



Food Insecurity Risk and Alcohol Use Disorder in US Young Adults: Findings from the National Longitudinal Study of Adolescent to Adult Health

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Abstract

Background and Objectives: The relationship between food insecurity and alcohol use disorder remains unknown. The aim of this study was to determine the association between food insecurity risk and alcohol use disorder in a nationally representative sample of young adults.

Methods: Cross-sectional nationally representative data of 14,786 US young adults aged 24–32 years old from Wave IV (2008) of the National Longitudinal Study of Adolescent to Adult Health were analyzed to assess a single-item measure of food insecurity risk and Diagnostic and Statistical Manual, 5th Edition (DSM-5) alcohol use disorder.

Results: Among young adults, 12% were found to be at risk for food insecurity. Young adults with food insecurity risk had greater odds of moderate (AOR 1.34, 95% CI 1.13–1.58) and severe (AOR 1.67, 95% CI 1.34–2.07) threshold alcohol use disorder than food-secure young adults, adjusting for age, sex, race/ethnicity, education, income, receipt of public assistance, household size, and smoking. Food insecurity risk was also associated with a 23% higher (95% CI 11% – 37%) number of problematic alcohol use behaviors (e.g. risky behaviors, continued alcohol use despite emotional or physical health problems).

Discussion and Conclusions: Food insecurity risk is associated with problematic patterns of alcohol use. Health care providers should screen for food insecurity and problematic alcohol use in young adults and provide referrals for further resources and treatment when appropriate.

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Declaration of Interest: The authors report no conflicts of interest. The authors alone are responsible for the content and writing of this paper.

Scientific Significance: This nationally representative study of US young adults is the first to find an association between food insecurity risk and alcohol use disorder using DSM-5 criteria.

Keywords

food insecurity; young adult; risk behavior; alcohol; alcohol use disorder

Introduction

Food insecurity, defined as the disruption of food intake or eating patterns due to a lack of money or other essential resources, affects nearly 50 million Americans.¹ Young adults, defined as ages 18–34 by the US Census Bureau, experience economic and educational transitions that may confer a greater risk for food insecurity.² Substance use and related risk behaviors peak in young adulthood, and 27% of young adults ages 18–29 have been found to meet criteria for alcohol use disorder, according to the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5), in the preceding 12 months.³ Alcohol use disorders impair interpersonal functioning and productivity, are highly disabling, and are associated with substantial morbidity and mortality.³

While food insecurity has known associations with illicit substance use,⁴ among young adults ages 24–32 years specifically,⁵ research on the relationship between food insecurity and alcohol use is more limited. Previous studies among US adults have found significant associations between food insecurity and heavy drinking.^{6,7} Yet, studies examining food insecurity and alcohol abuse/dependency using screening tools based on DSM-IV criteria have shown inconsistent results.^{7,8} In 2013, the DSM-5 introduced alcohol use disorder, which replaced the DSM-IV dichotomy between “alcohol abuse” and “alcohol dependence” with a single diagnosis of alcohol use disorder graded as “mild”, “moderate”, or “severe”.^{9,10} The DSM-5 update was based on findings from over 200,000 study participants, and it sought to overcome issues such as lower reliability, validity, and potentially stigmatizing terminology of the “abuse” diagnosis, which previously only required one criterion.¹⁰ Although abuse was often assumed to be milder than dependence, some abuse criteria (e.g. substance-related failure to fulfil major responsibilities), nonetheless, indicated clinically severe problems. The DSM-5 is now the standard classification of mental disorders used for clinical, research, policy, and reimbursement purposes and, therefore, has widespread importance and influence on diagnosis, treatment, and investigation.¹⁰ To our knowledge, there have been no studies in the US or elsewhere that have analyzed associations between food insecurity and *alcohol use disorder* as defined by the DSM-5.

Furthermore, aside from one recent study of university students that found no association between food insecurity and a single-item measure of binge drinking,¹¹ no studies in the US have examined food insecurity and problematic patterns of alcohol use among young adults, specifically. Elsewhere, food insecurity was associated with DSM-IV alcohol abuse/dependence among young adults in France.¹² However, this study did not establish which problematic patterns of alcohol use might be linked with food insecurity in this population.

