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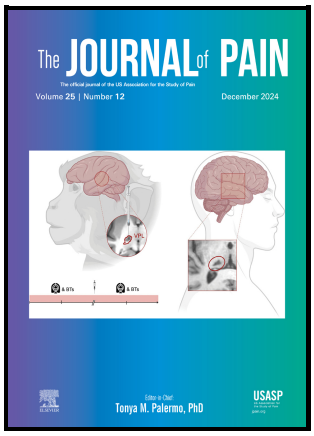

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Gender Discrimination is Associated with Greater Chronic Pain Interference Among Women

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Abstract

Pain disparities between men and women are found in multiple domains; women have been shown to experience greater pain intensity, pain disability, and risk for chronic pain. While often ascribed to biological differences, recent research has demonstrated the significance of social determinants of gendered pain disparities. Gender discrimination is one factor that disproportionally affects women and has been associated with adverse health outcomes, yet has received less attention in pain research. Discrimination is intrusive and stressful, and may exacerbate the extent to which chronic pain interferes with life. Prior work has shown that among

women, general experiences of discrimination are indirectly associated with pain interference through perceived stress. However, the direct relationship between gender discrimination specifically and pain interference has not been explored. Here, using data from the Midlife in the United States national survey, we first assessed the relationship between daily experiences of discrimination due to any aspect of identity and pain interference in those with chronic pain. We further explored whether discrimination due to gender specifically was associated with pain interference among women. Results indicated that daily discrimination was associated with greater pain interference within the whole sample; however, within-group analyses found that this relationship was only significant for women, and not men. Exploring further within women only, discrimination due to gender predicted greater pain interference, controlling for health-related covariates. These findings support recent calls for probes into the role of discrimination on health outcomes and suggests that experiencing discrimination contributes to disruption of life and pain disparities.

Perspective: The findings presented here advance our understanding of the harmful impact of discrimination on pain outcomes, broadening its scope by providing evidence regarding the association between gender discrimination and pain interference. Considering known pain disparities between men and women, we discuss potential insight into mechanisms contributing to this burden.

Keywords: Pain Disparities, Psychosocial Factors, Physical Functioning, Interpersonal Harm, Sexism

Introduction

Systemic inequity and injustice are primary drivers of health disparities[1]. One way that this cultural and structural patterning of harm and disadvantage produces health disparities is through interpersonal discrimination or the unjust treatment of others based on some aspect of

their identity such as race, sexuality or gender[2–4]. These infringements prevent or disrupt people (particularly those with marginalized identities) from fully participating within society, leading to heightened stress, reduced social opportunities, and poorer health outcomes[1,2,4]. Indeed, discrimination is increasingly being recognized as a determinant of enhanced pain; prior work has shown a relationship between frequent experiences with racialized discrimination and the incidence and severity of clinical and laboratory pain, while generalized discrimination longitudinally predicts the development of chronic pain[5–8]. Furthermore, racialized discrimination imposes systemic barriers to accessing treatment for pain while also negatively affecting the quality of care received, and is associated with increased central sensitization[9,10]. Discrimination based on gender, however, has received less attention.

This is surprising considering that gender-based discrimination experienced by women is common, with some studies reporting 100% of women having suffered discrimination at some point in their life, while others describe 18%-94% of women experiencing discrimination in health care settings[11–14]. Gender-based discrimination is associated with greater stress, disability harassment, poor mental health, lower self-esteem, drug use, and depression[15–23]. Furthermore, perceived experiences of gender-based discrimination have been shown to partially explain differences in self-rated mental health and depression between men and women, negatively impacting women to a greater extent[16,24].

Yet despite well-documented gender disparities in pain (e.g., relative to men, women experience greater pain severity as well as pain-related interference and disability, are more likely to develop chronic pain, and are less likely to have their pain reports believed or appropriately treated)[25–34], the mechanisms that produce disparities across pain experience and management have received less attention. While gender disparities in pain are often attributed to

biological differences between men and women (e.g. hormones), recent research indicates that, as with racial disparities, social factors pattern gender disparities in pain outcomes[28,35–38]. For instance, women's pain is frequently dismissed or deemed exaggerated due to gender stereotypes including perceptions of the emotionality of women[39–41].

