Brief Report

Occurrence of Comorbid Metabolic and Depressive Symptoms across Sociodemographic Categories in the United States

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Objective: This study was conducted to quantify the prevalence of metabolic syndrome and depressive symptoms across racial/ethnic and socioeconomic strata in a nationally representative U.S. sample.

Methods: We used National Health and Nutrition Examination Survey 2017–March 2020 data for participants aged 18 years and older. Prevalence of depressive symptoms and metabolic syndrome alone and in combination was measured across racial/ethnic, sex, age, and income strata. Chi-square tests were used for between-group comparisons.

Results: Over 7% of sampled adults had comorbid depressive symptoms and metabolic syndrome, representing 18.3 million Americans. These conditions were not equally distributed across racial/ethnic groups (χ^2=124.28, P<.0001). The non-Hispanic Asian group was least likely to have either condition. Differences by economic status were also significant (χ^2=86.61, P<.0001). Those in the highest economic group were least likely to have either or both conditions.

Conclusions: Disparities in comorbid conditions exist across socioeconomic and demographic strata. Achieving optimal and equitable health outcomes for people with these comorbidities will require "whole-person-in-context" interventions. Integrated approaches to coexisting medical, psychological, and social complexities are needed. *Ethn Dis.* 2025;35(2):83–86; doi:10.18865/EthnDis-2024-29

Keywords: Metabolic Risk Factors; Depressive Symptomology; Sociodemographic Differences

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Introduction

Metabolic syndrome is highly prevalent in the United States and is a major risk factor for cardiovascular disease.[1] At the same time, psychiatric disorders have become increasingly prevalent in the United States.[2] People who suffer from severe psychopathology have a 25% increased risk of premature death.[3] Importantly, there is substantial comorbidity between psychiatric disorders and cardiometabolic risks,[4-6] which complicates successful management of each condition.[7] Independent of known risk factors, depression is a risk factor for cardiometabolic syndrome and is associated with a 15% increased risk of cardiovascular disease.[8]

The prevalence of metabolic syndrome and psychiatric disorders varies across racial/ethnic, gender, and age groups in the US population.[2] There is also an increased probability of adverse health outcomes among individuals with chronic physical conditions and comorbid mental health conditions.[5] The risk of adverse outcomes for these comorbidities also increases when they intersect with racial inequities and adverse social determinants of health. For ethnic minority populations, who more often have limited access to both medical care and culturally appropriate mental health services compared with White non-Hispanic patients, the presence of a comorbid mental health condition can further impede their ability to manage chronic medical conditions and widens racial disparities in health outcomes. We measured the prevalence of metabolic syndrome and depressive symptomology across racial/ethnic and socioeconomic strata in a nationally representative sample of the U.S. population.

Methods

We used National Health and Nutrition Examination Survey (NHANES) 2017–March 2020 data to determine the prevalence of comorbid depressive symptoms and metabolic syndrome for participants 18 years of age and older. The NHANES has a complex multistage sampling design to obtain a representative sample of the US civilian, noninstitutionalized population. The NHANES was approved by the institutional review board at the National Center for Health Statistics.

Independent variables included age group, sex, race/ethnicity, and income-to-poverty ratio (IPR). The NHANES provides IPR data, which was calculated by dividing total annual family (or individual) income by the poverty guidelines specific to the survey year. The poverty measure, which differs by family size and geographic location, is derived from the Department of Health and Human Services poverty guidelines. IPR was divided into quartiles. Race/ethnicity categories were (1) non-Hispanic (NH) White, (2) NH-Black,

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(3) NH-Asian, (4) Mexican American and other Hispanic, and (5) other race and multiracial.

Main outcomes were the depressive symptoms and metabolic syndrome. The frequency of depressive symptoms during the previous 2 weeks was assessed using the PHQ-9, a 9-item screening tool. Those participants scoring ≥5 were characterized as having depressive symptoms. Participants presenting with at least 3 of the following conditions were considered positive for metabolic syndrome: glucose intolerance (fasting plasma glucose level at least 100 mg/dL or taking diabetes medications), central obesity (waist circumference greater than 102 cm in men or 88 cm in women), raised blood pressure (systolic/diastolic blood pressure of 130/85 mm Hg or greater or taking hypertension medications), reduced high-density lipoprotein cholesterol (less than 40 mg/dL in men or less than 50 mg/dL in women), or raised triglyceride level (greater than 150 mg/dL).

