Preventive Medicine 81 (2015) 295–302

Contents lists available at ScienceDirect

Preventive Medicine

journal homepage: www.elsevier.com/locate/ypmed

Smoking, heavy drinking, and depression among U.S. middle-aged and older adults

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ARTICLE INFO

Available online 5 October 2015

Keywords:
Smoking
Heavy drinking
Depression
Midlife
Older adult
Health and Retirement Study
Survival analysis

ABSTRACT

Objective. To examine the relationship between smoking, heavy drinking and depression among U.S. middle-aged and older adults.

Method. Individual-level data came from 1992–2012 waves of the Health and Retirement Study. Smoking was ascertained from self-reported cigarette smoking status at the time of interview. Heavy drinking was defined as one or more drinks per day on average or four or more drinks on any occasion in the past three months for women, and two or more drinks per day on average or four or more drinks on any occasion in the past three months for men. Depression was defined as scoring three and above on the eight-item Center for Epidemiologic Studies Depression Scale. Cox proportional hazards regressions were performed to examine the relationship between smoking, heavy drinking and depression.

Results. Compared to non-smokers, smokers free from depression and heavy drinking at baseline were 20% (95% confidence interval: 12–28%) and 34% (20–50%) more likely to develop depression and engage in heavy drinking during follow-up period, respectively. Compared to non-depressed participants, participants with depression who were nonsmokers and non-heavy drinkers at baseline were 41% (14–74%) and 18% (6–31%) more likely to smoke and engage in heavy drinking during follow-up, respectively. Compared to non-heavy drinkers, heavy drinkers who were nonsmokers at baseline were 60% (26–104%) more likely to smoke during follow-up.

Conclusion. Health promotion programs in midlife and older age should be mindful of the associations between smoking, heavy drinking and depression in order to improve intervention effectiveness.

Introduction

Depression is a common psychiatric disorder characterized by depressed or sad mood, tiredness, fatigue, disturbed sleep or appetite, and recurrent thoughts of death (Kendler and Gardner, 1998; Marcus et al., 2012). As a major contributor to the global burden of disease, depression consumes considerable medical and social resources and results in substantially reduced quality of life (Ferrari et al., 2013). Compared to their younger counterparts, depressed middle-aged and older adults are more likely to experience loss of interest and cognitive changes, endorse affective and somatic symptoms, and attempt suicide (Fiske et al., 2009). Emerging evidence also relates depression in middle-aged and older adults to other adverse health outcomes like hypertension, cardiovascular disease and functional limitations (Meng et al., 2012; Papakostas, 2009; Xiang and An, 2015a,b).

As two of the leading health risk factors for morbidity and premature mortality in the U.S. and worldwide, smoking and heavy drinking have been closely linked to depression (Arfken, 2007; Mendelsohn, 2012; Sullivan et al., 2005). Boden and Fergusson (2011) systematically reviewed literature on the relationship between alcohol use disorders and major depression. Meta-analysis reported the presence of either condition to double the odds of the second condition. Park and Romer (2007) systematically reviewed evidence on the relationship between smoking and depression among adolescents. Significant associations between smoking and depression were reported in 47 of 57 reviewed studies. However, validity of findings was compromised as many of the studies did not adjust for confounders or did not use validated instruments to measure depression. Hitsman et al. (2013) systematically reviewed literature on the effect of major depression on smoking cessation. A modest adverse effect from past major depression on abstinence during and after smoking cessation treatment was reported in meta-analysis.

