

HEALTH BEHAVIORS AND OBESITY AMONG HISPANICS WITH DEPRESSION, UNITED STATES 2006

Objective: To examine the differences in health behaviors, and obesity between Hispanics and non-Hispanic Whites with depression.

Design: Depression data were gathered from 38 states, the District of Columbia, Puerto Rico, and the US Virgin Islands using the 2006 Behavioral Risk Factor Surveillance System, a state-based random-digit-dialed telephone survey of adults aged ≥ 18 years ($n=156,991$). The Patient Health Questionnaire 8 was used to determine current depression. Lifetime diagnosis of depression was assessed by self-report of physician diagnosis. Prevalence ratios were calculated to examine the racial/ethnic differences in leisure-time physical activity, cigarette smoking, binge drinking, heavy drinking and obesity among people with current depression and lifetime diagnosis of depression.

Results: There were significant differences in age, education, and health care coverage between Hispanics and non-Hispanic Whites with current depression and lifetime diagnosis of depression. Hispanics with current depression and with lifetime diagnosis of depression were more likely to be obese than non-Hispanic Whites. After adjusting for demographic factors, health care coverage, and self-rated health status, Hispanics with current depression were 17% more likely not to participate in leisure-time physical activity and 42% less likely to be a current cigarette smoker compared with non-Hispanic Whites. Hispanics with lifetime diagnosis of depression were 14% more likely not to participate in leisure-time physical activity and 44% less likely to be a current cigarette smoker than non-Hispanic Whites after adjusting for confounders.

Conclusions: Public health intervention programs are needed to promote healthy behaviors especially physical activity participation with in the Hispanic community, and paying particular attention to people who already are depressed. (*Ethn Dis.* 2014;24[1]:92–96)

Key Words: Depression, Ethnicity, Hispanics, Physical Activity, BRFSS

From Division of Behavioral Surveillance, Centers for Disease Control and Prevention, Atlanta (PPC, GZ, MT); and Environmental Health Tracking Branch, Division of Environmental Hazards and Health Effects, National Center for environmental Health, Centers for Disease Control and Prevention, Atlanta (LB).

Pranesh P. Chowdhury, MD, MPH; Lina S. Balluz, MPH, ScD; Guixiang Zhao, MD, PhD; Machell Town, PhD

INTRODUCTION

Approximately 6.6% of the US adult population had experienced a major depressive disorder during the preceding 12 months.¹ In the last 30 years, the American population represented by minority populations increased at a faster rate than that of non-Hispanic White populations.² The Surgeon General's supplement report on *Mental Health: Culture, Race and Ethnicity* indicates a greater burden of disability from mental illness for Hispanic populations than for Whites.³

Depression is associated with poor health-related quality of life and impaired social functioning.⁴ Depression can increase one's risk of becoming obese⁵ and to adopting unhealthy behaviors⁶ such as smoking, physical inactivity, and heavy and binge-level consumption of alcohol. Research studies have indicated a higher prevalence of any current depression among Hispanics⁷ as compared with non-Hispanic Whites. Hispanics are more likely to be obese⁸ and less likely to participate in physical activity than non-Hispanic Whites.⁹ Encouraging behaviors that promote good health and control obesity may help to alleviate depression.⁹ The purpose of our study was to examine the disparities in health behaviors and obesity between Hispanics and non-Hispanic Whites with current depression (CD) and with lifetime diagnosis of depression (LDD).

Address correspondence to Pranesh P. Chowdhury, MD, MPH; 2500 Century Blvd. NE; MSE-97; Atlanta, GA30345; 404.428.0528; 404.498.0585 (fax); Pranesh.Chowdhury@cdc.hhs.gov

The purpose of our study was to examine the disparities in health behaviors and obesity between Hispanics and non-Hispanic Whites with current depression (CD) and with lifetime diagnosis of depression (LDD).