Statistics

Prevalence of depressive symptoms and metabolic syndrome, either alone or in combination, was determined for each racial/ethnic, sex, and age group and IPR category. Chi-square tests were used for between-group comparisons with SAS statistical software (SAS Institute, Cary, North Carolina). The SAS SurveyFreq procedure was used to account for the complex survey design.

Results

This study included 8965 adult participants (Table 1). The majority of participants (57.55%) did not have either study condition. Similar proportions had either depression symptoms only or metabolic syndrome only (17.59% and 17.48%, respectively). Over 7% of sampled adults had comorbid depressive symptoms and metabolic syndrome, representing 18.3 million Americans.

Study conditions were not equally distributed across racial/ethnic groups (χ^2=124.28, P<.0001). The NH-Asian group was least likely to have either condition, whereas the multirace group was more likely to have both study conditions. Female participants were more likely to have depressive symptoms. As age increased, so did the likelihood of presenting with either or both conditions. Almost half of participants over age 60 had either metabolic syndrome or depressive symptoms, and more than 1 in 10 had both. Differences by economic status were also significant (χ^2=86.61, P<.0001). Those in the highest economic group were most likely to have neither condition and were least likely to have both study conditions. Additionally, we reran the analysis to include people who either had depressive symptoms or were taking antidepressant treatments and found slightly increased prevalence of depression and of comorbid depression and metabolic syndrome, but racial-ethnic differences were substantially similar.

Discussion

Metabolic syndrome and depressive symptoms are highly prevalent in the US population. Each complicates management of the other. Both influence overall health outcomes.[4,6] Depression specifically is an important predictor of adverse cardiac outcomes, both as a driver of behavioral risks (obesity, smoking, cholesterol, etc) and independent of other known risk factors.[6]

We found significant differences in prevalence across race/ethnicity, age, sex, and income level. As a result, there is a disproportionate impact of these co-occurring medical, psychological, social, and economic risk factors on the health of populations in greatest need. Achieving optimal and equitable health outcomes for people with these comorbidities, especially when combined with social and economic disparities, will require "whole-person-in-context" interventions, including culturally relevant integration of behavioral health and primary care with social service support.

So far, there has been only modest adoption of the integration of behavioral health professionals into primary care,[9] even though such integration has been demonstrated to reduce both emergency department visits and primary care visits, with an increase in specialized behavioral health services.[10] But what about the intersections of race and gender and poverty for individuals with comorbid mental health issues and cardiometabolic risk? What about addressing the social determinants of health? The American College of Cardiology recently published a review of how clinicians might address 5 domains of social determinants of health in achieving cardiovascular health equity, but the College left out the critical component of mental/behavioral health.[11] Several authors have argued for adopting the lessons of behavioral health integration for the next step of integrating social care into the primary care/behavioral health model.[12,13]

Beyond professional treatment models, mental health recovery and management of cardiometabolic risk factors both require an element of self-management and perhaps culturally relevant peer support. Self-efficacy in managing comorbid chronic diseases is essential for achieving optimal and equitable clinical outcomes and quality of life.

At a population level, cardiometabolic risk, psychological distress, and adverse social determinants of health may constitute a syndemic that is widespread but unequally distributed across the U.S. population. We need to

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Table 1. Prevalence of medical conditions by race/ethnicity, sex, age, and income-to-poverty ratio category