However, previous studies have not explored the direct relationship between gender-based discrimination and pain, and importantly have not explored the relationship with pain interference – a dimension of the pain experience that reflects the extent to which pain disrupts psychological, social, and physical aspects of daily living[42–44]. Pain interference impacts mental and physical health, linking with depression, anxiety, negative affect, poor sleep quality, and increased pain intensity, and is often more indicative of pain-related outcomes than the severity of the pain itself[45–50].

Prior research linking experiencing any type of discrimination to pain interference is limited, and has only been observed through mediation by other variables such as depression and stress; no direct correlation has been found. For instance, among Black women with osteoarthritis, depressive symptoms mediate the relationship between racial discrimination and pain interference[51]. Others have assessed the relationship between discrimination experiences based on any aspect of identity and pain disability – a construct related to interference – and found no correlation between the two, though stress mediated the relationship between discrimination and pain disability for women, but not men[52]. However, due to a smaller sample size, it is possible that a relationship between gender-based discrimination and pain interference exists but has not been detected due to sample limitations. As pain interference tends to be more prevalent among women relative to men[32,33], understanding factors that contribute to this disparity is paramount.

Therefore, to explore the relationship between discrimination and pain interference, we analyzed data from the Midlife in the United States (MIDUS) national survey[53]. Specifically, we assessed whether daily experiences with discrimination based on any aspect of one's identity were associated with pain interference, first among all participants with chronic pain and then separately within a) female participants and b) male participants to probe potential within-group variability and illuminate pain disparities. We then assessed whether gender-based discrimination specifically could explain pain interference among female participants with chronic pain. We hypothesized that frequent experiences of daily discrimination would be associated with greater pain interference, particularly for women. We further hypothesized that among women, gender-based discrimination specifically would be associated with pain interference.

Method

Study Design

This study was a secondary analysis of open-source data was determined exempt by Texas A&M University's Institutional Review Board. Cross-sectional data were extracted from Wave 2 of the MIDUS, an ongoing longitudinal study assessing health variables across mid to late life, collected using telephone surveys and mailed questionnaires during which consent was obtained (2004-2005; N=4963) [53]. Only those participants reporting currently having some form of chronic pain were included in the current analyses (n=1461, 29.4%).

Measures

Chronic Pain

Participants responded to the question "Do you have chronic pain, that is do you have pain that persists beyond the time of normal healing and has lasted from anywhere from a few months to many years?" (yes or no) to assess chronic pain status.

Pain Interference

Participants were asked to rate how much pain interfered with 5 different aspects of daily living (general activity, mood, relations, sleep, and enjoyment of life) over the previous week on a scale of 0 (did not interfere) to 10 (completely interfered). Pain interference was calculated as the average of responses to the 5 items ($\alpha = .906$). Higher scores indicated greater interference (Table 1).

Daily Discrimination

Daily discrimination was assessed using an everyday discrimination scale developed for use in the MIDUS [53,54]. Participants were asked "How often on a day-to-day basis do you experience each of the following types of discrimination?". Participants then rated the frequency with which they experienced acts of discrimination on a day-to-day basis due to any aspect of their identity in their daily lives in nine different ways (e.g., "You are treated with less respect than other people."), scored using a scale of 1 (often), 2 (sometimes), 3 (rarely), 4 (never). Items were reverse coded so that higher scores represented more frequent discrimination. The nine items were then summed to create a total daily discrimination score ($\alpha = .918$). If participants total scores were greater than 9 (i.e., indicating they had experienced discrimination at any time), they were then asked follow-up questions assessing which aspect of their identity they believed was the *main* reason for the discrimination (i.e., race, ethnicity, gender, age, religion, height/weight, some other aspect of appearance, sexual orientation, physical disability, other (please specify): yes = 1 or no = 0). If they believed there was more than one reason they were

told to "check all that apply". The distribution of attributions in the larger MIDUS sample is the topic of previous research [55].