METHODS

Data Sources

We used data from the 2006 Behavioral Risk Factor Surveillance System (BRFSS) for our study. The BRFSS is a cross-sectional telephone survey conducted by the state health departments with assistance from the Centers for Disease Control and Prevention on non-institutionalized adults aged ≥ 18 years.¹⁰ Trained interviewers collect data on a monthly basis, and interviews are conducted in English and Spanish. Design, random sampling procedures, information about weighting, and validation of the BRFSS survey are described in detail elsewhere.¹¹ During 2006, an anxiety and depression module (ADM) was added to the BRFSS survey for 38 states, the District of Columbia, Puerto Rico, and the US Virgin Islands. Five states, Connecticut, Kansas, Maryland, Nebraska, and Washington, collected ADM data on a subset of the state sample rather than on the entire sample.

The first eight questions of the ADM assess current depression with the Patient Health Questionnaire (PHQ-8) and the remaining two questions assess health care professional diagnoses of depressive disorders and anxiety disorders. The PHQ-8 has been adopted from the PHQ-9 and is an acceptable alternative to PHQ-9 in diagnosing depressive disorder.^{12,13} The PHQ-9 has been used both in population-based settings¹⁴ and in telephone-administered modes.¹⁵ Additionally, it has been shown to be effective for detecting depressive symptoms in various racial/ethnic groups.¹⁶ The PHQ-8 omits the ninth item of PHQ-9 that asks about thoughts of death or self-harm. Research indicates that the deletion of this question has only a minor effect on scoring because thoughts of self-harm are fairly uncommon in the general population and adequate intervention over the telephone is not possible.^{12,13}

We standardized the PHQ-8 response set to parallel other BRFSS questions by asking the number of days in the past 2 weeks the respondent experienced a particular depressive symptom. We converted the modified response set back to the original response set: 0 to 1 days = not at all, 2 to 6 days = several days, 7 to 11 days = more than half the days, and 12 to 14 days = nearly every day, with points (0 to 3) assigned to each category, respectively. We summed the scores for each item to produce a total score between 0 and 24 points. Current depression (CD) was defined as a PHQ-8 score of ≥ 10 , which has an 88% sensitivity and specificity for major depression.¹⁷ One question on lifetime diagnosis of depression (LDD) was asked, and the participants' responses to this question were dichotomized as yes/no: "Has a doctor or other health care provider ever told you that you have a depressive disorder (including depression, major depression, dysthymia, or minor depression)?"

Demographic and Self-rated Health Status Measures

Demographic factors included sex, age, education, marital status, health care coverage, and race/ethnicity. Respondents were classified as having health care coverage if they had any kind of health care plan, including health insurance, prepaid plans such as HMOs, or government plans such as Medicare. Self-rated health status was dichotomized into good health (excellent, very good, or good health) and fair or poor health.

We classified race/ethnicity on the basis of two questions. Respondents who reported that they were Hispanic or Latino were classified as Hispanic regardless of their answer to the other questions on race/ethnicity. Respondents who did not classify themselves as Hispanic were asked their race and were considered non-Hispanic. For our study purposes, we included non-Hispanic White as the referent.

We classified respondents as physically inactive if they had not participated in any leisure-time physical activity or exercise during the past 30 days other than their regular job. Respondents who smoked ≥ 100 cigarettes in their lifetime and smoked every day or some days were classified as current smokers. Men who reported consuming ≥ 5 drinks on one or more occasions in the past month and women who reported consuming ≥ 4 drinks on one or more occasions in that month were classified as binge drinkers. Men who had > 2 drinks per day on average and women who had > 1 drink per day on average were classified as heavy drinkers. We used respondents' self-reported weight and height to calculate body mass index (BMI = weight [kg]/height [m²]). We classified respondents as obese if their BMI was ≥ 30 kg/m².

