

Depression and Hypertension Among U.S. Adults: A Cross-Sectional Analysis of NHANES Data

Background

- Hypertension and depression represent two of the most prevalent and costly chronic conditions in the United States, affecting millions of adults.¹⁻²

1.28B Adults with hypertension globally

47.7% US adult hypertension prevalence (2023)

27-29% Depression prevalence in hypertensive adults

~13% Depression prevalence in general US adults

- Evidence supports a bidirectional relationship between hypertension and depression, where each condition can contribute to the onset or worsening of the other, resulting in poorer disease control and adverse long-term outcomes. Compared to non-hypertensive individuals, hypertensive individuals face a higher risk of developing depression.⁴⁻⁸
- While previous studies have established an association between depression and hypertension, few have examined this relationship using recent, nationally representative U.S. data, leaving it unclear whether this association has persisted, strengthened, or changed over time.³⁻¹⁰

Objectives

- This study examined the current association between depression and hypertension among U.S. adults using recent, nationally representative survey data to inform integrated mental and cardiovascular care strategies.

Methods

Data Source	National Health and Nutrition Examination Survey (NHANES) 2011–2023.
Sample	US adults with complete data on hypertension status, depression screening, and all covariates
Outcome	Hypertension: Self-reported diagnosis OR Blood pressure (BP) \geq 130/80 mmHg OR antihypertensive medication use. ⁶
Exposure	Depressive symptoms were assessed using the Patient Health Questionnaire (PHQ-9), a 9-item screening instrument for measuring frequency of depressive symptoms in the past two weeks. Depression was classified as: No depression (0–9), Moderate (10–19), Severe (20–27) ¹¹ .
Covariates	Age, sex, race/ethnicity, BMI, education, marital status, income, smoking, alcohol use.
Analysis	A multivariable logistic regression model was used to assess the independent association between depression and hypertension. Two models were constructed: Model 1, unadjusted hypertension and depression, and Model 2 (Adjusted), controlled for demographic (age, gender, race/ethnicity), socioeconomic (income, education), lifestyle (smoking, alcohol), and clinical covariates (BMI). Results were reported as odds ratios (ORs) with 95% confidence intervals (CIs). Statistical significance was set at $\alpha = 0.05$. All statistical tests were two-sided and completed by SAS v. 9.4.

Table 1: Baseline Demographic and Clinical Characteristics of Study Participants

Population Characteristics	N= 5,519 (%)
Weighted Population	221,169,407
Demographic Characteristics	
Mean Age	47
Gender, (%)	
Male	2,715* (49.2%)
Female	2,798* (50.7%)
Race and Ethnicity, (%)	
Hispanic	3,337 (61.9%)
Non-Hispanic Asian	646 (10.6%)
Non-Hispanic Black	541 (9.1%)
Non-Hispanic White	379 (6.9%)
Native American	248 (5.2%)
Others	342* (6.2%)
Socioeconomic Characteristics	
Education Status, (%)	
Less than High School	337* (6.1%)
High School	386 (7.0%)
Some College	1,372* (24.9%)
College Graduate	1,602* (29.0%)
Advanced Degree	1,881* (34.1%)
Marital Status, (%)	
Married	3,394* (61.5%)
Never Married	1,127* (20.4%)
Widowed	1,001* (18.1%)
Income Level, (%)	
Low Income	4,166* (75.5%)
High Income	1,351* (24.5%)
Behavioral/Lifestyle Factors	
Smoking Status, (%)	
Non-Smoker	3,478* (63.0%)
Smoker	2,032* (36.8%)
Drinking Status, (%)	
Non-Drinker	527* (9.6%)
Drinker	4,958* (89.8%)
Clinical Characteristics	
BMI (kg/m ²), Mean	29.7
Depression Status, (%)	
No Depression	4,638 (84.2%)
Moderate Depression	734* (13.3%)
Severe Depression	138* (2.5%)
Hypertension Status, (%)	
Hypertensive	3,022 (54.7%)
Not Hypertensive	2,497 (45.3%)

*Calculated based on the total n and provided percentages.

