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The Impact of Ethnic Discrimination on Chronic Pain: The Role of Sex and Depression

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Abstract

Perceived ethnic discrimination (PED) is predictive of chronic pain-related outcomes. Less is known about pathways through which these constructs interact. The goal of this study was to test whether PED was predictive of chronic pain-related outcomes (pain interference, pain intensity, and symptoms related to central sensitization), whether depression mediated the relationship between PED and pain outcomes, and if these relationships were maintained across sex in a sample of racially and ethnically minoritized adults ($n = 77$). PED significantly predicted pain interference, pain intensity, and symptoms related to central sensitization. Sex accounted for a significant proportion of the variance in pain interference only. Depression explained the relationship between PED and pain interference and pain intensity. Sex moderated the indirect pathway, such that for men, the relationship between PED and pain interference and pain intensity was explained via depression. Depression partially explained the relationship between PED and symptoms related to central sensitization. Sex did not moderate this mediational effect. This study provided a unique contribution to the pain literature by providing a contextual analysis of PED and pain. Addressing and validating experiences of lifetime discrimination may be a clinically relevant tool in the management of chronic pain for of racially and ethnically minoritized adults.

Keywords

Ethnic Discrimination; Chronic Pain; Depression; Sex; Health Disparities

Introduction

Perceived ethnic discrimination (PED) is a form of psychosocial stress that is estimated to impact approximately 75% of Black, Hispanic/Latinx, Native, and Asian Americans (Findling et al. 2019; Lee et al. 2019). A growing body of literature has begun to explore the prevalence and impact of PED on the mental and physical health of adults who identify as belonging to a racially or ethnically minoritized group (Carter et al. 2019). PED has been

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directly linked to depression (Trost et al. 2019), psychological distress (Garcia, David, and Mapaye 2019), cardiovascular deficits (Panza et al. 2019), reduced overall health (Nicholson 2020), and pain outcomes (Brown et al. 2018).

Chronic pain is a public health problem that impacts 20% of the U.S. population (Dahlhamer et al. 2018). Disparities in chronic pain experience have been found across race, sex, and age, with a higher prevalence reported in Non-Hispanic White and Black respondents, older adults, and women (Dahlhamer et al. 2018; Zelaya et al. 2020). Despite increased reports of chronic pain among Non-Hispanic White individuals relative to racially and ethnically minoritized groups, Black and African Americans report the highest levels of generalized pain-related disability (Janevic et al. 2017) and pain sensitivity (Meints and Edwards 2018b) and racially minoritized groups are generally undertreated for pain-related issues (Morales and Yong 2021). Recent findings have provided evidence for the role of psychosocial stress on experiences of generalized pain (Meints and Edwards 2018b) and related constructs, such as central sensitization (CS) (Güereca et al. 2022). Despite growing evidence demonstrating the pernicious impact of PED on pain outcomes, less is known about potential mediators through which these processes influence outcomes (Boring et al. 2021; Walker Taylor et al. 2018).

Preliminary evidence suggests that depression may play a role in explaining how psychosocial stress influences pain outcomes. Depression has been found to be related to experiences of ethnic discrimination and pain-related injustice appraisals (Ziadni et al. 2020), greater pain catastrophizing (Dong et al. 2020), pain interference (Rahman et al. 2020) and generalized experience of chronic pain (Tappe-Theodor and Kuner 2019). There is initial evidence that it may also mediate the relationships between psychosocial stress and pain interference (Morasco et al. 2013; Walker Taylor et al. 2018), pain intensity (Piontek et al. 2020), chronic pain diagnoses (Earnshaw et al. 2015), and probability of developing generalized chronic pain (Brown et al. 2018).

There is preliminary, but conflicting, evidence that the psychological impact of exposure to racial discrimination differs between sexes, and it is currently unclear whether these potential sex differences are associated with differential experiences of chronic pain. In an early study, exposure to racial discrimination was found to be associated with anxiety and obsessive-compulsive symptoms, but not depression, for African American women compared to men (Greer, Laseter, and Asiamah 2009) and in a later study increases in racial discrimination across the lifespan was found to predict depression symptoms in males compared to females (Assari et al. 2017). Additionally, exposure to racial discrimination has consistently been found to have a stronger association with chronic pain experience among women compared to men (Boring et al. 2021; Merriwether et al. 2021). Pain researchers have begun to identify the unique contributions of perceived discrimination, depression, and sex on pain-related constructs in chronic pain populations, however, more research is needed to elucidate the exact pathways through which these constructs relate and how they interact for different sociodemographic groups.