Statistical Analyses

All analyses were conducted using SUDAAN 10.0 (Research Triangle Institute, RTP, NC) to account for the complex sample design. We excluded

participants with missing responses to any study questions leaving data from 12,678 respondents (11,140 non-Hispanic White, and 1,538 Hispanic) who reported CD and 29,467 respondents (27,091 non-Hispanic White, and 2,376 Hispanic) who reported LDD. Demographic factors, health behaviors, and obesity were compared between Hispanics and non-Hispanic Whites with CD and LDD using a Chi-square test ($P < .05$). The unadjusted and adjusted (for demographics, health care coverage, and self-rated health status) prevalence ratios (PR) were obtained using a LOGLINK (log-binomial) procedure to test the difference in health behaviors and obesity between Hispanics and non-Hispanic Whites with CD and LDD.

RESULTS

Table one summarizes characteristics of our study population. In the population subset reporting CD: among Hispanics, 65% were female, 62% were aged 18–44, 36% did not finish high school, and 36% had no health care coverage; among non-Hispanic White respondents, 61% were female, 51% were aged 18–44, 49% had $>$ high school education, and 22% had no health care coverage. In the population subset reporting LDD, among Hispanics, 69% were female, 60% were aged 18–44, 42% had $>$ high school education, and 24% had no health care coverage; among non-Hispanic Whites, 65% were female, 48% were aged 18–44, 63% had more than high school education, 14% had no health care coverage and 25% reported their health as fair or poor. A significant difference (P for Chi-square test $< .05$) persisted between Hispanics and non-Hispanic Whites for age, education, and health care coverage among people with CD and for age, education, health care coverage, and self-rated health status among people with LDD.

Table 1. Sociodemographic factors, health behaviors, and obesity by race/ethnicity among respondents with current depression (CD), and lifetime diagnosis of depression (LDD), BRFSS 2006

Characteristics	Current Depression (CD)		Lifetime Diagnosis of Depression (LDD)	
	(n=12,678)		(n=29,467)	
	Hispanic (%) (n=1,538)	Non-Hispanic White (%) (n=11,140)	Hispanic (%) (n=2,376)	Non-Hispanic White (%) (n=27,091)
Sex				
Male	35.5	39.0	30.8	35.1
Female	64.5	61.0	69.2	64.9
Age				
18–44	62.1	51.5 ^a	59.5	48.2 ^a
45–64	31.9	38.3	31.6	41.1
≥65	6.0	10.2	8.9	10.7
Education				
Not a high school graduate	36.2	16.4 ^a	31.8	8.8 ^a
High school graduate	28.7	35.1	25.9	27.9
More than high school	35.1	48.5	42.3	63.3
Marital status				
Married ^b	52.2	52.1	58.5	59.7
Prev. married	24.9	28.1	24.3	23.6
Never married	22.9	19.8	17.2	16.7
Health care coverage				
Yes	63.7	78.3 ^a	75.5	86.0 ^a
No	36.3	21.7	24.5	14.0
Self-rated health status				
Good health	51.8	55.7	56.8	75.3 ^a
Fair or poor	48.2	44.3	43.2	24.7

^a Factors significantly different between Hispanic and non-Hispanic White (Chi-square test $P < .05$).

^b Married or member of an unmarried couple.

Table 2 summarizes the association of race/ethnicity with health behaviors and obesity among people who had CD and LDD. Among people with CD and LDD, Hispanics were significantly more likely ($P < .05$) not to participate in leisure-time physical activity and less likely to report current cigarette smoking; after adjusting for confounders, Hispanics with CD were 17% more likely (PR=1.17 [1.03–1.33]) and Hispanics with LDD were 14% more likely (PR=1.14 [1.01–1.28]) not to participate in leisure-time physical activity, compared with non-Hispanic Whites with CD and LDD, respectively. In addition, Hispanics with CD were 42% less likely (PR=.58 [.48–.69]) and Hispanics with LDD were 44% less likely (PR=.56 [.47–.67]) to be current smokers, compared with their non-

Hispanic White counterparts after adjusting for confounders. Hispanics with CD and LDD were more likely to be obese than non-Hispanic Whites; but Hispanics with CD were more likely to binge and heavy drink and Hispanics with LDD were less likely to binge and heavy drink compared with non-Hispanic Whites. After adjusting for confounders, there were no associations of race/ethnicity with binge drinking, heavy drinking and obesity among people with CD and LDD.