Covariates

"*Gender"* was coded such that male = 1 and female = 2, and is hereafter referred to as sex. *Marital status* was coded from married = 1 to never married = 5. *Education level* was coded from no school/some grade school = 1 to Ph.D./MD = 12. *Self-rated physical health* was assessed with the question, "In general, would you say your physical health is excellent, very good, good, fair, or poor?", on a scale of 1 (excellent) to 5 (poor), such that greater values indicate worse physical health. *Self-rated mental health* was similarly assessed ("In general, would you say your mental or emotional health…") using the same scale, such that greater values indicate worse mental health. Body mass index values (*BMI)* were calculated and provided as a distinct variable by the MIDUS by dividing the participants' self-reported weight (recorded in lbs. and converted to kilograms) from their self-reported height (recorded in inches and converted to meters squared). *Depression* was measured using the World Mental Health Organization's Composite International Diagnostic Interview Short Form (WHO CIDI-SF) [56]. Depression scores were calculated as the summed "Yes" responses to seven questions regarding depressed affect (e.g. "During two weeks in the past 12 months, when you felt sad, blue or depressed, did you lose interest in most things?") and anhedonia (e.g. "During two weeks in the past 12 months, when you lost interest in most things, did you have a lot more trouble concentrating than usual?") with greater totals representing greater depression. *Anxiety* was also measured using the WHO CIDI-SF with participants indicating the frequency that they experienced 10 items (e.g. "How often over the past 12 months you were restless because of your worry") using a scale of 1 (most days) to 4 (never) [56]. All responses of "most days" were

summed to calculate total anxiety scores. *Number of Chronic Conditions* was calculated by summing the number of chronic conditions (out of 30, e.g., asthma, stroke, ulcers) participants reported experiencing in the past 12 months. Descriptive statistics for covariates can be found in Table 1.

Analysis Plan

To test the hypothesis that greater experience with daily discrimination would be associated with greater pain interference we first conducted a cross-sectional hierarchical multiple regression with age, sex, racialized identity, marital status, and education level added in the first step, BMI, self-rated physical health and mental health, depression, anxiety, and number of other chronic conditions in the second step, and daily discrimination added in the final step of the regression, following previously reported analytical procedures studying pain using the MIDUS [7,57,58]. We then probed for any sex-differences by conducting a moderation analysis using Model 1 of the Hayes PROCESS macro for SPSS (version 4.2), with sex moderating the relationship between daily discrimination and pain interference. We followed this by conducting within group regressions (with sex removed from the first step of the regression) to assess the independent association of general daily discrimination with pain interference among female and male participants separately. To further explore this relationship and to test the hypothesis that gender-based discrimination would be associated with pain interference, we conducted one final regression among female participants who reported experiencing any discrimination, entering gender-based daily discrimination specifically in the final step of the regression. All analyses were conducted using SPSS version 25 (IBM Corp, Armonk, NY).

Results

The analysis sample (n=1461) included 847 female participants and 614 male participants, with 1313 White participants, 59 Black and/or African Americans, 18 identifying as Other, 13 as Multiracial, 6 Asian or Pacific Islander, 5 Native American or Aleutian Islander, and 47 did not provide a response. Ages ranged between 30 and 84 years, with an average of 57.86 (SD=12.28). Participants were predominantly married (n=991), followed by divorced (n=210), widowed (n=132), never married (n=101), separated (n=23), and did not respond (n=4). The highest level of completed education for most participants was high school (n=404), followed by bachelor's degree (n=231), associate degree (n=124), master's degree (n=126), professional degree (n=52), and GED (n=25); 126 participants did not receive a GED or high school diploma.

Variable descriptive statistics can be found in Table 1; there were no sex differences in daily discrimination (M_{male}=13.29, SD= 5.08; M_{female}=13.73, SD=4.61), t(1216)= -1.67, p=.095, 95% CI [-0.951, 0.077], but female respondents reported significantly higher pain interference (M_{male}=2.97, SD=2.46; M_{female}=3.23, SD=2.43), t(1450)= -1.98, p=.048, 95% CI [-0.512, -0.002]. Overall, greater daily discrimination was associated with pain interference, r(1421)=.208, p<.001. Results of the linear regression analysis within the whole sample supported our hypothesis, finding that more frequent daily experiences with discrimination based on any aspect of identity were associated with greater pain interference, b=.040, p=.001, 95% CI [0.016, 0.065], controlling for demographics and other health variables (Table 2).

