Prevalence and Impact of Adverse Childhood Experiences in the Hispanic Community by Questionnaire Language Preference: Behavioral Risk Factor Surveillance System (BRFSS) 2011, 2012

Culminating Experience- Northwestern University Masters of Public Health

Abstract

Objective: The study analyzes the prevalence of Adverse Childhood Experiences (ACEs) in the Hispanic population of nine states, using 2011-2012 Behavioral Risk Factor Surveillance System (BRFSS). The study compares ACEs prevalence and adult self-reported health status, chronic conditions, and behavioral risk factors by English versus Spanish survey language.

Methods:. BRFSS data are weighted estimates that reflect state level populations. ACEs were compared by questionnaire language preference and by respondent sociodemographic characteristics. Self-reported health status, behavioral risk factors and chronic conditions were dichotomized into adverse adult health outcomes and compared across four categories of ACEs score (0, 1, 2-3, 4+). Chi square tests were used to determine the statistical significance of language preference differences in individual ACE items and sociodemographic characteristics. Multiple logistic regression, adjusted for differences in language preference within each level of ACEs score, was used to analyze the likelihood of adverse adult health outcomes independently associated with language preference across all ACE score categories.

Results: From over 68,000 respondents 2,983 affirmed being Hispanic or Latino, representing a weighted population of 1,855,212. For the overall cohort and both language preference groups, respondents ages 35 to 49, women, and the uninsured reported the highest percentage of "4+" ACEs. Verbal abuse was the most common adverse childhood experience reported (27.2%) while being forced to have sex was the least common (4.9%). The prevalence of the majority of individual adverse childhood experiences differed significantly between the English and Spanish questionnaire preference groups ($p<0.01$). Reporting "4+" ACEs was associated with an elevated prevalence of disability, cancer, COPD, asthma, depression, smoking, and heavy drinking but not

diabetes, self-reported, physical, mental, and general health, and in the overall cohort. Differences between the English and Spanish "4+" ACE groups included higher odds of having cancer, having smoked, and being a heavy drinking among English preference respondents and higher odds of poor or fair general health, cardiovascular disease and COPD among those that preferred Spanish.

Conclusions: There were substantial differences in both ACEs prevalence by BRFSS language preference and in both populations there was a strong association between effects of ACEs score on adult health outcomes. The superior health status of Spanish language respondents, a younger, healthier population, may in part correspond to differences in immigrant health, or as described in terms of cultural differences, 'acculturation'. However, it is important to note that the nine states studied reflect smaller, more isolated Hispanic communities than those of high Hispanic population states usually studied.

The greatest association between high ACEs score and bad health outcomes was seen among English survey language survey respondents with the highest ACE score. Public health and medical professionals are trying to address childhood adversity as we better understand how it is a root cause for many negative adult health conditions. Approaches to universal screening by pediatricians and trauma informed care for adults are evolving.

Public Health Relevance

The original Adverse Childhood Experiences (ACE) study, conducted at Kaiser in the 1990s, found that adult reports of adverse childhood experiences, defined as psychological, physical, and sexual abuse, and household dysfunction before the age of 18, have an association with several adult health risk behaviors, poor self-reported health, and chronic diseases.(1-4) Findings also showed a strong positive correlation between the number of questionnaire adverse childhood experience items reported (the ACEs count) and self-reported prevalence of several leading causes of death.(1) There has been little research on childhood adversity in immigrant populations. It remains unclear whether the association of childhood adversity with adult health is essentially the same or different depending on cultural or ethnic identity.

ACEs in the Study Of Latinos (SOL)

A recent study focused on ACEs within the Hispanic population found a higher prevalence of ACEs among US Hispanics/Latinos and showed that the prevalence within the Hispanic population varied by ancestry (country of origin) and nativity (born in or outside the US mainland).(5) Additionally, the study of 5117 Hispanics from four large urban areas with large Hispanic populations found that there was a lower burden of chronic disease than in the original ACEs study despite a higher prevalence of ACEs among Hispanic SOL respondents. The SOL ACEs study supports previous findings that the Hispanic/Latino population is a heterogeneous one, in which health outcomes and behavioral risk factors are affected by ancestry and nativity.(6-8) However, the SOL ACEs study did not present finding by preferred language of respondents which can reflect acculturation and be associated with health outcomes.(9-12)

Study Aims

This study was undertaken to supplement findings from the SOL study. The study analyzes the prevalence of ACEs in the Hispanic population using 2011-2012 Behavioral Risk Factor Surveillance System (BRFSS) from nine states with almost 3000 self-identified Hispanic respondents, including approximately 40% who completed the survey in Spanish. Findings from these nine states reflect the respondents from states with relatively small and isolated Hispanic communities.

