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The Role of Gender in Depression Among Patients With Rheumatoid Arthritis Pain

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Introduction

Rheumatoid arthritis (RA) is a chronic autoimmune disease marked by persistent joint pain, fatigue, and functional impairment. Depression is common in RA and may be driven, in part, by the burden of chronic pain. While both RA and depression are more prevalent in women, it remains unclear whether gender influences depression severity among RA patients. This study aimed to assess whether gender is associated with depression scores in individuals with RA, while considering the potential role of chronic pain as a key contributor to psychological distress.

Methods

We used data from the National Health and Nutrition Examination Survey (NHANES) 2021–2023 to identify adults with self-reported RA. Depression severity was measured using the PHQ-9, and a multivariable linear regression model was employed to assess the association between gender and depression scores, adjusting for age, race, education, and marital status.

Results

Among 419 individuals with RA, 58.7% were female. While females had slightly higher rates of moderate to moderately severe depression, gender was not significantly associated with PHQ-9 scores ($\beta = 0.74$, $p = 0.335$). Marital status was the only variable significantly associated with depression scores, with unmarried individuals reporting higher levels of depressive symptoms ($\beta = 1.67$, $p = 0.029$). The high prevalence of depressive symptoms highlights the likely influence of chronic pain in driving psychological burden across all demographic groups.

Conclusion

Depressive symptoms are common among patients with RA, but gender differences may be diminished by the unifying effect of chronic pain. These findings underscore the importance of addressing chronic pain as a central component in managing RA-related depression, and call for integrated care approaches that target both physical and emotional well-being.

INTRODUCTION

Rheumatoid arthritis (RA) is a chronic autoimmune disease characterized by joint pain, swelling, and stiffness, often resulting in significant functional limitations and reduced quality of life. In 2019, 18 million people worldwide were living with RA, with 70% of those affected being women.¹ RA can contribute to significant psychological distress, particularly in the early stages of the disease. Patients frequently report symptoms of depression and anxiety, which

can often be exacerbated by chronic pain, fatigue, and social isolation resulting from physical disability.²⁻⁴

Depression is a major public health concern, affecting over 280 million people globally, and is recognized as a leading cause of disability.⁵ Depression often coexists with chronic physical illnesses like RA, and studies indicate that up to 42% of RA patients experience clinically significant symptoms of depression.² One likely contributor to this association is chronic pain, which is a hallmark of RA and an established risk factor for depression across medical populations.^{2,6} Chronic pain not only affects physical function-

ing but also contributes to emotional exhaustion, helplessness, and social withdrawal, all of which can exacerbate depressive symptoms. The presence of this comorbidity is particularly concerning, as depression can intensify RA-related physical symptoms, impair functionality, reduce treatment adherence, and ultimately lead to poorer health outcomes.^{3,7}

The association between RA and depression is well-documented; however, gender differences in this relationship remain underexplored. Depression is known to be more prevalent in women than in men, due to a combination of biological, hormonal and psychosocial factors.⁸ Given that RA is also more prevalent in women, with prevalence rates 2-3 times higher than those in men, it is possible that the interplay between gender, depression and RA differs from that seen in the general population.¹

Understanding how gender influences the relationship between RA and depression is critical for developing effective management strategies for patients with RA. This study aims to utilize data from the National Health and Nutrition Examination Survey (NHANES) to investigate whether gender plays a role in the association between RA and depression. By adjusting for demographic variables such as age, race, education, and marital status, this analysis seeks to determine whether female patients with RA exhibit higher depression scores than their male counterparts.

MATERIALS & METHODS

Data Collection Our study analyzed data from the National Health and Nutrition Examination Survey (NHANES), administered by the CDC. Data from the August 2021 to August 2023 NHANES questionnaire were utilized, focusing on the Demographics, Medical Conditions, and Depression sections. The Medical Conditions section was used to identify individuals with Rheumatoid Arthritis (RA) based on self-reported responses indicating a diagnosis of RA. The Depression section contained the nine items of the Patient Health Questionnaire (PHQ-9), which were used to derive a composite depression score. This study aimed to examine the relationship between RA and depression in a nationally representative sample.

