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Associations of Smoking, Physical Inactivity, Heavy Drinking, and Obesity with Quality-Adjusted Life Expectancy among US Adults with Depression

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ABSTRACT

Objectives: To examine associations between four health behaviors (smoking, physical inactivity, heavy alcohol drinking, and obesity) and three health indices (health-related quality of life, life expectancy, and quality-adjusted life expectancy (QALE)) among US adults with depression. **Methods:** Data were obtained from the 2006, 2008, and 2010 Behavioral Risk Factor Surveillance System data. The EuroQol five-dimensional questionnaire (EQ-5D) health preference scores were estimated on the basis of extrapolations from the Centers for Disease Control and Prevention's healthy days measures. Depression scores were estimated using the eight-item Patient Health Questionnaire. Life expectancy estimates were obtained from US life tables, and QALE was estimated from a weighted combination of the EQ-5D scores and the life expectancy estimates. Outcomes were summarized by depression status for the four health behaviors (smoking, physical inactivity, heavy alcohol drinking, and obesity). **Results:** For depressed adults, current smokers and the physically inactive had significantly lower EQ-5D scores (0.040 and 0.171, respectively), shorter life expectancy

(12.9 and 10.8 years, respectively), and substantially less QALE (8.6 and 10.9 years, respectively). For nondepressed adults, estimated effects were similar but smaller. Heavy alcohol drinking among depressed adults, paradoxically, was associated with higher EQ-5D scores but shorter life expectancy. Obesity was strongly associated with lower EQ-5D scores but only weakly associated with shorter life expectancy. **Conclusions:** Among depressed adults, physical inactivity and smoking were strongly associated with lower EQ-5D scores, life expectancy, and QALE, whereas obesity and heavy drinking were only weakly associated with these indices. These results suggest that reducing physical inactivity and smoking would improve health more among depressed adults.

Keywords: burden of illness, depression, quality-adjusted life-years, risk factors.

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Introduction

Depression is a health outcome associated with genetic predispositions, sex, adverse childhood experiences, exposure to disasters, and poverty [1–5]. It is also associated with several unhealthy behaviors including physical inactivity [6–10], sedentary behavior [11–13], excessive alcohol use [14–17], smoking [18–22], and less social engagement [23]. Finally, depression is associated with most chronic conditions [24]. In a review of 31 studies of associations between depression and other chronic conditions including diabetes, pulmonary disease, heart disease, and arthritis, those with a chronic condition as well as

depression reported significantly more medical symptoms than did those with only a chronic condition [25]. In terms of causal associations, the relationship between depression and other chronic conditions is bidirectional [26,27].

Although depression has an age of onset earlier than that of most other chronic conditions [28,29], this does not necessarily demonstrate that depression causes the new chronic conditions. In a review examining bidirectional effects of depression and chronic obstructive pulmonary disease (COPD) [30], 16 studies supported a causal effect of depression on COPD, whereas 6 studies supported a causal effect of COPD on depression.

Conflicts of interest: The authors have no conflicts of interest to report.

This analysis used de-identified data produced by federal agencies in the public domain. Data were downloaded from the Centers for Disease Control and Prevention Web site (<ftp://ftp.cdc.gov/pub>). The findings and conclusions in this article are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

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Several different interventions decrease rates of depression, including drug therapy [31], psychotherapy [32,33], physical activity [7–10], and reducing harmful risky behaviors such as smoking and heavy alcohol use [21,22,34]. Counterintuitively, in some studies, smoking cessation has been found to increase rates of depressive symptoms in some individuals, likely because of withdrawal symptoms associated with nicotine dependence.

Depression is a leading cause of disability [24,35–37] and suicide [35,38,39]. It is also associated with poor health-related quality of life (HRQOL) and increased years of living with a disability [35,40,41]. Depression has also been associated with excess mortality and substantially lower life expectancy [42–44]. In a recent study of US adults, the life expectancy for those with depression was 16.4 years less than that for those without depression [44]. The total health loss, for both fatal and nonfatal outcomes associated with depression, was a 28.9-year loss in quality-adjusted life expectancy (QALE) starting at age 18 years, a more than 50% decrease in QALE relative to that in those without depression.

