively identify mechanisms linking perceived discrimination with pain. First, a variety of research has indicated that elevated indices of chronic stress among minorities are a frequent consequence of racism and discrimination (Harrell et al. 2003; Mays et al. 2007). High levels of such stress over time produce chronic sympathetic nervous system activation and adverse health consequences in a variety of domains (Clark et al. 1999); indeed, more severe emotional distress has frequently been linked with adverse back pain-related outcomes (Brage et al. 2007; Dionne 2005; Linton 2005). It is important to note, however, that the present analyses controlled for the presence of a depressive disorder and for global ratings of "mental or emotional health," suggesting that among African-Americans, the association between perceived discrimination and pain is somewhat independent of global indices of psychological functioning.

Indeed, it is possible that perceived discriminatory experiences may activate, among some individuals, specific emotional and physiological responses such as anger and muscle tension that have long-term consequences for particular pain conditions. For example, substantial recent

research has highlighted the role of anger in producing enhanced muscular tension and reduced effectiveness of endogenous opioid systems, especially in the context of chronic low back pain (Bruehl et al. 2006a, b, 2003, 2007; Burns 2006; Burns et al. 2006). Such anger-related emotional and physiological responses may contribute to the associations between pain and perceived discrimination among African-Americans in the U.S. population. Recent findings have highlighted the role of racism and discrimination in enhancing daily episodes of angry affect (Broudy et al. 2007) and in promoting the use of anger coping (Brondolo et al. 2005), which supports this possible mechanism. Additionally, anger may impair processes such as acceptance, which have been shown to enhance adaptation to pain and reduce pain's impact (McCracken and Eccleston 2005; McCracken and Vowles 2006; McCracken et al. 2007).

Numerous other (non-mutually-exclusive) potential explanations for the observed associations are also possible. For example, ethnic disparities in access to health care (Williams 1999) and in health behaviors (Brawley 1998; Reddy et al. 2003) are widespread. In the case of these findings, prior experiences with perceived discrimination may deter African-Americans to a greater degree than whites from seeking treatment for back pain, molding a stronger association between discrimination and pain in the African-American group. Several prior studies have documented associations between a history of perceived discrimination and reduced healthcare-seeking activities, longer delays in seeking care, and reduced adherence with provider recommendations (Casagrande et al. 2007; Wamala et al. 2007a, b).

Similarly, ethnic minority patients may wait until symptoms become more severe than white patients before seeking treatment (Lee et al. 2000), and may be less likely to engage in back-pain-related preventive self-care behaviors (Rogers and Allison 2004). Given the general climate of mistrust for the medical community which is understandably prevalent within many minority groups (List 2005), and the fact that healthcare providers demonstrate less empathy and friendliness when interacting with ethnic minority patients (Schouten and Meeuwesen 2006), it would not be particularly surprising to find that individuals from ethnic minority backgrounds who have experienced the largest burden of discrimination might be least likely to follow recommendations from predominantly-white medical providers. That is, higher levels of perceived discrimination may be selectively correlated with reduced quality of care for back pain (e.g., both self-care and care by medical professionals) among African-Americans (relative to whites), which could contribute to the present pattern of findings. Several recent studies have documented related effects; for example, among diabetes patients, those who reported recent perceived discrimination also reported less effective interpersonal interactions on the part of their healthcare providers and had worse physical functioning and poorer disease control (Piette et al. 2006). However, such hypotheses regarding perceived discrimination and pain treatment are speculative at present, and await independent confirmation.

The present study possesses a number of limitations that urge caution when interpreting the findings. First, patients self-reported their ethnic background using relatively broad categories; further subdivision of individuals' perceived ethnicities may provide additional valuable information. Second, as the current study design is cross-sectional in nature, no firm conclusions can be drawn regarding the directionality of the relationship between perceived discrimination and pain. It is possible that higher levels of back pain generate greater perceptions of discrimination among African-Americans, though the converse direction of association seems more plausible. Third, although the assessment of perceived discriminatory experiences was quite extensive, assessment of recent back pain was limited to a single-item measure of pain frequency; future research in this area would benefit from the use of validated multi-item back pain scales that assess pain quality, severity, and impact. Fourth, while the MIDUS sample approximated the U.S. population, ethnic minorities and individual with lower-SES backgrounds were under-represented. Moreover, not everyone who was invited to participate in the study responded fully, though the 60.8% response rate for full study participation is comparable to what many other population surveys are able to achieve (Latthe et al. 2006). As a consequence, the generalizability of these findings is not perfectly clear and replication of these effects in other samples will be quite important. Relatedly, the difference in sample sizes of the ethnic groups is an issue in studies such as this, reducing the power to detect between-group differences. In spite of these study limitations, we hope that identifying perceived discrimination as a potentially important variable contributing to individual differences in the report of back pain, at least among African-Americans, will help to advance research on the biopsychosocial model of pain. Interestingly, one other recent study has reported that perceived discrimination was associated with the presence of chronic pain conditions such as arthritis and low back pain among Asian Americans (Gee et al. 2007), suggesting that this association could be present across multiple ethnic minority groups. Continued investigation of this association, and the mechanisms underlying it, appears warranted, and researchers studying pain in ethnic minority groups may wish to measure perceived discrimination as a potential correlate of a variety of pain-relevant outcomes.

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