HIV Testing Among Adults with Mental Illness in the United States

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Abstract

Nationally representative data from the 2007 National Health Interview Survey (NHIS) were used to compare HIV testing prevalence among US adults with mental illness (schizophrenia spectrum disorder, bipolar disorder, depression, and/or anxiety) to those without, providing an update of prior work using 1999 and 2002 NHIS data. Logistic regression modeling was used to estimate the probability of ever being tested for HIV by mental illness status, adjusting for age, sex, race/ethnicity, marital status, substance abuse, excessive alcohol or tobacco use, and HIV risk factors. Based on data from 21,785 respondents, 15% of adults had a psychiatric disorder and 37% ever had an HIV test. Persons with schizophrenia (64%), bipolar disorder (63%), and depression and/or anxiety (47%) were more likely to report ever being tested for HIV than those without mental illness (35%). In multivariable models, individuals reporting schizophrenia (adjusted prevalence ratio=1.68, 95% confidence interval=1.33–2.13), bipolar disease (1.58, 1.39–1.81), and depression and/or anxiety (1.31, 1.25–1.38) were more likely to be tested for HIV than persons without these diagnoses. Similar to previous analyses, persons with mental illness were more likely to have been tested than those without mental illness. However, the elevated prevalence of HIV in populations with mental illness suggests that high levels of testing along with other prevention efforts are needed.

Introduction

HIV INFECTION AND MENTAL ILLNESS are frequently co-occurring health conditions, as nearly half of persons living with HIV (PLWH) have a psychiatric disorder, and between 5–23% of those with mental illness are infected with HIV.^{1–6} Yet few prevention and screening efforts target this at-risk population. The United States (US) Centers for Disease Control and Prevention (CDC) recommends that all persons aged 13–64 years be tested for HIV in healthcare settings and that persons with increased risk such as injecting drug users and their sex partners, those who exchange sex for money or drugs, and men who have sex with men or heterosexuals who have multiple sex partners be tested at least annually.⁷ The US Preventive Services Task Force has similar recommendations.⁸ Ensuring that mentally ill individuals are tested for HIV in accordance with national guidelines is critical to controlling the US HIV epidemic.^{1,9}

HIV testing benefits individuals by increasing the likelihood of early identification of the disease, linkage to care, and prescription of life-saving HIV therapies.^{10–12} In addition, testing benefits the general population by decreasing the risk of HIV transmission, since individuals aware of their HIV infection are less likely to engage in high-risk behaviors and those in care and on treatment are more likely to achieve viral suppression.^{13–17} HIV screening may be additionally important for individuals with mental illness, as testing facilities and providers can enable access to mental health services.¹⁸ Moreover, treating mental illness in HIV-infected populations may decrease sexual risk taking, increase prescription of antiretroviral therapy, and improve compliance with HIV treatment.^{19–21} For these and other reasons, HIV testing is integral to the US National HIV/AIDS Strategy and test-and-treat approaches to HIV prevention.^{22–24}

An evaluation of the 1999 National Health Interview Survey (NHIS) revealed that persons with major depression

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episodes (including bipolar and schizoaffective disorder), generalized anxiety disorder, and panic attacks were more likely to report ever having had an HIV test than those without these disorders (45.0% vs. 31.1%).²⁵ Similarly, an examination of the 2002 NHIS revealed that individuals with physical, intellectual, sensory, and mental health disabilities more commonly reported ever being tested for HIV than those without any disabilities (58.5% vs. 46.9%).²⁶ However, these studies were limited in that they did not differentiate persons with depression, bipolar disorder, and schizophrenia spectrum disorder, and narrowly focused on individuals with disabilities, respectively. Additionally, advances in HIV testing and changing epidemiological patterns have occurred since 2002, necessitating an updated evaluation of HIV testing in people with mental illness.^{12,27–30} This study compared HIV testing prevalence among a nationally representative sample of US adults with and without mental illness using data from the 2007 NHIS, the most recent cycle of the survey that included information on mental health diagnoses.

