

Combined Impact of Physical Activity and Dietary Quality on Depression Symptoms in U.S. Adults: An Analysis of NHANES 2007-2020 Data

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Abstract : Depression has emerged as a growing public health issue, with the limited effectiveness of current treatment methods driving the search for modifiable lifestyle factors. Physical inactivity and poor dietary habits are consistently identified as factors associated with increased depression symptoms. While the independent effects of physical activity (PA) and dietary quality (DQ) on mental health are well established, the combined influence of both factors on depression has not been thoroughly examined in a representative sample of U.S. adults. This study aims to explore the individual and joint associations of PA and DQ with depression symptoms, highlighting their combined impact on adults across the U.S. Using data from the National Health and Nutrition Examination Survey (NHANES) from 2007 to 2020, we evaluated the relationships between PA (measured through metabolic equivalent (MET) minutes per week) and DQ (assessed using the Healthy Eating Index [HEI]-2015) and depression symptoms (defined by a score of ≥ 10 on the 9-item Patient Health Questionnaire [PHQ-9]). Participants were classified into four lifestyle categories: (1) healthy diet and active, (2) unhealthy diet but active, (3) healthy diet but inactive, and (4) unhealthy diet and inactive. Logistic regression models adjusted for relevant covariates were used to examine associations, with age-adjusted prevalence rates for depression calculated according to NHANES guidelines. Data from 21,530 participants, representing approximately 954 million U.S. adults aged 20-80 years, were analyzed. The overall age-adjusted prevalence of depression symptoms was 7.15%. A total of 83.1% of participants met PA recommendations, and 27.3% scored above the 60th percentile in the HEI-2015 index. Higher PA levels were inversely related to depression symptoms (adjusted odds ratio [AOR]: 0.805; 95% CI: 0.724-0.920), as was better dietary quality (AOR: 0.788; 95% CI: 0.690-0.910). A combination of healthy diet and adequate PA was associated with the lowest risk of depression symptoms (AOR: 0.635; 95% CI: 0.520-0.775) compared to inactive participants with unhealthy diets. Notably, participants with either a healthy diet or adequate PA but not both did not experience the same reduction in depression risk. This study highlights that the combination of a healthy diet and regular physical activity offers a synergistic protective effect against depression symptoms in U.S. adults. Public health initiatives targeting both dietary improvements and increased physical activity may significantly reduce the burden of depression across populations. Further research should focus on understanding the mechanisms underlying these interactions.

Keywords : dietary quality, physical activity, depression, healthy eating

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