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Aims and hypotheses

The primary aim of this study was to assess if PED predicts pain-related outcomes among a national sample of people who endorse chronic pain and identify as being a member of an ethno-racial minoritized group. The secondary aim was to evaluate depression as a mediator of the relationship between PED and pain-related outcomes. The third aim was to assess if sex identified at birth moderated the relationships between PED and pain-related outcomes, and to assess if sex identified at birth moderated the mediational pathways from PED to depression and depression to pain-related outcomes.

We hypothesized that,

1. PED would significantly predict pain intensity, pain interference, and symptoms related to CS
2. Depression would mediate the relationships between PED and pain intensity, pain interference, and symptoms related to CS
3. Sex would moderate the relationships between PED and pain intensity, pain interference, and symptoms related to CS such that (3a) PED would predict outcomes for females and not for males and (3b) sex would moderate the mediational pathways from PED to pain intensity, pain interference, and symptoms related to CS, such that for females, depression would mediate the relationship between PED and pain outcomes and for males it would not.

Method

In this cross-sectional study, we conducted secondary analyses using a subsection of a larger survey battery designed to examine the psychometric properties of a new self-report survey instrument. The parent study and secondary analyses were approved by the Oregon Health & Science University's institutional review board. Written informed consent was obtained from all participants prior to participating in the study. Qualtrics (Qualtrics 2020) was contracted to recruit a randomly-selected, United States national sample. Strategic quota sampling was used to target respondents as to reflect the 2010 census stratified in domains of race, ethnicity, geographic location, age, sex identified at birth, education, and income. Eligible participants were English-speaking adults, ages 18–70, had internet access, and reported chronic pain, as defined by the National Institute of Health Task Force for Research Standards for Chronic Pain (Deyo et al. 2015). The RTF recommends that "chronic pain" be defined as a pain problem that has persisted at least three months and has resulted in pain at least half the days over the past six months. Following RTF guidelines, we included two questions to define chronicity: "How long has pain has been an ongoing problem for you?" and "How often has pain been an ongoing problem for you over the past 6 months?" A response of "greater than 3 months" to question one and a response of "at least half the days in the past 6 months" to question two indicated chronic pain. Exclusion criteria included the endorsement of being currently involved with a workers' compensation claim or currently undergoing a disability application or claim.

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Qualtrics recruited 2,743 participants to take the survey. Of these individuals, 301 participants met inclusionary criteria, consented to the study, and completed an online battery of validated questionnaires. Questionnaires were presented in a randomized order to reduce ordering effects. All surveys were completed remotely online in a single administration session lasting an average of 29 minutes. Of the 301 participants, 77 individuals identified as being a member of an ethno-racial minoritized group (i.e. Hispanic, Latinx, Spanish, Black, Asian, Native American, or multiple ethnicities identified). No missing data was found in the dataset.

Measures

Demographic information collected included age, sex identified at birth, gender, race/ethnicity, education, employment, income, relationship status, chronic pain duration, and pain location.

The **PROMIS Pain Interference Short Form** (PROMIS Pain Interference 4a; Amtmann et al. 2010) is a four-item scale that measures the degree to which pain interferes in daily living. Items are rated on a 5-point Likert-type scale ranging from 1 *(Not at all)* to 5 *(Very much)*. Total scores range from 4 to 20. A total score is calculated by summing scores across all items, with higher scores indicating more pain interference. The measure demonstrates excellent reliability ($\alpha = 0.90$) and expected correlations with bodily pain and pain interference (Amtmann et al. 2010).

The **PROMIS Pain Intensity Scale (**PROMIS Pain Intensity 1a; Cella et al. 2019**)** is a one-item scale that assesses pain intensity over the last seven days using a numerical rating scale of 0 (*No Pain*) to 10 (*Worse Imaginable Pain*). Higher scores indicate greater pain intensity.

The **Central Sensitization Inventory- Part A** (CSI; Mayer et al. 2012) is a 25-item self-report measure that assesses key polysomatic symptoms associated with hyperactivity of pain processing in the central nervous system, present in many chronic pain disorders. Items are rated on a 5-point Likert-type scale ranging from 1 (*Never*) to 5 (*Always*). Two example items include, “I feel pain all over my body,” and “My muscles feel stiff and achy.” Total scores range from 25 to 125. A total score is calculated by summing scores across all items, with higher scores indicating greater symptom severity. The CSI has been shown to discriminate between pain patients and non-pain patients and is shown to be associated with pain disability and pain severity The CSI demonstrates excellent reliability ($\alpha = 0.93$) and expected correlations with the Widespread Pain Inventory and Pain Catastrophizing scale (Van Wilgen et al. 2018).

