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Physical Activity Levels and Depressive Disorder: A Cross-Sectional Sample of Vermont Adults

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Abstract

Objective: To investigate the association between meeting physical activity (PA) recommendations and having ever been told of having a depressive disorder in a cross-sectional sample of Vermont adults.

Methods: Study participants (n = 11,429) were Vermont residents that had answered all required questions from 2015 and 2017 Behavioral Risk Factor Surveillance System (BRFSS) telephone surveys. Descriptive and binary logistic analyses were run with PA as the exposure variable and depression as the outcome variable.

Results: Study participants were 44.5% males; 93.2% white/non-Hispanic; 67.6% with some college or more; 46% age 60 or over; 45.8% employed for wages and retired. A significant association between PA and depression was observed (0.669, 0.609 – 0.734) when adjusting for sex, age, employment status, education level, alcohol consumption, current diabetes status, and smoking status. However, a significant association was not observed for educational level (1.011, 0.963 – 1.062) or race (0.893, 0.734 – 1.087).

Conclusions: Our study found that there is an association between meeting the PA recommendations and having ever been told you have depression.

Introduction

Mental health disorders are a growing public health issue, nationally and internationally.[1] Mental health disorders are characterized by changes in emotion, behavior, or thinking that can have negative effects on physical health and social functioning.[1,2] According to several studies, physical activity (PA) can help prevent and alleviate symptoms of several mental

health disorders, can be clinically effective in treating panic disorders and depression, and can be as effective as medication or psychological interventions for treating depression.[3-6]

Broadly, PA is musculoskeletal movement leading to energy expenditure.[7] National recommendations for PA in adults are 150 minutes to 300 minutes of moderate-intensity aerobic PA, or 75 minutes to 150 minutes per week of vigorous-intensity aerobic PA, weekly.[8,9] This should be spread throughout the week for optimal effects.[9]

Numerous studies indicated an association between PA and mental health. However, gaps exist in examining the associations between PA and mental health disorders.[1] In relation to depression, exercise is indicated to have an anti-depressant effect, but the mechanisms are relatively unstudied.[3] Although PA has a protective role in mental health disorders, the magnitude of that role, and the optimum type and level of PA for mental health are largely unknown.[10] More nuanced examinations of PA and mental health are needed to better understand associations between the two.[1] Further, many potential confounders exist in the relationship between PA and mental health, including age and sex, which have mostly been unexplored.[10] The objective of this analysis is to further evaluate the association between PA levels and depressive disorder in a cross-sectional sample of Vermont adults.

Methods

Participants

We analyzed the results of a cross-sectional survey, using data from the Behavioral Risk Factor Surveillance System (BRFSS). The BRFSS is a telephone survey in all 50 States that assesses health behavior risks, chronic health conditions, and use of preventative care. In this study we focused only on responses from Vermont residents.[11] The surveys are conducted by state health departments using standardized questionnaires and technical assistance from the Centers for Disease Control and Prevention (CDC).[11]

The University of Vermont Institutional Review Board has reviewed this project and determined that it qualifies as exempt from additional review.

After exclusions, we examined a total of 11,429 participants that reported their depressive disorder diagnosis, whether they met the PA recommendations, diabetes diagnosis, ethnicity, gender, age, education level, smoking status, alcohol consumption, and employment status.

Gender was coded as two levels (male or female), education was coded as four levels (less than high school, some college, college graduate, and postgraduate), depressive disorder was coded as two levels (yes or no), PA index was coded as two levels (met the recommendations of 150 minutes of moderate or 75 minutes of vigorous PA per week or did not meet these recommendations), diabetes was coded as two levels (yes or no), ethnicity was coded as two levels (white, non-Hispanic or person of color), age was coded as five subgroups (18-29, 30-39, 40-49, 50-59, and 60 and over), smoking status was coded as four levels (current every day smoker, current some day smoker, former smoker, and never smoked), and alcohol consumption was coded as two levels (no heavy drinking and heavy drinking). Each of the covariates used were nominal as different values were used to indicate the participants response.

Participants were excluded if they responded with "don't know" to ever being told they have a depressive disorder and meeting the aerobic recommendations. The total number of exclusions were 1,576.