Therefore, the objective of this study was to determine the association between food insecurity risk and alcohol use disorder as defined by the DSM-5 in US young adults using a nationally representative sample, including associations with the individual DSM-5 criteria capturing specific patterns of problematic alcohol use. We hypothesized that food insecurity risk would be associated with alcohol use disorder and individual DSM-5 symptom criteria in young adults.

Methods

Study Population

We analyzed data from the National Longitudinal Study of Adolescent to Adult Health (Add Health) using cross-sectional data from Wave IV (ages 24–32, 2008), the only wave to collect information on food insecurity. The baseline sample (Wave I, ages 11–18, 1994–1995) of this study was selected to be nationally representative with respect to ethnicity, region, size, type, and urbanicity. Systematic sampling methods and implicit stratification were used to select students from 80 high schools and paired middle schools throughout the US. The Institutional Review Board of the University of North Carolina approved all data collection and storage procedures.

Study Procedures

After gaining agreement for study participation, an interviewer traveled to the home of—or another suitable location for—the participant. Written informed consent was obtained from all study participants. Interviews lasted approximately 90 minutes and were conducted in as private an area as possible. Sensitive questions, including those related to substance use, were self-administered using Computer-Assisted Self-Interviewing (CASI). Additional information about the study design and study procedures are available elsewhere.¹³

Measures

Predictor Variable

Food insecurity risk: Data on risk for food insecurity was based on self-report. Participants were asked, “In the past 12 months, was there a time when (you/your household were/ was) worried whether food would run out before you would get money to buy more?” Response options included yes or no; this question had a 99.9% response rate. This single item measure has a 59–93% sensitivity and 85–87% specificity range (though in child populations) for detecting food insecurity as measured by the “gold standard” 18-item US Household Food Security Scale.^{14–16} This item is considered to be the most inclusive question of the scale.^{15,17} For the purposes of this study, we will refer to those with an affirmative response as at risk for food insecurity, similar to previous studies using Add Health data.^{5,18–20}

Outcome Variables

Problematic patterns of alcohol use: Participants were asked 10 questions regarding problematic patterns of alcohol use in accordance with DSM-IV criteria for alcohol abuse/dependence (see Table 1 for individual questions).^{21,22} The 10 questions administered to

participants constitute 10 of the 11 symptom criteria for DSM-5 alcohol use disorder.^{9,10} According to the DSM-5, two out of the 11 criteria are needed to meet the threshold for a diagnosis of alcohol use disorder. In accordance with the DSM-5, we classified participants as having mild (2–3 symptoms), moderate (4–5 symptoms), or severe (6 symptoms) alcohol use disorder, noting that we were missing one symptom (craving to use alcohol). Given that the DSM-5 is the current standard classification of mental disorders and given the lower reliability, validity, and potentially stigmatizing terminology of the prior DSM IV “abuse” diagnosis,¹⁰ we used DSM-5 criteria for alcohol use disorder.¹⁰

Covariates

Sociodemographic and behavioral covariates were selected based on previous literature and theory as being potential confounders for the association between food insecurity and alcohol.^{5–8,11} For example, socioeconomic status, including income and education, is known to shape risk for food insecurity and problematic alcohol use,⁸ and both food insecurity and alcohol use are associated with other forms of substance use, such as smoking.⁵ Covariates include *age* in years (continuous, range 24–32 years), *sex* (male or female), *race/ethnicity* (non-Hispanic White, non-Hispanic Black/African American, Hispanic/Latino, non-Hispanic Asian/Pacific Islander, American Indian/Native American, or Other), *education* (high school or less, versus more than high school), *household size* (count), and *household income* in US dollars (continuous). We also include *receipt of public assistance* (any receipt of public assistance, welfare payments, or food stamps in the past seven years since the last interview, yes or no) and *smoking* (none to 10 days versus more than 10 days, in the prior 30 days), which were both recorded based on self-report, as per previous studies using Add Health data.^{5,18–20}