The overall model of the moderation analysis with sex moderating the relationship between daily discrimination and pain interference was significant, R^2=.050, F(3, 1415)=24.938, p<.001. Additionally, he interaction between daily discrimination and sex was significant,

b=.072, p=.006, 95% CI [0.021, 0.124], ΔR2=.005, suggesting a moderating role of sex on the relationship between daily discrimination and pain interference.

When examining within sex, linear regression analysis found that daily discrimination significantly predicted greater pain interference among female participants, b=.061, p=.001, 95% CI [0.026, 0.096], but not male participants b=.018, p=.297, 95% CI [-0.016, 0.053] (Tables 3 and 4). Exploring further, 347 female participants (40.92%) reported experiencing discrimination at some point throughout their day; of these, 226 (65.13%) reported that gender was the main reason they were discriminated against. Specifically, the follow-up linear regression analysis again supported our second hypothesis, finding that experiencing gender-based discrimination was associated with greater pain interference among female participants controlling for demographics and other health variables, b=.536, p=.033, 95% CI [0.43, 1.029] (Table 5). Due to the relative scarcity of gender discrimination among male participants (only 23 male participants indicated that they had experienced discrimination because of their gender), further probing within this subgroup lacked statistical power.

Discussion

Discrimination represents a harmful interpersonal attack on a person or group of people based on some aspect of their identity, and negatively impacts multiple dimensions of health [1,2]. While discrimination based on race or ethnicity has been linked to adverse pain experiences, less attention has been given to gender-based discrimination [6,7,9]. Recent reviews of the impact of discrimination on health have revealed the scope of its harmful effects on mental and physical wellbeing, and have further called for the need to assess multiple forms of discrimination, including gender-based discrimination, on health outcomes [2,3]. Here we provide evidence for a direct association between discrimination experienced on a daily basis and pain interference, a

construct representing the impact of pain on daily living. Building upon previous findings, female participants carried the burden of this relationship such that more frequent experiences of discrimination were associated with greater pain interference for female participants but not for male participants [52]. Furthermore, we showed that among women, gender-based discrimination specifically was associated with pain interference independently of other factors such as self-rated health and other chronic health conditions. As such, discrimination may impose barriers that compound existing pain interference, especially for women who have previously been found to experience increased harassment due to the combination of both disability and gender [59]. For instance, when experienced consistently, daily discrimination itself becomes a chronic stressor that can contribute to allostatic load which has been shown to lead to greater pain severity, lower physical functioning, and greater disability, and pain interference [60–67]. It is notable that the social repercussions of chronic pain (e.g., stigma, accessibility) may be particularly pronounced in women relative to men, leading to more frequent discrimination compounded across domains, and consequently increasing experiences of pain interference. This is consistent with the social stigma and stressors that women face to a greater degree than men, particularly in relation to pain [68–72]. While further research is needed, assessments of discrimination among women with chronic pain in clinical settings – particularly gender-based discrimination experienced by women – may help identify those who might be at risk for greater pain interference.

Conversely, while men reported experiencing discrimination at a similar frequency as women, this was not associated with greater pain interference. First, it is important to note that the current measure was not designed to detect differences in the *severity* of gender discrimination, and results do not imply equity in gender discrimination experiences. Past research indicates women minimize or underreport their experiences of gender discrimination, in

