

Investigating the Association Between Depression and Hypertension

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ABSTRACT

Background

Previous research findings suggest a higher hypertension risk among people with major depressive disorder (MDD). However, age, income, race, and gender may confound this observed association. Using a nationally representative sample of 3,161 U.S. adults aged 18–65, we examined whether the odds of hypertension are higher for individuals with depression compared to individuals without depression and whether any observed association is explained by differences in age, income, race, and gender.

Methods

Our study population included individuals aged 18–65 in the NHANES 2017–2018 survey with non-missing measures for depression, blood pressure, age, income, race, and gender. Exposure was based on responses to the depression screener and dichotomously categorized as either some MDD (total score > 4) or no MDD (total score 0–4). Systolic and diastolic blood pressure was taken as the average of 3 measurements and categorized into “Hypertensive” (≥ 130 mmHg systolic, or ≥ 80 mmHg diastolic) or “Not hypertensive” (< 130 mmHg systolic and < 80 mmHg diastolic). Respondents who self-reported taking medication to lower cholesterol were also categorized as “Hypertensive”. Age, gender, race, and income were based on self-reporting and operationalized into categories (age: quartiles; race: white vs. non-white; income: approximate quartiles). Differences by exposure group at baseline were assessed via descriptive statistics (chi-square, t-tests) as appropriate. Crude and covariate-adjusted (adjusting for age and gender) logistic regression models were used to estimate the odds of hypertension by presence of MDD.

Results

Twenty-six percent of the 3,161 study participants were diagnosed with MDD compared to 74% without. Individuals with MDD were more likely to be between the ages 43–55 years (29.1% vs 26.3% 56–65 years vs 25.8% 18–29 years vs 22% 30–42 years), female (29.6% of females vs 21.7% of males), white (31.7% of whites vs 22.8% of non-white), and with a monthly income of \$0–\$1249 (39.1% vs 33.2% of \$1250–\$2899 vs 21.4% of \$2900–\$5399 vs 15.2% of \$5400+). In unadjusted analyses, individuals with MDD had 1.18 times the odds (95% CI: 1.00–1.39) of hypertension compared to those without. After adjusting for age and gender, the association between MDD and hypertension was slightly stronger. Adjusted odds of hypertension, comparing those with MDD vs without, were marginally higher (OR = 1.25, 95% CI: 1.04–1.49).

Discussion and Conclusion

In summary, our study aimed to examine the association between depression and hypertension in adults aged 18–65 using data from NHANES 2017–2018 and found that there were not increased odds of hypertension among those with MDD. Income, race, age, and gender were investigated, but only age and gender significantly confounded the depression-hypertension relationship. After adjusting for age and gender, the association between MDD and hypertension was strengthened but did not reach significance. While our study had strengths such as using a large, nationally representative sample, its cross-sectional design limits our ability to establish causality. Future studies could investigate underlying mechanisms, conduct a longitudinal study, and develop interventions to reduce depression symptoms in individuals with hypertension.

Table 1. Characteristics of the study population by exposure categorization¹

		Total	Major Depressive Disorder: Dichotomous		
		N	Major Depressive Disorder	No Major Depressive Disorder	P-value
Total		3161	816 (26%)	2345 (74%)	
Gender	Male	1512 (48%)	328 (22%)	1184 (78%)	<.0001 ²
	Female	1649 (52%)	488 (30%)	1161 (70%)	
Age	Mean (SD)	42.4 (14.4)	42.9 (14.5)	42.2 (14.4)	0.25 ³
Age Quartiles	18 - 29 years	767 (24%)	198 (26%)	569 (74%)	<.0001 ²
	30 - 42 years	800 (25%)	176 (22%)	624 (78%)	
	43 - 55 years	808 (26%)	235 (29%)	573 (71%)	
	56 - 65 years	786 (25%)	207 (26%)	579 (74%)	
Monthly Income	\$0 - \$1249	542 (17%)	212 (39%)	330 (61%)	<.0001 ²
	\$1250 - \$2899	828 (26%)	275 (33%)	553 (67%)	
	\$2900 - \$5399	922 (29%)	197 (21%)	725 (79%)	
	\$5400 +	869 (28%)	132 (15%)	737 (85%)	
Race	Non-White	2081 (66%)	474 (23%)	1607 (77%)	<.0001 ²
	White	1080 (35%)	342 (32%)	738 (68%)	

1. Percentages in table are row percents

2. P-values calculated from Chi-square

3. P-values calculated from 2-sample t-test

Table 2. Results of odds ratio estimates and 95% confidence intervals

	Crude		Adjusted	
	Odds Ratio (OR)	95% CI	Odds Ratio (OR)	95% CI
MDD	1.18	(1.00, 1.39)	1.25	(1.04, 1.49)
No MDD	Reference		Reference	
56 – 65 years			17.08	(12.92, 22.57)
43 – 55 years			8.72	(6.63, 11.47)
30 – 42 years			4.19	(3.17, 5.54)
18 – 29 years			Reference	
Male			1.88	(1.60, 2.21)
Female			Reference	