

Racial and Ethnic Differences in Asthma and Mental Health among US Adults: Results from the National Survey on Drug Use and Health.

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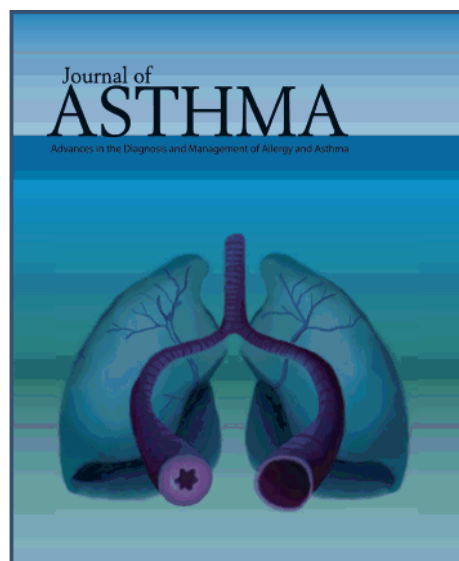
Abstract

Objective: Evaluate the racial and ethnic differences in asthma and mental health comorbidity.

Methods: A secondary analysis of 2008-2013 National Survey on Drug Use and Health was conducted, resulting in a total of 206,993 civilian adult respondents to evaluate the association between asthma and mental health (past year serious psychological distress [SPD] and doctor diagnosis of depression). Both survey weighted bivariate (chi-square) and multivariable (binary logistic) regression analyses, after accounting for control variables, were conducted to evaluate the asthma/mental health nexus. A *P* value of less than 0.05 was used to denote significance.

Results: Current asthma was significantly associated with past year SPD for non-Hispanic Whites (adjusted odds ratio [aOR] = 1.45), Hispanics (aOR = 1.68), and Black/African Americans (aOR = 1.47). A similar association was noted for current asthma and past year doctor diagnosis of depression (non-Hispanic White aOR = 1.74; Hispanics aOR = 1.77; Black/African American aOR = 1.62). Among those with lifetime asthma, higher odds of SPD were reported for non-Hispanic Whites (aOR = 1.42), Hispanics (aOR = 1.64), and Black/African Americans (aOR = 1.50). Lifetime asthma also significantly associated with past year doctor diagnosis of depression for non-Hispanic Whites (aOR = 1.42), Hispanics (aOR = 1.41), and Black/African Americans (aOR = 1.46).

Conclusion: Our results demonstrate the significant burden of asthma and mental health comorbidity among diverse racial and ethnic groups. Improved public health efforts through promotion of integrated care for early screening and preventive measures are needed to alleviate the burden for at-risk groups.



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Key words: Depression, serious psychological distress, racial and ethnic groups, current asthma, lifetime asthma

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Conclusion: Our results demonstrate the significant burden of asthma and mental health comorbidity among diverse racial and ethnic groups. Improved public health efforts through promotion of integrated care for early screening and preventive measures are needed to alleviate the burden for at-risk groups.

Introduction

Mental illness, comprising a spectrum of conditions, including major depression, schizophrenia, bipolar disorder, obsessive compulsive disorder (OCD), panic disorder, posttraumatic stress disorder (PTSD) and borderline personality disorder, contributes to nearly \$58 billion in healthcare costs in 2006 (1). Results from the 2012 National Survey on Drug Use and Health (NSDUH) note that nearly 44 million and 10 million American adults had any mental illness and serious mental illness, respectively (2). In addition, mood disorders, specifically depression, are the most common type of mental illness in the nation, affecting 26% of all adult Americans (3).

Asthma, a respiratory illness, results from tightening of airway passages and is often characterized by wheezing, shortness of breath, and nighttime or early morning coughing (4). Current estimates demonstrate a 7.7% prevalence of asthma among adults, with higher rates noted among women and those of low socioeconomic status (5). Additionally, 479,300 hospitalizations, 1.9 million emergency department visits, and 8.9 million doctor visits were due to asthma in 2009, while nearly nine deaths are attributable to asthma every day (6).

The current literature has further highlighted a putative association between asthma and mental health. Studies in Canada, Spain, and China have reported a significant association between asthma to that of anxiety and panic disorders (7–10). Similarly, Strine and colleagues (11) utilizing Behavioral Risk Factor Surveillance System (BRFSS) 2001 demonstrated that those with asthma and frequent mental distress (14 or more days within the last month) were more likely to report negative health behaviors, such as smoking, obesity, and physical inactivity, demonstrating a lower health-related quality of life. To our knowledge, assessment of racial and ethnic differences in the asthma-mental health nexus is lacking in the literature, as is the association of both current and lifetime asthma to that of serious psychosocial distress and doctor diagnosis of depression.