DISCUSSION

Our results indicate that the pattern of health behaviors and obesity disparity in Hispanics with depression differed from that reported in the general His-

panic population. We found a significant association between Hispanic ethnicity and risk of being physically inactive and cigarette smoking among people with CD and LDD. Although we did not find a strong association of Hispanic ethnicity

Our results indicate that the pattern of health behaviors and obesity disparity in Hispanics with depression differed from that reported in the general Hispanic population.

Table 2. Association of race/ethnicity with health behaviors and obesity among people with current depression (CD), and lifetime diagnosis of depression (LDD), BRFSS 2006

	Current Depression (CD)		Lifetime Diagnosis of Depression (LDD)	
	Non-Hispanic White	Hispanic	Non-Hispanic White	Hispanic
No leisure time physical activity				
Prevalence, %	40.6	49.6 ^a	27.0	38.9 ^a
UPR ^b	Referent	1.22 (1.07–1.39)	Referent	1.44 (1.28–1.62)
APR ^c	Referent	1.20 (1.05–1.37)	Referent	1.26 (1.11–1.42)
APR ^d	Referent	1.17 (1.03–1.33)	Referent	1.14 (1.01–1.28)
Current smoking				
Prevalence, %	40.8	26.8 ^a	30.5	22.1 ^a
UPR ^b	Referent	.66 (.53–.81)	Referent	.73 (.60–.88)
APR ^c	Referent	.58 (.48–.70)	Referent	.58 (.49–.69)
APR ^d	Referent	.58 (.48–.69)	Referent	.56 (.47–.67)
Binge drinking				
Prevalence, %	16.2	16.8	15.3	13.5
UPR ^b	Referent	1.03 (.79–1.36)	Referent	.88 (.69–1.13)
APR ^c	Referent	.93 (.71–1.23)	Referent	.84 (.66–1.08)
APR ^d	Referent	.94 (.71–1.25)	Referent	.88 (.68–1.12)
Heavy drinking				
Prevalence, %	7.2	9.4	6.4	5.6
UPR ^b	Referent	1.31 (.86–2.00)	Referent	.88 (.56–1.37)
APR ^c	Referent	1.18 (.78–1.79)	Referent	.87 (.55–1.38)
APR ^d	Referent	1.19 (.79–1.80)	Referent	.92 (.58–1.46)
Obese				
Prevalence, %	35.6	38.2	32.1	34.8
UPR ^b	Referent	1.07 (.92–1.26)	Referent	1.09 (.96–1.23)
APR ^c	Referent	1.10 (.94–1.29)	Referent	1.07 (.94–1.22)
APR ^d	Referent	1.08 (.93–1.26)	Referent	1.00 (.88–1.13)

^a Factors significantly different between Hispanic and non-Hispanic White ($P < .05$).

^b Unadjusted prevalence ratio (95% confidence interval).

^c Adjusted prevalence ratio - adjusted for demographics and health care coverage (95% confidence interval).

^d Adjusted prevalence ratio - adjusted for demographics, health care coverage, and self-rated health status (95% confidence interval).

with obesity among people with depression, a high prevalence of obesity among Hispanics ($\approx 35\%$) with CD and LDD is a public health concern.

Physical activity, particularly aerobic and resistant-based exercise, can be an effective intervention for clinical depression.¹⁸ Research has demonstrated that higher levels of physical activity are associated with fewer depressive symptoms.^{19,20} Our preliminary analyses found that the association of depression (CD and LDD) and participation in leisure time physical activity significantly differed between non-Hispanic Whites and Hispanics. After adjusting for confounders, Hispanics with CD and LDD were 14%–17% more likely not to participate in leisure-time physical activity than non-Hispanic Whites.