The study presents differences by survey language in ACEs prevalence and associations with adult self-reported health status, chronic conditions, and behavioral risk factors. Study findings assess whether there is an association between language preference within the Hispanic nine state population and ACE counts and the related burden on adult health. Based on a long literature on the negative health effects of acculturation among US immigrants,(13) the current study hypothesizes that Spanish language preference would be associated will less severe ACEs prevalence and associated adult health conditions, reflecting cultural differences related to immigration or acculturation within Hispanic communities.

Methods

The Behavioral Risk Factor Surveillance System (BRFSS) ACEs Items

(BRFSS) is an annual, state-based telephone survey that interviews US adults 18 years or older regarding sociodemographics, risk factors, and health conditions (http://www.cdc.gov/brfss). Nine states administered the BRFSS optional ACE survey module to assess adverse childhood experiences in 2011-2012. The current study merges the 2011 and 2012 BRFSS survey for states with ACEs responses and includes 2,983 Hispanic respondents from nine states, Iowa,

Minnesota, Montana, North Carolina, Oklahoma, Tennessee, Vermont, Washington, Wisconsin. Wisconsin included the ACEs module in both 2011 and 2012, but only the 2012 Wisconsin data are analyzed here. BRFSS data were weighted to account for the probability of selection and nonresponse and to match the age, race/ethnicity, and gender composition within each state. Five ACE items assess childhood abuse (sexual (3), physical (1), and emotional (1)), and six assess household dysfunction (having lived with parents or adults who separated/divorced, had a mental illness, abused alcohol, abused drugs, were incarcerated, or were involved in intimate partner violence). A composite ACE score was calculated for each respondent based on the sum of ACE items endorsed and empirically divided into four categories of ascending severity: zero, one, two to three, and four or more.

Health Status and Sociodemographic Characteristics

The BRFSS also includes self-assessment of general health, health status reported as days out of the month with "not good" physical or mental health, and disability, defined as reporting being limited "because of physical, mental or emotional problems". Chronic conditions were reported from questions asking "whether you have ever been told by a doctor or other health professional" of the condition. BRFSS includes items on behavior risk factors such as smoking and drinking. Smoking was defined as having smoked 100 or more cigarettes in their lifetime and heavy drinking was defined as drinking two or more drinks a day for men and one or more drinks per day for women. Educational attainment level was reported as less than high school, some high school, high school graduate, some college, or college graduate. Household income level was imputed for missing responses using regression estimates derived from reported income level. Insurance status was coded as any insurance versus uninsured.

Statistical Analysis

Chi square tests were used to determine the statistical significance of differences in ACE items by language preference and sociodemographic variables. To test the significance of language preference with populations with the same ACE score, eight subgroups were identified from the interaction of language preference and the four ACE score categories. Differences between these groups were compared by self-reported health status, adult health outcomes, and behavioral risk factors.

Differences in Survey Language Populations

It is well known that younger respondents have a higher prevalence of reported ACEs, possibly as a function of lower survival of those with high ACE counts. There are other well-known differences between Spanish speaking Hispanic and English speaking Hispanic populations that are related to more recent immigration and cultural differences that vary greatly between different US Hispanic populations. Age, sex, educational attainment level, annual household income, and insurance status were therefore included as covariates to adjust analyses to test the strength of association of ACEs with adult health across the eight linguistic-ACE score population subgroups. Multiple logistic regression was used to analyze the relationship between Hispanic subgroups (with English-preference zero ACEs respondents as the reference category) and the likelihood of reporting low health status, chronic conditions, and behavioral risk factors. Odds ratios across the eight populations were compared to determine whether there were important differences in the likelihood of a negative adult health outcome across language populations. In a sensitivity analysis, two separate multiple logistic regression models were also estimated to analyze the language preference groups individually, comparing odds ratio gradients

for respondents reporting ACEs within each language group, with zero ACEs as the reference population. The study used the STATA Version 14 (College Station, TX) complex survey design commands, which use state-weighted population estimates, for all analyses. This study of de-identified public data was IRB exempt.