Results

Figure 1: Depression severity distribution by hypertension status

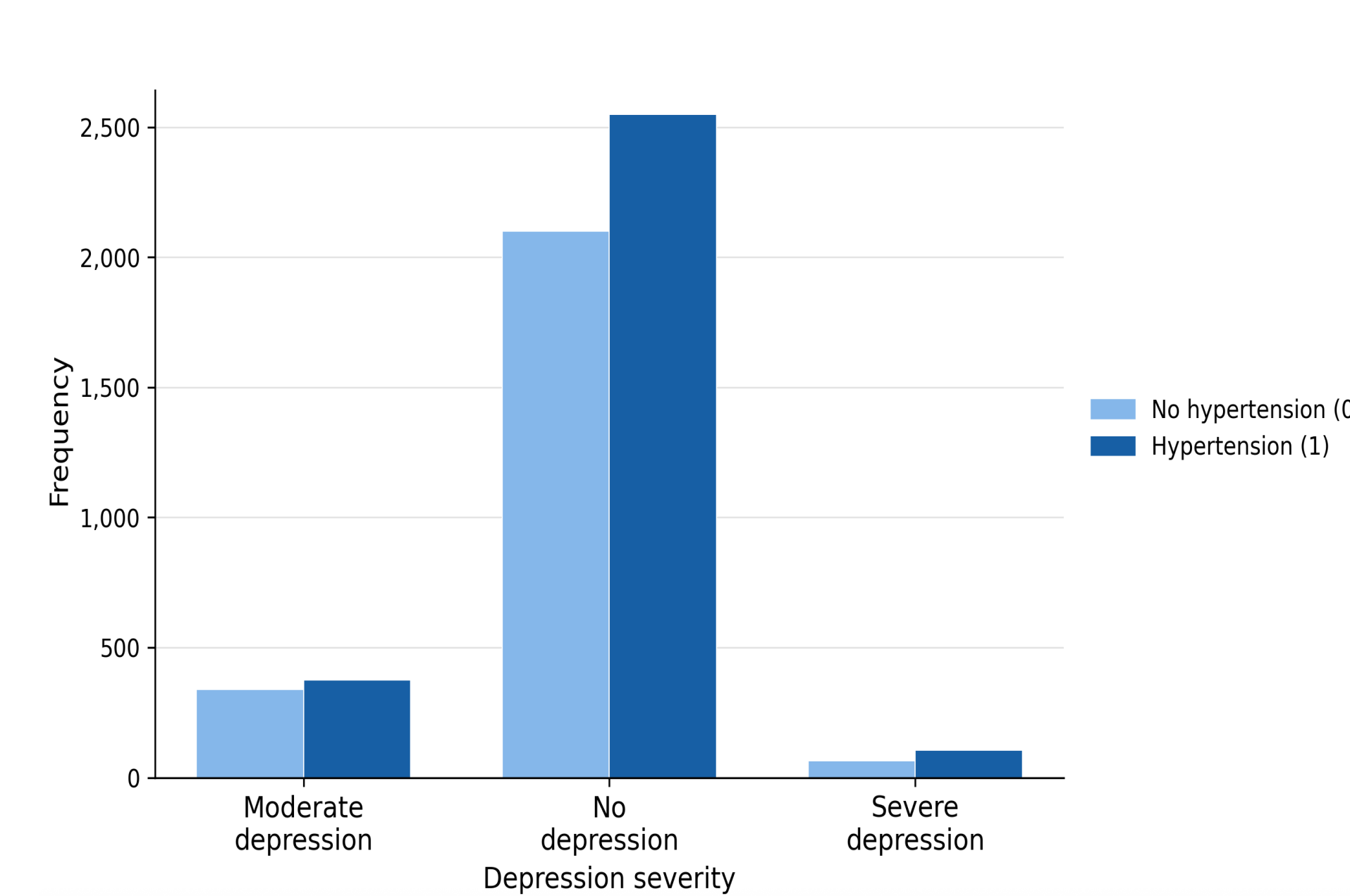


Figure 2: Hypertension prevalence by depression severity across racial/ethnic groups