The **Brief Perceived Ethnic Discrimination Questionnaire - Community Version** (Brief PEDQ-CV; Brondolo et al. 2005) is a 17-item measure derived from the full-length 70-item PEDQ-CV measure that assesses perceived exposure to ethnic discrimination from peoples of any ethnic/racial background. The Brief PEDQ-CV consists of five factors: Lifetime Exposure, Exclusion/Rejection, Stigmatization/Devaluation, Discrimination at Work/School, and Threat/Aggression. Items are responded to on a five-point Likert-style scale ranging from 1 (*Never happened*) to 5 (*Happened very often*). Total scores range from 17 to

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85. Higher scores indicate a higher perception of lifetime racism. The Brief PEDQ-CV demonstrates good internal consistency (α = 0.88) and convergent validity with the Perceived Racism Scale (Collado-Proctor 1999).

The **PROMIS Depression Scale Short Form** (PROMIS Depression 4a; Cella et al. 2019) is a four-item scale that assesses symptoms of depression. Items are rated on a 5-point Likert-type scale ranging from 1 (*Never*) to 5 (*Always*). Total scores range from 4 to 20. A total raw score is calculated by summing scores across all items, with higher scores indicating greater symptom severity. While raw scores can be converted into T-scores, the raw scores were used in the current study. The measure demonstrates excellent reliability (α = 0.93) and convergent validity with the Center for Epidemiological Studies Depression Scale and Patient Health Questionnaire (Pilkonis et al. 2014).

Statistical analyses

All statistical analyses were performed using IBM SPSS for Windows version 26.0 (IBM Corp 2019) at an alpha level of 0.05. Prior to data analyses, all variables were examined to evaluate data compliance with parametric analysis assumptions. Pearson's correlations were conducted to characterize the overall relationship between variables (see Table 2). To test hypothesis one, three hierarchical multiple regression analyses were conducted to investigate if: (1) PED predicted pain intensity, pain interference, and symptoms related to CS. To test hypothesis two, three path analyses using the PROCESS procedure for SPSS (Hayes, 2013) were conducted to assess if depression mediated the relationships between PED and pain intensity, pain interference, and symptoms related to CS. To test hypothesis 3a, an interaction term between PED and sex was added to the three primary regression models. To test hypothesis 3b, we examined the moderating impact of sex on the mediational pathways from PED to pain intensity, pain interference, and symptoms related to CS through depression. For all mediation models, we employed a bootstrapping method to compute an estimate of the indirect effects. Bootstrapping is a non-parametric resampling method that bypasses assumptions of normality common to traditional tests of mediation, and is, thus, more powerful (Preacher & Hayes, 2004, 2008). Specifically, 5,000 samples of the original size were taken from the obtained data (with replacement after each specific number was selected), and indirect effects were calculated in each sample. The mean indirect effect computed over each of these 5,000 samples was used to compute the point estimate. The bias corrected and accelerated 95% confidence intervals (CI; i.e., with z score-based corrections for bias due to the underlying distribution) were then examined, and if these intervals did not contain 0, the point estimate of the indirect effect was considered significant. Sample size was based on statistical power analysis conducted using G*Power software tool (Faul, Erdfelder, Lang, & Buchner 2007). Using the number of predictors as four, a medium effect size level (0.15), a moderate significance level (α =0.05), and a power requirement of 0.80, the minimum required sample size was 80.

Pain duration was controlled for in the regression models due to its predictive capacity on the outcome measures of interest. Age and education were not found to be predictive. The alpha level was set at 0.05 (two-tailed) for all analyses.

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Results

Participant demographics are reported in Table 1. The mean age was 47.61 (*SD* = 15.40) and 65% identified as female. All participants in the sample reported moderate pain intensity (*M* = 4.97; *SD* = 4.10) and moderate to severe CS-related symptoms, indexed by a score greater than 40 on the CSI (Neblett et al. 2013) (*M* = 63.93; *SD* = 18.33). Males and females did not differ in reported pain outcomes. Respondents reported an average Brief PEDQ-CV score of 29.08 (*SD* = 12.22), Pain Interference score of 9.80 (*SD* = 4.10), Pain Intensity score of 4.97 (*SD* = 2.34), CSI score of 63.90 (*SD* = 18.33), and Depression score of 8.87 (*SD* = 4.61). All correlations among study variables were in the expected direction. Descriptive statistics of the variables of interest are reported in Table 2.