Results

ACES Prevalence and Negative Adult Health Outcomes

Table 1 shows population-weighted sample characteristics and prevalence of negative health outcomes for the entire Hispanic cohort by questionnaire language preference. Overall, 61% of the Hispanic/Latino respondents preferred the English survey. The English-preference cohort was older than the Spanish-preference with a significantly greater percentage of respondents reporting being 50 years of age or older (22.6% vs. 13.4%). Individuals that preferred the Spanish survey were more likely to be male, have less than a high school education, have household income <$45,000, and be uninsured. In terms of self-reported health, the English preference group reported "not good" physical health (3.8%), "not good" mental health (4.0%) and being disabled (18.6%) more often than the Spanish preference group (1.6%, 1.4%, and 8.1%, respectively). The Spanish preference group had a significantly higher percentage of respondents that rated their general health as "poor" or "fair" (41.5% versus 16.0%). Prevalence of cancer, asthma, and ever having been a smoker were significantly higher for the English prevalence group.

Differences in ACE Item Responses

With respect to individual ACE items, shown in Table 2, verbal abuse was the most common adverse childhood experience reported (27.2%) while being forced to have sex was the least

common (4.9%) in the overall cohort. Weighted prevalence of individual reported adverse childhood experiences were significantly different ($p<0.01$) in 6 of the 11 ACE items between the English and Spanish questionnaire preference groups. Specifically, the English preference group was more likely to have reported being touched sexually, living with a substance abuser, imprisonment of a household member, living with a mentally ill person, and parental separation or divorce. Those in the Spanish preference cohort were almost twice as likely to experience physical abuse (28.8% versus 15.9%).

The Burden of ACEs-ACE Scores

The prevalence of adverse childhood experience counts by sociodemographics and questionnaire language preference is shown in Table 3. For the overall cohort and both language preference groups, respondents ages 35 to 49, women, and the uninsured had the highest weighted percentage of "4+" ACEs. A statistically significant difference in ACE count was found within the overall cohort and English preference group when stratified by age, with the younger age groups (those <50) showing significantly higher rates of "2 or 3" and "4+" adverse childhood experiences. For those in the Spanish preference group, those that were uninsured had elevated ACE counts.

As Table 4 shows, when controlling for gender, age, education, income, and insurance status, reporting "4+" ACEs was significantly associated with the prevalence of disability, cancer, COPD, asthma, depression, smoking, and heavy drinking in the overall cohort. However, there was no association found between reporting "4+" ACEs and self-reported "not good" physical or mental health, cardiovascular disease, diabetes, or stroke. The odds of having cancer, having smoked, and being a heavy drinking were associated with reporting "4+" ACEs group within the

English preference group while higher odds of poor or fair general health, cardiovascular disease and COPD were found in the "4+" Spanish preference group. When compared to the English preference zero ACE group, the entire Spanish-preference group, regardless of ACE count, was significantly associated with a higher prevalence of "fair" or "poor" general health and cardiovascular disease. In a sensitivity analysis, the Spanish-preference "4+" ACEs group was positively correlated with the odds of reported "fair" or "poor" general health.

Discussion

Over the last 20 years, immigration patterns have shifted from California, New York, Texas, Florida, and Illinois to essentially every region of the United States, including rural areas.(14) As this dispersion continues, an increasingly large percentage of US Hispanics will be located outside of traditionally Hispanic states and cities.(15) Furthermore, variations exist in both disease prevalence and risk behaviors between those that have and have not recently immigrated.(16) Thus, as the population of untraditional immigrants continues to grow, it is prudent to include this subpopulation in our understanding of Hispanics in the United States. This study does so by analyzing ACEs in smaller and more dispersed Hispanic populations than prior studies have done before.

While the prevalence of Hispanic respondents in each ACE count category did not differ significantly between the two language-preference groups in this study (data not shown), more than half of the individual ACE items were significantly different in prevalence. Some of the differences seen in this study between the two language preference groups may stem from differences in cultural and social norms between the United States and Latin America. Many studies have described the negative effect that acculturation, the process of adopting the culture,

beliefs, and behaviors of a host country,(17) has on Hispanic health behaviors and outcomes.(13) The higher rates of smoking and drinking in the English preference group can be explained by this phenomenon. However, the protective effect seen in the Spanish-preference group against an increased risk of smoking and heavy drinking within the "4+" ACEs group cannot be explained by the tradition acculturation effect.