Such an assessment is imperative, as both mental health and asthma remain leading public health priorities and often varies by racial and ethnic groups. For example, national data (12) demonstrate a higher prevalence of current depression among Blacks (8%) and Mexican Americans (6.3%), as compared to non-Hispanic Whites (5%). Similarly, according to CDC, Blacks are two to three times more likely to die from asthma, as compared to other racial and ethnic groups in the nation (6). As such, understanding the association between asthma and mental health by racial and ethnic groups can not only add to the limited body of literature, but further provide public health professionals the foundational tool to create targeted preventive and integrated care measures for at-risk groups.

Methods

Data source

We used the National Survey on Drug Use and Health (NSDUH) public access data from 2008-2013. NSDUH, sponsored by the Substance Abuse and Mental Health Services Administration (SAMHSA), is an annual interview survey providing national and state-level estimates of substance use and abuse and their risk factors among the non-institutionalized population in the United States aged 12 years or older. Details of data collection methodology can be found elsewhere (13,14). In this study, we included American civilian adults (aged 18 or above) resulting in a total sample (n) of 206,993, representing an average annual population estimate (N) of 202,887,519.

Measures

The exposure variables in our study were both current and lifetime asthma. The outcome variables included past year doctor diagnosis of depression and past year SPD. NSDUH questionnaire includes a list of several self-reported doctor or other medical professional's diagnosis of conditions, including asthma and mental health status. For example, participants responding asthma to the following question were selected as having lifetime asthma in our study: "Following is a list of health conditions. Please read the list, and type in the numbers of any of these conditions that a doctor or other medical

professional has ever told that you had.” In addition, respondents reporting asthma from the following question were defined as having current asthma in our study: “Which, if any, of these conditions did a doctor or other medical professional tell you that you had in the past 12 months.” Similarly, those reporting diagnosis of depression in the past 12 months, were defined as past year doctor diagnosis of depression in our study. The NSDUH-created variable of “Past year serious psychological distress (SPD) indicator” was utilized to identify participants with SPD. This variable was based on the Kessler 6 scale assessing on symptoms of distress, including: feeling nervous; feeling hopeless; feeling restless or fidgety; feeling so sad or depressed that nothing could cheer you up; feeling that everything was an effort; and feeling down on yourself, no good, or worthless.

In addition, we included sociodemographic control variables of: age (18-34 years, 35-49 years, 50-64 years, 65 years or more), gender (male, female), marital status (currently not married, currently married), total annual family income (\$20,000 or less, \$20,000-\$49,999, \$50,000-\$74,999, and \$75,000 or more), education level (high school or less, some college, college graduate), employment status (currently not employed, currently employed), current health insurance status (currently not insured, currently insured), and metropolitan area (large metro, small metro, nonmetro). The literature has noted several risk factors associated with poor mental health outcomes, including substance use, chronic diseases, lack of religiosity, and incarceration (15–19). As such, we further included smoking behavior, past year illicit drug or alcohol dependency, lifetime history of sexually transmitted diseases (STD) and chronic diseases (including lifetime diabetes, heart disease, stroke, and blood pressure), and reporting importance of religious beliefs in life. Race and ethnic groups were defined as provided by NSDUH: non-Hispanic Whites, Hispanics, non-Hispanic Asian American and Pacific Islanders (AAPI), and non-Hispanic Black/African Americans. In NSDUH, AAPI were defined as non-Hispanic Asian American and non-Hispanic Native Hawaiian/Other Pacific Islander, which were collapsed as one group, AAPI, in our study. Several other racial/ethnic groups were defined as “Other” in NSDUH, but excluded from this study due to heterogeneity of the group.

Data analysis

All analyses were conducted utilizing appropriate survey weights. The first step was to conduct descriptive analyses to demonstrate the sociodemographic and other characteristics of the study population, by racial and ethnic groups. Next, we conducted survey weighted chi-square analyses to assess if there was an association between the prevalence of mental health outcomes (current depression and SPD) and asthma status (current and lifetime) among racial and ethnic groups in the study (non-Hispanic Whites, Hispanics, AAPI, and Black/African Americans). Finally, independent survey weighted multivariable logistic regression analyses were employed to evaluate the association and predict the relationship between asthma and mental health status, upon adjusting for control variables and survey year. Significance was established at $p < 0.05$ and we used SAS 9.4 (SAS Institute, Inc., Cary, NC) for all data analyses.