part as an effective way of coping with the pervasiveness of these experiences [73]. Nonetheless, that reported general discrimination frequency (irrespective of attribution) was not associated with pain interference for men may be somewhat surprising. While we caution against over interpretation of this null finding, the past literature indicates cultural gender norms and socialization processes may contribute to this pattern of results. For example, it is possible that while men may perceive that they are discriminated against, these social threats are not internalized due to cultural stereotypes and expectations of gender-related competency and ability, particularly in domains such as the workplace [74]. Others have suggested that men may perceive discrimination against them as socially competitive in nature and subsequently view it as a challenge rather than a threat to their identity, which may buffer against internalization and limit the impact on pain-related outcomes [74–78]. Alternatively, it is possible that a relationship between gender discrimination and pain interference may exist among men but was not seen here due to socially influenced adjustments of pain reporting, such as social desirability and self-presentation motives [41,79]. Conversely, while discrimination based on factors such as race has clear harmful effects on the health and pain burden of both men and women, gender discrimination negatively impacts women's personal, social, and professional health and well-being to a greater extent than men's, which may be further compounded by not only the interference caused by living with chronic pain itself but the discrimination potentially experienced because of that pain and related disability [14,74,80,81]. Furthermore, as interference involves disruption of daily living, including the ability to do one's job, and gender discrimination experienced by women is particularly prevalent in the workplace, these factors may combine to compound the extent to which pain interferes with life [74,82,83].

Some limitations constrain the inferences that can be made from the current study. First, participants were asked to identify their sex and not their gender specifically, and response options were limited to male or female – not man or woman – and omitted potential gender non-binary, transgender, and other relevant identities. This is likely a byproduct of the time of study creation (early to mid 1990s) where the distinction between sex and gender was not consistently recognized, and terms (e.g., sex vs. gender; female vs. woman) were often used interchangeably [84]. Indeed, the MIDUS item regarding discrimination used the term "gender" despite identity having identity previously been assessed using "sex". It is critical that future studies of gender discrimination in the context of pain use appropriate terminology, and consider gender beyond the binary.

Second, racialized identities are also not represented - 91% of participants identified as white. This is important because intersectional identities (e.g., racialized women) create different discrimination experiences (e.g., due to differential stereotypes) [85,86]. This limitation also prohibited examination of interactions between racialized and gender discrimination and intersectionality in the current study, and limited the scope of discrimination experiences represented in the sample. It is possible, for example, that gender discrimination among racialized men may be related to pain outcomes. Future studies will attempt to gather a more diverse sample of men and women to explore the interaction of gender and racial discrimination on pain interference, as well as the compounding and interaction effects of other identity-based forms of discrimination on pain outcomes.

Third, no one specific chronic pain condition was represented, and women with different types of chronic pain may vary in how they are impacted by discrimination based on the severity of their pain condition and the stigma associated with that condition. For instance, women with

fibromyalgia are more likely to have their pain stigmatized or invalidated relative to other conditions such as osteoarthritis, partially due to the general cultural lack of understanding of the underlying mechanisms of the disease and "clear" diagnosis of underlying pathology associated with nociplastic conditions [87–91]. The combination of invalidation and discrimination may therefore interfere with life to a greater extent in some pain conditions relative to others. However, the representativeness of the MIDUS supports the generalization of the findings to all forms of chronic pain.

Discrimination is harmful, particularly when experienced frequently, and may compound the burden that pain imposes on daily functioning [61]. This is particularly stressful for individuals who experience discrimination due to multiple aspects of identity (e.g. gender, race, sexuality, physical disability) impacting mental, physical, and social health [16,59]. Women with chronic pain who face additional barrages of interpersonal attacks such as gender-based discrimination may ultimately face compounded obstacles and barriers that interfere with the ability to live life. Recognizing and addressing social and systemic issues that cause unjust and unwarranted harm against people remains paramount in helping reduce unnecessary suffering in relation to pain outcomes.

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Variable Descriptive Statistics

	All Participants		Male Participants		Female Participants	
Variables	Mean (σ)	Range	Mean (σ)	Range	Mean (σ)	Range
Physical Health Rating	2.81 (1.05)	1-5	2.78 (1.08)	1-5	2.83 (1.03)	1-5
Mental/Emotional Health Rating	2.38 (0.98)	1-5	2.33 (0.98)	1-5	2.42 (0.99)	1-5
BMI	28.94 (6.64)	14.23-82.31	28.95 (5.14)	14.23-56.73	28.94 (7.56)	15.08-82.31
Depression	0.87 (2.02)	0-7	0.54 (1.61)	0-7	1.11 (2.24)	0-7
Anxiety	0.20 (1.10)	0-10	0.10 (0.80)	0-10	0.26 (1.27)	0-10
# of Chronic Conditions	3.60 (3.11)	0-30	3.13 (3.03)	0-28	3.93 (3.13)	0-30
Daily Discrimination	13.55 (4.82)	9-36	13.29 (5.08)	9-36	13.73 (4.61)	9-31.5
Pain Interference	3.12 (2.45)	0-10	2.97 (2.46)	0-10	3.23 (2.43)	0-10

Table 1. Predictor and outcome variable descriptive statistics.

