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Racial Differences in the Prevalence of Depressive Disorders Among U.S. Adult Population

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RACIAL DIFFERENCES IN THE PREVALENCE OF DEPRESSIVE DISORDERS

AMONG U.S. ADULT POPULATION

by

FANG-DI YANG

Under the Direction of Gengsheng Qin

ABSTRACT

Depression is a common but serious illness, which may have significant impact on a person's daily life. This study examined racial/ethnic disparities on the prevalence of lifetime diagnosis of depression and current depression according to 2010 Behavioral Risk Factor Surveillance System (BRFSS) data. Logistic regression models were constructed to calculate odds ratios for comparing prevalence rates of depression across racial/ethnic groups. Significant racial/ethnic differences were found in both the prevalence of lifetime diagnosis of depression and current depression. Regional disparities were also found to be significant in the prevalence of depressive disorders across racial/ethnic groups.

INDEX WORDS: BRFSS, CDC, Depression, Logistic regression, Racial disparity, Regional disparity, Risk factors

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TABLE OF CONTENTS

LIST OF TABLES

CHAPTER 1   INTRODUCTION

1.1   Background

Depression is a major mental disorder among adult population in the United States (National Institute of Mental Health, 2012). The close connection between mental health and physical health made it a priority to identify and understand the prevalence of mental disorders for the purpose of improving health status and treatment expansion, as highlighted in Healthy People 2020 (U.S. Department of Health and Human Services, 2012). It has been posited in previous studies that racial/ethnic disparities exist in the prevalence of depressive disorders (Karno et al., 1987; Somervell, Leaf, Weissman, Blazer, & Bruce, 1989; Williams et al., 2007). Some studies suggested that, compared with Whites, minority racial/ethnic groups are usually associated with higher prevalence of depression (Centers for Disease Control and Prevention [CDC], 2010c; Gavin et al., 2011). However, Williams et al. (2007) stated that Whites are at a higher risk of having depression than other racial/ethnic groups. Other studies reported that the prevalence of depression was higher in minority groups then Whites, but the difference became insignificant after controlling for confounders (Dunlop, Song, Lyons, Manheim, & Chang, 2003; Frerichs, Aneshensel, & Clark, 1981). Different sample designs and methodologies could be potential reasons for the inconsistency. Various depression measurement tools used across studies, such as self-reported status, medical diagnoses, or scales

representing depressive symptoms, could account for the inconsistency as well (Reeves et al., 2011).

In addition to race/ethnicity, there are other risk factors that contribute to depressive disorders, including socio-demographic factors (age, gender, education level, income level, and marital status), family factors (genetic factors), life events, early trauma (Hirschfeld & Weissman, 2002), chronic diseases (Huang, Dong, Lu, Yue, & Liu, 2010), personal health behaviors (smoking and alcohol use (Hamalainen et al., 2001)), health care access, and social factors (emotional and social support). For example, women were more likely than men to report major depression; married persons were found to be less likely than those who were divorced, separated, or widowed to have depression (CDC, 2010c; Hirschfeld & Weissman, 2002). Huang et al. (2010) suggested that the prevalence of chronic diseases was significantly associated with depressive disorders, especially among older population. Hamalainen et al. (2001) proved that smoking and alcohol use were adverse health behaviors which could elevate the prevalence rate of depressive disorders.

Regional differences in depression were found to be significant according to CDC's report based on 2006 and 2008 BRFSS data, which suggested that major depression among U.S. adults was mainly concentrated in the southeastern region (CDC, 2010c). Kessler, Zhao, Blazer, and Swartz (1997), based on a sample of U.S. household population aged 15-54 from National Comorbidity Survey, reported regional differences in the prevalence of minor depression.

The purpose of this study was to determine whether there were racial/ethnic disparities in the prevalence of depressive disorders among U.S. adult population based on the 2010 Behavior Risk Factor Surveillance System (BRFSS) data (Centers for Disease Control and Prevention [CDC], 2010a). Two assessments were compared in this study: 1) lifetime diagnosis of depression, which was measured by self-reported diagnoses of depressive symptoms, and 2) prevalence of current depression, which was measured based on *Diagnostic and Statistical Manual of Mental Disorders* (4th ed., text rev.; DSM-IV-TR; American Psychiatric Association, 2000) diagnostic criteria. The effects of race/ethnicity were assessed using odds ratio after adjusting for various covariates. Regional differences in the prevalence of depression among racial/ethnic groups were also examined in this study.

The comparison between the two assessments of depression, by medical professionals or by self-reported questionnaires, was of particular interest because it has been stated in previous study that racial/ethnic minority groups were significantly less likely than Whites to have mental health care access (Alegria et al., 2008). It is important to determine whether the diagnosed prevalence of depression among racial/ethnic minority groups was underestimated so appropriate interventions can be provided. Polednak (2012) reported that regional differences in the prevalence of depression might reflect regional lifestyle factors, potential discrimination, and quality of medical cares. Identifying regional disparities in the prevalence of depression across racial/ethnic groups will contribute to more effective healthcare programs or health policy interventions.

1.2   Data Sources

Data used in this study was obtained from the 2010 Behavior Risk Factor Surveillance System (BRFSS) (CDC, 2010a). The BRFSS is an ongoing data collection project supported by Centers for Disease Control and Prevention (CDC) and its Behavioral Risk Factor Surveillance Branch. State-level information on health behaviors and healthcare access related to diseases and injuries were collected monthly through telephone interviews in the adult population (age 18 and older). Participating states/territories includes all 50 states, the District of Columbia, Puerto Rico, the U.S. Virgin Islands, and Guam. Published survey data were used by health departments to identify relationship between health status and risk factors, to track prevalence of diseases, and to conduct future health objectives and policies (CDC, 2010a).

CHAPTER 2   METHODS AND PROCEDURES

2.1   Survey Design

Target population of BRFSS is non-institutional adults, 18 years of age and older, living in households with landline telephones. All sample households used have a known, nonzero chance of selection. In 2010, 51 states/territories used a disproportionate stratified sample (DSS) design. Guam, Puerto Rico, and the U.S. Virgin Islands used a simple random sample design. With DSS design, telephone numbers are divided into two groups, which are the high-density stratum and the medium-density stratum. The high-density stratum is expected to contain a larger proportion of residential telephone numbers than the medium-density stratum. Telephone numbers are then sampled separately from the two strata with high-density numbers being sampled at a higher rate (Mokdad, Stroup, Giles, & Behavioral Risk Factor Surveillance, 2003). Usually, each state forms a single stratum. However, some states sample disproportionately from strata defined in order to provide sufficient sample sizes for substate estimates (CDC, 2010a).

The most common sources of survey errors in BRFSS are: 1) noncoverage error, 2) sampling error, 3) nonresponse error, and 4) measurement error.

Since BRFSS is a telephone survey, households without telephones are a source of *noncoverage error*. Although the telephone coverage rate of U.S. households reached approximately 95% in 2008, the coverage rate varies across geographical areas and subgroups. For example, for some minority race groups or lower soci-

oeconomic groups, telephone noncoverage is much higher. The difference means that BRFSS estimates may underestimate the risk in these groups. In addition, the growing number of cellular phone-only households also increased the noncoverage rate, since BRFSS samples were based on landline telephones only (CDC, 2010a).

Like in all other survey data, *sampling error* occurs when estimates are based on a sample of the population rather than the whole population (CDC, 2010a).

Nonresponse error occurs in BRFSS when the respondent is not available or refuses to take part in the survey. Incomplete questionnaires, in which data are not obtained to all items in the questionnaire, can also result in nonresponse error (CDC, 2010a).

Measurement error arises from question wording, question order, respondent attitude, interviewer techniques, and data entry error (CDC, 2010a).

Post-stratification weights were used to adjust for sampling errors, and were incorporated when deriving population-based estimates in this study by using appropriate statistical software (CDC, 2010a).

2.2 Questionnaire

The 2010 BRFSS questionnaire includes three parts: core component, optional modules, and state-added questions. The core component was mandatory to be asked by all participating states/territories on questions related to health status, health behaviors, and demographic characteristics. Optional modules are sets of questions about specific topics that states can choose to use on their questionnaires

or not. In 2010, 26 optional modules were supported by CDC. Thirteen states/territories used the Anxiety and Depression module and hence were included in this present study. State-added questions are questions conducted and added to their questionnaires by participating states without being edited or evaluated by CDC. No state-added questions were analyzed in this study (Centers for Disease Control and Prevention [CDC], 2010b).

2.3 Study population

The 2010 BRFSS data contained 451,075 records. Data from the 13 states/territories which implemented the Anxiety and Depression Module were included in this study. The 13 states/territories were Arizona, Georgia, Hawaii, Indiana, Louisiana, Mississippi, Missouri, Nevada, South Carolina, Vermont, Wisconsin, Wyoming, and Puerto Rico. Variables with missing values were excluded in this study. Variables with answers "unknown", "not sure", and "not applicable" were excluded in this study. The present study was restricted to respondents who identified themselves in one of the following race/ethnicity: non-Hispanic White, non-Hispanic Black, non-Hispanic Asian/Pacific Islander, non-Hispanic Native American/other, non-Hispanic Multirace, and Hispanic. The study population contained 48,156 records, 70% of the study population were non-Hispanic Whites, 13% were non-Hispanic Blacks, 2% were non-Hispanic Asians/Pacific Islanders, 2% were non-Hispanic Native Americans/others, 2% were non-Hispanic Multiracials, and 11% were Hispanics.

2.4   Outcome Variables

The Patient Health Questionnaire depression scale (PHQ-8) was used to measure depressive disorder in the BRFSS survey (Kroenke et al., 2009). The PHQ-8 contains eight of the nine items from the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) for diagnosis of depression (American Psychiatric Association, 1994). The BRFSS Anxiety and Depression Module omitted the ninth question, which assesses suicidal or self-injurious thoughts, since the interviewers would not be able to provide adequate intervention by telephone. To adhere to BRFSS methodology, the PHQ-8 response set was modified by asking the number of days in the last two weeks the respondent had a particular depressive symptom. Response in number of days to each of the eight items in PHQ-8 were then be assigned a score of 0-3 as follows: 0-1 day=0; 2-6 days=1; 7-11 days=2; 12-14 days=3 (Mazurek, Knoeller, & Moorman, 2012). The summated score ranged from 0 to 24 and was used to measure the severity of depressive disorders. The BRFSS Anxiety and Depression Module also included two additional questions about participant's lifetime diagnoses of anxiety and depression. To assess a lifetime diagnosis of depression, participants were asked "Has a doctor or other healthcare provider EVER told you that you have a depressive disorder (including depression, major depression, dysthymia, or minor depression)?"