Results

Table 1 summarizes the characteristics of the study population, by each racial and ethnic group. Prevalence of both asthma and mental health status were significantly ($P < .0001$) different across each racial and ethnic group. For example, highest prevalence of current and lifetime asthma were noted among Black/African Americans at nearly 7.40% and 12.40%, respectively, while lowest in AAPI (current asthma = 4.32%, lifetime asthma = 9.17%). Non-Hispanic Whites reported the highest prevalence of past year SPD (11.35%) and doctor diagnosis of depression (9.06%), while AAPI had the lowest for both.

Several other characteristics were different in the racial and ethnic groups in our study population. For example, non-Hispanic Whites had a higher prevalence of those aged 65 years of age or older (16.74%) while lowest were noted among Hispanics (7.90%). On the other hand, higher prevalence of 18-34 years was among Hispanics (43.60%). For all groups, females were the majority of the study population, with higher prevalence noted for Black/African Americans (59.64%). Marital status was

diverse in the study population with majority of non-Hispanic Whites (58.17%) and AAPI (62.10%) noted as currently married, as compared to Hispanics (49.31%), and Black/African Americans (31.08%).

Socioeconomic status of the study population was significantly diverse ($P < .0001$), with highest prevalence of those with annual family income of \$75,000 or more noted among non-Hispanic Whites (36.70%) and AAPI (42.64%). Similarly, the highest prevalence of being a college graduate was present in the AAPI group (59.59%). Majority of the study population in each racial and ethnic group were currently employed, had current insurance, lived in large metropolitan, with highest prevalence of all noted for AAPI.

Statistically significant differences ($P < .0001$) were also noted for risk factors in the study population. For example, prevalence of ever smoker were highest among non-Hispanic Whites (47.62%) and lowest for AAPI (21.03%). Highest prevalence of STD were noted for Black/African Americans (6.11%) and lowest for AAPI (1.22%). Prevalence of lifetime chronic disease further ranged from 34.19% in Black/African Americans to 19.98% in Hispanics. In our study, Black/African Americans had the highest prevalence of history of incarceration (21.70%) and past year illicit drug/alcohol dependency (5.52%), while AAPI reported the lowest for each (history of incarceration = 5.65%, past year illicit drug/alcohol dependency = 2.19%). Non-Hispanic Whites reported the highest prevalence of no religious importance in life (28.56%) while Black/African Americans reported the lowest (15.05%).

Table 2a demonstrates the racial and ethnic group-specific prevalence of mental health outcomes among those with current asthma as compared to those without. Results show that significantly higher prevalence of both past year SPD and doctor diagnosis of depression were among non-Hispanic Whites, Hispanics, and Black/African Americans with current asthma as compared to those without such condition. For example, prevalence of past year SPD was 18.52% among Hispanics with current asthma compared to 9.86% among Hispanics without current asthma. Similarly, past year doctor diagnosis of

depression was higher among Black/African Americans with current asthma as compared to those without (7.63% vs. 3.95%). No significant differences in mental health outcomes were noted for AAPIs.

Among those with lifetime asthma, as compared to those without (Table 2b), past year diagnosis of depression was also significantly higher for non-Hispanic Whites (13.35% vs. 8.49%), Hispanics (8.01% vs. 4.86%), and Black/African Americans (6.48% vs. 3.90%). Among all racial and ethnic groups, a higher percent of past year SPD was noted for those with lifetime asthma compared to those without.

Table 3 summarizes the results of survey weighted multivariable logistic regression analyses of odds of mental health outcomes among those with current and lifetime asthma, by racial and ethnic group. Upon adjusting for control variables and survey years, results demonstrate significantly increased odds of past year doctor diagnosis of depression among non-Hispanic Whites (adjusted odds ratio [aOR] = 1.74), Hispanics (aOR = 1.77), and Black/African Americans (aOR = 1.62) with current asthma, as compared to those without current asthma. Likewise, higher odds of past year SPD were noted among non-Hispanic Whites (aOR = 1.45), Hispanics (aOR = 1.68), and Black/African Americans (aOR = 1.47) with current asthma as compared to those without.