Regression analyses

Consistent with hypothesis 1, when controlling for pain duration, PED significantly predicted pain interference, $R^2 = 0.21$, F (2,74) = 9.52, $p < .001$, β = 0.39; pain intensity, $R^2 = 0.17$, F (2,74) = 7.72, $p = .05$, β = 0.21; and symptoms related to CS, $R^2 = 0.33$, F (2,74) = 18.53, $p < .001$, β = 0.57, (Displayed in Tables 3–5). When adding the PED X Sex interaction term to the three regression models, it significantly predicted pain interference, $\Delta R^2 = 0.06$, ΔF (1, 72) = 5.91, $p = .02$, b = −0.16, but not pain intensity, $\Delta R^2 = 0.02$, ΔF (1, 72) = 2.19, $p = .14$ or symptoms related to CS, $\Delta R^2 = 0.004$, ΔF (1, 72) = 0.43, $p = .51$. A simple slope analysis of PED predicting pain interference for females and males demonstrated that the impact of PED on pain interference was significantly different between males and females, revealing a significant relationship for males, β = 0.18, SE = 0 .05, $p = .001$, but not females β = 0.07, SE = 0.04, $p = .06$ (Figure 1).

Path analyses

To assess depression as a mediator of the relationship between PED and pain-related outcomes, we conducted three path analyses in which PED was entered as the independent variable, the pain-related outcome (i.e., pain interference, symptoms related to CS, or pain intensity) as the dependent variable, depression as the mediator, and pain duration as a covariate. Results from the first path analysis demonstrated that scores in depression completely mediated the relationship between PED and pain interference [point estimate = 0.07; 95% bootstrap CI = 0.02, 0.14], displayed in Table 6. After accounting for depression, the relationship between PED and pain interference was no longer significant. Results from a moderated mediation analysis found that sex at birth moderated the mediation $\Delta R^2 = 0.05$, ΔF (1,71) = 5.60, $p = .02$ such that for males, the relationship between PED and pain interference was explained via depression β = 0.58 SE = 0.14, 95% CI (0.29, 0.86); however, for females, depression did not significantly explain this relationship β = 0.20, SE = 0.10, 95% CI (−0.001, 0.43) (Figure 2).

Results from the second path analyses demonstrated that scores in depression completely mediated the relationship between PED and pain intensity [point estimate = 0.02; 95% bootstrap CI = 0.003 to 0.05]. After accounting for depression, the relationship between PED and pain intensity was no longer significant (Table 7). Results from the moderated mediation analysis found that sex at birth moderated the mediational effects $\Delta R^2 = 0.05$,

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ΔF (1,71) = 4.80, p = .03, such that for males, the relationship between PED and pain intensity was explained via depression β = .28 SE = 0.08, 95% CI (0.11, 0.45); however, for females, depression did not significantly explain this relationship β = 0.07, SE = 0.06, 95% CI (−0.05, 0.19) (Figure 3).

Results from the third path analyses demonstrated depression partially mediated the relationship between PED and symptoms related to CS, point estimate = 0.42, 95% CI = 0.21 to 0.68 (Table 8). Sex at birth did not moderate this mediational effect ΔR^2 = 0.004, ΔF (1,71) = 0.67, p =. 41.

Discussion

There is a growing body of research that has provided evidence for the deleterious effects of ethnic discrimination on physical health, mental health, and well-being. The current study adds to the existing literature by examining whether depression is a mediator through which lifetime PED impacts pain-outcomes in a sample of racially diverse participants diagnosed with chronic pain. We hypothesized that: (1) PED would predict pain-related outcomes among a national sample of racially and ethnically minoritized adults who endorse chronic pain; (2) depression would explain the relationship between PED and pain-related outcomes; and (3) the relationships between these variables would not be consistent across sex at birth.

The current findings supported our first and second hypotheses. PED significantly predicted pain interference, pain intensity, and symptoms related to CS. Depression was found to fully mediate the relationship between ethnic discrimination and two outcomes: pain interference and pain intensity. Depression partially mediated the relationship between ethnic discrimination and symptoms related to CS. These results provide preliminary evidence for depression as a candidate mediator in this model. The third hypothesis was partially supported, albeit in the opposite than expected direction. PED significantly predicted pain interference for males, but not for females, and the mediational path through PED, depression, and pain interference was significant for males only. No sex differences were found in relation to the predictive capacity of PED on either pain intensity or symptoms related to CS when depression was excluded from the model. However, sex did moderate the mediational pathway between PED, depression, and pain intensity, such that this relationship was significant for males and nonsignificant for females. Sex did not moderate the mediational pathway for symptoms related to CS. These findings suggest that the impact of PED on the pain experience of racially minoritized adults with chronic pain differs between males and females. PED and depression may be particularly salient constructs when assessing pain interference and pain intensity in males.

