



# History of major depression as a barrier to health behavior changes after a chronic disease diagnosis



Xiaoling Xiang

Center for Education in Health Sciences, Feinberg School of Medicine, Northwestern University, 633 North St. Clair, 20th floor, Chicago, IL 60611, United States

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## ABSTRACT

**Objective:** To examine whether changes in smoking, drinking, and physical activity after a chronic disease diagnosis differ between middle-aged and older adults with and without a history of major depression.

**Methods:** Individual-level data came from 1996 to 2010 waves of the U.S. Health and Retirement Study. Chronic disease diagnosis was ascertained from self-reports of physician diagnosed diseases. Major depression was assessed by the short-form Composite International Diagnostic Interview. Mixed-effects logistic regressions were performed to estimate the potential moderating effect of a history of major depression.

**Results:** Baseline major depression was associated with a more than 3-fold increase (OR = 4.48, 95% CI = 2.27–8.86) in the odds of smoking and 37% decrease (OR = 0.63, 95% CI = 0.52–0.75) in the odds of staying physically active, but not with odds of excessive drinking. After a chronic disease diagnosis, the odds of smoking was reduced by 75% (OR = 0.25, 95% CI = 0.20–0.32), the odds of excessive drinking was reduced by 47% (OR = 0.53, 95% CI = 0.47–0.61), and the odds of staying physically active was reduced by 30% (OR = 0.70, 95% CI = 0.63–0.78). There was a significant interaction effect for smoking such that the decline in the odds of smoking was smaller among adults with a history of major depression.

**Conclusion:** Chronic disease diagnosis may be an important teachable moment for health behavior change, but the behavior changing effect may be smaller for those with a history of major depression especially when it comes to smoking.

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## 1. Introduction

Health behaviors of smoking cessation, moderate drinking, and regular exercise play an important role in primary and secondary prevention of chronic conditions. Engaging in health behaviors can improve chronic disease management, reduce additional morbidity and functional limitations, and decrease premature mortality [7,36]. While chronic illnesses are a major threat to health and quality of life, a disease diagnosis could motivate patients to adopt health behaviors, a phenomena sometimes labeled a “teachable moment” [31]. According to McBride et al. [31] a teachable moment is a cognitive process of making sense of a cueing event which prompts subsequent behavior change. The occurrence of a teachable moment is supported by major theories of health behaviors including the Health Belief Model [18,37] and related models based on the Social Cognitive Theory [2]. A number of population-based studies have documented positive behavior changes after a wide range of chronic disease diagnoses [12,30,34,48,49], providing empirical evidence for the teachable moment hypothesis.

Although positive behavior change after a diagnosis of chronic disease is not uncommon in midlife and older adulthood, several authors

have noted that a sizeable proportion of individuals who experienced this health event do not make behavior changes [32,34]. However, little is known about intrapersonal differences in behavioral responses to a chronic disease diagnosis [30,34,48]. One important factor that may shape individuals' responses to a chronic disease diagnosis is their emotional state, such as the presence of depression or depressive symptoms. Depression as a predisposing factor may modify the cognitive process thought to motivate behavior change after a chronic disease diagnosis. Major cognitive theories of depression [3,39] propose that depressive symptoms result from negative cognitive schemata that attribute negative outcomes to internal, stable and uncontrollable factors and positive outcomes to external factors. Consequences of the schemata include low self-efficacy and motivational deficits particularly in performing tasks that require complex concept-formation and problem-solving [46].

Assessing the role of depression in the process of behavior change is an important public health issue. Depression is the most prevalent mental illness among middle-aged and older adults [5] and has been shown to increase risk for a number of chronic diseases [23,50]. Epidemiological studies have extensively documented the cross-sectional association of depression and health risk behaviors, including smoking [33], excessive drinking [28], and physical inactivity [13]. Studies of treatment adherence in chronic disease have consistently shown the association of

E-mail address: [xiaoling.xiang@northwestern.edu](mailto:xiaoling.xiang@northwestern.edu).

depressive symptoms and poor self-care behaviors [11,20]. A recent study found that significant depressive symptoms were a significant barrier to smoking cessation among survivors of smoking-related cancers [4]. High level of depressive symptoms has also been recognized as a barrier to primordial prevention of cardiovascular diseases primarily due to its association with health risk behaviors [14]. Determining whether a chronic disease diagnosis can induce comparable reductions in health risk behaviors across levels of depression could help identify opportunities for secondary prevention for persons with chronic disease and co-occurring depression.

The objective of this study was to examine the moderating role of major depression in the relationship between chronic disease diagnosis and health behavior changes. The study hypothesis was that individuals would engage in risk reduction/health promoting behaviors after a chronic disease diagnosis and these effects would be smaller for individuals with a history of major depression. A number of chronic diseases were examined including diabetes, heart disease, stroke, cancer, and chronic lung disease and tested three health behaviors including smoking, drinking, and physical activity. The dynamic relationships between history of major depression, chronic disease diagnosis and health behaviors were examined in a nationally representative sample of middle-aged and older adults initially free of chronic disease who were followed for up to 14 years.