A similar trend was noted among those with lifetime asthma, with increased odds of past year diagnosis of depression reported among non-Hispanic Whites (aOR = 1.42), Hispanics (aOR = 1.41), and Black/African Americans (aOR = 1.46). Past year SPD was also higher for non-Hispanic Whites (aOR = 1.42), Hispanics (aOR = 1.64), and Black/African Americans (aOR = 1.50) with lifetime asthma, as compared to those without. No significant associations were noted with asthma status (current or lifetime) with any mental health outcomes among the AAPI population.

Discussion

The literature has noted a putative association between asthma and mental health (7,20,21). Few studies, however, have demonstrated the role of current and lifetime asthma on mental health outcomes such as doctor diagnosis of depression and SPD, among racial and ethnic groups in order to highlight

potential disparities and at-risk groups. By using the 2008-2013 NSDUH public access data, we were able to address such a gap in the literature.

Our study noted differences in the prevalence of both past year SPD and doctor diagnosis of depression among racial and ethnic groups. National reports show a higher prevalence of current depression among Blacks (12). In our study higher prevalence SPD was noted among non-Hispanic Whites, closely followed by Black/African Americans and Hispanics. On the other hand, past year doctor diagnosis of depression was highest among non-Hispanic Whites and substantially lower among racial and ethnic minorities. One potential explanation for such trends could be the limited access to mental health services. For instance, in our study, nearly 36% and 21% of Hispanics and Black/African Americans, respectively, reported lacking current health insurance, as compared to 12% of non-Hispanic Whites. As such, lack of insurance may posit a barrier for such minorities to access mental health services, and in turn lower diagnoses rates. Such a putative association between lack of insurance and mental health service utilization has been further shown in the literature (22). Researchers have also noted that stigma and perceived discrimination can often limit ethnic minorities' mental health service utilization, and in turn such factors could explain the lower rates of depression diagnoses noted among Hispanics and Black/African Americans in our study (23). Despite lower diagnosis rates, the disparities in mental illness and thus the need for services among Hispanics and Black/African Americans, however, is evident in our study as reflected by the prevalence of SPD in both groups.

Similarly, our results demonstrated differences in both current and lifetime prevalence of asthma across racial and ethnic groups, with highest prevalence of both current and lifetime asthma noted among Black/African Americans. In our study, AAPIs reported the lowest asthma prevalence, consistent with previous literature (24). Such disparities in asthma prevalence among racial and ethnic minorities highlight the need for targeted interventions, including early screening, among at-risk populations.

Distribution of mental health outcomes by asthma status also highlight that in most racial and ethnic groups, prevalence of past year SPD and depression diagnosis were higher among those with asthma, as compared to those without asthma. Multivariable logistic regression analyses further confirmed, that upon adjusting for control variables, both current and lifetime asthma were significantly associated with SPD and past year depression diagnosis among most racial and ethnic groups. Such trends are similar to previous researchers addressing the asthma/mental health nexus. For example, a study among Canadian adults noted that asthma diagnosis was significantly associated with increased odds of several mental illnesses, including PTSD, panic disorder, and mania (7). Results of our study also showed such an association with asthma and mental health, specifically SPD and depression diagnosis among American adults by racial and ethnic groups. Similarly, results from BRFSS 2006 further demonstrated a dose-dependent association with current asthma and poor mental health days, though the association with that of lifetime asthma remained inconclusive (25). In our study, we were able to demonstrate the association between lifetime asthma and mental health, in addition to reporting racial and ethnic differences in such a nexus. Addressing lifetime asthma, distinct from current asthma, is critical, as those with lifetime asthma may not currently have symptoms, as compared to those with current asthma. In addition, only evaluating those with current asthma may significantly undercount the true asthma burden, as asthma is a chronic disease without any cure (26). As such, our study, assessing both current and lifetime asthma, adds to the limited body of literature on the asthma-mental health nexus.

While the association between asthma and mental health outcomes among Asian Americans did not yield significant results, it should be interpreted with caution. The literature notes several cultural barriers among the AAPI population that may explain the lower rates of both SPD and depression diagnoses in our study among the said population. For example, researchers have shown that Asian cultures may often perceive display of emotions as weakness and in turn discourage such display to maintain societal and family harmony (27). Such stigma can play a significant factor in lower rates of discussion of mental health and thus service utilization (28). In addition, lack of Western equivalent

standards of Asian culture-specific terminologies of mental health (27) may further add to the lower prevalence of mental illness among AAPIs. Such cultural barriers may partially explain the low rates of mental health outcomes noted in our study and the lack of association between asthma and mental health in the AAPI population.