2.4.1 Lifetime Diagnosis of Depression

Lifetime diagnosed depression in this study was measured upon self-reported diagnosis of depression. BRFSS participants answering "yes" to the question "Has a doctor or other healthcare provider EVER told you that you have a depressive disorder (including depression, major depression, dysthymia, or minor depression)?" were classified as having a lifetime diagnosis of depression (Strine et al., 2008).

2.4.2 Current Depression

Current depression in this study was measured based on DSM-IV, a diagnostic criteria. The PHQ-8 score$\geqq 10$ was used to define current depression. Severity of depression was measured based on PHQ-8 score as follows: 0-4 represents no significant depressive symptoms; 5-9 mild depressive symptoms; 10-14 moderate depressive symptoms; 15-19 moderately severe depressive symptoms; >20 severe depressive symptoms (Kroenke et al., 2009).

2.5 Independent Variables

2.5.1 Race/ Ethnicity

Participants were first asked whether they were Hispanic ethnicity or not. Those who reported as non-Hispanics then were asked to identify the groups that best represents their race: White, Black, Asian, Native Hawaiian or other Pacific Islander, American Indian or Alaska Native, Multirace, or Other. Due to the relatively small sample sizes, Native Hawaiian or other Pacific Islander (136) was com-

bined with Asian as Asian/Pacific Islander, and Other (254) was combined with American Indian or Alaskan Native as Native American/Other. Finally, the study population was classified into one of the following six racial/ethnic groups: non-Hispanic White, non-Hispanic Black, non-Hispanic Asian/Pacific Islander, non-Hispanic Native American/Other, non-Hispanic Multiracials, and Hispanic.

2.5.2 State/ Region

Data used in this study comprised of participants from 13 states/territories, Arizona, Georgia, Hawaii, Indiana, Louisiana, Mississippi, Missouri, Nevada, South Carolina, Vermont, Wisconsin, Wyoming, and Puerto Rico. Twelve of the thirteen states, in exception of Puerto Rico, were grouped into four regional divisions defined by the United States Census Bureau: 1) Northeast: Vermont; 2) Midwest: Indiana, Missouri, and Wisconsin; 3) South: Georgia, Louisiana, Mississippi, and South Carolina; 4) West: Arizona, Hawaii, Nevada, and Wyoming (U.S. Census Bureau).

2.6   Risk Factors

"A risk factor is any attribute, characteristic or exposure of an individual that increases the likelihood of developing a disease or injury." (World Health Organization [WHO]) The risk factors in this study included demographic characteristics, health behaviors, prevalence of chronic diseases, health care access, and other risk factors.

2.6.1 Demographic Characteristics

Demographic factors in this study included age, sex, education level, annual household income, employment status, and marital status. The study population was consisted of adults aged 18 or older, and was further categorized into six age groups for analytical purpose: 18-24, 25-34, 35-44, 45-54, 55-64, and 65 and older.

2.6.2 Health Behaviors

Health behavior factors included Body Mass Index (BMI), smoking status, drinking status, and physical activity or exercise. BMI is an index commonly used to classify underweight, overweigh, and obesity in adults. BMI is defined as the weight in kilograms divided by the square of the height in meters (kg/m^2). BMI<18.5 was considered underweight; $25 \leqq BMI < 30$ was considered overweight; $BMI \geqq 30$ was considered obese (WHO, 2000). Smoking status was determined upon response to "Four-level smoker status: Every day smoker, Someday smoker, Former smoker, Non-smoker" Binge drinker was defined as "males having five or more drinks on one occasion, females having four or more drinks on one occasion". Heavy drinker was defined as "adult men having more than two drinks per day and adult women having more than one drink per day" (CDC, 2010b). Physical activity or exercise was based on whether the participant reported doing physical activity or exercise during the past 30 days other than their regular job or not.

2.6.3 Chronic Diseases

Prevalence of chronic diseases (asthma, diabetes, coronary heart disease, and stroke) among participants was determined by self-reported responses to related questions (e.g. "Have you ever been told by a doctor, nurse, or other health professional that you had asthma?").

2.6.4 Health Care Access and Other Risk Factors

Health care access was measured regarding three aspects: 1) "Do you have any kind of health care coverage, including health insurance, prepaid plans such as HMOs, or government plans such as Medicare?" 2) "Do you have one person you think of as your personal doctor or health care provider?" 3) "Was there a time in the past 12 months when you needed to see a doctor but could not because of cost?"

Other risk factors included disability, self-rated health status, life satisfaction, and social and emotional support. Self-rated health status was based on self-reported response to "Would you say that in general your health is?" Life satisfaction and social and emotional support were emotional factors that were associated with depression (Davidson, Bellamy, Guy, & Miller, 2012; Rissanen et al., 2012).

2.7   Statistical Analysis

SAS version 9.2 (SAS Institute Inc., Cary, NC) was used for statistical analyses. The SURVEY procedures, instead of direct application of standard statistical analysis method, were implemented to account for the complex sample design of

BRFSS. The SURVEYFREQ procedure was used to obtain weighted frequencies, percentages, and to provide design-adjusted Rao-Scott chi-square test for testing the association between variables. We also constructed multivariate logistic regression models to calculate odds ratios and confidence intervals of risk factors for lifetime diagnosed depression and current depression. For binary response data in our study, the logit function is:

$$\text{logit}(Y) = \log\left(\frac{p(Y=1)}{1-p(Y=1)}\right) = \beta_0 + \beta_i x_i \ , \qquad i = 1, 2, \dots, p$$

where $x_1, x_2, \dots, x_p$ are p independent variables. The SURVEYLOGISTIC procedure, which incorporates complex survey sample designs with stratification, clustering, and unequal weighting, was used to fit logistic regression models for categorical response variables by the method of maximum likelihood. For variance estimation in complex sample design, either the Taylor series linearization method or the replication (resampling) methods was used to compute estimated variances for regression parameters and odds ratios (SAS Institute Inc. 2008).

Descriptive statistics such as weighted frequencies, percentages, and confidence intervals were conducted for risk factors across race/ethnicity to examine baseline characteristics associated with depressive disorders. Rao-Scott chi-square tests were conducted to determine whether there were significant racial/ethnical differences in the association of risk factors and prevalence of depressive disorders. Severity of depressive symptoms was evaluated according to PHQ-8 score of the participant. Logistic regression models were used to examine the effect of race/ethnicity on lifetime diagnosed depression and current depression. Both unad-

justed odds ratios and odds ratios adjusted for demographic characteristics, health behaviors, history of chronic disease, health care access, and other risk factors were calculated for comparison.

The significance level was chosen to be 0.05. Significance tests with p-values less than 0.05 were considered to be statistically significant.

CHAPTER 3   RESULTS

3.1   Descriptive Statistics

Table 1 Prevalence of diagnosed depression in different racial/ethnic groups

| | Lifetime Diagnosis of Depression | | | |
Race	Frequency (n)	Weighted Percentage (%)[a]	95% Confidence Interval	p-value
White, non-Hispanic	8006	21.31	(20.49-22.12)	<0.0001
Black, non-Hispanic	1032	13.19	(11.77-14.60)	
Asian/ Pacific Islander, non-Hispanic	126	4.09	(2.82-5.35)	
Native American/ Other, non-Hispanic	188	25.79	(19.67-31.92)	
Multiracial, non-Hispanic	305	22.69	(18.17-27.22)	
Hispanic	761	17.91	(16.04-19.79)	
Total	10418	19.59	(18.93-20.24)	

[a] Total number of individuals with lifetime diagnosis of depression in a certain racial group / total population in the certain racial group.

Of the 451,075 records in the 2010 BRFSS data, 48,156 were included in this study. Of all the participants, 10,418 (19.59%) were considered to have lifetime diagnosis of depression as they answered "yes" to the question "Has a doctor or other healthcare provider ever told you that you have a depressive disorder (including depression, major depression, dysthymia, or minor depression)?" The prevalence of lifetime diagnosis of depression was significantly different among different racial/ethnic groups (p<0.0001). Non-Hispanic Whites (21.31%), non-Hispanic Native Americans/Others (25.79%), and non-Hispanic multiracials (22.69%) had higher prevalence of lifetime diagnosed depression, while non-Hispanic Asians/Pacific Is-

landers (4.09%) had the lowest rate.

Table 2 Prevalence of current depression in different racial/ethnic groups

	Current Depression			
Race	Frequency (n)	Weighted Percentage (%)[a]	95% Confidence Interval	p-value
White, non-Hispanic	3810	10.91	(10.30-11.52)	<0.0001
Black, non-Hispanic	962	14.20	(12.60-15.79)	
Asian/ Pacific Islander, non-Hispanic	93	5.69	(2.63-8.74)	
Native American/ Other, non-Hispanic	141	21.56	(15.80-27.33)	
Multiracial, non-Hispanic	201	16.53	(12.27-20.79)	
Hispanic	571	14.59	(12.76-16.42)	
Total	5778	11.90	(11.36-12.44)	

[a] Total number of individuals with current depression in a certain racial group / total population in the certain racial group.

The prevalence of current depression in different racial/ethnic groups was significantly different. Non-Hispanic Native Americans/Others (21.56%) was most likely to report current depression, and non-Hispanic Blacks (14.20%), non-Hispanic Multiracials (16.53%), and Hispanics (14.59%) had relatively high prevalence of current depression than non-Hispanic whites (10.91%) and Asians/Pacific Islanders (5.69%).