Hispanic/Latino Social Networks

One mechanism that may account for this finding are the social networks specific to the Hispanic and Latino communities in the nine state population. Respondents that prefer Spanish and reside in non-traditional Hispanic states and cities often have limited social networks. This limitation often leads to the creation of small, cohesive communities.(14) These Hispanic communities provide an environment that reinforces Spanish language use, limits acculturation,(18) and provides a supportive environment that prevents substance abuse.(19) Thus, this unique community may also counteract the deleterious effects of elevated ACE counts on behavioral risk factors.

The Hispanic Child Adversity Literature

This study serves as a supplement to the previous Hispanic ACE study.(5) Rates of "4+" ACEs were higher in both studies of Hispanics than in the original ACEs study.(1) However, the current study found a significantly lower burden of ACEs that the SOL study. In terms of individual ACE items, prevalence of emotional and domestic abuse were similar to that of the SOL study but rates of physical abuse, parental separation or divorce, and household member imprisonment were found to be lower. The overall prevalence of "4+" ACEs for both men and women (13.7% and 16.9%) was lower (25.8% and 31.2%) and the prevalence of the zero ACEs

group for men and women was higher (46.6% and 43.8% versus 23.6% and 22.2%) than that of the SOL study.

The discrepancy between the two studies of ACEs in Hispanics is most likely multifactorial. The baseline characteristics of the study populations, such as annual household income and time since immigration, may account for some of the variance. Both lower socioeconomic status and time spent in the US by Hispanic immigrants are associated with higher rates of ACEs.(20, 21) There was a greater percentage of respondents in the current study with income greater than $30,000. Additionally, this study's participants are from non-traditional Hispanic destinations that have immigrated more recently(14) than the average Hispanics included in the SOL study that has lived in the US for 20.5 years. Aside from baseline characteristics, the variability between the studies' individual ACE measures may also account for the discrepancy in ACE prevalence. The SOL study included two measures on neglect that were not found in the BRFSS ACE module. There is evidence suggesting that neglect is prevalent in immigrant populations.(21) Thus, the inclusion of those items in this study may have led to higher ACE counts similar to those seen in SOL.

Despite using different markers of recent immigration, the groups that were presumed to have experienced less acculturation in both studies (Spanish preference and born outside the US) had a lower prevalence of "4+" ACEs than their English preference and US born counterparts. These findings support a prior study showing that the Hispanic paradox, a phenomenon where immigrant, less acculturated individuals have better outcomes than those that are native born despite lower socioeconomic status, also applies to adverse childhood experiences.(21)

Limitations

This study depends on retrospective reporting that is inherently at risk for underreporting. Uninsured respondents, which composed a large portion of the study participants, may not be aware of asymptomatic doctor-diagnosed conditions. Thus, both ACE counts and health outcomes may be underreported. Additionally, ACEs items represent an approximate measure of childhood adversity which includes many other neighborhood and family environmental factors that the study does not elicit and cannot account for. Lastly, our analysis relied on language preference as a single measure of acculturation and proxy for whether and how recently respondents families immigrated to the US. However, despite its limitation as a single item, language preference has shown to strongly correlate with a validated acculturation instrument in Hispanics.(9)

What is to be Done?

Acknowledgment of the effects of childhood trauma and adversity is growing among public health and medical practitioners. The policy agenda of ACEs research includes evaluating universal childhood screening, breaking the cycle of neglect and abuse across generations, strengthening families, providing early, more effective mental health interventions and alternative services. Hispanic community researchers, attuned to local area needs and assets, will need to identify culturally relevant and realistic strategies to prevent ACEs going forward and mediate the effects adverse experiences have on current adults.

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Table 1: Sociodemographic characteristics, outcomes, and behavioral risk factor prevalence of respondents by questionnaire language preference using population-weighted responses from nine states' BRFSS 2011, 2012[a]