These trends in mental health stigma and low prevalence, potentially resulting from low mental health service utilization, however, highlight the need for integrated care for at-risk groups. For example, integrating mental health with primary care could provide a safer option for those of AAPI population wanting to seek help but are limited due to cultural barriers. Making mental health screening as part of regular health care could eliminate or at least in part lower the culture-associated stigma related with seeking out specific services.

Our study is not without limitations. The NSDUH data is cross-sectional and thus does not provide a causal relationship between asthma and mental health. The data is further susceptible to self-report and social desirability biases, especially among minority groups where stigma related to mental health is prevalent. In addition, the lack of Asian American subgroup analyses limits our ability to assess whether the asthma-mental health nexus varies by Asian ethnicity. The lack of longitudinal clinical data limited our ability to assess the impact of such a nexus, such as on health resource utilization; a need that future studies may address.

Notwithstanding such limitations, the results of this study have significant implications. The racial and ethnic group-specific analyses highlight at-risk groups and those in need for further preventive measures. For instance, our results showed that most racial and ethnic groups with asthma have a significant mental health burden and thus routine screening is warranted. Similarly, the high prevalence of SPD among Hispanics and Black/African Americans, despite the low doctor diagnosis of depression, demonstrates the need for improved mental health service access and utilization among such vulnerable populations. The asthma-mental health nexus noted in our study also demonstrates a substantial public

health concern in the United States among various racial and ethnic groups, and thus the need for integrated care. Finally, the use of a population-based survey allows our results to be generalizable to the United States adult civilian population, in turn providing public health professionals a comprehensive evaluation of the asthma-mental health burden.

JUST ACCEPTED

Declaration of Interest and Acknowledgements.

The authors have no conflict of interest to declare, financial or otherwise.

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Table 1. Characteristics of study population, National Survey on Drug Use and Health, 2008-2013

(n = 206,993, Average Annual N=202,887,519)

	Non-Hispanic White	Hispanic	AAPI	Black/African American	P value
Sample size (n)	134,155	35,499	9,941	27,398	
Age (years), %					<.0001
18-34	29.44	43.60	36.43	37.92	
35-49	27.04	31.48	32.35	28.11	
50-64	26.78	17.01	20.73	22.30	
65 or more	16.74	7.90	10.50	11.68	
Sex, %					<.0001
Male	41.83	48.96	45.65	40.36	
Female	58.17	51.04	54.35	59.64	
Marital Status, %					<.0001
Currently not married	44.61	50.69	37.90	68.92	
Currently married	55.39	49.31	62.10	31.08	
Total Annual Family Income, %					<.0001
\$20,000 or less	14.88	26.70	15.14	33.48	
\$20,000 - \$49,999	29.93	42.28	25.30	36.17	
\$50,000 - \$74,999	18.49	13.35	16.92	13.61	
\$75,000 or more	36.70	17.67	42.64	16.74	
Education, %					<.0001
High school or less	40.91	64.69	22.83	54.35	
Some college	26.29	21.55	22.58	28.07	
College graduate	32.79	13.76	54.59	17.58	

Employment Status, %					<.0001
Currently not employed	33.18	33.06	29.67	38.84	
Currently employed	66.82	66.94	70.33	61.16	
Insurance Status, %					<.0001
Currently not insured	12.33	35.63	14.10	20.93	
Currently insured	87.67	64.37	85.90	79.07	
Metropolitan Area, %					<.0001
Large metro	47.24	68.35	76.39	66.36	
Small metro	32.96	25.28	20.00	23.17	
Nonmetro	19.79	6.38	3.61	10.47	
Risk Factors, %					
Ever smoker	47.62	29.52	21.03	34.00	<.0001
Lifetime STD	3.75	2.67	1.22	6.11	<.0001
Lifetime chronic disease	28.90	18.98	21.13	34.19	<.0001
No reported religious importance in life	28.56	21.06	26.61	15.05	<.0001
History of incarceration	17.44	15.99	5.65	21.70	<.0001
Past year illicit drug/alcohol dependency	5.04	5.03	2.19	5.52	<.0001

Table 1. Continued

	Non- Hispanic White	Hispanic	AAPI	Black/African American	<i>P</i> value
Asthma Status, %					
Current	6.00	5.61	4.32	7.40	<.0001
Lifetime	11.78	9.69	9.17	12.40	<.0001
Mental Health Outcomes, %					
Past year SPD	11.35	10.32	7.77	10.70	<.0001
Past year doctor diagnosis of depression	9.06	5.17	2.53	4.22	<.0001

AAPI = Asian American and Pacific Islander, SPD = serious psychological distress.