Table 3 Demographic characteristics of participants with lifetime diagnosis of depression

	White, non-Hispanic		Black, non-Hispanic		Asian/ Pacific Is- lander, non-Hispanic		Native Amer- ican/ Other, non-Hispanic		Multiracial, non-Hispanic		Hispanic	
n	8006		1032		126		188		305		761	
	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)
Age Group	**p-value=0.1763**											
Age 18 – 24	5.93	(0.78)	6.94	(2.01)	1.92	(1.63)	7.77	(4.69)	7.87	(2.73)	7.75	(2.16)
Age 25 – 34	18.15	(0.98)	22.46	(2.66)	14.42	(7.78)	24.18	(6.65)	18.48	(4.58)	14.15	(2.35)
Age 35 – 44	20.43	(0.90)	21.47	(2.63)	20.33	(6.23)	21.47	(6.22)	27.87	(6.20)	23.70	(2.66)
Age 45 – 54	25.39	(0.93)	21.36	(2.06)	28.00	(6.85)	26.04	(5.69)	18.18	(3.46)	24.55	(2.34)
Age 55 – 64	18.72	(0.65)	21.97	(1.99)	21.66	(4.52)	15.55	(3.55)	20.70	(4.00)	19.15	(1.69)
Age 65 +	11.38	(0.44)	5.80	(0.74)	13.67	(3.40)	4.99	(1.42)	6.90	(1.67)	10.70	(1.06)
Gender	**p-value <0.0001**											
Male	36.76	(1.10)	23.37	(2.55)	33.50	(6.91)	56.97	(6.63)	35.17	(5.34)	35.70	(2.83)
Female	63.24	(1.10)	76.63	(2.55)	66.50	(6.91)	43.03	(6.63)	64.83	(5.34)	64.30	(2.83)
Education	**p-value <0.0001**											
< High School	8.75	(0.61)	16.70	(1.85)	2.91	(1.72)	19.73	(6.08)	6.96	(1.98)	22.45	(2.46)
Graduated High School	26.27	(0.94)	34.77	(2.83)	28.99	(7.25)	26.18	(6.26)	28.09	(5.23)	26.59	(2.37)
Some College / Technical School	30.67	(1.01)	32.07	(2.78)	24.15	(6.04)	31.41	(6.03)	42.84	(5.77)	30.96	(2.75)
Graduated College / Technical School	34.31	(1.03)	16.46	(1.95)	43.96	(7.42)	22.68	(5.86)	22.12	(4.33)	20.00	(2.20)
Annual Household Income	**p-value <0.0001**											
< $15,000	11.96	(0.62)	31.02	(2.58)	18.60	(6.50)	35.86	(6.97)	23.26	(5.11)	34.23	(2.53)
$15,000 – < $25,000	19.87	(0.86)	30.85	(2.48)	6.73	(2.50)	21.03	(5.36)	26.29	(4.42)	33.05	(2.65)

$25,000 – < $35,000	11.39	(0.65)	14.32	(2.40)	11.13	(4.20)	18.41	(6.32)	10.11	(3.01)	9.26	(1.50)
$35,000 – < $50,000	15.19	(0.76)	8.91	(1.65)	14.63	(5.32)	8.96	(2.61)	13.06	(2.64)	10.62	(2.20)
> $50,000	41.60	(1.09)	14.90	(2.24)	48.91	(7.50)	15.74	(4.00)	27.27	(5.95)	12.84	(2.23)
Employment Status	**p-value <0.0001**											
Employed for wages / Self-employed	52.35	(1.08)	29.43	(2.58)	54.10	(7.37)	25.67	(5.37)	38.69	(5.80)	37.95	(2.93)
Out of work (Unemployed)	9.33	(0.68)	20.17	(2.62)	8.64	(3.67)	26.56	(7.15)	15.62	(4.45)	9.23	(1.96)
Homemaker / Student	10.22	(0.66)	10.39	(1.91)	3.96	(1.81)	13.78	(5.71)	12.35	(3.18)	16.98	(1.81)
Retired	12.89	(0.52)	9.48	(1.40)	14.71	(3.49)	4.78	(1.62)	8.66	(1.95)	11.75	(1.21)
Unable to work	15.20	(0.73)	30.53	(2.53)	18.59	(6.57)	29.21	(5.71)	24.67	(4.78)	24.10	(2.38)
Marital Status	**p-value <0.0001**											
Married / Member of an unmarried couple	64.01	(1.03)	35.98	(2.92)	58.36	(7.40)	39.89	(6.31)	52.05	(5.65)	59.37	(2.75)
Divorced / Separated	17.14	(0.69)	30.21	(2.64)	19.30	(6.55)	29.17	(6.65)	21.41	(4.51)	20.06	(2.01)
Widowed	5.83	(0.29)	6.24	(0.94)	6.95	(2.73)	6.19	(3.67)	5.70	(1.48)	5.61	(0.72)
Never Married	13.02	(0.92)	27.57	(2.40)	15.39	(5.18)	24.75	(6.80)	20.84	(4.11)	14.95	(2.32)

Table 3 presents the demographic characteristics of the participants with lifetime diagnosis of depression in each racial/ethnic group. In most racial/ethnic groups, the prevalence of diagnosed depression increased with age, from 18 to 54 years old, but decreased when aged more than 55 years old. There was no significant difference in the association of age with diagnosed depression (p=0.1763) across racial/ethnic groups. Females were significantly more likely to have diagnosed depression than males (p<0.0001) except for Native Americans/Others. Whites and Asians/Pacific Islanders had low prevalence of depression in lower edu-

cation level (less than high school, 8.75% and 2.91%) compared with those with
higher education level (college or technical school graduate, 34.31% and 43.96%),
while among Blacks, Native Americans/Others, and Hispanics, lower-educated indi-
viduals had relatively high prevalence of diagnosed depression (16.7%, 19.73%, and
22.45%). Whites and Asians/Pacific Islanders with income > $50,000 (41.60% and
48.91%, respectively) per year were more likely to have depression, while Blacks,
Native Americans/Others, and Hispanics reported highest depression rate among
those with lower income level (< $15,000). Among Whites and Asians/Pacific Is-
landers, employed persons (52.35% and 54.10%, respectively) were more likely to be
diagnosed with depression; while among Blacks (50.7%) and Native Ameri-
cans/Others (55.77%), individuals who were unemployed or unable to work had
highest rate of diagnosed depression. Among those who had lifetime diagnosis of
depression, Blacks and Native Americans/Others had the highest rates being di-
vorced, separated or widowed.

Table 4 Health behaviors of participants with lifetime diagnosis of depression

	White, non-Hispanic		Black, non-Hispanic		Asian/ Pacific Islander, non-Hispanic		Native American/ Other, non-Hispanic		Multiracial, non-Hispanic		Hispanic	
n	8006		1032		126		188		305		761	
	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)
Weight Status	**p-value=0.0002**											
Neither overweight nor obese	29.63	(1.03)	18.35	(2.11)	49.79	(7.50)	27.34	(6.41)	25.11	(4.15)	24.77	(2.54)
Overweight	32.81	(1.01)	32.20	(2.78)	22.75	(4.93)	40.39	(6.85)	28.11	(4.85)	37.05	(2.73)
Obese	37.56	(1.04)	49.46	(2.88)	27.46	(7.11)	32.27	(6.32)	46.79	(5.82)	38.17	(2.77)
Smoking	**p-value<0.0001**											
Current Smoker	30.54	(1.04)	32.79	(2.75)	21.29	(6.48)	47.29	(7.00)	47.53	(5.79)	22.09	(2.64)
Former Smoker	27.99	(0.92)	18.91	(2.29)	29.86	(7.16)	28.20	(6.25)	27.41	(4.83)	20.40	(2.23)

	White, non-Hispanic		Black, non-Hispanic		Asian/Pacific Islander, non-Hispanic		Native American/Other, non-Hispanic		Multiracial, non-Hispanic		Hispanic	
Never Smoked	41.47	(1.07)	48.30	(2.87)	48.86	(7.47)	24.51	(5.42)	25.06	(4.10)	57.51	(2.87)
Binge Drinking	**p-value=0.1469**											
No	84.36	(0.92)	90.00	(1.90)	93.21	(3.22)	86.44	(5.08)	82.38	(5.73)	88.28	(2.23)
Yes	15.64	(0.92)	10.00	(1.90)	6.79	(3.22)	13.56	(5.08)	17.62	(5.73)	11.72	(2.23)
Heavy Drinking	**p-value=0.0009**											
No	93.07	(0.63)	95.68	(1.60)	96.74	(1.94)	96.17	(2.06)	93.75	(2.42)	98.42	(0.55)
Yes	6.93	(0.63)	4.32	(1.60)	3.26	(1.94)	3.83	(2.06)	6.25	(2.42)	1.58	(0.55)
Exercise	**p-value<0.0001**											
Yes	68.15	(0.99)	53.50	(2.87)	66.13	(6.63)	66.00	(6.66)	64.30	(5.51)	54.39	(2.84)
No	31.85	(0.99)	46.50	(2.87)	33.87	(6.63)	34.00	(6.66)	35.70	(5.51)	45.61	(2.84)

Overweight or obese persons were more likely to report diagnosed depression compared with neither overweight nor obese persons, expect for Asians/Pacific Islanders. Native Americans/Others and Multiracials had higher prevalence of diagnosed depression among current smokers compared with the other racial groups. Whites (6.93%) and Multiracials (6.25%) had more heavy drinkers in the depressed population than other racial groups. Blacks (46.50%) and Hispanics (45.61%) had higher prevalence of diagnosed depression among those without exercise.

Table 5 Prevalence of chronic disease of participants with lifetime diagnosis of depression

	White, non-Hispanic		Black, non-Hispanic		Asian/Pacific Islander, non-Hispanic		Native American/Other, non-Hispanic		Multiracial, non-Hispanic		Hispanic	
n	8006		1032		126		188		305		761	
	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)
Asthma	**p-value=0.0221**											
Current	14.16	(0.72)	18.79	(1.99)	10.70	(3.68)	25.97	(6.60)	20.86	(4.26)	15.96	(2.16)
Former	5.95	(0.52)	6.49	(1.62)	12.61	(6.49)	7.11	(3.32)	10.39	(4.14)	8.18	(1.35)
Never	79.88	(0.85)	74.72	(2.40)	76.69	(6.87)	66.92	(6.83)	68.75	(5.31)	75.86	(2.41)
Diabetes	**p-value<0.0001**											

	White, non-Hispanic		Black, non-Hispanic		Asian/Pacific Islander, non-Hispanic		Native American/Other, non-Hispanic		Multiracial, non-Hispanic		Hispanic	
Yes	12.60	(0.67)	22.51	(2.09)	12.94	(4.90)	19.48	(5.22)	13.77	(3.53)	18.47	(1.90)
No	87.40	(0.67)	77.49	(2.09)	87.06	(4.90)	80.52	(5.22)	86.23	(3.53)	81.53	(1.90)
Coronary Heart Disease	p-value<0.0001											
Yes	6.24	(0.41)	8.77	(1.94)	8.17	(4.19)	11.88	(4.16)	4.97	(1.29)	12.59	(1.54)
No	93.76	(0.41)	91.23	(1.94)	91.83	(4.19)	88.12	(4.16)	95.03	(1.29)	87.41	(1.54)
Stroke	p-value<0.0001											
Yes	4.08	(0.32)	8.66	(1.41)	7.18	(2.38)	10.15	(4.20)	7.01	(1.94)	3.39	(0.83)
No	95.92	(0.32)	91.34	(1.41)	92.82	(2.38)	89.85	(4.20)	92.99	(1.94)	96.61	(0.83)

The association of a history of asthma, coronary heart disease, and stroke with depression was relatively high in Native Americans/Others (33.08%, 11.88%, and 10.15%, respectively). Multiracials with a history of asthma (31.25%) were more likely to report diagnosed depression, as were Blacks with diabetes (22.51%) and Hispanics with coronary heart disease (12.59%) compared with the other racial/ethnic groups.