N=2983 respondents (2012- 1,504; 2011- 1,479) ; weighted pop=1,855,212

	Overall Cohort	English Preference	Spanish Preference
	n= 2,983	n= 1,815	n=1,168
Age*			
18-34	51.4	51.3	51.4
35-49	30.0	26.1	35.2
50-64	13.7	15.7	11.1
≥65	4.9	6.9	2.3
Male**	55.4	53.0	58.6
Education*			
≤ Elementary	22.5	6.7	43.5
Some HS	22.2	17.3	28.8
HS Graduate	28.7	34.4	21
Some College	17.8	27	5.7
≥ College Graduate	8.8	14.7	1.0
Household Income*			
<15,000	8.0	7.5	8.6
15,000 – 29,999	16.9	13.6	21.2
30,000 – 44,999	38.6	29.4	50.8
45,000 – 59,999	13.9	14.6	13.1
≥60,000	22.6	35.0	6.3
Uninsured*	50.6	29.5	75.7
"Not good" physical health[b]**	2.9	3.8	1.6
"Not good" mental health[b]**	2.9	4.0	1.4
Fair or poor general health[c]*	27.0	16.0	41.5
Disability[d]*	14.1	18.6	8.1
Cardiovascular Disease	4.1	3.3	5.2
Diabetes	6.7	6.9	6.4
Stroke	1.3	1.5	1.2
Cancer*	3.7	5.4	1.5
COPD	1.7	1.6	1.7
Asthma*	9.1	12.0	5.4
Depression	13.5	14.2	12.6
Prior or Current Smoker*	35.7	40.7	29.1
Heavy Drinker	3.4	4.3	2.4

[a] States included were Iowa, Minnesota, Montana, North Carolina, Oklahoma, Tennessee, Vermont, Washington, Wisconsin (2012)

[b] Participant responded at least one day of "not good" physical/mental health in the last 30 days.

[c] Participant responded either "fair" or "poor" to the question "Would you say that in general your health is:"

[d] Participants were categorized to have "disability" if they answered "yes" to the question "Are you limited in any way in any activities because of physical, mental, or emotional problems?"

* $p < 0.001$

** $p < 0.05$

Table 2: Prevalence of individual ACE item by questionnaire language preference using population-weighted responses from nine states' BRFSS 2011, 2012[a]

N=2983 respondents (2012- 1,504; 2011- 1,479) ; weighted pop=1,855,212

Adverse Childhood Experiences	Overall Cohort	English Preference (%)	Spanish Preference (%)	P-value
How often did a parent or adult in your home ever swear at you, insult you, or put you down?	27.2	27.9	26.3	0.56
Before age 18, how often did a parent or adult in your home ever hit, beat, kick, or physically hurt you in any way? Do not include spanking.	21.5	15.9	28.8	<0.01
How often did anyone at least 5 years older than you or an adult, ever touch you sexually?	8.6	10.8	5.6	<0.01
How often did anyone at least 5 years older than you or an adult, try to make you touch them sexually?	6.2	7.2	4.9	0.07
How often did anyone at least 5 years older than you or an adult, force you to have sex?	4.9	5.0	4.8	0.93
Did you live with anyone who was a problem drinker or alcoholic?	22.8	21.9	24.1	0.34
Did you live with anyone who used illegal street drugs or who abused prescription medications?	8.0	10.7	4.3	<0.01
Did you live with anyone who served time or was sentenced to serve time in a prison, jail, or other correctional facility?	7.6	10.4	4.0	<0.01
Did you live with anyone who was depressed, mentally ill, or suicidal?	10.0	13.9	5.0	<0.01
Were your parents separated or divorced?	21.9	27.7	14.3	<0.01
How often did your parents or adults in your home ever slap, hit, kick, punch or beat each other up?	18.5	17.1	20.3	0.13

Table 3: Adverse Childhood Experience Counts reported by Hispanics by sociodemographic characteristics from nine states' Behavioral Risk Factor Surveillance System (BRFSS) 2011, 2012[a]