Category	Neither condition	Depressive symptoms only	Metabolic syndrome only	Metabolic syndrome and depressive symptoms	Total (denominator)
Weighted frequency	142,626,784 (N=5000)	43,602,553 (N=1544)	43,317,080 (N=1679)	18,289,278 (N=742)	247,835,696 (N=8965)
Percentage (SE)	57.55 (.7963)	17.59 (.6134)	17.48 (.5996)	7.38 (.4111)	100
Race/Ethnicity[a]					
Non-Hispanic White	86,620,108 (56.14)	27,487,218 (17.81)	28,645,991 (18.56)	11,551,270 (7.49)	154,304,587
Non-Hispanic Black	16,673,911 (58.88)	4,889,608 (17.27)	4,732,405 (16.71)	2,022,014 (7.14)	28,317,938
Non-Hispanic Asian	10,857,383 (73.86)	1,512,634 (10.29)	1,887,801 (12.84)	442,405 (3.01)	14,700,223
Mexican American and other Hispanics	23,286,209 (57.62)	7,743,861 (19.16)	6,293,052 (15.57)	3,089,558 (7.65)	40,412,679
Multi and Other Race	5,189,173 (51.38)	1,969,233 (19.50)	1,757,832 (17.40)	1,184,031 (11.72)	10,100,269
	Race/Ethnicity by Condition χ^2=124.28; Adj F=10.34; Pr>Adj F<.0001				
Sex[a]					
Male	72,292,310 (60.45)	18,453,193 (15.43)	22,222,078 (18.58)	6,628,666 (5.54)	119,596,247
Female	70,334,474 (54.85)	25,149,360 (19.61)	21,095,002 (16.45)	11,660,613 (9.09)	128,239,449
	Sex by Condition χ^2=35.11; Adj F=11.70; Pr>Adj F<.0001				
Age (years)[a]					
18–39	60,817,179 (64.69)	20,723,633 (22.04)	8,673,754 (9.23)	3,799,685 (4.04)	94,014,251
40–59	45,492,603 (55.37)	13049605 (15.88)	16498093 (20.08)	7124086 (8.67)	82,164,387
60+	36,317,002 (50.68)	9,829,316 (13.72)	18,145,233 (25.32)	7,365,507 (10.28)	71,657,058
	Age by Condition χ^2=231.87; Adj F=38.62; Pr>Adj F<.0001				
Income-to-poverty ratio[a]					
Quartile 1 (0.00-1.02)	31,432,049 (53.53)	13,198,055 (22.48)	8,704,269 (14.82)	5,387,252 (9.17)	58,721,624
Quartile 2 (1.03-1.96)	20,336,854 (51.11)	8,240,607 (20.71)	7,181,380 (18.05)	4,028,016 (10.12)	39,786,857
Quartile 3 (1.97-3.88)	33,535,321 (55.36)	10,140,171 (16.74)	12,117,719 (20.00)	4,785,836 (7.90)	60,579,047
Quartile 4 (>3.88)	57,322,560 (64.59)	12,023,721 (13.55)	15,313,712 (17.26)	4,088,174 (4.61)	88,748,167
	IPR by Condition χ^2=86.61; Adj F=9.61, Pr>Adj F<.0001				

[a] Values are frequencies (percentages)

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develop both improved patient-care models and collaborative community-level interventions.

Limitations of this study include potential nonresponse bias and self-reported medication use inherent in the design of the NHANES. The present study was cross-sectional and infers no causal relationship between depressive symptoms and metabolic syndrome. Further, we used a PHQ-9 cutoff point of 5 to denote depressive symptoms, which is not indicative of clinical depression and may overestimate US prevalence of clinical depression. Although metabolic syndrome is more a cluster of cardiometabolic risk factors than a disease, we have followed established criteria for defining metabolic syndrome.[1] The use of large categories such as "Hispanic" or "Asian" do not reflect all the subgroup heterogeneity that exists within these ethnic populations.

Public Health Implications

Comprehensive whole-person health, including universal screening and integrated behavioral health care for mood disorders as part of primary care, is vital. A better understanding of how racial/ethnic and socioeconomic factors contribute to outcomes for people with metabolic syndrome and depressive symptom comorbidity is essential for developing culturally relevant interventions to address these comorbid conditions. The history and culture of each distinct population determines how and why people are exposed to individual or multiple risk factors. Because the distribution of health and disease in a society reflects the distribution of advantages and disadvantages in that society, this study highlighted the impact of sociostructural factors, including race and socioeconomic status, on the distribution of comorbid metabolic risk factors and depression. Interventions to improve population health outcomes will require both targeting traditional cardiometabolic risk factors and systematic approaches to addressing the full constellation of clinical, psychological, cultural, socioeconomic, societal, and institutional components of this syndemic.

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Conflict of Interest

No conflicts of interest reported by authors.

Author Contributions

Research concept and design: Dark and Rust; Manuscript draft: Dark and Rust

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