Table 6 Healthcare access of participants with lifetime diagnosis of depression

	White, non-Hispanic		Black, non-Hispanic		Asian/Pacific Islander, non-Hispanic		Native American/Other, non-Hispanic		Multiracial, non-Hispanic		Hispanic	
n	8006		1032		126		188		305		761	
	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)
Health Care Coverage	p-value<.0001											
Yes	83.40	(0.93)	69.88	(2.88)	94.97	(2.54)	72.75	(6.83)	81.29	(4.54)	89.23	(2.22)
No	16.60	(0.93)	30.12	(2.88)	5.03	(2.54)	27.25	(6.83)	18.71	(4.54)	10.77	(2.22)
Personal Health Care Provider	p-value=0.0002											
Yes	87.45	(0.77)	81.00	(2.66)	93.34	(3.27)	73.05	(6.83)	76.82	(4.97)	87.93	(2.15)
No	12.55	(0.77)	19.00	(2.66)	6.66	(3.27)	26.95	(6.83)	23.18	(4.97)	12.07	(2.15)

Could Not See Doctor Because of Cost	p-value<.0001											
Yes	22.95	(0.91)	42.70	(2.92)	24.52	(6.84)	39.05	(7.17)	26.13	(4.52)	36.47	(2.92)
No	77.05	(0.91)	57.30	(2.92)	75.48	(6.84)	60.95	(7.17)	73.87	(4.52)	63.53	(2.92)

Blacks (69.88%) and Native Americans/Others (72.75%) were least likely to have health care coverage such as health insurance, prepaid plans, or government plans, while those in the other racial/ethnic groups had health care coverage rates above 80%. More than 40% Blacks reported could not see doctor because of cost, while only 23% Whites did. Native Americans/Others (39.05%) and Hispanics (36.47%) were also more likely to be unable to see doctor because of cost.

Table 7 Other risk factors of participants with lifetime diagnosis of depression

	White, non-Hispanic		Black, non-Hispanic		Asian/ Pacific Is-lander, non-Hispanic		Native Ameri-can/ Other, non-Hispanic		Multiracial, non-Hispanic		Hispanic	
n	8006		1032		126		188		305		761	
	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)
Disability	p-value= 0.0005											
Yes	45.22	(1.08)	56.59	(2.82)	43.56	(7.33)	53.20	(7.04)	53.60	(5.78)	39.88	(2.73)
No	54.78	(1.08)	43.41	(2.82)	56.44	(7.33)	46.80	(7.04)	46.40	(5.78)	60.12	(2.73)
Self-Rate Health	p-value<.0001											
Good / Better	70.35	(0.95)	51.14	(2.88)	55.86	(7.54)	55.11	(6.79)	54.50	(5.65)	46.81	(2.89)
Fair / Poor	29.65	(0.95)	48.86	(2.88)	44.14	(7.54)	44.89	(6.79)	45.50	(5.65)	53.19	(2.89)
Life Satisfac-tion	p-value=0.0357											
Satisfied	83.60	(0.80)	78.98	(2.34)	83.16	(5.09)	75.89	(5.31)	72.17	(5.84)	83.16	(2.54)
Dissatisfied	16.40	(0.80)	21.02	(2.34)	16.84	(5.09)	24.11	(5.31)	27.83	(5.84)	16.84	(2.54)
Social/ Emo-tional Support	p-value<.0001											
Yes	89.23	(0.65)	80.46	(2.47)	76.13	(7.01)	79.19	(5.03)	82.83	(4.68)	85.38	(2.06)
Rare / No	10.77	(0.65)	19.54	(2.47)	23.87	(7.01)	20.81	(5.03)	17.17	(4.68)	14.62	(2.06)

More than 50% of Blacks, Native Americans/Others, and Multiracials with disability reported diagnosed depression. Hispanics had the highest rate (53.19%) of reporting their health status as "fair or poor", while among Whites more than 70% reports their health as "good or better". Over 85% Whites and Hispanics received enough social or emotional support, while 23.87% Asians/Pacific Islanders rarely or did not receive social or emotional support.

Table 8 Severity of depression among racial/ethnic groups

	No Depression	Mild	Moderate	Moderately Severe	Severe
	% (SE)	% (SE)	% (SE)	% (SE)	% (SE)
White, non-Hispanic	40.27 (1.06)	28.29 (0.99)	16.36 (0.83)	9.66 (0.59)	5.41 (0.47)
Black, non-Hispanic	25.84 (2.54)	24.61 (2.22)	25.07 (2.71)	15.31 (1.89)	9.16 (2.04)
Asian/ Pacific Islander, non-Hispanic	47.88 (7.52)	21.62 (5.61)	9.73 (2.76)	13.80 (6.15)	6.96 (4.16)
Native American/ Other, non-Hispanic	28.10 (6.44)	19.67 (5.22)	19.56 (5.53)	17.32 (5.62)	15.36 (4.58)
Multiracial, non-Hispanic	29.86 (5.02)	31.03 (4.90)	14.42 (3.02)	17.56 (6.08)	7.14 (2.42)
Hispanic	29.78 (2.57)	29.82 (2.61)	20.69 (2.38)	12.90 (2.07)	6.81 (1.25)

Table 8 presented that the prevalence of moderately severe or severe depression in racial minorities was much higher than non-Hispanic Whites. The number of participants reported moderately severe or severe depression in Blacks (24.47%), Native Americans/Others (32.68%), and Multiracials (24.7%) were significantly higher than that in Whites (15.07%). Especially, the prevalence rates of moderately severe or severe depression among Native Americans/Others were more than twice

as those among Whites.

Table 9 Prevalence of diagnosed depression and current depression by state

	Diagnosed Depression			Current Depression		
State	Frequency	%	(95% CI)	Frequency	%	(95% CI)
Arizona	731	21.27	(18.79-23.75)	398	11.66	(9.71-13.61)
Georgia	677	17.50	(15.79-19.20)	448	11.96	(10.47-13.45)
Hawaii	589	11.21	(9.93-12.48)	302	6.64	(5.58-7.70)
Indiana	1370	21.84	(20.29-23.39)	704	11.78	(10.58-12.98)
Louisiana	813	18.18	(16.48-19.89	545	13.28	(11.80-14.76)
Mississippi	1076	19.92	(18.30-21.53)	743	15.39	(13.80-16.98)
Missouri	792	23.37	(20.95-25.79)	402	11.50	(9.73-13.28)
Nevada	474	16.75	(14.40-19.10)	294	12.40	(10.24-14.57)
South Carolina	964	17.37	(15.48-19.26)	604	11.85	(10.11-13.59)
Vermont	1089	23.78	(22.07-25.49)	388	8.94	(7.78-10.10)
Wisconsin	609	19.81	(17.64-21.98)	300	9.35	(7.74-10.96)
Wyoming	785	21.66	(19.80-23.53)	334	10.49	(8.91-12.08)
Puerto Rico	449	19.68	(17.50-21.86)	316	15.53	(13.27-17.79)

Table 10 Prevalence of diagnosed depression and current depression in by region

	Diagnosed Depression			Current Depression		
	Frequency	%	SE	Frequency	%	SE
Northeast	1089	23.78	0.87	388	8.94	0.59
Midwest	2771	21.72	0.62	1406	10.91	0.46
South	3530	17.93	0.49	2340	12.66	0.44
West	2579	18.99	0.81	1328	11.16	0.65
	p-value<0.0001			p-value=0.0044		

The prevalence of lifetime diagnosis of depression was relatively high in Arizona (21.27%), Indiana (21.84%), Missouri (23.37%), and Vermont (23.78%). The prevalence of current depression was higher in Mississippi (15.39%) and Puerto Rico (15.53%) and was lowest in Hawaii (6.64%). After combining states into four regions, Table 10 presented that the prevalence rates were significantly different

across regions. People in the Northeast were more likely to report diagnosed de-

pression, while people in the South were more likely to report current depression.

3.2   Odds Ratios

3.2.1 Racial Differences in Lifetime Diagnosis of Depression

Table 11 Unadjusted and adjusted odds ratios for prevalence of lifetime diagnosis of
depression, by race/ethnicity

	Model 1[a]	Model 2[b]	Model 3[c]	Model 4[d]	Model 5[e]	Model 6[f]
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
White, non-Hispanic	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Black, non-Hispanic	0.56* (0.49-0.64)	0.42* (0.37-0.48)	0.51* (0.45-0.59)	0.53* (0.47-0.61)	0.45* (0.39-0.52)	0.39* (0.33-0.45)
Asian/ Pacific Islander, non-Hispanic	0.16* (0.11-0.22)	0.17* (0.12-0.23)	0.18* (0.12-0.25)	0.17* (0.12-0.23)	0.18* (0.13-0.25)	0.19* (0.14-0.27)
Hispanic	0.81* (0.70-0.92)	0.56* (0.48-0.65)	0.83* (0.72-0.95)	0.79* (0.69-0.90)	0.76* (0.65-0.87)	0.71* (0.60-0.83)
Multiracial, non-Hispanic	1.08 (0.83-1.41)	0.93 (0.71-1.21)	1.00 (0.78-1.28)	1.01 (0.78-1.32)	0.85 (0.64-1.13)	0.74* (0.57-0.97)
Native American/ Other, non-Hispanic	1.28 (0.93-1.77)	1.10 (0.80-1.51)	1.14 (0.83-1.57)	1.20 (0.88-1.65)	0.96 (0.64-1.44)	0.94 (0.64-1.39)

[a]Model 1: Unadjusted

[b]Model 2: Adjusted for demographic characteristics

[c]Model 3: Adjusted for health behaviors

[d]Model 4: Adjusted for chronic diseases

[e]Model 5: Adjusted for other risk factors

[f]Model 6: Adjusted for demographic characteristics, health behaviors, chronic diseases, and other risk factors

*p-value<0.05

The unadjusted odds ratios showed that Blacks, Asian/Pacific Islanders, and

Hispanic had significantly lower odds to have lifetime diagnosis of depression than

Whites. After adjusting for demographic characteristics, health behaviors, chronic

diseases, and other risk factors, all of the other racial/ethnic groups showed lower

odds than Whites except for Native Americans/Others.