Table 2a. Prevalence of mental health outcomes among civilian adults with or without current asthma, National Survey on Drug Use and Health, 2008-2013

	Current Asthma	No Current Asthma	P value
Past year doctor diagnosis of depression, % (95% CI)			
Non-Hispanic White	16.55 (15.10, 18.01)	8.59 (8.33, 8.84)	<.0001
Hispanic	10.57 (8.43, 12.70)	4.85 (4.35, 5.34)	<.0001
AAPI	2.42 (0.69, 4.14)	2.54 (1.97, 3.10)	0.9011
Black/African American	7.63 (5.24, 10.03)	3.95 (3.54, 4.35)	0.0002
Past year SPD, % (95% CI)			
Non-Hispanic white	17.48 (16.16, 18.80)	10.99 (10.71, 11.26)	<.0001
Hispanic	18.52 (15.77, 21.28)	9.86 (9.33, 10.40)	<.0001
AAPI	8.02 (5.45, 10.59)	7.74 (6.90, 8.58)	0.8417
Black/African American	16.89 (14.69, 19.09)	10.27 (9.64, 10.89)	<.0001

Table 2b. Prevalence of mental health outcomes among civilian adults with or without lifetime asthma, National Survey on Drug Use and Health, 2008-2013

	Lifetime Asthma	No Lifetime Asthma	P value
Past year doctor diagnosis of depression, % (95% CI)			
Non-Hispanic White	13.35 (12.45, 14.24)	8.49 (8.21, 8.76)	<.0001
Hispanic	8.01 (6.60, 9.42)	4.86 (4.35, 5.37)	<.0001
AAPI	2.64 (1.09, 4.19)	2.52 (1.94, 3.09)	0.8820
Black/African American	6.48 (4.89, 8.06)	3.90 (3.49, 4.30)	0.0004
Past year SPD, % (95% CI)			
Non-Hispanic White	16.78 (15.81, 17.76)	10.66 (10.38, 10.93)	<.0001
Hispanic	17.40 (15.66, 19.14)	9.59 (9.05, 10.12)	<.0001
AAPI	10.55 (7.40, 13.70)	7.48 (6.63, 8.34)	0.0450

Black/African American	16.24 (14.69, 17.79)	10.00 (9.38, 10.62)	<.0001
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AAPI = Asian American and Pacific Islander, SPD = serious psychological distress, CI = confidence interval. Significance established at $P < .05$

JUST ACCEPTED

Table 3. Logistic regression odds ratio (95% CI) of mental health outcomes among civilian adults with current and lifetime asthma, National Survey on Drug Use and Health, 2008-2013^a

	<u>Current Asthma</u>		<u>Lifetime Asthma</u>	
	Depression Diagnosis	Past year SPD	Depression Diagnosis	Past year SPD
Non-Hispanic				
White	1.74 (1.55, 1.96)***	1.45 (1.32, 1.60)***	1.42 (1.29, 1.57)***	1.42 (1.31, 1.55)***
Hispanic	1.77 (1.40, 2.25)***	1.68 (1.37, 2.06)***	1.41 (1.15, 1.72)**	1.64 (1.42, 1.90)***
AAPI	0.90 (0.38, 2.14)	1.13 (0.77, 1.67)	0.86 (0.42, 1.73)	1.36 (0.97, 1.92)
Black/African American	1.62 (1.09, 2.40)*	1.47 (1.19, 1.82)**	1.46 (1.09, 1.95)*	1.50 (1.29, 1.75)***

* $P < 0.05$, ** $P < 0.005$, *** $P < 0.0001$

AAPI = Asian American and Pacific Islander, SPD = serious psychological distress. CI = confidence interval.

^aModel adjusted for: age, gender, marital status, total annual family income, education, employment, health insurance, metropolitan area, smoking status, lifetime sexually transmitted disease, lifetime chronic disease, religious importance, incarceration history, past year illicit drug or alcohol dependency, and survey year.