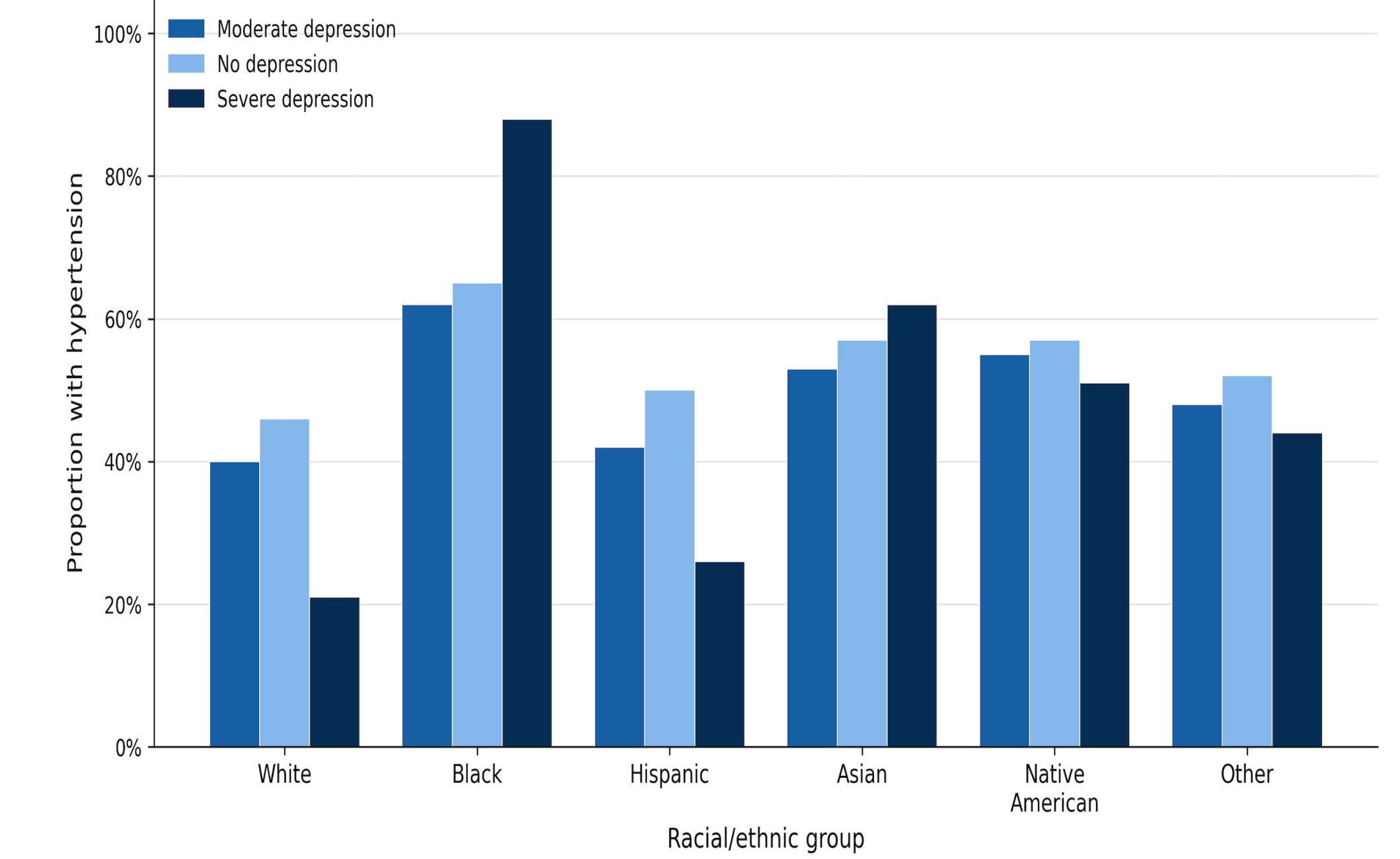
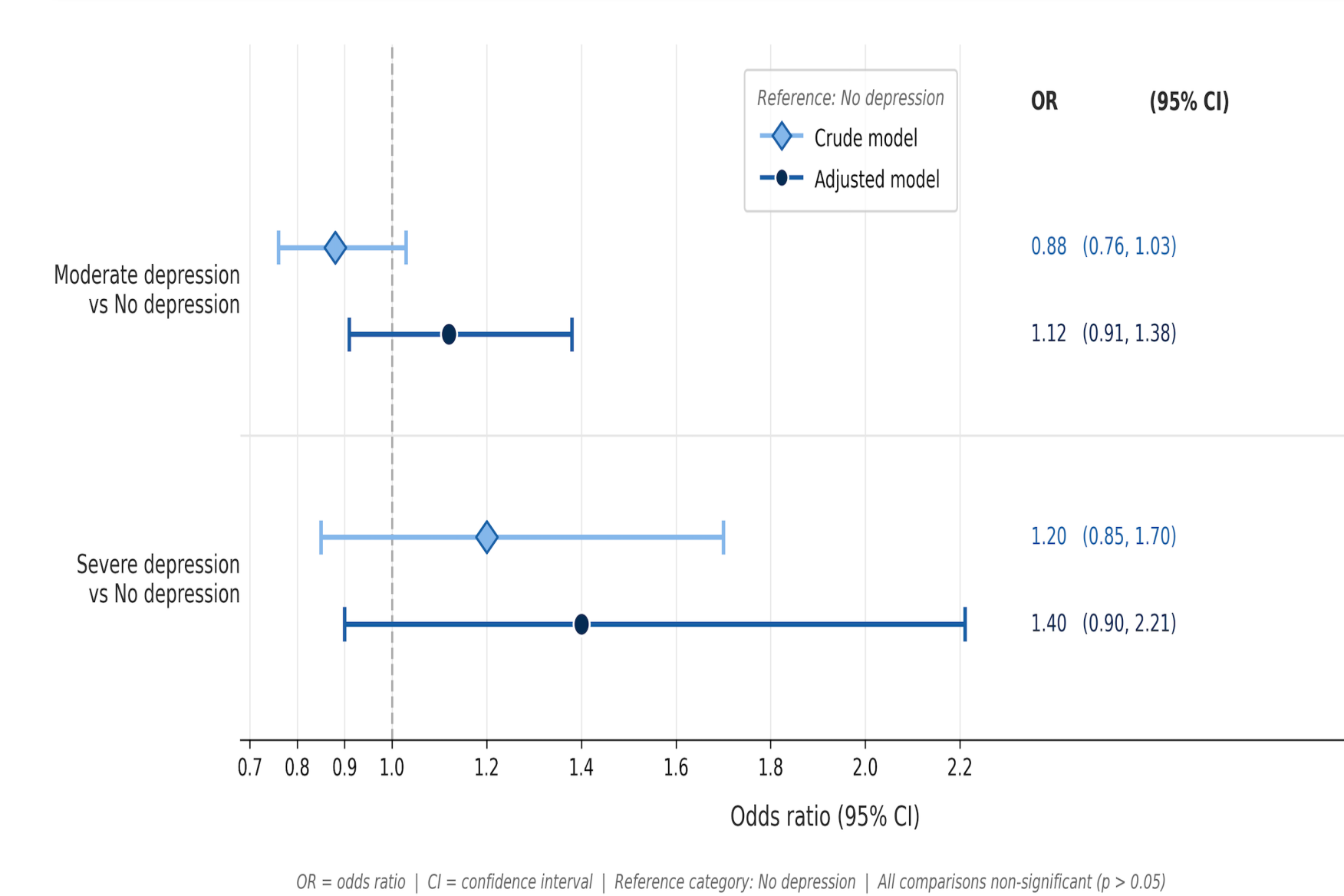