General Discrimination Predicting Pain Interference in Whole Sample

Variables	Step 1 β	Step 2 β	Step 3 β
Age	-.12***	-.16***	-.14***
Sex	.04	.01	.01
Education Level	-.18***	-.06*	-.06*
Marital Status	.04	-.04	-.04
Race	.02	-.00	-.01
Physical Health Rating		.32***	.32***
Mental/Emotional Health Rating		.03	.02
BMI		.06**	.06*
Depression		.10***	.10***
Anxiety		.04	.04
# of Chronic Conditions		.23***	.22***
Daily Discrimination			**.08****
R^2	.049	.316	.322
ΔR^2	.049	.267	.006

*p <. 05; **p <. 01; ***p < .001

Table 2. Hierarchical regression of predictors of pain interference for all participants who report having chronic pain. Values in each step represent the standardized coefficient Betas.

General Discrimination Predicting Pain Interference Among Male Participants

Variables	Step 1 β	Step 2 β	Step 3 β
Age	-.06	-.17***	-.16***
Education Level	-.17***	-.08*	-.07
Marital Status	-.02	-.07*	-.08*
Race	.02	-.01	-.01
Physical Health Rating		.38***	.38***
Mental/Emotional Health Rating		-.03	-.03
BMI		.04	.04
Depression		.10**	.10**
Anxiety		-.03*	-.02
# of Chronic Conditions		.26***	.26***
Daily Discrimination			.04
R^2	.031	.327	.328
ΔR^2	.031	.296	.001

*p <. 05; **p <. 01; ***p < .001

Table 3. Hierarchical regression of predictors of pain interference for male participants who report having chronic pain. Values in each step represent the standardized coefficient Betas.

General Discrimination Predicting Pain Interference Among Female Participants

Variables	Step 1 β	Step 2 β	Step 3 β
Age	-.17***	-.16***	-.13***
Education Level	-.20***	-.05	-.05
Marital Status	.09*	-.01	-.02
Race	.02	-.01	-.01
Physical Health Rating		.27***	.27***
Mental/Emotional Health Rating		.07	.06
BMI		.08*	.06*
Depression		.10**	.09**
Anxiety		.07*	.07*
# of Chronic Conditions		.20***	.19***
Daily Discrimination			**.11****
R^2	.064	.315	.325
ΔR^2	.064	.251	.010

*p <. 05; **p <. 01; ***p < .001

Table 4. Hierarchical regression of predictors of pain interference for female participants who report having chronic pain. Values in each step represent the standardized coefficient Betas.

Discrimination Based on Gender Predicting Pain Interference Among Female Participants

Variables	Step 1 β	Step 2 β	Step 3 β
Age	-.09	-.12*	-.10*
Education Level	-.22**	-.08	-.09
Marital Status	.02	-.02	-.03
Race	.06	.06	.07
Physical Health Rating		.28***	.29***
Mental/Emotional Health Rating		.10	.10
BMI		.07	.08
Depression		.03	.02
Anxiety		.05	.05
# of Chronic Conditions		.26***	.25***
Gender Discrimination			**.10***
R^2	.061	.362	.372
ΔR^2	.061	.302	.010

†p = .054; *p <. 05; **p <. 01; ***p < .001

Table 5. Study 1b - Hierarchical regression of gender discrimination specifically as a predictor of pain interference for female participants who report having chronic pain. Values in each step represent the standardized coefficient Betas.

Highlights

- Frequency of daily experiences of discrimination were associated with greater pain interference.
- Within group, this association was seen for women but not for men.
- Among women, discrimination based on gender specifically was associated with pain interference.