## 2. Methods

### 2.1. Participants

Participants were selected from the U.S. Health and Retirement Study (HRS), a longitudinal panel study of health and labor force participation in later life. The HRS is sponsored by the National Institute on Aging (grant number NIA U01AG009740) and conducted by the University of Michigan. The HRS adopts a complex probability sampling design and conducts biannual interviews with age-eligible members from specific birth cohorts along with their non-age eligible spouses. When the original respondent could not complete the interview often due to illness and cognitive impairment, a “proxy” respondent answered certain survey questions. The HRS web site (<http://hrsonline.isr.umich.edu>) provides information on the survey design, questionnaires, and data.

The present study used data from 8 waves (1996–2010) of the HRS and included four birth cohorts—the original HRS cohort, the Asset and Health Dynamics Among the Oldest Old (AHEAD) cohort, the Children of Depression (CODA) cohort, and the War Baby (WB) cohort. Because birth cohorts entered the HRS at different years, data points were centered at the time participants first entered the study, referred to as baseline hereafter. A total of 22,840 participants were interviewed at baseline. Respondents were excluded from analyses if they were younger than 50 years of age ( $n = 905$ ) or older than 80 years of age ( $n = 2317$ ), used proxies ( $n = 1401$ ), had missing data on chronic disease diagnosis ( $n = 17$ ), or reported an existing diagnosis of diabetes, heart disease, stroke, cancer, or chronic lung disease ( $n = 6761$ ) at baseline. The final study sample consisted of 11,439 middle-aged and older adults initially free of the five chronic diseases with average follow-up of 12.4 years (6.2 survey waves). Participants younger than 50 years of age were excluded because they were not part of the probability sample of the HRS. Including these persons would undermine the generalizability of findings to the study population. Participants older than 80 years of age at baseline were excluded to reduce the potential influence of attrition and survival bias. Proxies were excluded because depression was not assessed for these individuals. Excluding proxy interviews was also necessary to reduce potential reporting and recall error. Furthermore, participants with an existing chronic disease diagnosis were excluded at baseline in order to reduce the potential confounding effects of a prior diagnosis on depression status and health behaviors.

### 2.2. Measures

#### 2.2.1. Health behaviors

Current smoking was ascertained from answers of “yes” to the question, “do you smoke cigarettes now?” Based on the 2010 Dietary Guidelines for Americans [43], excessive drinking was defined as more than one drink per day on average or  $\geq 4$  drinks on any occasion in the past 3 months for women, and more than 2 drinks per day on average or  $\geq 4$  drinks on any occasion in the past 3 months for men. From 1996 through 2002 surveys, respondents were classified as physically active from answers of “yes” to the question, “on average over the last 12 months have you participated in vigorous physical activity or exercise three times a week or more? By vigorous physical activity, we mean things like sports, heavy housework, or a job that involves physical labor.” From 2004 surveys and onward, the wording of questions and response scales associated with physical activity have changed and vigorous physical activity due to work has been excluded. Inclusion of inconsistent physical activity measures introduces systematic differences due to measurement error and may mask the true changes in physical activity across waves. Therefore, only data from 1996 through 2002 were used when modeling physical activity.

#### 2.2.2. Chronic disease diagnosis during follow-up

Chronic disease diagnosis was ascertained from self-reports of physician diagnosed conditions including: 1) diabetes or high blood sugar; 2) a heart attack, coronary heart disease, angina, congestive heart failure, or other heart problems; 3) stroke; 4) cancer or a malignant tumor, excluding minor skin cancer, and 5) chronic lung disease, such as chronic bronchitis or emphysema. A dummy variable was created to indicate whether the participant had any of the aforementioned conditions at each wave. Because the final analytical sample included persons free of these conditions at baseline, the dummy variable is an indicator of whether participants' chronic disease status changed from “free of disease” to “have a chronic disease diagnosis” during each follow-up wave.

#### 2.2.3. Major depressive episodes (MDE)

MDE was assessed only at baseline by the short-form of the World Health Organization's Composite International Diagnostic Interview (CIDI-SF), a widely accepted method for estimating the prevalence of psychiatric disorders in large surveys with lay interviewers [22]. CIDI-SF identifies a probable diagnosis of a MDE during the past 12 months that meet the criteria of the Diagnostic and Statistical Manual of Mental Disorders (DSM-III-R) [1]. The short form consists of 33 questions, but respondents do not answer all of the questions. Respondents were first asked if they had experiences of dysphoria (depressed mood) and/or anhedonia (the inability to experience pleasure activities usually found enjoyable) for more than 2 weeks in a row in the past 12 months. Symptoms were then probed for those who answered yes to either of the screening questions. The summary CIDI-SF score ranges from 0 to 7. A cut-off score of  $\geq 3$  has been suggested to indicate a diagnosis of a major depressive episode [45]. More detailed description and scoring of the CIDI-SF can be found in Wallace et al. [45].

#### 2.2.4. Other individual characteristics

The following individual characteristics were adjusted in logistic regression consisting of time-invariant covariates including sex, race/ethnicity, and highest education attainment, and time-varying covariates including age, marital status, employment status, household net wealth (coded into quartiles due to skewness), and any difficulty in performing activities of daily living (ADLs, including bathing, eating, dressing, walking across a room, and getting in or out of bed).

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