Research has indicated that social, cultural, and environmental factors can influence physical activity patterns among minority populations.²¹ Consequently, public health practitioners need to target the evidence-based strategies recommended by the Task Force on Community Preventive Services to increase physical activity among the Hispanic population especially those with depression.²²

Cigarette smoking is the single-most preventable cause of death in the United States. Research indicates that people with major depression are more likely to smoke^{23,24} and history of daily smoking increases risk for depression.²⁴ The National Survey on Drug Use and Health (2006–2008) reported lower prevalence of current cigarette smoking

among Hispanics than non-Hispanic Whites.²⁵ Our study indicated that Hispanics with CD and a LDD were nearly 40% less likely to be current smokers than non-Hispanic Whites. Our findings are in accordance with an overall lower prevalence of cigarette smoking found among Hispanics in the general population.⁹

Obesity continues to be a major public health concern. According to The National Health and Nutrition Examination Survey (NHANES), 35.9% of US adults (aged ≥ 20 years) were obese during 2009–2010. There was a significant increase in obesity prevalence from 1999 through 2010 for men and Mexican-American women.²⁶ Previous studies indicated a significant association between depressive

symptoms²⁷ and high body mass index or obesity.⁵ Similarly, our study indicated a high prevalence of obesity in Hispanics with CD and LDD. Although we did not find a significant association between Hispanic ethnicity and obesity among people with CD and LDD, the high level of obesity among Hispanics underscores the need to develop and implement programs to control obesity in this population.

The findings in our study are subject to several limitations. First, depression data were available for only 38 states, the District of Columbia, Puerto Rico, and the US Virgin Islands; therefore, our results may not represent the entire country. Secondly, all information on health behaviors and obesity was self-reported, and thus subject to recall bias. Nonetheless, BRFSS has a very good sample size for this minority population and PHQ-8 is a well-validated measure for depression.

As Hispanic populations continue to grow in the United States, it is important to find ways to address their changing mental health needs. Culturally appropriate public health programs that promote healthy behaviors like increasing physical activity and weight control are needed to improve health conditions of Hispanic population, including people with depression.

ACKNOWLEDGMENTS

The findings and conclusions in this article are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

REFERENCES

1. Kessler RC, Berglund P, Demler O, et al. The epidemiology of major depressive disorder: results from the National Comorbidity Survey Replication (NCS-R). *JAMA*. 2003;289(23):3095–3105.
2. Day JC. Population projections of the United States by age, sex, race, and Hispanic origin: 1995 to 2050: US Bureau of the Census, Current Population Reports, P25–1130. Washington, DC: US Government Printing Office; 1996.
3. U.S. Department of Health and Human Services. (2001). Mental Health: Culture,