3.2.2 Racial Differences in Current Depression

Table 12. Unadjusted and adjusted odds ratios for prevalence of current depression, by race/ethnicity

	Model 1[a]	Model 2[b]	Model 3[c]	Model 4[d]	Model 5[e]	Model 6[f]
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
White, non-Hispanic	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Black, non-Hispanic	1.35* (1.17-1.56)	0.84* (0.71-0.98)	1.25* (1.07-1.45)	1.30* (1.12-1.51)	0.96 (0.81-1.14)	0.78* (0.65-0.93)
Asian/ Pacific Islander, non-Hispanic	0.49* (0.28-0.87)	0.57 (0.32-1.04)	0.59 (0.31-1.12)	0.54* (0.30-0.96)	0.68 (0.35-1.35)	0.78 (0.39-1.56)
Hispanic	1.40* (1.19-1.64)	0.75* (0.64-0.89)	1.44* (1.21-1.71)	1.37* (1.17-1.61)	1.16 (0.96-1.40)	0.97 (0.80-1.19)
Multiracial, non-Hispanic	1.62* (1.18-2.22)	1.22 (0.87-1.71)	1.47* (1.07-2.01)	1.49* (1.07-2.07)	1.04 (0.72-1.49)	0.88 (0.61-1.27)
Native American/ Other, non-Hispanic	2.25* (1.59-3.18)	1.59* (1.10-2.30)	2.02* (1.45-2.82)	2.10* (1.46-3.02)	1.41 (0.81-2.43)	1.39 (0.84-2.29)

[a]Model 1: Unadjusted

[b]Model 2: Adjusted for demographic characteristics

[c]Model 3: Adjusted for health behaviors

[d]Model 4: Adjusted for chronic diseases

[e]Model 5: Adjusted for other risk factors

[f]Model 6: Adjusted for demographic characteristics, health behaviors, chronic diseases, and other risk factors

*p-value<0.05

Before adjustment, Blacks, Hispanics, Multiracials, and Native Ameri-

cans/Others were more likely than Whites to report current depression while

Asians/Pacific Islanders were less likely than Whites to have current depression.

The differences between Blacks and Whites were attenuated after adjustment for other risk factors. Blacks appeared to have lower odds than Whites to report current depression after adjustment for demographic characteristics and adjustment for all covariates. The differences between Asians/Pacific Islanders and Whites were attenuated after adjustment for demographic characteristics, health behaviors, other risk factors, and all covariates. The differences between Hispanics and Whites were attenuated after adjustment for other risk factors and all covariates. Hispanics had lower odds than Whites after adjustment for demographic characteristics. The differences between Multiracials and Whites were attenuated after adjustment for demographic characteristics, other risk factors, and all covariates. The differences between Native Americans/Others and Whites were attenuated after adjustment for other risk factors and all covariates.

3.2.3 Effects of Risk Factors on Lifetime Diagnosis of Depression

Table 13 Effects of demographic characteristics on the odds ratios of lifetime diagnosis of depression

	White, non-Hispanic	Black, non-Hispanic	Asian/ Pacific Is-lander, non-Hispanic	Hispanic	Multiracial, non-Hispanic	Native American/ Other, non-Hispanic
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Age Group, years						
18–24	2.75* (1.88-4.00)	3.63* (1.46-9.00)	0.34 (0.06-1.91)	0.94 (0.46-1.91)	7.15* (1.91-26.76)	7.57 (0.95-60.62)
25–34	2.80* (2.22-3.53)	5.33* (2.72-10.43)	0.66 (0.11-4.01)	0.83 (0.47-1.49)	3.88* (1.36-11.09)	4.10 (0.84-20.02)
35–44	2.45* (1.99-3.02)	3.98* (2.06-7.69)	1.38 (0.36-5.28)	1.29 (0.75-2.20)	4.56* (1.71-12.15)	3.32 (0.68-16.30)
45–54	2.39* (1.98-2.89)	3.36* (1.84-6.15)	1.91 (0.63-5.82)	1.27 (0.78-2.06)	3.57* (1.33-9.59)	4.21 (0.96-18.48)

55–64	2.14* (1.82-2.51)	4.06* (2.39-6.87)	2.64* (1.07-6.51)	1.35 (0.91-2.00)	3.80* (1.68-8.61)	3.38 (0.82-13.95)
65 +	Ref	Ref	Ref	Ref	Ref	Ref
Gender						
Female	2.06* (1.81-2.33)	2.74* (2.02-3.71)	2.85* (1.20-6.77)	1.74* (1.26-2.41)	3.14* (1.76-5.59)	1.18 (0.59-2.37)
Male	Ref	Ref	Ref	Ref	Ref	Ref
Education						
< High School	0.68* (0.53-0.86)	0.76 (0.45-1.28)	0.31 (0.06-1.63)	1.09 (0.65-1.81)	0.57 (0.21-1.55)	0.38 (0.11-1.25)
Graduated High School	0.71* (0.61-0.82)	0.86 (0.56-1.33)	0.99 (0.27-3.57)	1.11 (0.73-1.68)	0.44* (0.20-0.98)	0.31* (0.11-0.88)
Attended College / Technical School	0.88 (0.77-1.01)	1.07 (0.69-1.66)	0.98 (0.49-2.00)	1.34 (0.89-2.03)	0.70 (0.36-1.39)	0.75 (0.31-1.81)
Graduated from College / Technical School	Ref	Ref	Ref	Ref	Ref	Ref
Annual Household Income						
< 15,000	Ref	Ref	Ref	Ref	Ref	Ref
$15,000 – < $25,000	0.98 (0.80-1.21)	1.05 (0.73-1.50)	0.28* (0.09-0.95)	1.48* (1.06-2.07)	0.96 (0.43-2.14)	0.35* (0.13-0.94)
$25,000 – < $35,000	0.87 (0.69-1.09)	1.00 (0.59-1.68)	1.00 (0.29-3.44)	1.15 (0.70-1.88)	0.50 (0.19-1.30)	0.59 (0.19-1.76)
$35,000 – < $50,000	0.87 (0.69-1.09)	1.00 (0.54-1.80)	0.87 (0.26-2.94)	1.7 (0.97-3.00)	0.69 (0.29-1.66)	0.35 (0.09-1.33)
$50,000 +	0.75* (0.59-0.96)	0.90 (0.47-1.60)	0.90 (0.29-2.75)	1.32 (0.75-2.32)	0.80 (0.30-2.11)	0.37 (0.11-1.29)
Employment Status						
Employed for wages / Self-employed	Ref	Ref	Ref	Ref	Ref	Ref
Out of work (Unemployed)	1.18 (0.92-1.52)	2.41* (1.52-3.81)	2.85 (0.86-9.46)	1.19 (0.66-2.14)	1.26 (0.54-2.90)	1.80 (0.65-4.99)
Homemaker / Student	1.09 (0.91-1.31)	1.68 (1.00-2.83)	0.64 (0.20-2.01)	0.98 (0.65-1.47)	1.15 (0.54-2.44)	7.63* (2.55-22.83)
Retired	1.27* (1.08-1.49)	2.45* (1.33-4.51)	0.85 (0.31-2.35)	1.26 (0.80-1.99)	1.96 (0.81-4.74)	1.31 (0.38-4.46)
Unable to work	2.06* (1.65-2.57)	2.81* (1.84-4.28)	5.00* (1.61-15.51)	3.59* (2.17-5.93)	3.40* (1.37-8.43)	3.10* (1.10-8.71)
Marital Status						
Married	Ref	Ref	Ref	Ref	Ref	Ref

	White, non-Hispanic	Black, non-Hispanic	Asian/ Pacific Islander, non-Hispanic	Hispanic	Multiracial, non-Hispanic	Native American/ Other, non-Hispanic
Divorced / Separated	1.30* (1.12-1.51)	1.60* (1.10-2.32)	2.11 (0.68-6.56)	1.53* (1.06-2.20)	1.06 (0.45-2.51)	2.95* (1.15-7.60)
Widowed	0.95 (0.82-1.12)	1.12 (0.70-1.79)	2.31 (0.72-7.41)	0.92 (0.57-1.49)	1.23 (0.44-3.45)	2.39 (0.62-9.26)
Never Married	1.06 (0.84-1.32)	0.96 (0.65-1.43)	0.66 (0.26-1.66)	1.18 (0.74-1.88)	0.70 (0.36-1.36)	2.45* (1.06-5.66)

ORs were adjusted for demographic characteristics, health behaviors, chronic diseases, and other risk factors
*p-value<0.05

Table 14 Effects of health behaviors on the odds ratio of lifetime diagnosis of depression

	White, non-Hispanic	Black, non-Hispanic	Asian/ Pacific Islander, non-Hispanic	Hispanic	Multiracial, non-Hispanic	Native American/ Other, non-Hispanic
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Weight Status						
Neither overweight nor obese	Ref	Ref	Ref	Ref	Ref	Ref
Overweight	1.27* (1.11-1.46)	1.29 (0.87-1.91)	0.88 (0.45-1.72)	1.25 (0.86-1.80)	0.90 (0.46-1.78)	1.79 (0.87-3.69)
Obese	1.55* (1.35-1.77)	0.95 (0.65-1.40)	1.29 (0.44-3.75)	1.30 (0.90-1.87)	1.74 (0.96-3.13)	0.96 (0.47-1.99)
Smoking						
Current Smoker	1.72* (1.48-2.00)	1.61* (1.14-2.27)	1.92 (0.74-4.95)	2.03* (1.33-3.11)	3.77* (1.91-7.41)	3.65* (1.61-8.25)
Former Smoker	1.39* (1.23-1.57)	1.73* (1.19-2.51)	1.94 (0.70-5.37)	1.16 (0.80-1.68)	1.87 (0.92-3.80)	2.77* (1.22-6.25)
Never Smoked	Ref	Ref	Ref	Ref	Ref	Ref
Binge Drinking Yes vs No	0.94 (0.78-1.13)	1.24 (0.74-2.07)	0.42 (0.08-2.10)	1.00 (0.56-1.77)	0.72 (0.27-1.93)	1.06 (0.39-2.88)
Heavy Drinking Yes vs No	1.32* (1.02-1.72)	0.96 (0.40-2.32)	2.50 (0.44-14.07)	0.49 (0.18-1.30)	1.46 (0.50-4.22)	0.76 (0.14-4.14)
Exercise Yes vs No	0.93 (0.81-1.06)	0.85 (0.66-1.11)	0.73 (0.34-1.57)	0.89 (0.68-1.18)	0.91 (0.52-1.59)	1.15 (0.56-2.38)