Statistical Analysis

We analyzed the data using Stata 15.0. We applied Add Health’s pre-constructed sample weights specific to Wave IV to yield nationally representative estimates. First, multiple logistic regression analyses were used to identify associations with alcohol use disorder (severity thresholds) as the dependent variable and risk for food insecurity as the independent variable, adjusting for age, race/ethnicity, education, household income, receipt of public assistance, household size, and smoking. Then, we employed multiple logistic regression analyses to identify associations with individual DSM-5 symptom criteria for alcohol use disorder as the dependent variables and risk for food insecurity as the independent variable, adjusting for age, race/ethnicity, education, household income, receipt of public assistance, household size, and smoking. Next, a negative binomial regression analysis was used to identify associations with the number (sum; 0–10) of problematic patterns of alcohol use as the dependent variable and risk for food insecurity as the independent variable, adjusting for the covariates as stated above. As the count data were overdispersed (dispersion parameter $\alpha=2.97$, indicating overdispersion), negative binomial regression was more appropriate than Poisson regression.²³ Negative binomial regression coefficients were transformed into incidence rate ratios.²³ In an exploratory analysis, we tested for effect modification by sex in the association between risk for food insecurity and problematic alcohol behaviors, and presented sex-stratified results for outcomes with evidence of effect modification ($p<0.05$).

Results

Of the 14,786 young adults (ages 24–32) included in Wave IV of the Add Health study, 12% were considered at risk for food insecurity (14% of young women and 9% of young men). The demographic and health characteristics of participants who were food secure versus at risk for food insecurity are reported in Table 2.

In both young men and women, food insecurity risk was associated with moderate and severe alcohol use disorder (Table 3). Compared to food-secure young adults, young adults at risk for food insecurity had greater odds of having seven of the 10 problematic patterns of alcohol use. Food insecurity risk was most strongly associated with higher odds of continued use of alcohol despite emotional or physical health problems (AOR 1.79, 95% CI 1.40–2.31) and cutting down on activities and socialization that interfere with alcohol use (AOR 1.61, 95% CI 1.24–2.08). Food insecurity risk was also associated with a 23% higher (95% CI 11% – 37%) number of problematic patterns of alcohol use, adjusting for potential confounders.

Of the individual symptom criteria, food insecurity risk was most strongly associated with continued alcohol use despite emotional or physical health problems (AOR 1.79, 95% CI 1.40–2.31); cutting down on activities and socialization that interfere with alcohol use (AOR 1.61, 95% CI 1.24–2.08); problems with family, friends, or people at work or school because of drinking (AOR 1.46, 95% CI 1.21–1.76); getting hurt or undertaking risky behaviors while under the influence of alcohol (AOR 1.32, 95% CI 1.11–1.57); trying to quit alcohol (AOR 1.27, 95% CI 1.10–1.47); drinking more or longer than intended (AOR 1.26, 95% CI 1.07–1.49); and drinking interfering with responsibilities at work or school (AOR 1.24, 95% CI 1.01–1.53).

Sex did not modify the association between food insecurity risk and problematic alcohol behaviors (all $p > 0.05$) except for alcohol withdrawal symptoms (p -value for interaction = 0.041). The risk for food insecurity was associated with alcohol withdrawal symptoms in men (AOR 2.02, 95% CI 1.26–3.27, $p = 0.004$), but not in women (AOR 0.73, 95% CI 0.34–1.53, $p = 0.399$).

Discussion

In this nationally representative sample of young adults, we found that risk for food insecurity was associated with moderate and severe alcohol use disorders, as defined by the DSM-5, as well as a greater number of problematic alcohol use behaviors. Risk for food insecurity was most strongly associated with severe alcohol use disorder, compared to mild or moderate thresholds. Of the individual symptom criteria, food insecurity risk was most strongly associated with continued alcohol use despite emotional or physical health problems, and was also significantly associated with drinking more or longer than intended; trying to quit alcohol; drinking interfering with responsibilities at work or school; having problems with family, friends, or people at work or school because of drinking; cutting down on activities and socialization that interfere with alcohol use; and getting hurt or undertaking risky behaviors while under the influence of alcohol. Risk for food insecurity

was also associated with higher odds of experiencing withdrawal symptoms in young men, but not in young women. This is consistent with previous literature finding that women are less likely than men to experience alcohol withdrawal symptoms and have lesser risk for withdrawal-induced seizures and delirium tremens.²⁴