Figure 3: Odds ratios for depression severity and hypertension



*Forest plots showing the Odds ratio between the unadjusted and adjusted models

Conclusions

- In this nationally representative sample, depression was associated with higher odds of hypertension, though the association was not statistically significant after covariate adjustment.
- These findings suggest that shared risk factors may underlie the observed relationship and highlight the importance of integrated mental and cardiovascular health strategies to reduce population-level disease burden.

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Results/Discussion

- Moderate depression showed 12% higher odds of hypertension (adjusted OR = 1.12, 95% CI: 0.91–1.38) compared to no depression.
- Severe depression was associated with 40% higher odds of hypertension (adjusted OR = 1.40, 95% CI: 0.90–2.21) compared to no depression.
- Neither association reached statistical significance; both confidence intervals crossed 1.0
- Odds ratios increased after covariate adjustment, suggesting negative confounding in the crude model
- Demographic, socioeconomic, lifestyle, and clinical factors may partially mask the true depression–hypertension relationship
- Findings are consistent with a modest positive association between depression severity and hypertension risk.
- Results highlight the need for integrated mental and cardiovascular health strategies at the population level
- Shared underlying risk factors may drive co-occurrence of depression and hypertension
- Larger samples may be needed to achieve adequate power to detect significance, particularly for severe depression, given its lower prevalence