Variables Participants were included if they reported a diagnosis of Rheumatoid Arthritis. The primary dependent variable was the composite depression score, calculated by summing the responses from the nine PHQ-9 items. Each item was scored on a scale from 0 ("Not at all") to 3 ("Nearly every day"), with a total score ranging from 0 to 27. Depression severity was categorized as: Minimal (0-4), Mild (5-9), Moderate (10-14), Moderately Severe (15-19), and Severe (20-27). Covariates included Age, Race, Education, and Marital Status.

Statistical Analysis All statistical analyses were performed using R version 4.2.0. Descriptive statistics summarized demographic characteristics, including standard deviations, and frequencies with percentages. A linear regression model was fitted to examine whether gender was associated with depression scores among RA patients, ad-

justing for age, race, education, and marital status. The significance of associations was determined at a two-sided p-value threshold of 0.05, with 95% confidence intervals calculated for all estimates.

RESULTS

A total of 419 patients with Rheumatoid Arthritis were included in the analysis. The average age was 62.76 years (SD = 13.32). The sample was predominantly female, with 246 females (58.7%) compared to 173 males (41.3%). In terms of race, 50.8% of participants were White, 20.8% were Hispanic, 17.7% were Black, and 10.7% were categorized as 'NA'. Educational attainment varied, with 9.3% reporting less than a 9th-grade education, 15.8% completing 9-11th grade, 31.0% graduating high school or obtaining a GED, 27.4% having some college or an AA degree, and 16.5% being college graduates or above. Marital status was nearly evenly split, with 46.5% of participants being married and 53.5% not married.

Based on PHQ-9 scores, 37.0% of patients had Minimal depression, 16.0% had Mild depression, 5.0% had Moderate depression, 5.0% had Moderately Severe depression, and 1.7% had Severe depression. The regression analysis is presented in (Table 1).

The regression analysis found that gender was not significantly associated with depression scores ($\beta = 0.74$, 95% CI: -0.77 to 2.25, $p = 0.335$) in patients with RA. Age was also not significantly associated with depression scores ($\beta = -0.03$, 95% CI: -0.09 to 0.03, $p = 0.292$). Regarding race, Hispanic participants had lower depression scores than Black participants, but this difference was not significant ($\beta = -0.82$, 95% CI: -3.11 to 1.48, $p = 0.485$). Similarly, White participants showed lower depression scores than Black participants, but this difference was also not significant ($\beta = -1.02$, 95% CI: -2.92 to 0.88, $p = 0.290$). (Table 2)

Educational attainment did not show a significant association with depression scores for any category when compared to the reference group (Less than 9th grade). Marital status was the only variable that showed a significant association with depression scores. Patients who were Not Married had higher depression scores compared to those who were Married ($\beta = 1.67$, 95% CI: 0.17 to 3.17, $p = 0.029$).

This study investigated whether gender is associated with depression scores among individuals diagnosed with rheumatoid arthritis (RA) using a nationally representative sample from NHANES 2021–2023. While prior literature has consistently shown that both RA and depression disproportionately affect women, our analysis did not find a statistically significant association between gender and depression scores in RA patients after adjusting for demographic variables, including age, race, education, and marital status.

Although women made up the majority of the sample and reported slightly higher levels of moderate to moderately severe depression compared to men, the difference in mean PHQ-9 scores between genders was not statistically significant. This finding aligns with previous work suggesting that the gender gap in depression observed in

Table 1. Demographic and Clinical Characteristics of Patients with RA

Variable	Male RA N (%)	Female RA N (%)	Total N (%)
Count	173 (41.3%)	246 (58.7%)	419
Race			
Black	23 (13.3%)	51 (20.7%)	74 (17.7%)
Hispanic	29 (16.8%)	58 (23.6%)	87 (20.8%)
White	101 (58.4%)	112 (45.5%)	213 (50.8%)
NA	20 (11.6%)	25 (10.2%)	45 (10.7%)
Education			
Less than 9th grade	15 (8.7%)	24 (9.8%)	39 (9.3%)
9-11th grade	24 (13.9%)	42 (17.1%)	66 (15.8%)
High school graduate/GED	57 (32.9%)	73 (29.7%)	130 (31.0%)
Some college or AA degree	48 (27.7%)	67 (27.2%)	115 (27.4%)
College graduate or above	29 (16.8%)	40 (16.3%)	69 (16.5%)
Marital Status			
Married	91 (52.6%)	104 (42.3%)	195 (46.5%)
Not Married	82 (47.4%)	142 (57.7%)	224 (53.5%)
Depression Severity			
Minimal (PHQ-9: 0–4)	69 (39.9%)	86 (35.0%)	155 (37.0%)
Mild (PHQ-9: 5–9)	35 (20.2%)	32 (13.0%)	67 (16.0%)
Moderate (PHQ-9: 10–14)	6 (3.5%)	15 (6.1%)	21 (5.0%)
Moderately Severe (PHQ-9: 15–19)	7 (4.0%)	14 (5.7%)	21 (5.0%)
Severe (PHQ-9: 20–27)	2 (1.2%)	-	2 (1.2%)