ORs were adjusted for demographic characteristics, health behaviors, chronic diseases, and other risk factors
*p-value<0.05

Table 15 Effects of chronic diseases on the odds ratio of lifetime diagnosis of depression

	White, non-Hispanic	Black, non-Hispanic	Asian/ Pacific Is- lander, non-Hispanic	Hispanic	Multiracial, non-Hispanic	Native American/ Other, non-Hispanic
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Asthma						
Current	1.23* (1.04-1.45)	1.38 (0.98-1.96)	1.50 (0.52-4.34)	1.36 (0.87-2.12)	2.15* (1.07-4.30)	2.07 (0.89-4.82)
Former	1.44* (1.11-1.86)	1.31 (0.76-2.24)	5.37 (0.88-32.89)	1.57 (0.97-2.56)	1.32 (0.64-2.73)	2.22 (0.47-10.41)
Never	Ref	Ref	Ref	Ref	Ref	Ref
Diabetes Yes vs No	1.12 (0.94-1.34)	1.09 (0.78-1.52)	0.37 (0.11-1.23)	0.95 (0.67-1.34)	1.94 (0.85-4.43)	1.57 (0.56-4.42)
Coronary Heart Disease Yes vs No	1.05 (0.85-1.30)	1.24 (0.72-2.12)	1.21 (0.33-4.48)	1.14 (0.75-1.73)	0.40 (0.13-1.25)	1.37 (0.41-4.55)
Stroke Yes vs No	0.93 (0.74-1.17)	1.30 (0.83-2.05)	2.39 (0.72-7.93)	0.97 (0.48-1.98)	0.79 (0.34-1.82)	2.33 (0.65-8.37)

ORs were adjusted for demographic characteristics, health behaviors, chronic diseases, and other risk factors
*p-value<0.05

Table 16 Effects of health care access on the odds ratio of lifetime diagnosis of depression

	White, non- Hispanic	Black, non- Hispanic	Asian/ Pacific Is- lander, non- Hispanic	Hispanic	Multiracial, non- Hispanic	Native American/ Other, non- Hispanic
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Health Care Coverage Yes vs No	0.91 (0.73-1.13)	1.00 (0.70-1.43)	2.02 (0.58-7.05)	1.73* (1.04-2.88)	1.23 (0.55-2.75)	1.61 (0.67-3.85)
Personal Health Care Provider Yes vs No	1.54* (1.29-1.84)	1.16 (0.78-1.74)	0.86 (0.22-3.35)	1.55 (0.99-2.42)	0.74 (0.35-1.56)	1.12 (0.48-2.59)
Could Not See Doctor Because of Cost Yes vs No	1.13 (0.96-1.35)	1.19 (0.88-1.60)	1.75 (0.67-4.56)	1.58* (1.13-2.21)	0.82 (0.39-1.71)	1.17 (0.58-2.39)

ORs were adjusted for demographic characteristics, health behaviors, chronic diseases, and other risk factors
*p-value<0.05

Table 17 Effects of other risk factors on the odds ratio of lifetime diagnosis of depression

	White, non-Hispanic	Black, non-Hispanic	Asian/ Pacific Islander, non-Hispanic	Hispanic	Multiracial, non-Hispanic	Native American/ Other, non-Hispanic
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Disability Yes vs No	2.35* (2.05-2.69)	3.12* (2.27-4.29)	1.90 (0.85-4.28)	1.93* (1.39-2.67)	1.97* (1.11-3.51)	2.60* (1.21-5.59)
Emotional Support Yes vs No	0.66 (0.53-0.81)	0.77 (0.54-1.11)	0.64 (0.30-1.34)	1.09 (0.74-1.60)	0.74 (0.31-1.76)	0.70 (0.31-1.58)
Life Satisfaction Dissatisfied vs Satisfied	3.17* (2.48-4.05)	1.94* (1.34-2.80)	4.24* (1.56-11.53)	3.34* (1.96-5.71)	3.08* (1.41-6.76)	2.80* (1.06-7.43)
Self-rated Health						
Fair/Poor	1.32* (1.12-1.55)	1.50* (1.09-2.07)	4.76* (1.82-12.42)	1.63* (1.17-2.27)	1.89* (1.05-3.42)	1.13 (0.49-2.63)
Good/Better	Ref	Ref	Ref	Ref	Ref	Ref

ORs were adjusted for demographic characteristics, health behaviors, chronic diseases, and other risk factors
*p-value<0.05

3.2.4 Effects of Risk Factors on Current Depression

Table 18 Effects of demographic characteristics on the odds ratio of current depression

	White, non-Hispanic	Black, non-Hispanic	Asian/ Pacific Islander, non-Hispanic	Hispanic	Multiracial, non-Hispanic	Native American/ Other, non-Hispanic
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Age Group, years						
18-24	2.93* (1.82-4.73)	4.04* (1.66-9.85)	338.47* (12.98->999.9)	2.42 (0.98-6.02)	4.87* (1.08-22.07)	2.24 (0.15-34.33)
25-34	2.71* (1.94-3.80)	6.34* (3.01-13.37)	17.89* (1.63-196.65)	2.19* (1.15-4.17)	1.15 (0.28-4.73)	9.09* (1.49-55.31)
35-44	2.77* (2.05-3.75)	3.04* (1.50-6.15)	13.04* (1.33-128.25)	2.08* (1.09-3.95)	4.29* (1.23-14.98)	9.29* (1.71-50.40)
45-54	2.22* (1.68-2.93)	2.45* (1.32-4.58)	1.89 (0.23-15.47)	1.38 (0.80-2.36)	0.95 (0.30-3.04)	7.72* (1.77-33.72)

55-64	1.43* (1.13-1.79)	2.37* (1.38-4.09)	2.63 (0.53-13.04)	0.93 (0.60-1.44)	0.61 (0.20-1.90)	2.76 (0.65-11.66)
65 +	Ref	Ref	Ref	Ref	Ref	Ref
Gender						
Female	1.84* (1.55-2.20)	2.98* (2.03-4.36)	1.50 (0.57-4.00)	1.69* (1.15-2.48)	1.87* (1.04-3.36)	1.59 (0.67-3.78)
Male						
Education						
< High School	1.25 (0.92-1.70)	2.47* (1.39-4.38)	1.38 (0.25-7.61)	1.14 (0.67-1.94)	0.27 (0.06-1.27)	3.67 (0.65-20.59)
Graduated High School	1.13* (0.89-1.43)	1.18 (0.71-1.95)	0.90 (0.23-3.51)	1.31 (0.80-2.17)	0.48 (0.20-1.16)	0.65 (0.15-2.83)
Attended College / Technical School	1.14 (0.91-1.41)	1.46 (0.84-2.53)	1.10 (0.37-3.29)	1.34 (0.81-2.23)	1.05 (0.49-2.25)	3.63 (0.77-17.11)
Graduated from College / Technical School	Ref	Ref	Ref	Ref	Ref	Ref
Annual Household Income						
< 15,000	Ref	Ref	Ref	Ref	Ref	Ref
$15,000 - < $25,000	0.97 (0.75-1.26)	1.46* (1.00-2.15)	0.36 (0.06-2.15)	0.88 (0.59-1.30)	1.98 (0.81-4.86)	0.23* (0.08-0.68)
$25,000 - < $35,000	0.71* (0.52-0.97)	0.97 (0.57-1.65)	0.21 (0.03-1.41)	0.89 (0.48-1.64)	1.09 (0.37-3.22)	0.55 (0.13-2.29)
$35,000 - < $50,000	0.85 (0.63-1.16)	1.99* (1.07-3.70)	0.21 (0.04-1.14)	1.06 (0.55-2.06)	1.46 (0.45-4.67)	1.11 (0.23-5.27)
$50,000 +	0.68* (0.50-0.93)	1.23 (0.66-2.27)	0.37 (0.06-2.18)	0.43* (0.23-0.81)	1.13 (0.38-3.31)	0.20* (0.04-0.95)
Employment Status						
Employed for wages / Self-employed	Ref	Ref	Ref	Ref	Ref	Ref
Out of work (Unemployed)	1.80* (1.35-2.40)	2.04* (1.28-3.25)	2.40 (0.60-9.55)	1.81 (0.99-3.32)	4.00* (1.49-10.77)	2.07 (0.65-6.65)
Homemaker / Student	1.00 (0.76-1.30)	1.46 (0.85-2.49)	0.90 (0.17-4.77)	1.25 (0.75-2.09)	1.25 (0.47-3.33)	1.53 (0.36-6.57)
Retired	0.82 (0.65-1.04)	1.15 (0.58-2.27)	6.55* (1.16-37.01)	1.47 (0.86-2.49)	1.74 (0.54-5.66)	0.94 (0.20-4.40)
Unable to work	1.82* (1.40-2.36)	1.56* (1.01-2.41)	9.04* (2.16-37.79)	2.90* (1.64-5.10)	12.14* (4.52-32.64)	1.75 (0.50-6.20)
Marital Status						
Married	Ref	Ref	Ref	Ref	Ref	Ref
Divorced / Separated	1.07 (0.85-1.34)	0.97 (0.66-1.41)	1.98 (0.56-6.98)	1.20 (0.76-1.88)	0.88 (0.38-2.07)	0.57 (0.19-1.77)

Widowed	0.96 (0.76-1.22)	1.04 (0.63-1.70)	0.55 (0.11-2.75)	1.03 (0.60-1.76)	1.93 (0.66-5.60)	0.79 (0.17-3.71)
Never Married	1.00 (0.76-1.32)	1.26 (0.82-1.93)	0.15* (0.03-0.94)	1.21 (0.72-2.06)	0.92 (0.39-2.14)	1.21 (0.38-3.91)

ORs were adjusted for demographic characteristics, health behaviors, chronic diseases, and other risk factors
*p-value<0.05