This study corroborates a previous cross-sectional study in France that found a significant association between food insecurity and DSM-IV alcohol abuse/dependence among young adults¹². These findings likely reflect bidirectional relationships and mechanisms between food insecurity and problematic alcohol use among young adults. On one hand, food insecurity may be a risk factor for alcohol use disorder. Qualitative studies have illuminated the nexus of hunger, exhaustion, guilt, shame, and stigma woven into the experience of food insecurity in the US.^{25,26} It is plausible such phenomena could drive problematic use of alcohol, which is easily available and a known appetite-suppressant producing short-term anxiolytic, euphoric, and sedative psychoactive effects. Indeed, epidemiological studies have shown that food insecurity contributes to emotional, affective, stress- and trauma-related psychological disturbances, including depression, anxiety, and symptoms of post-traumatic stress disorder.^{18,27–29} All of these outcomes are, in turn, known risk factors for problematic alcohol use, likely due to self-medication with alcohol.³⁰ This mechanism is particularly plausible for US young adults, who have high baseline rates of alcohol use.³ In this study, food insecurity was associated with nearly twice the odds of continuing to drink despite emotional or physical health problems, which was the strongest association in the overall sample and would accord with this direction of association. Worsened mental and physical health in the context of food insecurity may also explain the association with drinking more or longer than intended.

On the other hand, problematic alcohol use is likely to use up limited financial resources, lower the probability of maintaining employment, and leave less time for income generation due to time spent drinking, being intoxicated, and recovering—all of which would subsequently elevate the risk for food insecurity. Alcohol use also contributes to higher anxiety symptoms in general, including anxiety over material need insecurities.³ These putative mechanisms, which position alcohol use disorder as a risk factor for food insecurity, are likely to be prominent among US young adults, for whom low incomes and precarious forms of employment with poor job security and limited access to health insurance are particularly prevalent.² Many of the problematic patterns of alcohol use associated with food insecurity in this study would fit with this direction of association, including drinking more or for longer than intended and drinking that interferes with responsibilities at work or school.

Related, food-insecure people who drink alcohol have a greater incentive to try to quit in order to save scant resources, which may explain associations with this particular symptom criteria. Food-insecure people may drink more than intended given that resources spent on alcohol may displace limited resources for food. However, the stresses and stigma propagated by having fewer resources available may increase the likelihood of neglecting work- or school-related responsibilities, experiencing interpersonal problems, or undertaking more risky behaviors.⁵ In contrast, risk for food insecurity was not associated with spending lots of time planning drinking, consuming, or recovering, which accords with data showing

that the process of finding food when food-insecure itself uses up considerable time and resources, leaving less time for other activities.²⁶ Likewise, risk for food insecurity was not associated with drinking more than in the past in order to get the effect wanted. Given that alcohol use disorder often develops and peaks in young adulthood,³ young adults may have fewer past problematic alcohol-related experiences for comparison. Future longitudinal and qualitative studies will help to clarify directionality and mechanisms.

Limitations and Strengths

This secondary analysis of previously collected data has several limitations. Self-report measures may be subject to response bias. Food insecurity risk was assessed by a single item food security measure, the first item of both the full 18-item US Household Food Security Scale and the validated 6-item short form.¹⁴ Although this is only one item that has not been validated specifically in young adults, it is notable that even worrying about not having enough money for food is associated with problematic patterns of alcohol use. Future research could validate shorter item food insecurity screeners in young adults or could assess food insecurity in young adults using the full US Household Food Security Scale. The individual problematic alcohol use measures were developed based on DSM-IV alcohol abuse/dependence criteria; while these measures correspond sufficiently to DSM-5 criteria for alcohol use disorder criteria, they lack one question related to cravings to use alcohol.⁹ Given that the DSM-5 criteria are based on the number of criteria met, we may have underestimated the number of alcohol use disorder outcomes. Although we controlled for several potential confounders, including income, education, receipt of public assistance, race/ethnicity, sex, age, household size, and smoking, there are likely unobserved characteristics that lead individuals to both use alcohol and other drugs to excess and to be food insecure. Future research could incorporate analytic techniques to address this endogeneity.³¹ This cross-sectional associational study does not establish directionality or causality in the relationship between food insecurity and problematic drinking. The participants in our sample (24–32 years) are within the US Census Bureau's definition of young adulthood (18–34 years);² however, there is great variation in the age range classified as young adulthood across studies.³² Despite these limitations, strengths of the study included a large, nationally representative sample size of young adults 24–32 years old. The association between food insecurity risk and problematic patterns of alcohol use persisted independent of other socio-economic measures, such as income and education, indicating that food insecurity is not simply a proxy for poverty.