N=2983 respondents from nine states ; weighted pop=1,855,212

	Population-weighted Percent Reporting Adverse Childhood Experiences											
	Overall Cohort				English Preference				Spanish Preference			
	0	1	2 or 3	4+	0	1	2 or 3	4+	0	1	2 or 3	4+
Overall	45.3	16.8	22.8	15.1	45.6	16.7	20.8	16.9	45	16.8	25.3	12.8
Age												
18-34	45.4	15.6	24.0	15.1	44.6	15.3	22.8	17.3	46.2	16.1	25.6	12.1
35-49	41.1	19.0	21.8	18.1	38.3	19.1	20.8	21.7	43.8	18.9	22.7	14.6
50-64	49.4	13.7	25.2	11.7	54.8	14.6	18.9	11.8	39.4	12.1	37.0	11.5
≥65	59.3	23.4	10.8	6.6	58.1	22.9	11.5	7.5	64.2	25.3	7.6	2.9
Gender												
Female	43.8	18.2	21.1	16.9	42.6	17.7	20.5	19.2	45.6	19.1	21.9	13.4
Male	46.6	15.6	24.2	13.7	48.2	15.9	21.1	14.7	44.6	15.2	27.7	12.4
Education												
≤ Elementary	47.8	17.0	24.4	10.9	44.7	18.1	22.2	15.0	48.4	16.8	24.8	10.0
Some HS	39.9	14.9	25.1	20.1	39.1	11.6	23.9	25.5	40.7	17.5	26.1	15.8
HS Graduate	46.8	16.4	20.4	16.3	49.2	17.6	17.0	16.2	41.5	14.0	27.8	16.7
Some College	43.7	19.4	23.1	13.8	42.6	18.7	23.9	14.8	50.7	23.9	18.1	7.3
≥ College Graduate	50.1	17.6	20.0	12.4	49.9	17.0	20.5	12.6	54.0	27.5	11.5	7.0
Household Income												
<15,000	50.6	19.9	15.1	14.4	50.9	23.7	9.6	15.8	50.3	15.5	21.4	12.9
15,000 – 29,999	43.0	13.2	27.6	16.3	45.9	12.9	26.4	14.8	40.5	13.5	28.6	17.5
30,000 – 44,999	47.3	14.2	23.6	14.9	48.1	12.4	20.2	19.3	46.7	15.7	26.2	11.5
45,000 – 59,999	43.3	19.2	21.7	15.8	39.3	17.8	23.0	19.9	49.3	21.2	19.8	9.7
≥60,000	43.0	21.2	21.3	14.5	44.7	20.0	20.8	14.5	30.4	30.5	24.6	14.5
Health Insurance												
Yes	45.8	18.4	22.2	13.6	44.7	17.8	22.4	15.2	50.0	21.0	21.4	7.6
No	44.8	15.2	23.2	16.8	47.2	14.3	17.5	20.1	43.6	15.6	26.2	14.6

a States included were Iowa, Minnesota, Montana, North Carolina, Oklahoma, Tennessee, Vermont, Washington, Wisconsin

Table 4: Adjusted odds ratios[a] (AOR) for the likelihood of adult health by adverse childhood experiences (ACEs) counts using population-weighted responses from nine states' Behavioral Risk Factor Surveillance System (BRFSS)2011, 2012[b]