Methods

The NHIS, a cross-sectional household interview survey of the civilian, non-institutionalized population in all 50 states and the District of Columbia, uses a multistage area probability sampling design to produce nationally representative estimates of the health of the US population. Data are collected through a household interview, with one adult (age ≥ 18 years old) per sampled household randomly selected and invited to participate in the Sample Adult Core component of the survey. The annual response rate of NHIS is close to 90% of the eligible households in the sample. Information on participants' health status, HIV testing, and mental illness diagnoses or symptomatology were available in the 2007 NHIS.

A total of 23,393 adults participated in the 2007 NHIS. After we excluded 673 adults who reported dementia or used a proxy to answer questions and 935 adults with incomplete answers, 21,785 persons remained for the analysis. Participants were considered tested for HIV if they answered "Yes" to the following question: "Have you ever been tested for HIV?" Those who answered "Yes" to the following four questions were considered as having schizophrenia spectrum disorder, bipolar disorder, depression, and anxiety, respectively: "Have you ever been told by a doctor or other health professional that you had schizophrenia?", "Have you ever been told by a doctor or other health professional that you had bipolar disorder?", "During the past 12 months, have you been frequently depressed?", and "During the past 12 months, have you been frequently anxious?" Furthermore, we adapted an algorithm to classify individuals into three categories based on the likely severity of their mental illness.³¹ We coded those with schizophrenia spectrum disorder as having the most severe mental illness; individuals with bipolar disease but without schizophrenia as having the next most severe mental illness; and those with only depression and/or anxiety symptomatology as having the least severe mental illness.

Patients' age was divided into four groups: 18–24, 25–44, 45–64, and ≥ 65 years old; Race/ethnicity was categorized as non-Hispanic white, non-Hispanic black, Hispanic, and other/unknown. Marital status was grouped into married, separated/divorced/widowed, and single/never married. Patients who self-reported any substance abuse (based on an affir-

mative response to the question: During the past 12 months, have you had substance abuse, other than alcohol or tobacco?) or excessive use of alcohol or tobacco (based on an affirmative response to the question: During the past 12 months, have you had excessive use of alcohol or tobacco?) were considered to have active substance abuse and excess alcohol or tobacco use, respectively. Respondents were considered at higher risk of HIV in the last 12 months if they agreed with at least one of the following statements: (1) You have hemophilia and have received clotting factor concentrations; (2) You are a man who has had sex with other men, even just one time; (3) You have taken street drugs by needle, even just one time; (4) You have traded sex for money or drugs, even just one time; (5) You have tested positive for HIV (the virus that causes AIDS); and (6) You have had sex (even just one time) with someone who would answer "yes" to any of these statements. Total combined family income in the last calendar year was grouped as: $< \$20,000$, $\$20,000$ – $\$54,999$, $\$55,000$ – $\$74,999$, and $\geq \$75,000$. Highest educational level attained was categorized as: less than high school, high school graduate, some college or bachelor's degree, and master's, doctorate, or professional school degree.

The percentage of those reporting an HIV test was calculated overall and by mental illness group. Logistic regression was used to model the probability of ever having an HIV test for persons with mental illness, adjusting for age, sex, race/ethnicity, marital status, active substance abuse, excessive alcohol or tobacco use, and HIV risk factors. A sensitivity analysis was conducted excluding individuals at higher risk of HIV in the last 12 months. All statistical analyses were performed using SAS-callable SUDAAN to account for the NHIS complex survey design and respondent sample weighting. Associations with p values ≤ 0.05 were considered statistically significant.

Results

Based on completed surveys from 21,785 respondents, 68.7% of adults were non-Hispanic whites, 51.7% women, and 49.5% were ≥ 45 years old (Table 1). Fifteen percent reported at least one mental illness. Of these, 2.6% had schizophrenia spectrum disorder, 8.5% had bipolar disorder, and 88.9% had symptoms of depression and/or anxiety. Overall, 36.9% of adults reported ever having had an HIV test.

Women (39.2%) were more likely to have been HIV tested than men (34.4%); while Hispanics (41.8%) and non-Hispanic blacks (54.6%) had a higher testing prevalence than non-Hispanic whites (33.1%) (Table 1). Those reporting active substance abuse (57.7%), excess alcohol or tobacco use (47.8%), and HIV risk factors (64.3%) were more likely to be tested than individuals not reporting these conditions (36.7%, 36.3%, 36.0%, respectively). Higher levels of education were associated with an increased likelihood of being HIV tested. Persons reporting a diagnosis of schizophrenia spectrum disorder (64.3%), bipolar disorder (63.4%), and symptoms of depression and/or anxiety (46.5%) were more likely to be tested than those not reporting these diagnoses or symptoms (34.7%).