Clinical and policy implications

There are several important implications for medical, mental health, and policymaking professionals. Clinicians should screen for food insecurity and problematic patterns of alcohol use among young adults. Referrals can be made to community services that address alcohol use problems, including mental health and substance use clinical professionals and programs, as well as services assisting individuals in receiving adequate food resources through the Supplemental Nutrition Assistance Program (SNAP), food pantries, or local community centers and religious organizations. Policymakers should consider strengthening and expanding federal and state programs (e.g., SNAP, unemployment benefits) to provide more assistance to this largely overlooked age group.³³ Food-insecure households receiving

SNAP need an average of \$42 per week to reduce their resource gap and become food secure.³⁴ Adding more federal funding or changing the SNAP eligibility requirements may reduce this resource gap. Increasing the federal minimum wage may also reduce the resource gap. Strengthened unemployment benefits, in the form of increased weekly payments and improved training, re-education, and career counseling programs, may also reduce rates of food insecurity and may be a novel way to combat problematic alcohol use. These programs could also consider incorporating counseling to prevent alcohol use disorder. Improving food security may reduce stress and anxiety and promote overall health and wellbeing,¹² which could reduce the need for alcohol use to manage these emotions. Receipt of free food has been shown to attenuate the association between food insecurity and poor mental health.³⁵ Therefore, mental health and substance use programs may consider expanding food services and offerings to reduce food insecurity among their clients.

Acknowledgements:

Dr. Nagata is supported by the American Heart Association Career Development Award (CDA34760281, Dallas, TX) and the National Heart, Lung, and Blood Institute (K08HL159350, Bethesda, MD). Dr. Weiser is supported by the National Institute of Allergy and Infectious Diseases (K24AI134326, Bethesda, MD). Dr. Hahn is supported by the National Institute on Alcohol Abuse and Alcoholism (K24AA022586, Bethesda, MD). The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

We would like to thank Samuel Benabou and Ananya Rupanagunta for providing editorial assistance. This research uses data from Add Health, a program project directed by Kathleen Mullan Harris and designed by J. Richard Udry, Peter S. Bearman, and Kathleen Mullan Harris at the University of North Carolina at Chapel Hill, and funded by grant P01-HD31921 from the Eunice Kennedy Shriver National Institute of Child Health and Human Development, with cooperative funding from 23 other federal agencies and foundations. No direct support was received from grant P01-HD31921 for this analysis.

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Table 1.

Description of Problematic Patterns of Alcohol Use Measures in Accordance with Diagnostic and Statistical Manual (DSM) criteria

Hurt or risky behaviors while under the influence of alcohol	“How often have you been under the influence of alcohol when you could have gotten yourself or others hurt, or put yourself or others at risk, including unprotected sex?” Responses were dichotomized into none (0) or 1 times.
Cut down on activities and socialization that interfere with alcohol use	“Have you ever given up or cut down on important activities that would interfere with drinking like getting together with friends or relatives, going to work or school, participating in sports, or anything else?” Response options were yes or no.
Continued to use alcohol despite emotional or physical health problems	“Have you ever continued to drink after you realized drinking was causing you any emotional problems (such as feeling irritable, depressed, or uninterested in things or having strange ideas) or causing you any health problems (such as ulcers, numbness in your hands/feet or memory problems)?” Response options were yes or no.
Drinking interfered with responsibilities at work or school	“How often has your drinking interfered with your responsibilities at work or school?” Responses were dichotomized into none (0) or 1 times.
Problems with family, friends, or people at work or school because of drinking	“How often have you had problems with your family, friends, or people at work or school because of your drinking?” Responses were dichotomized into none (0) or 1 times.
Spent a lot of time drinking, planning how you would get alcohol, or recovering from a hangover	“Has there ever been a period when you spent a lot of time drinking, planning how you would get alcohol, or recovering from a hangover?” Response options were yes or no.
Drink more than you used to in order to get the effect you wanted	“Have you ever found that you had to drink more than you used to in order to get the effect you wanted?” Response options were yes or no.
Try to quit alcohol	“Have you ever tried to quit or cut down on your drinking?” Response options were yes or no.
Alcohol withdrawal symptoms	“During the first few hours of not drinking, do you experience withdrawal symptoms such as the shakes, feeling anxious, trouble getting to sleep or staying asleep, nausea, vomiting, or rapid heart beats?” Response options were yes or no.
Drink more or longer than intended	“Have you often had more to drink or kept drinking for a longer period of time than you intended?” Response options were yes or no.