- Race, and Ethnicity—A Supplement to Mental Health: A Report of the Surgeon General. Rockville, MD: U.S. Department of Health and Human Services, Substance Abuse and Mental Health Services Administration, Center for Mental Health Services; 2001.
4. Creed F, Morgan R, Fiddler M, et al. Depression and anxiety impair health-related quality of life and are associated with increased costs in general medical inpatients. *Psychosomatics*. 2002;43(4):302–309.
5. Chapman DP, Perry GS, Strine TW. The vital link between chronic disease and depressive disorders. *Prev Chronic Dis*. 2005;2(1)
6. Strine TW, Mokdad AH, Dube SR, et al. The association of depression and anxiety with obesity and unhealthy behaviors among community-dwelling US adults. *Gen Hosp Psychiatry*. 2008;30(2):127–137.
7. Centers for Disease Control and Prevention. Current depression among adults —United States, 2006 and 2008. *MMWR Morb Mortal Wkly Rep*. 2010;59(38):1229–1235.
8. Centers for Disease Control and Prevention. Differences in prevalence of obesity among Black, White, and Hispanic adults —United States, 2006–2008. *MMWR Morb Mortal Wkly Rep*. 2009;58(27):740–744.
9. Chowdhury PP, Balluz L, Okoro C, et al. Leading health indicators: a comparison of Hispanics with non-Hispanic Whites and non-Hispanic Blacks, United States 2003. *Ethn Dis*. 2006;16(2):534–541.
10. Centers for Disease Control and Prevention. Public health surveillance for behavioral risk factors in a changing environment: recommendations from the Behavioral Risk Factor Surveillance Team. *MMWR Recomm Rep*. 2003;52(RR-9):1–12.
11. Centers for Disease Control and Prevention. Behavioral Risk Factor Surveillance System Operational and User's Guide, Version 3.0. Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention; 2006.
12. Kroenke K, Spitzer RL. The PHQ-9: a new depression diagnostic and severity measure. *Psychiatric Annals*. 2002;32:1–7.
13. Kroenke K, Strine TW, Spitzer RL, et al. The PHQ-8 as a measure of current depression in the general population. *J Affect Disord*. 2009;114:163–173.
14. Martin A, Rief W, Klaiberg A, Braehler E. Validity of the brief patient health questionnaire mood scale (PHQ-9) in the general population. *Gen Hosp Psychiatry*. 2006;28(1):71–77.
15. Pinto-Meza A, Serrano-Blanco A, Penarrubia MT. Assessing depression in primary care with the PHQ-9: can it be carried out over the telephone? *J Gen Intern Med*. 2005;20:738–742.
16. Huang FY, Chung H, Kroenke K, et al. Using the Patient Health Questionnaire-9 to measure

- depression among racially and ethnically diverse primary care patients. *J Gen Intern Med*. 2006;21(6):547–552.
17. Kroenke K, Spitzer RL, Williams JB. The PHQ-9: validity of a brief depression severity measure. *J Gen Intern Med*. 2001;16(9):606–613.
18. Bluementhal JA, Babyak MA, Doraiswamy PM, et al. Exercise and pharmacotherapy in the treatment of major depressive disorder. *Psychosom Med*. 2007;69(7):587–596.
19. Stephens T. Physical activity and mental health in the United States and Canada: evidence from four population surveys. *Prev Med*. 1988;17(1):35–47.
20. Camacho T, Roberts RE, Lazarus NB, et al. Physical activity and depression: evidence from Alameda county study. *Am J Epidemiol*. 1991;134(2):220–231.
21. Lee SM. Physical activity among minority populations: what health promotion practitioners should know—a commentary. *Health Promot Pract*. 2005;6(4):447–52.
22. Centers for Disease Control and Prevention. Increasing physical activity: a report on recommendation of the Task Force on Community Prevention Services. *MMWR Recomm Rep*. 2001;50(RR-18)
23. Covey LS, Glassman Ah, Stetner F. Cigarette smoking and major depression. *J Addict Dis*. 1998;17(1):35–46.
24. Breslau N, Peterson E, Schultz LR, et al. Major depression and stages of smoking: A longitudinal investigation. *Arch Gen Psychiatry*. 1998;55:161–166.
25. Centers for Disease Control and Prevention. Cigarette smoking—United States, 1965–2008. *MMWR Morb Mortal Surveill Summ*. 2011;60(suppl.):109–113.
26. Flegal KM, Carroll MD, Kit BK, et al. Prevalence of obesity and trends in the distribution of body mass index among US adults, 1999–2010. *JAMA*. 2012;307(5):491–497.
27. Zhao G, Ford ES, Dhingra S, et al. Depression and anxiety among US adults: associations with body mass index. *Int J Obesity*. 2009;33(2):257–266.

AUTHOR CONTRIBUTIONS

Design and concept of study: Chowdhury, Balluz, Town
Acquisition of data: Chowdhury
Data analysis and interpretation: Chowdhury, Balluz, Zhao, Town
Manuscript draft: Chowdhury, Balluz, Zhao, Town
Statistical expertise: Chowdhury, Balluz, Zhao
Acquisition of funding:
Administrative: Chowdhury, Balluz
Supervision: Balluz, Town