Adjusting for sociodemographic characteristics and HIV risk factors, individuals with any mental illness diagnoses or symptoms were more likely to report being tested for HIV than those without mental illness diagnoses or symptoms

TABLE 1. NUMBER AND PERCENTAGE OF PARTICIPANTS, BY SELECTED CHARACTERISTICS, AND RESULTS OF BIVARIATE RELATIONSHIP BETWEEN EACH CHARACTERISTIC AND HIV TESTING – NHIS 2007

Characteristics	Total	Weighted total ^g (%)	HIV tested	Weighted HIV tested ^g (%)	Weighted percent HIV tested (95% CI)	p Value ^h
Total	21,785	207,991,000	8,386	76,673,000	36.9 (35.9–37.8)	–
Mental illness						
Yes	3,510	31,954,000 (15.4)	1,749	15,494,000 (20.2)	48.5 (46.4–50.5)	<0.01
No (Ref)	18,247	175,803,000 (84.6)	6,626	61,089,000 (79.8)	34.7 (33.8–35.7)	
Mental illness diagnoses/symptoms						
No mental illness (Ref)	18,247	175,803,000 (84.6)	6,626	61,080,000 (79.8)	34.7 (33.8–35.7)	
Schizophrenia ^a	109	900,000 (0.4)	63	579,000 (0.8)	64.3 (51.0–77.7)	<0.01
Bipolar disorder ^b	292	2,762,000 (1.3)	188	1,752,000 (2.3)	63.4 (56.5–70.4)	<0.01
Depression/anxiety ^c	3,109	28,293,000 (13.6)	1,498	13,163,000 (17.2)	46.5 (44.2–48.8)	<0.01
Age (years)						
18–24 (Ref)	2,354	27,015,000 (13.0)	925	8,892,000 (11.6)	32.9 (30.3–35.6)	
25–44	8,108	78,031,000 (37.5)	4,431	40,702,000 (53.1)	52.2 (50.7–53.6)	<0.01
45–64	7,276	71,265,000 (34.3)	2,527	23,403,000 (30.5)	32.8 (31.3–34.3)	0.96
65 and Above	4,047	31,680,000 (15.2)	503	3,676,000 (4.8)	11.6 (10.3–12.9)	<0.01
Sex						
Male (Ref)	9,629	100,392,000 (48.3)	3,378	34,542,000 (45.1)	34.4 (33.0–35.8)	
Female	12,156	107,599,000 (51.7)	5,008	42,131,000 (54.9)	39.2 (38.1–40.2)	<0.01
Race/ethnicity						
White, Non-Hispanic (Ref)	12,964	142,949,000 (68.7)	4,282	47,348,000 (61.8)	33.1 (32.1–34.2)	
Black, Non-Hispanic	3,356	23,575,000 (11.3)	1,824	12,880,000 (16.8)	54.6 (52.3–57.0)	<0.01
Hispanic	3,933	28,102,000 (13.5)	1,733	11,733,000 (15.3)	41.8 (39.7–43.8)	<0.01
Other race	1,532	13,364,000 (6.4)	547	4,712,000 (6.1)	35.3 (32.1–38.5)	0.20
Marital status						
Married/living with partner (Ref)	10,931	128,238,000 (61.8)	4,129	47,487,000 (62.1)	37.0 (35.9–38.2)	
Widowed/divorced/separated	5,904	37,033,000 (17.9)	2,104	13,319,000 (17.4)	36.0 (34.3–37.6)	0.27
Never married	4,859	42,158,000 (20.3)	2,122	15,670,000 (20.5)	37.2 (35.0–39.4)	0.91
Total combined family income						
< \$20,000 (Ref)	5,252	35,317,303 (17.0)	2,082	13,490,650 (17.6)	38.2 (36.2–40.3)	
\$20,000–\$54,999	8,514	77,030,418 (37.0)	3,183	27,516,132 (35.9)	35.7 (34.3–37.1)	0.04
\$55,000–\$74,999	2,623	29,089,378 (14.0)	988	10,660,611 (13.9)	36.6 (34.4–38.9)	0.32
\$75,000 and over	5,396	66,553,696 (32.0)	2,134	25,005,652 (32.6)	37.6 (36.0–39.2)	0.62
Education						
Less than high school (Ref)	4,441	36,935,637 (17.9)	1,612	12,898,699 (16.9)	34.9 (33.2–36.7)	
High school graduate	5,447	53,568,665 (26.0)	1,722	16,240,660 (21.3)	30.3 (28.8–31.8)	<0.01
Some college and bachelor's degree	9,812	96,696,696 (46.9)	4,186	39,014,776 (51.2)	40.3 (39.0–41.7)	<0.01
Masters, doctorate or professional school degree	1,904	19,069,345 (9.2)	807	8,010,648 (10.5)	42.0 (39.4–44.7)	<0.01
Active substance abuse^d						
Yes	135	1,373,000 (0.7)	82	793,000 (1.0)	57.7 (47.4–68.1)	<0.01
No (Ref)	21,641	206,532,000 (99.3)	8,301	75,848,000 (99.0)	36.7 (35.8–37.7)	
Excessive alcohol or tobacco use^e						
Yes	1,050	10,458,000 (5.0)	513	4,996,000 (6.5)	47.8 (44.2–51.4)	<0.01
No (Ref)	20,724	197,438,000 (95.0)	7,869	71,637,000 (93.5)	36.3 (35.4–37.2)	
HIV risk behaviors^f						
Yes	625	5,737,000 (2.8)	425	3,686,000 (4.9)	64.3 (59.3–69.2)	<0.01
No (Ref)	20,720	198,100,000 (97.2)	7,788	71,412,000 (95.1)	36.0 (35.1–37.0)	