Gender and racial/ethnic differences in smoking, drinking, and depression have been extensively documented (Holmila and Raitasalo, 2005; Perkins et al., 1999; Piccinelli and Wilkinson, 2000), but studies on the differential relationship between these factors across population subgroups remain limited. Husky et al. (2008) assessed gender

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http://dx.doi.org/10.1016/j.ypmed.2015.09.026
0091-7435/

differences in the comorbidity of smoking behavior and major depression, and found female smokers at significantly higher risk of depression than male smokers. Schutte et al. (1997) evaluated gender differences in the relationship between heavy drinking and depression. Heavy drinking predicted depression onset in both genders, but a reciprocal association was found only among men. Castro et al. (2011) examined racial/ethnic differences in the effects of depression on smoking cessation. Depression predicted significantly lower cessation rates for whites and African Americans, but no relationship between depression and smoking cessation was found among Hispanics.

Using data from a nationally representative longitudinal survey, this study added a new data point to the literature by examining the relationship between smoking, heavy drinking and depression among U.S. middle-aged and older adults. As previous systematic reviews and meta-analyses documented effects that went in both directions and the underlining causal relationships remain unclear (Boden and Fergusson, 2011; Park and Romer, 2007; Sullivan et al., 2005), we hypothesized and empirically tested bidirectional associations between smoking, heavy drinking, and depression in which the presence of any one condition predicted future onset of the other two conditions. Survival models were performed to estimate the associations between smoking, heavy drinking, and depression, and potential population heterogeneities in the associations across gender and race/ethnicity were examined in subgroup analysis based on stratified samples.

Methods

Study participants

Individual-level data came from the Health and Retirement Study (HRS), an ongoing longitudinal study that surveys a representative sample of U.S. community-dwelling adults 50 years of age and above since 1992. Follow-up interviews are conducted every other year, with an overall response rate over 80% across waves. The HRS collects rich information including income, employment, assets, pension plans, health insurance, disability, physical health and functioning, cognitive functioning, and health care expenditures. Survey design, questionnaires, and other details about the HRS can be found on its web portal (http://hrsonline.isr.umich.edu/). This study used the HRS cross-sectional (RAND HRS enhanced fat files) and longitudinal (RAND HRS dataset version N) datasets constructed by the RAND Corporation, which cleaned and compiled the HRS data from 1992, 1993, 1994, 1995, 1996, 1998, 2000, 2002, 2004, 2006, 2008, 2010, and 2012 waves (http://hrsonline.isr.umich.edu/modules/meta/rand/). It included the original HRS cohort (born between 1931 and 1941) entering in 1992, the Asset and Health Dynamics Among the Oldest Old (AHEAD) cohort (born before 1924) entering in 1993, the Children of Depression (CODA) cohort (born between 1924 and 1930) and the War Baby (WB) cohort (born between 1942 and 1947) both entering in 1998, the Early Baby Boomer (EBB) cohort (born between 1948 and 1953) entering in 2004, and the Mid Baby Boomer (MBB) cohort (born between 1954 and 1959) entering in 2010. The HRS was approved by the University of Michigan Human Subjects Review Committee, and this study used de-identified publicly available HRS data and therefore did not require additional human subjects review.

The sampling unit in the HRS is household. A married household was considered age eligible as long as one spouse in the household was age eligible (e.g., 50 years of age and above). Therefore, it is possible that both spouses in a household were interviewed but only one of them met the age criterion whereas the other spouse did not. We restricted the study samples to HRS participants born during 1900–1953 (50 years of age and above in 1992) and free from depression, heavy drinking, or smoking at their first interview (i.e., baseline), respectively. Participants were excluded from the analyses on the basis of age ineligibility, presence of a specific condition (depressed, heavy drinking, or smoking) at the baseline, and/or missing covariates.