Table 2.

Demographic and health characteristics of 14,800 young adult participants in the National Longitudinal Study of Adolescent Health, stratified by food security status

n	<u>Food Secure</u>	<u>Food Insecure</u>	p
	<u>13,139</u>	<u>1,647</u>	
Demographic characteristics	Mean ± SE / %	Mean ± SE / %	
Age, years	28.3 ± 0.1	28.4 ± 0.2	0.395
Sex			<0.001
Female	48.2%	57.6%	
Male	51.8%	42.4%	
Race/ethnicity			<0.001
White (non-Hispanic)	66.7%	58.0%	
Black/African American (non-Hispanic)	14.8%	25.3%	
Hispanic/Latino	12.2%	10.6%	
Asian/Pacific Islander (non-Hispanic)	3.6%	1.5%	
American Indian/Native American	1.8%	3.5%	
Other	1.0%	1.0%	
Educational attainment			<0.001
High school or less	25.0%	42.0%	
More than high school	75.0%	58.0%	
Income, US dollars	63,473 ± 999	34,859 ± 1,216	<0.001
Household size	2.1 ± 0.0	2.5 ± 0.1	<0.001
Public assistance in the past seven years	20.7%	53.5%	<0.001
Smoker	28.1%	46.3%	<0.001
Alcohol characteristics			
Alcohol use disorder, DSM 5			<0.001
No alcohol use disorder	66.5%	68.3%	
Mild (2–3 criteria)	13.2%	9.4%	
Moderate (4–5 criteria)	10.8%	8.6%	
Severe (6 criteria)	9.5%	13.7%	
Number (count) of problematic drinking behaviors	1.56 ± 0.05	1.70 ± 0.10	0.095

Bold indicates p<0.05. All means and percentages are calculated with weighted data to reflect the representative proportion in the target U.S. population.

SE=standard error

Table 3. Association between food insecurity (predictor variable) and problematic alcohol behaviors (outcome variables) in young adults aged 24–32 years, adjusted for demographic variables and health behaviors

Outcomes	Food insecurity (predictor)	
	Adjusted odds ratio ^a (95% CI)	P
Alcohol use disorder, DSM 5		
Mild threshold (2 criteria)	1.15 (0.97 – 1.36)	0.105
Moderate threshold (4 criteria)	1.34 (1.13 – 1.58)	0.001
Severe threshold (6 criteria)	1.67 (1.34 – 2.07)	<0.001
Problematic pattern of alcohol use, DSM 5 criteria		
Drink more or longer than intended	1.26 (1.07 – 1.49)	0.006
Try to quit alcohol	1.27 (1.10 – 1.47)	0.002
Spent a lot of time drinking, planning how you would get alcohol, or recovering from a hangover	1.19 (1.00 – 1.42)	0.052
Drinking interfered with responsibilities at work or school	1.24 (1.01 – 1.53)	0.037
Problems with family, friends, or people at work or school because of drinking	1.46 (1.21 – 1.76)	<0.001
Cut down on activities and socialization that interfere with alcohol use	1.61 (1.24 – 2.08)	<0.001
Hurt or risky behaviors while under the influence of alcohol	1.32 (1.11 – 1.57)	0.002
Continued to use alcohol despite emotional or physical health problems	1.79 (1.40 – 2.31)	<0.001
Drink more than you used to in order to get the effect you wanted	1.13 (0.91 – 1.41)	0.261
Alcohol withdrawal symptoms	<u>1.38 (0.95 – 2.02)</u>	0.095
Number (count) of problematic drinking behaviors	<u>Adjusted IRR^a (95% CI)</u>	<u>P</u>
	1.23 (1.11 – 1.37)	<0.001

Bold indicates p<0.05. **IRR** = incidence rate ratio from negative binomial regression

^a Adjusted for age, sex, race/ethnicity, education, income, receipt of public assistance, household size, and smoking