CI, Confidence Interval; Ref, Reference Group.

^aCategory includes persons with schizophrenia, as well as other psychiatric disorders. ^bCategory includes persons with bipolar disease, as well as other psychiatric disorders, except schizophrenia. ^cCategory includes only persons with symptoms of depression and/or anxiety. ^dBased on responses to the following question: “During the past 12 months, have you had substance abuse, other than alcohol or tobacco?” ^eBased on agreement to the following statements in the past 12 months: (1) You have hemophilia and have received clotting factor concentrations, (2) You are a man who has had sex with other men, even just one time, (3) You have taken street drugs by needle, even just one time, (4) You have traded sex for money or drugs, even just one time, (5) You have tested positive for HIV (the virus that causes AIDS), and (6) You have had sex (even just one time) with someone who would answer “Yes” to any of these statements. ^gRounded to the nearest 1,000. ^hCompared to the reference level for each variable.

TABLE 2. CHARACTERISTICS ASSOCIATED WITH HIV TESTING – NHIS 2007

	Adjusted prevalence ratio (95% CI)	p Value ^g
<i>Mental illness diagnoses/symptoms (Ref: no mental illness)</i>		
Persons with schizophrenia ^a	1.68 (1.33–2.12)	<0.01
Persons with bipolar disorder ^b	1.58 (1.38–1.80)	<0.01
Persons with depression/anxiety ^c	1.32 (1.26–1.39)	<0.01
<i>Age, years (Ref: 18–24)</i>		
25–44	1.40 (1.30–1.52)	<0.01
45–64	0.87 (0.80–0.94)	<0.01
65 and Above	0.33 (0.29–0.38)	<0.01
<i>Sex (Ref: male)</i>		
Female	1.14 (1.09–1.19)	<0.01
<i>Race/ethnicity (Ref: white, Non-Hispanic)</i>		
Black, Non-Hispanic	1.59 (1.51–1.68)	<0.01
Hispanic	1.17 (1.10–1.24)	<0.01
Other race	0.98 (0.89–1.07)	0.62
<i>Marital status (Ref: married/living with partner)</i>		
Never married	0.82 (0.76–0.88)	<0.01
Widowed/divorced/separated never married	1.08 (1.02–1.13)	<0.01
<i>Total combined family income (Ref: <\$20,000)</i>		
\$20,000–\$54,999	0.94 (0.89–1.00)	0.07
\$55,000–\$74,999	0.91 (0.84–0.99)	0.02
\$75,000 and over	0.94 (0.88–1.00)	0.06
<i>Education (Ref: less than high school)</i>		
High school graduate	0.94 (0.87–1.02)	0.12
Some college and bachelor's degree	1.19 (1.11–1.27)	<0.01
Masters, doctorate or professional school degree	1.31 (1.20–1.43)	<0.01
<i>Active substance abuse (Ref: no)^d</i>		
Yes	1.13 (0.88–1.45)	0.34
<i>Excessive alcohol or tobacco use (Ref: no)^e</i>		
Yes	1.19 (1.10–1.28)	<0.01
<i>HIV risk behaviors (Ref: none)^f</i>		
Yes	1.59 (1.46–1.72)	<0.01