Current depression, heavy drinking, and smoking status

Depressive symptoms were measured by the eight-item CES-D, a shortened version of the 20-item CES-D (Kohout et al., 1993). Participants were asked whether ("yes" or "no") they felt depressed, felt that everything was an effort, slept restlessly, could not get going, felt sad, felt lonely, enjoyed life, and were happy in the past week. The two positive items (i.e., "enjoyed life" and "was happy") are reverse-coded, so that a higher score indicates a more depressed mood. The eight-item CES-D total score, ranging from zero to eight, sums up the presence of (coded as one) or absence (coded as zero) from each of the eight feelings. Melchior et al. (1993) reported that the eight-item and 20-item CES-D scales were highly correlated ($r = 0.93$) and had comparable discriminant validity. A cut-off score of three has been suggested by previous validation studies to indicate clinically relevant depressive symptoms (Turvey et al., 1999). This cut-off score has a sensitivity of 0.71 and a specificity of 0.79 to predict major depressive episodes. A participant was classified as having a depression onset in a survey wave if one scored three or above on the eight-item CES-D in that wave.

Heavy drinking was defined in accordance with the 2010 Dietary Guidelines for Americans (U.S. Department of Agriculture and U.S. Department of Health and Human Services, 2010) as one or more drink per day on average or four or more drinks on any occasion in the past three months for women, and two or more drinks per day on average or four or more drinks on any occasion in the past three months for men.

Smoking was assessed by the question "Do you smoke cigarettes now?" A participant was classified as a smoker in a survey wave if he or she answered yes in that wave.

Among 24,759 participants who did not have depression at their baseline interview, 27.38% of them had one or more depression onset during the follow-up period; among 27,331 participants who did not engage in heavy drinking at their baseline interview, 7.41% had heavy drinking during follow-up; and among 24,669 participants who did not smoke at their baseline interview, 2.02% smoked during follow-up.

Covariates

We controlled both wave-invariant and wave-variant individual characteristics in the regression analyses. Wave-invariant covariates include gender, race/ethnicity (non-Hispanic white, non-Hispanic African American, non-Hispanic other race or multi-race, and Hispanic), education (education less than high school, high school, college, and education higher than college), birth cohort (HRS, AHEAD, CODA, WB, EBB, and MBB), and history of psychiatric problem (ever versus never diagnosed with psychiatric problem), smoking (ever versus never smoked in one's life), and drinking (ever versus never drank in one's life) reported at the baseline interview. Wave-variant covariates include age in years, marital status (married or living with partner, and unmarried, divorced, separated, or widowed), household net wealth (divided into four quartiles based on the wealth distribution in each survey wave), diagnosis of a chronic condition (hypertension, diabetes, heart disease, stroke, lung disease, arthritis, and cancer), residential census region (Midwest, Northeast, South, and West), and body weight status. Body mass index (BMI) was calculated from self-reported height and weight. Body weight status was classified into four categories—underweight ($BMI < 18.5\ kg/m^2$), normal weight ($18.5\ kg/m^2 \le BMI < 25\ kg/m^2$), overweight ($25\ kg/m^2 \le BMI < 30\ kg/m^2$), and obesity ($BMI \ge 30\ kg/m^2$).

Statistical analyses

Descriptive statistics, weighted by the HRS baseline sampling weights, are reported separately for the three study samples that were free from depression, heavy drinking, or smoking at the baseline interview, respectively.

Cox proportional hazards regressions were performed to examine the relationship between depression, heavy drinking, and smoking. The regression to estimate the impact of heavy drinking and smoking on depression was performed on the participants who were non-depressed at the baseline interview, and the two key independent variables were their current heavy drinking and smoking status. Similarly, the regression to estimate the impact of depression and smoking on heavy drinking was performed on the participants who did not engage in heavy drinking at the baseline interview, and the two key independent variables were their current depression and smoking status. The regression to estimate the impact of depression and heavy drinking on smoking was performed on the participants who did not smoke at the baseline interview, and the two key independent variables were their current depression and heavy drinking status. In these regressions, a participant was considered a "survivor" till a specific condition (depression, heavy drinking, or smoking) was reported, if ever. Participants who died or were lost during follow-up without ever reporting a specific condition were censored at the last wave when they were interviewed. Participants who were alive and remained free from a specific condition by 2012 were censored at the last wave of the study. Multiple "failures", namely more than one occurrence of a specific condition