Table 19 Effects of health behavior on the odds ratio of current depression

	White, non-Hispanic	Black, non-Hispanic	Asian/ Pacific Is-lander, non-Hispanic	Hispanic	Multiracial, non-Hispanic	Native American/ Other, non-Hispanic
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Weight Status						
Neither overweight nor obese	Ref	Ref	Ref	Ref	Ref	Ref
Overweight	1.11 (0.92-1.34)	1.17 (0.74-1.84)	1.39 (0.49-3.93)	1.79* (1.20-2.67)	1.24 (0.59-2.61)	1.07 (0.42-2.76)
Obese	1.41* (1.16-1.72)	1.24 (0.79-1.94)	1.28 (0.39-4.18)	1.98* (1.32-2.98)	1.40 (0.68-2.90)	0.94 (0.35-2.54)
Smoking						
Current Smoker	1.60* (1.30-1.97)	1.56* (1.10-2.21)	1.24 (0.30-5.11)	1.71* (1.06-2.75)	3.71* (1.65-8.36)	6.42* (2.24-18.39)
Former Smoker	1.18 (0.98-1.43)	1.26 (0.81-1.95)	2.22 (0.68-7.26)	0.85 (0.59-1.23)	1.61 (0.73-3.53)	3.20* (1.07-9.60)
Never Smoked	Ref	Ref	Ref	Ref	Ref	Ref
Binge Drinking Yes vs No	1.04 (0.77-1.41)	1.17 (0.68-2.02)	6.37* (2.31-17.56)	0.79 (0.41-1.54)	2.19* (1.04-4.62)	2.75 (0.70-10.86)
Heavy Drinking Yes vs No	1.33 (0.90-1.97)	2.45* (1.14-5.28)	0.22 (0.03-1.41)	0.95 (0.32-2.84)	0.63 (0.18-2.16)	0.18 (0.04-0.84)
Exercise Yes vs No	0.62* (0.52-0.73)	0.58* (0.43-0.76)	0.76 (0.32-1.82)	0.89 (0.63-1.26)	0.73 (0.38-1.41)	0.36* (0.17-0.76)

ORs were adjusted for demographic characteristics, health behaviors, chronic diseases, and other risk factors
*p-value<0.05

Table 20 Effects of chronic diseases on the odds ratio of current depression

	White, non-Hispanic	Black, non-Hispanic	Asian/ Pacific Islander, non-Hispanic	Hispanic	Multiracial, non-Hispanic	Native American/ Other, non-Hispanic
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Asthma						
Current	1.19 (0.93-1.52)	1.34 (0.87-2.07)	1.29 (0.36-4.61)	1.90* (1.21-3.01)	1.37 (0.64-2.92)	1.08 (0.41-2.84)
Former	1.30 (0.86-1.94)	0.55 (0.32-0.97)	0.29 (0.08-1.09)	1.84* (1.05-3.22)	0.51 (0.21-1.25)	0.23 (0.04-1.30)
Never	Ref	Ref	Ref	Ref	Ref	Ref
Diabetes Yes vs No	0.92 (0.73-1.16)	0.92 (0.60-1.40)	2.28 (0.63-8.25)	1.17 (0.73-1.87)	0.81 (0.36-1.83)	0.69 (0.19-2.44)
Coronary Heart Disease Yes vs No	1.29 (1.00-1.67)	1.36 (0.82-2.28)	1.07 (0.25-4.64)	1.35 (0.90-2.01)	1.15 (0.33-4.05)	1.60 (0.35-7.31)
Stroke Yes vs No	1.52 (1.13-2.05)	1.66 (0.91-3.02)	2.45 (0.67-8.97)	1.08 (0.52-2.24)	0.58 (0.19-1.72)	0.38 (0.10-1.49)

ORs were adjusted for demographic characteristics, health behaviors, chronic diseases, and other risk factors
*p-value<0.05

Table 21 Effects of health care access on the odds ratio of current depression

	White, non-Hispanic	Black, non-Hispanic	Asian/ Pacific Is- lander, non-Hispanic	Hispanic	Multiracial, non-Hispanic	Native Ameri- can/ Other, non-Hispanic
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Health Care Coverage Yes vs No	1.23 (0.95-1.59)	1.11 (0.75-1.65)	0.46 (0.12-1.77)	1.27 (0.74-2.19)	2.24 (0.80-6.24)	1.93 (0.67-5.58)
Personal Health Care Provider Yes vs No	1.07 (0.83-1.37)	0.87 (0.55-1.36)	2.66 (0.53-13.39)	1.26 (0.72-2.22)	1.20 (0.50-2.85)	0.81 (0.28-2.34)
Could Not See Doctor Because of Cost Yes vs No	2.02* (1.64-2.49)	2.06* (1.49-2.84)	0.97 (0.25-3.68)	2.08* (1.46-2.98)	3.29* (1.71-6.32)	2.34 (0.94-5.81)

ORs were adjusted for demographic characteristics, health behaviors, chronic diseases, and other risk factors
*p-value<0.05

Table 22 Effects of other risk factors on the odds ratio of current depression

	White, non-Hispanic	Black, non-Hispanic	Asian/ Pacific Islander, non-Hispanic	Hispanic	Multiracial, non-Hispanic	Native American/ Other, non-Hispanic
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Disability Yes vs No	2.49* (2.08-2.98)	3.89* (2.74-5.54)	4.83* (1.35-17.34)	1.91* (1.31-2.77)	1.99 (0.98-4.07)	3.53* (1.41-8.84)
Emotional Support Yes vs No	0.37* (0.29-0.47)	0.37* (0.25-0.54)	1.47 (0.50-4.37)	0.45* (0.30-0.67)	0.67 (0.29-1.54)	0.70 (0.25-1.90)
Life Satisfaction Dissatisfied vs Satisfied	8.00* (6.22-10.30)	6.15* (4.02-9.42)	9.45* (2.72-32.89)	4.80* (2.87-8.03)	16.28* (7.12-37.24)	6.62* (2.12-20.69)
Self-rated Health						
Fair/Poor	2.51* (2.06-3.05)	2.42* (1.78-3.30)	2.78 (0.93-8.27)	2.66* (1.76-4.02)	3.16* (1.59-6.27)	1.95 (0.80-4.71)
Good/Better	Ref	Ref	Ref	Ref	Ref	Ref

ORs were adjusted for demographic characteristics, health behaviors, chronic diseases, and other risk factors
*p-value<0.05

Patterns of prevalence for current depression were generally similar to those for diagnosed depression, with some exceptions. From table 13 and table 18, the finding that younger persons were at higher prevalence rates was more obvious for current depression than lifetime diagnosed depression. Among Whites, those with education level "graduated high school" were less likely to report diagnosed depression but were more likely to have current depression compared with college or technical school graduates. For Whites, Blacks, Hispanics, and Native Americans/Others, diagnosed depression was associated with divorce or separated marriage; however, this association was not significant for current depression. From table 14 and table 19, Physical activities such as exercises were found helpful for re-

ducing current depression for Whites, Blacks, and Native Americans/Others, while the effects of exercises were not significant for lifetime diagnosed depression. From table 15 and table 20, Hispanics with asthma were associated with higher prevalence of current depression, but this association was not significant for lifetime diagnosed depression. From table 16 and table 21, White, Black, Hispanic, and multiracial respondents who could not see doctor because of cost were at higher risk of current depression, while this association appeared solely in Hispanics for diagnosed depression. From table 17 and table 22, having enough social or emotional support was helpful for reducing current depression for whites, blacks, and Hispanics, while this association appeared only in whites for diagnosed depression. Life satisfaction had great effects on the prevalence of both diagnosed depression and current depression among all race/ethnicity, and these effects were more obvious for current depression than for lifetime diagnosis of depression.

3.2.5 Regional Disparities

Table 23 Effects of region on the odds ratio of lifetime diagnosis of depression

	Unadjusted OR	95% CI	Adjusted OR[a]	95% CI
Northeast	1.43*	(1.27-1.60)	1.68*	(1.48-1.91)
Midwest	1.27*	(1.15-1.40)	1.31*	(1.18-1.46)
South	Ref.	Ref.	Ref.	Ref.
West	1.07	(0.95-1.21)	1.18*	(1.03-1.34)

[a]Adjusted for demographic characteristics, health behaviors, chronic diseases, and other risk factors
*p-value<0.05

Unadjusted ORs indicated that people in the Northeast had a 43% increased odds for diagnosed depression than in the South, and people in the Midwest had a

27% increased odds for diagnosed depression than in the South. Compared with the unadjusted ORs, adjusted ORs showed even more increased odds of diagnosed depression in the Northeast and Midwest (68% and 31%, respectively) than in the South. The adjusted ORs also showed that people in the West (OR of 1.18) were more likely to have diagnosed depression than those in the South.

Table 24 Effect of region on the odds ratio of current depression

	Unadjusted OR	95% CI	Adjusted OR[a]	95% CI
Northeast	0.68*	(0.58-0.80)	0.89	(0.73-1.08)
Midwest	0.85*	(0.75-0.95)	0.83*	(0.72-0.97)
South	Ref.	Ref.	Ref.	Ref.
West	0.87	(0.75-1.01)	0.99	(0.82-1.20)

[a]Adjusted for demographic characteristics, health behaviors, chronic diseases, and other risk factors
*p-value<0.05

Unadjusted ORs showed that people in the Northeast and Midwest were less likely to have current depression than people in the South. Adjusted ORs showed that those in the Midwest ware 17% less likely to have current depression than those in the South. The effect of region on the ORs of depression and current depression appeared to be in an opposite way, while people in the South were less likely to have diagnosed depression but were more likely to report current depression.