Table 2. Regression Results for Depression Scores Among RA Patients

Variable	Beta	95% CI	P-value
Gender (Female vs. Male)	0.74	-0.767 to 2.247	0.335
Age (years)	-0.031	-0.089 to 0.027	0.292
Race: Hispanic (vs. Black)	-0.815	-3.111 to 1.481	0.485
Race: White (vs. Black)	-1.023	-2.921 to 0.876	0.290
Education: 9–11th grade (vs. <9th)	-1.212	-4.787 to 2.364	0.505
Education: High school/GED (vs. <9th)	-1.114	-4.398 to 2.169	0.504
Education: Some college/AA (vs. <9th)	-1.937	-5.234 to 1.359	0.248
Education: College Grad+ (vs. <9th)	-2.912	-6.355 to 0.531	0.097
Marital Status: Not Married (vs. Married)	1.669	0.172 to 3.166	0.029*

*Significance Legend:

*p < 0.05

**p < 0.01

***p < 0.001

the general population may not be as pronounced among those with chronic conditions like RA, where shared disease burdens may level the psychological impact across sexes.¹ Nonetheless, this contrasts with broader epidemiologic patterns in the general population, where women are nearly twice as likely to experience depression as men.⁶

Interestingly, marital status emerged as the only demographic factor significantly associated with depression scores. Patients who were not married reported higher levels of depressive symptoms compared to those who were

married. This supports existing literature suggesting that social support—often facilitated through intimate partnerships—can serve as a protective factor against depression in individuals with chronic illnesses.^{3,4} These findings underscore the need to assess patients' psychosocial environments, including relationship status and social support networks, when managing RA-related mental health concerns.

Although gender was not significantly associated with depression scores in our analysis, the high overall preva-

lence of depressive symptoms among RA patients reinforces the need for integrated mental health care in this population. One likely driver of this mental health burden is the experience of chronic pain, which is intrinsic to RA and known to heighten the risk of depression. Unlike episodic pain, chronic pain can lead to ongoing emotional strain, feelings of hopelessness, and diminished coping capacity, potentially blunting the gender differences typically observed in depression prevalence. Recognizing the central role of pain in this dynamic could help clinicians better identify patients at risk for depression, regardless of gender, and underscores the value of multidisciplinary approaches that address both physical and psychological dimensions of RA.

This study has several strengths, including the use of NHANES, a nationally representative dataset that enhances the generalizability of the findings. Additionally, the use of the PHQ-9, a validated and widely used measure of depression, provides robust insight into the severity of depressive symptoms among RA patients. However, the study is not without limitations. First, RA diagnosis was based on self-report, which may introduce misclassification bias. Second, the cross-sectional nature of NHANES precludes causal inference. It is also possible that unmeasured variables—such

as disease duration, medication use, pain severity, or comorbidities—may confound the observed associations.

Future research should explore gender differences in depression among RA patients using longitudinal designs, incorporating clinical confirmation of RA diagnosis and detailed rheumatologic profiles. Qualitative studies may also help uncover gender-specific coping mechanisms, social expectations, or healthcare experiences that influence mental health outcomes in this population.

CONCLUSION

Although depression is prevalent among individuals with RA, this study did not find a statistically significant difference in depression scores between male and female RA patients. Marital status, however, was associated with depression levels, suggesting that social support may play a key role in mitigating psychological distress. These findings emphasize the need for holistic, psychosocially informed approaches to RA care, regardless of gender.

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