N=2983 respondents (2012- 1,504; 2011- 1,479); weighted pop=1,855,212

	Population-weighted Percent Reporting Adverse Childhood Experiences									
	Overall Cohort[c]			English Preference[d]			Spanish Preference[d]			
	1	2 or 3	4+	1	2 or 3	4+	0	1	2 or 3	4+
Self-Reported Health Status										
"Not good" physical health[e]	1.5 (0.6, 3.3)	0.7 (0.3, 1.7)	0.7 (0.3, 1.6)	1.6 (0.7, 4.0)	0.6 (0.2, 1.5)	0.5 (0.2, 1.4)	0.4 (0.1, 2.4)	0.3 (0.0, 2.6)	0.4 (0.1, 3.2)	0.5 (0.1, 3.8)
"Not good" mental health[e]	1.3 (0.5, 3.0)	1.0 (0.4, 2.7)	0.4 (0.2, 1.1)	1.4 (0.5, 3.5)	0.6 (0.2, 2.0)	0.3 (0.1, 1.0)	0.1 (0.0, 1.0)	0.1 (0.0, 1.3)	0.6 (0.1, 3.3)	0.1 (0.0, 1.0)
Fair/poor general health[f]	1.2 (0.9, 1.7)	**1.5 (1.1, 2.2)**	1.3 (0.9, 1.9)	**1.7 (1.0, 2.9)**	**2.1 (1.2, 3.8)**	1.2 (0.7, 2.1)	**3.1 (2.0, 4.8)**	**2.8 (1.6, 4.8)**	**3.6 (2.2, 6.0)**	**5.2 (2.9, 9.3)**
Disability[g]	1.4 (0.9, 2.2)	**1.6 (1.1, 2.5)**	**4.4 (2.8, 6.9)**	1.6 (0.9, 2.8)	**1.8 (1.0, 3.1)**	**4.4 (2.6, 7.5)**	**0.5 (0.3, 0.9)**	0.5 (0.2, 1.2)	0.7 (0.4, 1.5)	**2.0 (1.0, 3.8)**
Health Conditions/Outcomes										
Cardiovascular Disease	1.4 (0.7, 2.6)	1.6 (0.8, 3.2)	1.6 (0.8, 3.0)	1.2 (0.5, 3.0)	1.6 (0.6, 4.2)	1.2 (0.6, 2.4)	**2.1 (1.0, 4.4)**	**3.2 (1.3, 7.8)**	**3.2 (1.3, 8.2)**	**4.7 (1.7, 12.8)**
Diabetes	1.1 (0.6, 2.0)	**1.9 (1.1, 3.2)**	1.2 (0.7, 2.1)	1.2 (0.6, 2.6)	1.7 (0.8, 3.8)	0.9 (0.4, 1.9)	0.8 (0.4, 1.9)	0.8 (0.3, 2.0)	1.8 (0.7, 4.3)	1.5 (0.6, 4.2)
Stroke	1.1 (0.4, 2.9)	0.6 (0.2, 1.8)	1.7 (0.6, 5.3)	0.7 (0.3, 2.1)	0.5 (0.2, 1.7)	2.1 (0.6, 7.4)	1.0 (0.3, 3.2)	1.9 (0.5, 7.0)	0.8 (0.2, 3.8)	0.8 (0.1, 7.1)
Cancer	0.6 (0.3, 1.5)	1.1 (0.6, 2.3)	**4.5 (2.2, 9.3)**	0.7 (0.3, 1.9)	1.4 (0.6, 3.2)	**5.5 (2.6, 11.9)**	0.7 (0.2, 1.8)	**0.2 (0.1, 1.0)**	0.4 (0.1, 1.6)	0.9 (0.3, 3.3)
COPD	0.8 (0.3, 2.3)	1.1 (0.3, 4.4)	**4.2 (1.8, 9.6)**	0.9 (0.3, 2.9)	1.6 (0.3, 8.9)	1.6 (0.6, 4.3)	0.9 (0.3, 2.3)	0.5 (0.1, 4.6)	0.5 (0.1, 2.3)	**8.7 (2.5, 30.3)**
Asthma	1.1 (0.6, 1.9)	1.2 (0.7, 2.2)	**1.8 (1.1, 3.1)**	0.9 (0.4, 1.7)	1.3 (0.6, 2.6)	1.7 (0.9, 3.1)	**0.3 (0.1, 0.8)**	0.6 (0.2, 1.5)	**0.4 (0.2, 1.0)**	0.7 (0.3, 1.7)
Depression	1.4 (0.9, 2.2)	**2.0 (1.3, 3.0)**	**5.5 (3.6, 8.3)**	1.2 (0.7, 2.1)	**1.8 (1.0, 3.3)**	**5.3 (3.2, 9.0)**	0.7 (0.4, 1.3)	1.3 (0.6, 2.6)	1.6 (0.9, 2.8)	**4.1 (2.3, 7.3)**
Behavioral Risk Factors										
Prior or Current Smoker	0.8 (0.6, 1.1)	1.4 (1.0, 1.9)	**2.3 (1.6, 3.3)**	0.7 (0.5, 1.2)	1.4 (0.8, 2.2)	**3.0 (1.9, 4.7)**	**0.5 (0.3, 0.8)**	**0.5 (0.3, 0.8)**	0.7 (0.4, 1.2)	0.6 (0.4, 1.2)
Heavy Drinker	0.9 (0.4, 2.0)	0.7 (0.3, 1.7)	**2.6 (1.2, 5.3)**	0.9 (0.3, 2.7)	1.2 (0.4, 3.1)	**3.2 (1.4, 7.4)**	0.8 (0.3, 2.5)	0.7 (0.1, 3.0)	**0.2 (0.0, 0.7)**	1.1 (0.3, 3.9)

[a] Odds ratios adjusted for sex, age, education, income, and insurance status; presented as OR (95% CI)
[b] States included were Iowa, Minnesota, Montana, North Carolina, Oklahoma, Tennessee, Vermont, Washington, Wisconsin
[c] Reference group is ACE=0 for overall cohort
[d] Reference group is ACE=0 with English preference
[e] Participant responded at least one day of "not good" physical/mental health in the last 30 days.
[f] Participant responded either "fair" or "poor" to the question "Would you say that in general your health is:"
[g] Participants were categorized to have "disability" if they answered "yes" to the question "Are you limited in any way in any activities because of physical, mental, or emotional problems?"
Bolded font indicates statistical significance (P<0.05)