QALE takes into account both the years of life lost and the relative severity of current chronic conditions, making it possible to quantify both population-level and individual-level health losses associated with both fatal and nonfatal outcomes [45–48]. Typically, preference-based measures of HRQOL are used to estimate the effects of these nonfatal health losses. These measures capture respondents' perceived health for different health states using a summary score (called utility value) between 0 (for death) and 1 (for perfect health) [45]. Thus, 1 year of life lived at a utility value of 0.5 equals 0.5 quality-adjusted life-years (QALYs), the same as that of only half a year of life lived at a perfect utility value of 1.0 [24,25]. The QALE at a certain age (such as at age 18 years) is defined as the average QALY throughout the remainder of expected life [44,47].

The primary objectives of this article were to estimate changes in age-adjusted HRQOL scores, life expectancy, and

QALE associated with four risk factors—physical inactivity, smoking, heavy drinking, and obesity—previously associated with depression among adults. This study also estimated the potential gains in QALE for adults with high levels of depressive symptoms if they had lowered the frequency and levels of these risk factors.

Methods

The Behavioral Risk Factor Surveillance System (BRFSS) is an ongoing annual survey of noninstitutionalized civilian adult residents from each of the 50 states, the District of Columbia, and participating territories [49–51]. The BRFSS uses a random-digit-dialed telephone survey method to ascertain a population-based random sample of adults aged 18 years and older [50,51].

During 2006, 2008, and 2010, the eight-item Patient Health Questionnaire (PHQ-8) depression scale was included in the BRFSS state optional modules to classify individuals according to the severity of their self-reported depression symptoms [52,53]. The PHQ-8 is established as a valid and reliable diagnostic measure of depressive symptoms in large clinical studies and has frequently been used to estimate the prevalence of depression in the US adult population [54–56]. Thirty-six states and the District of Columbia asked PHQ-8 questions at least once during these 3 years, yielding a total sample size of 276,442 for this analysis. For the purposes of this study, a PHQ-8 score of 10 or more will be used to categorize adults as depressed [52,53] because such a score has an 88% sensitivity and an 88% specificity for major depressive disorders [54,55].

The BRFSS asks respondents about their physical activity, cigarette smoking, number of drinks of alcohol, and their weight and height without their shoes. Leisure-time physical activity is defined as having performed, during the past 30 days, physical activity or exercise other than that in a regular job. Cigarette smoking is defined as currently smoking any cigarettes every day

Table 1 – Demographic and risk factor characteristics among US adults with and without depression—BRFSS 2006, 2008, and 2010.

Demographic and risk factor characteristic	Depression (n = 24,826)		No depression (n = 251,616)	
	% ^a	SE	% ^a	SE
Age (y), mean	43.1	0.2	45.9	0.1
Age groups (y)				
18–44	54.1%	0.7%	50.7%	0.2%
45–64	36.6%	0.7%	32.7%	0.2%
> 65	9.3%	0.3%	16.6%	0.1%
% Women	61.0%	0.3%	49.3%	1.3%
Race/ethnicity				
White non-Hispanic	68.3%	1.8%	72.1%	1.6%
Black non-Hispanic	13.8%	1.0%	10.4%	0.9%
Hispanic	12.7%	1.7%	12.0%	1.5%
Others	5.2%	0.8%	5.5%	0.8%
% Currently smoking	39.9%	1.4%	19.5%	1.2%
% Physically inactive	43.5%	1.5%	20.6%	1.4%
% Heavy alcohol drinking	7.4%	0.8%	5.1%	0.7%
Body mass index (kg/m ²) groups				
< 18.5	1.9%	0.6%	0.8%	0.6%
18.5–24.9	23.2%	1.7%	30.0%	1.6%
25.0–29.9	32.1%	1.6%	38.7%	1.5%
≥30.0	42.8%	1.3%	30.5%	1.2%

BRFSS, Behavioral Risk Factor Surveillance System; SE, standard error.

^a Percentages accounting for sampling weight and age in subgroups (except by age groups).

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