Together, the findings of the current study partially align with prior research on the impacts of discrimination on pain-related outcomes. This is one of the first studies to address the predictive capacity of PED on symptoms related to CS in a sample of racially and ethnically minoritized adults living with chronic pain. One study to date has directly addressed the relative role of PED on CS. In a sample of 71 adults living with sickle cell disease, greater lifetime racial discrimination experienced in healthcare settings predicted enhanced mechanical temporal summation, an indicator of CS, through enhanced pain

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severity (Mathur et al. 2016). The results of the current study provide support for the potential role of PED on CS in a clinically broader sample of adults.

PED has been found to be predict bodily pain among African American male veterans, ethnically diverse samples of women, and Hispanic/Latinx samples (Burgess et al. 2009; Carlisle 2015; Dugan et al. 2017). Contrary to the findings of the current study, heightened experiences of daily interpersonal discrimination, but not major experiences of lifetime discrimination, were found to be predictive of pain interference in adults with chronic pain in a national survey (Boring et al. 2021). These results may reflect how differences in PED measurement (i.e., lifetime or daily PED) may impact the level of association between these constructs and pain outcomes. Recent findings have also concluded that discrimination is weakly associated with pain intensity and may be explained by fluctuations in pain experience over time (Ziadni et al. 2020). Of note, one prior study of exclusively older African American women found that perceived discrimination experienced over the past one year was significantly associated with pain intensity, demonstrating that sex may be a contributing factor in this relationship (Walker Taylor et al. 2018).

Our findings are also congruent with previous mediation studies exploring causal relationships between depression and pain, and support Pincus et al.'s (2010) *depression pathway model* (Hall et al. 2011; Lee et al. 2016). In this model, PED and depressive symptoms give rise to behavioral withdrawal and general tiredness, which leads to greater fear. Greater fear heightens cognitive mechanisms that result in selective attention to threatening stimuli (catastrophizing), leading to increased pain (Currie and Wang 2005).

The findings of the current study related to sex differences in the mediational impact of depression align with existing literature. A previous longitudinal study found that Black male adults who experienced increased racial discrimination from adolescence to adulthood demonstrated an increase in anxiety and depression over time, whereas heightened anxiety and depression were not found in relation to increased experiences of racial discrimination in Black female adults (Assari et al. 2017). However, the current findings are contrary to previous research that have addressed sex differences in relation to the impact of discrimination on mental health and chronic-pain experience. For example, early cross-sectional studies found that gender differences played a role in the impact of discrimination on mental health, such that women experienced early and heightened deleterious mental health symptoms when compared to men (Greer, Laseter, and Asiamah 2009). In accordance with this, Boring and colleagues (2021) found that the association between daily PED and pain interference was strongest among women in their sample, highlighting that both gender and discrimination measurement type (daily or lifetime) may play a role in the predictive relationship between these constructs. Lastly, prior research also indicates that discrimination may be associated to a higher degree with pain outcomes in women when compared with men in a sample with generalized chronic pain (Boring et al. 2021).

Results of the current study were surprising, given previous findings in the scientific literature and socio-cultural inequities experienced by females that may compound with ethnic discrimination to impact health (McClendon et al. 2021). Findings of the current study may be due to differences in the contribution of discrimination timeframe between

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males and females on pain outcomes. Congruent with this hypothesis, lifetime PED has been found to be predictive of pain in men, whereas daily PED may better predict pain in women (Edwards 2008).

Limitations of the current study must be noted. All study variables were all captured at the same time point, and thus, because of the cross-sectional design, causality could not be determined. Though longitudinal data are preferred to cross-sectional evidence for testing associations between changes in latent traits, theoretical contributions can come from cross-sectional mediation analyses when viewed as a type of variance partitioning, rather than a proxy for longitudinal relations, and can be useful even if none of the variables involve a temporal dimension. Though we provided a theorical rational for our path analyses, the study design did not rule out the possibility of the path being more accurately described as PED > Pain> Depression. Since study variables were all measured at the same time point, we conducted a post-hoc analysis to provide more evidence for our hypothesized model, in which pain was entered as a mediator of the relationship between PED and depression. Results demonstrated that this model was not supported [point estimate = 0.23; 95% bootstrap CI = −.02-.58]. A second limitation to note is that our sample did not have adequate power to analyze the impacts of PED on pain-outcomes between ethno-racial minoritized groups, likely masking important differences between groups.