Analytic Approach

We conducted a bi-directional binary logistic regression analysis interchanging depression and PA as the dependent and independent variables (95% confidence interval, alpha 0.05). These analyses were run to assess the association between depressive disorder and meeting PA recommendations. We performed the statistical analyses using IBM SPSS version 26 (Version 26.0, 2019).

Results

Table 1. Bivariate and Multivariate association between PA and depression

Characteristic	N[a]	% Ever Told to have Depression	Adjusted OR (95% CI)
Physical Activity Index			0.669 (0.609 – 0.734)
Yes	6977	20.1	
No	4452	29.2	
Age (years)			1.214 (1.170 – 1.259)
18-29	1040	28.4	
30-39	1111	27.5	
40-49	1521	25.2	
50-59	2462	25.8	
60 and up	5271	20.4	
Gender			0.554 (0.504 – 0.609)
Female	6343	27.9	
Male	5085	18.3	
Race/ethnicity			0.893 (0.734 – 1.087)
White, Non-Hispanic	10651	23.5	
Person of Color	594	27.8	
Educational level (years)			1.011 (0.963 – 1.062)
Never attended school	2	0.0	
Grade 1-8	161	32.9	
Grade 9-11	322	30.7	
Grade 12	3209	24.8	
College 1-3yrs	2732	26.5	
College 4 yrs or more	4983	20.7	
Employment Status			0.906 (0.890 – 0.923)
Employed for Wage	5229	21.2	

Self-employed	1343	17.4	
Out of work >1yr	197	42.6	
Out of work < 1yr	205	37.6	
Homemaker	378	24.6	
Student	260	26.9	
Retired	3063	19.1	
Unable to work	699	23.6	
Current Smoking Status			0.509 (0.449 – 0.577)
Yes	1539	21.5	
No	9811	37.5	
Current Diabetes Status			1.271 (1.184 – 1.364)
Yes	1230	32.8	
No	10190	22.3	
Alcohol Consumption			0.795 (0.676 – 0.935)
Yes	886	27.9	
No	10350	23.4	

[a] Numbers may not sum to total due to missing data.

Bivariate logistic regression demonstrated a significant association between PA and a diagnosis of depression. Of 6,977 respondents who met the PA index that were told to have depressive disorder was 20.1% (n =1,403) (OR= 0.610, CI=0.559, 0.666) and a 39.0% lower odds compared to participants that were told to have depression and did not meet PA recommendations.

Multiple logistic regression demonstrated a strong association between PA and depression adjusting for respondents' sex, age, employment status, education level, alcohol consumption, current smoking status, diabetes status, and race. Significant associations were observed with several of our covariates. A stronger association between PA

(OR=0.669, CI=0.609, 0.734) and depression was observed when adjusting for sex, age, employment status, education level, alcohol consumption, diabetes status, and race.

When adjusting for the other covariates, educational level (OR=1.011, CI=0.963, 1.062), and race (OR= 0.893 CI=0.734, 1.087) were not statistically significant. However, sex (OR=0.554, CI=0.504, 0.609), age (OR=1.214, CI=1.170, 1.259), alcohol consumption (OR= 0.795, CI=0.676, 0.935), employment status (OR= 0.906, CI= 0.890, 0.923), smoking status (OR=0.509, CI=0.449, 0.577), and diabetes (OR= 1.271, CI=1.184, 1.364) were statistically significant.

Discussion

This study found that people who met the recommended PA levels were at reduced risk of being diagnosed with depression compared with people who did not meet them. Previous studies had also found significant associations between PA and mental health. Similar to our findings, one study found that people with higher PA levels were at reduced odds of incident depression compared to people with lower PA levels.[10] Another study found that from midlife to old age, greater PA was associated with improved mental health.[12] In our study of adults only, the association between meeting recommended amounts of PA and depression diagnosis was independent of age.

The primary limitation of our study is that the results are only representative of the Vermont sample gathered; caution should be exercised when applying results to a wider population. Another limitation is that participants were disproportionately aged 60 and older. Data were self-reported and recall and response biases may have impacted the results.

Overall, this study adds to the existing literature supporting the associations between PA and mental health. Suggestions for future studies would be to further examine the effects of

various types and quantities of PA on mental health in general and depression specifically, with a more balanced representation of all age groups.

Public Health Implications

The findings suggest that by improving rates of physical activity across age groups, the prevalence of depression may be decreased by non-pharmacological methods.

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