Table 25 Regional effect on the odds ratio of lifetime diagnosis of depression, by race/ ethnicity

	Northeast		Midwest		South		West	
	Unadjusted OR (95% CI)	Adjusted OR[a] (95% CI)	Unadjusted OR (95% CI)	Adjusted OR[a] (95% CI)	Unadjusted OR (95% CI)	Adjusted OR[a] (95% CI)	Unadjusted OR (95% CI)	Adjusted OR[a] (95% CI)
White, non-Hispanic	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Black, non-Hispanic	1.60 (0.36-7.07)	1.30 (0.31-5.40)	0.75 (0.56-1.00)	0.43* (0.32-0.58)	0.56* (0.48-0.66)	0.40* (0.33-0.48)	0.51* (0.27-0.99)	0.35* (0.16-0.78)
Asian/ Pacific Islander, non-Hispanic	0.40 (0.09-1.84)	0.41 (0.11-1.55)	0.12* (0.05-0.34)	0.13* (0.05-0.37)	0.11* (0.04-0.32)	0.16* (0.06-0.41)	0.18* (0.13-0.26)	0.21* (0.15-0.30)
Hispanic	1.20 (0.52-2.75)	0.76 (0.36-1.62)	0.91 (0.57-1.43)	0.94 (0.59-1.48)	0.86 (0.53-1.39)	0.84 (0.51-1.36)	0.53* (0.37-0.77)	0.47* (0.31-0.74)
Multiracial, non-Hispanic	2.01 (0.81-4.98)	1.65 (0.65-4.19)	1.23 (0.73-2.05)	0.60 (0.33-1.11)	1.62 (0.87-3.03)	1.27 (0.74-2.18)	0.75 (0.53-1.06)	0.55* (0.40-0.76)
Native American/ Other, non-Hispanic	2.59* (1.20-5.62)	1.63 (0.65-4.12)	1.38 (0.77-2.45)	1.04 (0.51-2.11)	1.34 (0.77-2.32)	0.83 (0.43-1.60)	1.09 (0.62-1.90)	0.95 (0.52-1.73)

[a]Adjusted for demographic characteristics, health behaviors, chronic diseases, and other risk factors
*p-value<0.05

Unadjusted ORs indicated that in the Northeast, Native Americans/other were more likely to have depression, but after adjusted for demographic characteristics, health behaviors, chronic diseases, and other risk factors, the effect of race/ethnicity was diluted. Adjusted ORs showed that in the Midwest and South, Blacks and Asians/Pacific Islanders were less likely to report depression than Whites; in the West, except for Native Americans/other, all the other racial/ethnic groups were less likely to have depression than Whites.

Table 26 Regional effect on the odds ratio of current depression, by race/ ethnicity

	Northeast		Midwest		South		West	
	Unadjusted OR (95% CI)	Adjusted OR[a] (95% CI)	Unadjusted OR (95% CI)	Adjusted OR[a] (95% CI)	Unadjusted OR (95% CI)	Adjusted OR[a] (95% CI)	Unadjusted OR (95% CI)	Adjusted OR[a] (95% CI)
White, non-Hispanic	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Black, non-Hispanic	1.22 (0.20-7.35)	0.18* (0.05-0.67)	1.78* (1.28-2.47)	0.96 (0.67-1.36)	1.17 (0.98-1.39)	0.71* (0.56-0.89)	1.50 (0.75-2.98)	0.6 (0.25-1.24)
Asian/ Pacific Islander, non-Hispanic	1.06 (0.20-5.61)	1.34 (0.28-6.33)	0.54 (0.20-1.47)	0.74 (0.29-1.90)	0.77 (0.20-2.95)	1.72 (0.30-9.94)	0.35* (0.24-0.52)	0.5* (0.31-0.77)
Hispanic	4.09* (1.59-10.51)	2.92 (0.58-14.78)	1.22 (0.76-1.96)	1.00 (0.48-2.08)	1.26 (0.73-2.17)	1.11 (0.67-1.84)	1.26 (0.85-1.86)	0.7 (0.47-1.18)
Multiracial, non-Hispanic	1.89 (0.73-4.91)	1.12 (0.47-2.68)	2.52* (1.43-4.45)	0.85 (0.44-1.64)	2.09* (1.02-4.29)	1.30 (0.72-2.34)	0.98 (0.65-1.47)	0.6 (0.35-1.10)
Native American/ Other, non-Hispanic	5.20* (2.40-11.29)	1.26 (0.49-3.22)	2.12* (1.16-3.89)	1.13 (0.49-2.60)	2.27* (1.27-4.06)	1.26 (0.53-2.98)	2.24* (1.16-4.34)	1.8 (0.76-4.15)

[a]Adjusted for demographic characteristics, health behaviors, chronic diseases, and other risk factors
*p-value<0.05

In the Northeast, unadjusted ORs presented that Hispanics and Native Americans/other were significantly more likely to have current depression (ORs of 4.09 and 5.20) than Whites, while Hispanic and Native American/other were minority groups in the Northeastern area. After adjusted for demographic characteristics, health behaviors, chronic diseases, and other risk factors, Blacks appeared to have the lowest odds of current depression in the Northeast. In the Midwest, before adjustment, Blacks, multiracial people, and Native Americans/other were more likely to report current depression (ORs of 1.78, 2.52, and 2.12) than Whites, but after adjustment the effect of race/ethnicity was diluted and there was no significant difference across racial/ethnic groups. In the South, adjusted ORs showed that Blacks

had a 29% less odds of current depression than Whites. In the West, both unadjusted and adjusted ORs showed that Asians/Pacific Islanders in this region had an approximately 50% lower odds to have current depression than Whites.

CHAPTER 4   DISCUSSIONS

In this study, racial/ethnic differences in the prevalence of depressive disorders among U.S. adults aged 18 or older were examined based on 2010 BRFSS data (CDC, 2010a). The overall prevalence of lifetime diagnosis of depression was 19.59% (95% CI=18.93%-20.24%); however, the prevalence of depression differed based on race/ethnicity. The finding that compared with Whites, Blacks (OR=0.56), Asians/Pacific Islanders (OR=0.16), and Hispanics (OR=0.81) had significantly lower prevalence of lifetime diagnosis of depression was consistent with one previous study that assessed 12-month and lifetime major depressive disorder based on DSM-IV criteria (Blazer, Kessler, McGonagle, & Swartz, 1994; Hasin, Goodwin, Stinson, & Grant, 2005). The overall prevalence of current depression was 11.90% (95% CI=11.36%-12.44%). The racial/ethnic differences in the prevalence of current depression were significant; however, the patterns of prevalence rates across race/ethnicity differed from that of lifetime diagnosis of depression. Blacks (OR=1.35), Native Americans/Others (OR=2.25), Multiracials (OR=1.62), and Hispanics (OR=1.40) were at higher risk of current depression than Whites. One explanation for these intriguing findings was the different measuring instruments used. Lifetime diagnosis of depression was assessed by medical professionals, such as doctors or health care providers, while current depression was measured based on self-reported questionnaires. There were studies showed that there were racial/ethnic disparities in seeking mental health treatment. Alegria et al. (2008) suggested in

their study that racial/ethnic minority groups were significantly less likely than Whites to access any mental health treatment. Blacks, Asians, and Hispanics used mental health care services at significantly lower rates than Whites (Harris, Edlund, & Larson, 2005). Lacking access to medical care may result in underestimating the prevalence of lifetime diagnosis of depression among racial/ethnic minority groups. High prevalence of current depression but low prevalence of diagnosed depression among racial/ethnic minority groups should be addressed. Since the majority of depression can be effectively treated (National Institute of Mental Health, 2011), screening and monitoring of depressive symptoms should be regularly used among minority racial/ethnic groups.

After adjusting for demographic characteristics, Blacks, Asians/Pacific Islanders, and Hispanics remained to have lower odds of lifetime diagnosis of depression than Whites as the unadjusted odds ratios. However, after adjusting for demographic characteristics, Blacks and Hispanics had lower odds of current depression than Whites while Native Americans/Others remained higher odds than Whites. Although demographic characteristics may account for some of the racial/ethnic disparities, race/ethnicity was still an important factor for depressive disorders (Kessler & Neighbors, 1986). Hispanics with asthma were significantly more likely to have current depression. According to American Lung Association, compared with Whites, Hispanics suffer from asthma in more severe symptoms, fewer preventative cares, and lower quality of medical services. Lower socioeconomic status and environmental factors (air pollution) also contributed to the disparities (American

Lung Association, 2011). Intuitively, those who could not afford medical cost, with disability, lack of social or emotional support, dissatisfied with life, and reported fair or poor self-rated health were more prone to depression; it was found in this study that this kind of association was significantly more obvious among Hispanics and Native Americans/Others.

It has been proved in previous studies that regional differences existed in the prevalence of depression in the United States. Southeastern region of the U.S. generally have the highest prevalence of depression (CDC, 2010c; Reeves et al., 2011). The prevalence of lifetime diagnosis of depression appeared to be highest in the Northeast and lowest in the South was contrary to those studies; however, the prevalence of current depression appeared to be highest in the South was consistent with previous studies. There were some possible reasons why results varied. First, the sample in our study comprised of only the 13 states that used the anxiety and depression module in 2010 BRFSS, hence may contain inadequate observations for each region and resulted in biased result. Second, the measurement for current depression in this study and previous studies (CDC, 2010c; Reeves et al., 2011) were based on the eight items in the PHQ-8 questionnaire, but the measurement for lifetime diagnosis of depression in our study was not, which could lead to the inconsistency. Regional effects on different racial/ethnic groups, after adjusting for covariates, indicated that Blacks and Asians/Pacific Islanders in the Midwest, South, and West and Hispanics and Multiracials in the West were less likely than Whites to have lifetime diagnosis of depression. Blacks in the Northeast and South region

and Asians/Pacific Islanders in the West were less likely than Whites to have current depression. These regional differences could be associated with regional lifestyle-related factors, potential discrimination in certain areas, and quality of medical cares (Polednak, 2012). Identifying regional disparities in the prevalence rate of depressive disorders can contribute to more effective health care programs or public health policy interventions.

CHAPTER 5   STUDY LIMITATIONS

The findings in this study were subjected to a few limitations. First, persons with depressive symptoms may have been missed with the question "Has a doctor or other healthcare provider EVER told you that you have a depressive disorder?" Especially for those who did not have access to health care. Bias may result in underestimating prevalence rate of diagnosed depression and in a weaker association between depression and its risk factors. Second, relationships between depression and potential risk factors are complex. Directions of some of those relationships remain unclear and we could not determine whether depression was the cause of effect of these risk factors. Third, our sample from BRFSS 2010 data contained only the 13 states that utilized the optional anxiety and depression module, and 70% of the participants were Whites. When testing for regional racial/ethnic differences in depression, some regions contained around 50 respondents for a certain minority racial/ethnic group, which may lead to unstable estimates based on BRFSS's rule for analyzing subgroup sample.

CHAPTER 6   CONCLUSION

Despite some limitations, this study provided evidence that generally, female, unemployment or unable to work, divorced or separated marriage, current or former smokers, disability, and dissatisfaction with life were risk factors associated higher prevalence of depressive disorders. Significant racial/ethnic disparities were found in both the national analysis and regional analysis. Findings from the study suggested that minority racial/ethnic groups tended to report lower diagnosed depression but higher current depression than Whites. Prevention and intervention strategies for pre-existing depressive symptoms are needed to address the mental health needs for minority racial/ethnic groups.

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