Future research should analyze between and within minoritized group differences and address the differential protective factors that buffer specific cultural or ethno-racial minoritized groups against the impacts of race-based stress on pain-related outcomes. Future studies may also benefit from utilizing an intersectional methodology to better address how multiple identity factors may shape the experience of discrimination, its impacts on pain-related outcomes, the mediators in this process, and protective factors. A plethora of research has highlighted the role of biological, psychological, and social factors that contribute to experiences of chronic pain (Meints and Edwards 2018a). Individual factors such as epigenetics may play a role in the differential experiences of pain among various ethno-racial groups due to longstanding group differences in environment and psychosocial variables (Aroke et al. 2019). Disparities in treatment due to systemic racism also impact the chronic pain experience of racially and ethnically minoritized adults. Prior research has indeed found that individuals who hold multiple minoritized identities are at risk for experiencing heightened discrimination (Casey et al. 2019), which may impact chronic pain experience. Lastly, the duration, timeframe, and type of PED experienced by racially and ethnically minoritized adults might also be used as separate predictors to better understand which components of PED have a greater impact on pain-outcomes, mental health, and physical health.

In sum, this study has provided a unique contribution to the pain literature by providing a contextual analysis of PED and chronic pain. Further, we expanded on prior findings by addressing the contribution of ethno-racial identity and sex in the relationship between ethnic discrimination, depression, and pain outcomes among a sample of racially diverse individuals with chronic pain. Addressing and validating experiences of lifetime ethnic discrimination may be a clinically relevant tool in the management of chronic pain for ethno-racial minoritized adults.

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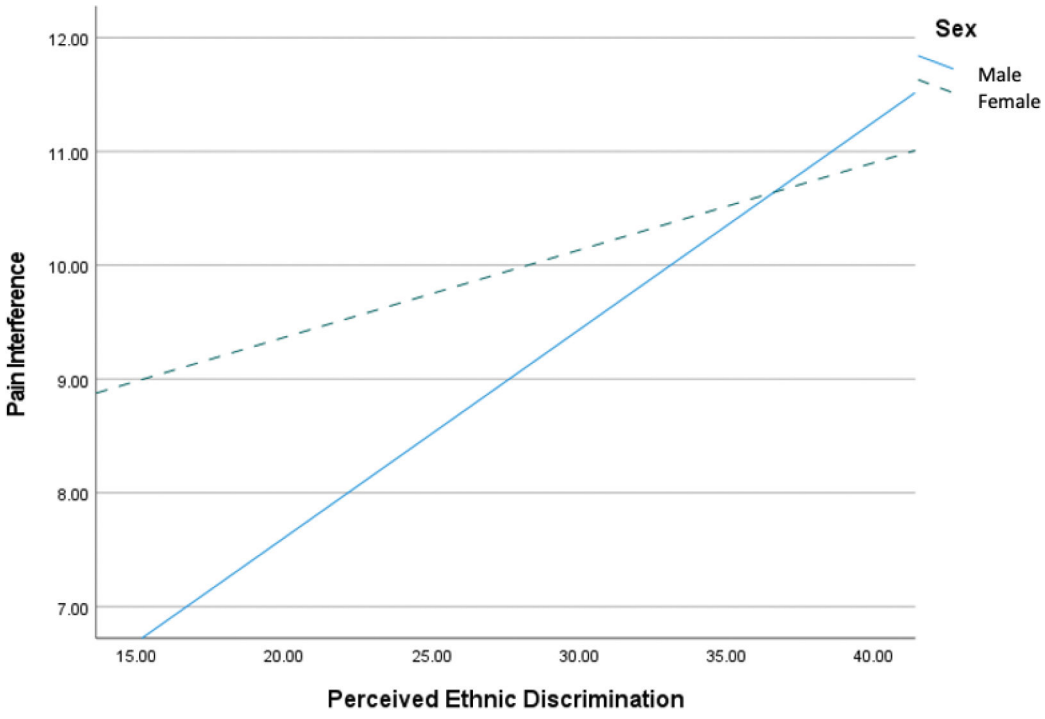

Figure 1:
Sex moderates the Relationship between Perceived Ethnic Discrimination and Pain Interference

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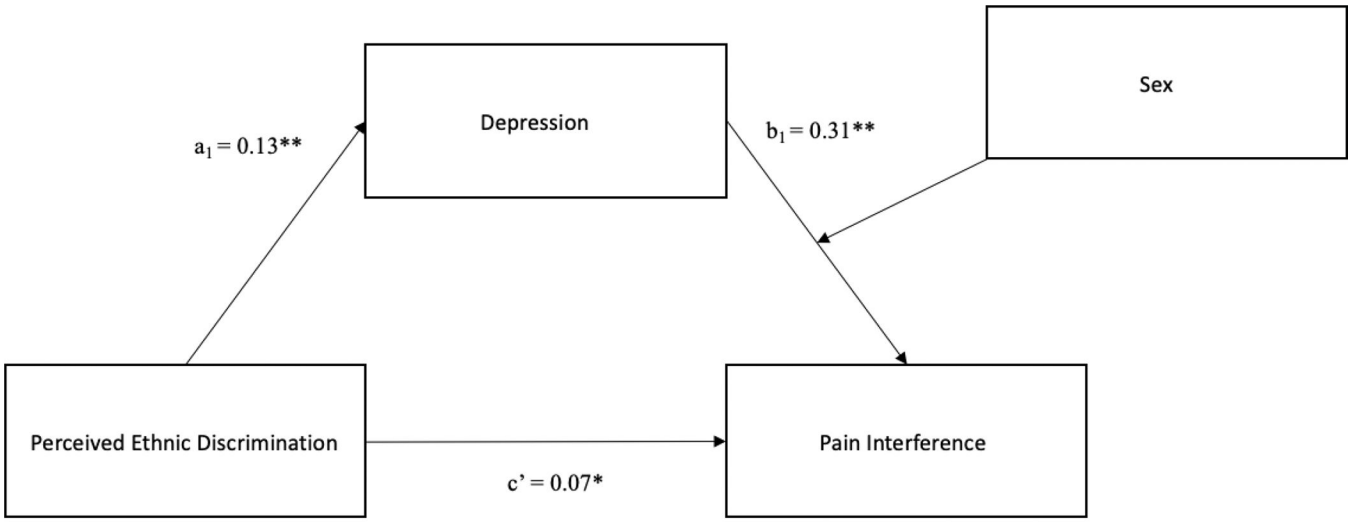

Notes. * $p \leq .05$; ** $p \leq .001$.

Figure 2:
Pain Interference Moderated Meditation

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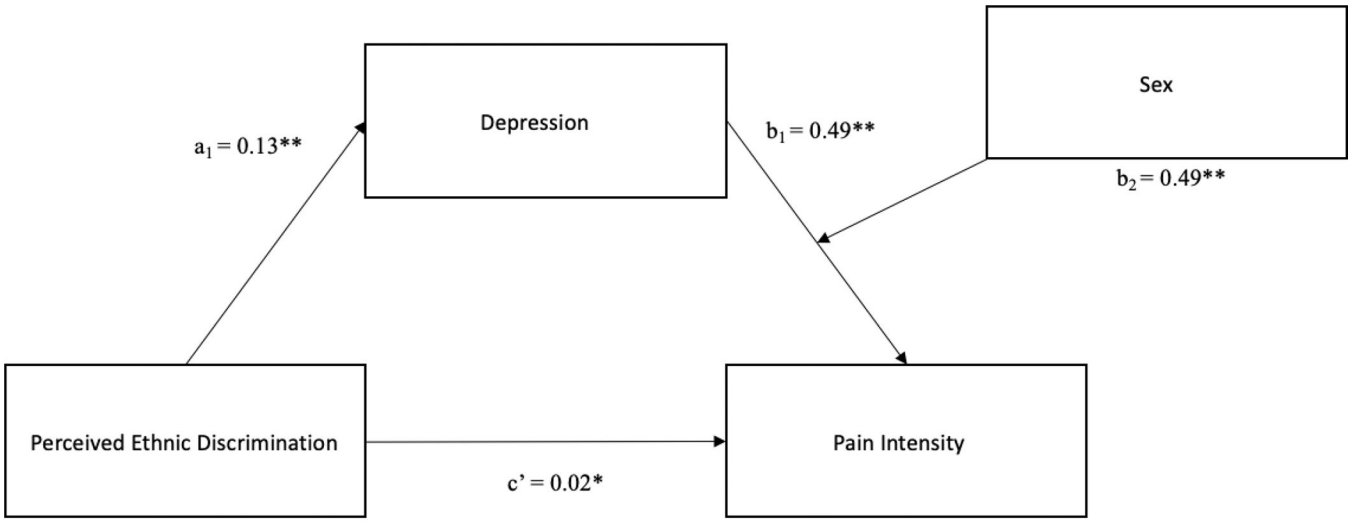

Notes. * $p \leq .05$; ** $p \leq .001$.

Figure 3:
Pain Intensity Moderated Meditation

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Table 1

Participant Demographics (n = 77)

Variable				
	M	**SD**	**Range**	**CI**
Age	47.61	15.40	51	44.02 – 51.21
	n	**%**		
Sex at Birth				
Male	25	32.50		
Female	50	64.90		
Intersex	2	2.50		
Race/Ethnicity				
Hispanic/Latinx/Spanish	15	19		
Black	33	42		
Asian	13	17		
Native American	9	12		
Multiple Ethnicities Identified	7	10		
Education				
Less than High school	1	1		
High school or equivalent	19	24		
Some College	20	26		
2-yr associate degree	9	12		
4-yr bachelor’s degree	17	22		
Master’s degree	9	12		
Doctoral/ Professional degree	2	3		
Employment				
Employed	24	31		
Temporarily laid off/ Unemployed	15	20		
Retired	21	27		
Disabled	8	10		
Not working- Other	9	12		
Income				
Less than 30,000	17	22		
30,000 – 50,000	30	25		
50,000 – 70,000	17	22		
80,000 – 100,000	3	4		
100,000 – 150,000	10	13		
Relationship Status				
Married	27	35		
Divorce/Separated	13	17		
Never Married	35	45		
Chronic Pain Duration			5	5.25 – 6.02

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Variable				
	M	**SD**	**Range**	**CI**
3–6 months	11	14		
6–12 months	10	13		
1–3 years	17	22		
3–5 years	13	17		
5–10 years	10	13		
More than 10 years	16	20		
Pain Location				
Neck and Back Pain	62	80		
Migraines	1	1		
Hip/ Pelvis	5	6		
Other	10	13		

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Table 2

Mean, Standard Deviation, Range, Confidence Interval, and Zero-order Correlations Matrix of Outcome Variables (n = 77)

Variable									
	M	**SD**	**Range**	**CI**	**1**	**2**	**3**	**4**	**5**
1. ED	29.08	12.22	41	25.61 – 30.33	-	.41**	.24*	.46**	.34**
2. PI	9.80	4.10	15	8.84 – 10.71	-	-	.72**	.57**	.46**
3. PIN	4.97	2.34	9	4.45 – 5.49	-	-	-	.44**	.34**
4. CS	63.93	18.33	82	59.77 – 68.09	-	-	-	-	.67**
5. Depression	8.87	4.61	16	7.99 – 10.13	-	-	-	-	-

** $p < .01$

* $p < .05$

ED = Ethnic Discrimination, PI = Pain Interference, PIN = Pain Intensity, CS = Central Sensitization.

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Table 3

Evaluating Effects of Perceived Ethnic Discrimination on Pain Interference Using Linear Regression Analysis (n = 77)

		Unstandardized Coefficients						
Step	**Predictor**	***B***	**SE**	**β**	***sr*²**	***p***	***R*²**	***F***
							.21	9.52
1	Pain Duration	.58	.27	.24	.24	< .05		
2	Ethnic Discrimination	.15	.41	.39	.38	< .001		

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Table 4

Evaluating Effects of Perceived Ethnic Discrimination on Pain Intensity Using Linear Regression Analysis (n = 77)

		Unstandardized Coefficients						
Step	**Predictor**	***B***	**SE**	**β**	***sr²***	***p***	***R²***	***F***
							.17	7.72
1	Pain Duration	.48	.14	.33	.36	< .05		
2	Ethnic Discrimination	.49	.02	.21	.21	.05		

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Table 5

Evaluating Effects of Perceived Ethnic Discrimination on CS Using Linear Regression Analysis (n = 77)

		Unstandardized Coefficients						
Step	**Predictor**	***B***	**SE**	**β**	***sr*²**	***p***	***R*²**	***F***
							.33	18.53
1	Pain Duration	1.39	1.23	.13	.13	.26		
2	Ethnic Discrimination	.10	.17	.57	.56	< .001		

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Table 6

Mediation Effects of Depression on the Relationship Between Perceived Ethnic Discrimination and Pain Interference

		95% CI	
Effect	***b***	**Lower**	**Upper**
Total	.16	.07	.24
Direct	.09	−.002	.18
Indirect (mediation)	.07	.02	.14

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Table 7

Mediation Effects of Depression on the Relationship Between Perceived Ethnic Discrimination and Pain Intensity

		95% CI	
Effect	***b***	**Lower**	**Upper**
Total	.05	.004	.10
Direct	.02	−.03	.07
Indirect (mediation)	.02	.003	.05

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Table 8

Mediation Effects of Depression on the Relationship Between Perceived Ethnic Discrimination and CS

		95% CI	
Effect	***b***	**Lower**	**Upper**
Total	1.01	.67	1.34
Direct	.58	.27	.90
Indirect (mediation)	.42	.21	.67