CI, Confidence Interval; Ref, Reference Group.

^aCategory includes persons with schizophrenia, as well as other psychiatric disorders. ^bCategory includes persons with bipolar disease, as well as other psychiatric disorders, except schizophrenia. ^cCategory includes only persons with symptoms of depression and/or anxiety. ^dBased on responses to the following question: “During the past 12 months, have you had substance abuse, other than alcohol or tobacco?” ^eBased on responses to the following question: “During the past 12 months, have you had excessive use of alcohol or tobacco?” ^fBased on agreement to the following statements in the past 12 months: (1) You have hemophilia and have received clotting factor concentrations, (2) You are a man who has had sex with other men, even just one time, (3) You have taken street drugs by needle, even just one time, (4) You have traded sex for money or drugs, even just one time, (5) You have tested positive for HIV (the virus that causes AIDS), and (6) You have had sex (even just one time) with someone who would answer “Yes” to any of these statements. ^gCompared to the reference level for each variable.

[adjusted prevalence ratio (APR)=1.34, 95% confidence interval (95% CI)=1.28–1.41; results not shown]. Persons reporting schizophrenia spectrum disorder (APR=1.68, 95% CI=1.33–2.12), bipolar disease (APR=1.58, 95% CI=1.38–1.80), and symptoms of depression and/or anxiety (APR=1.32, 95% CI=1.26–1.39) were more likely to be tested than those not reporting these diagnoses or symptoms (Table 2). Among individuals reporting mental illness diagnoses or symptoms, persons with bipolar disorder were more likely to be tested than those with only symptoms of depression and/or anxiety ($\chi^2=6.09$, $p=0.01$). Persons aged 25–44, women, racial/ethnic minorities, individuals who are widowed/divorced/separated, those reporting excessive use of alcohol or tobacco, and persons with HIV risk factors were significantly more likely to be tested for HIV than their counterparts (Table 2). Similar associations were observed in sensitivity analyses excluding individuals at higher risk of HIV in the last 12 months (Appendix 1).

Discussion

HIV testing is an essential component of HIV prevention strategies and serves as the entry to HIV care and treatment.^{22,24,32} People who reported schizophrenia spectrum disorder, bipolar disorder, and symptoms of depression and/or anxiety were more likely to have been tested for HIV than individuals without these diagnoses or symptoms. Yet, only 48.5% of people with mental illness ever reported an HIV test, which compared to earlier data, has not significantly change over a 9-year period.²⁵ While encouraging in some respects, these results highlight a need for improving testing efforts in this at-risk population.

Increased awareness of HIV risk in people with mental illness may explain the higher testing prevalence in this population. A regional survey of 221 healthcare providers in large primary care networks noted that most perceive their patients to be at low risk of HIV. This perception served as

the primary barrier to HIV testing,³³ and is inconsistent with national recommendations of routine HIV testing in clinical settings.⁷ In contrast, providers who perceive their patients to be at high risk of HIV perform more frequent testing.³⁴ Mentally ill individuals are more likely than others to engage in high-risk behaviors associated with HIV transmission, including unprotected sexual intercourse, injection drug use, and sex with multiple partners.^{35,36} Recognition of these risk factors may prompt patients to seek and for providers to offer HIV testing. However, regardless of risk behaviors, persons with mental illness were more likely to report having had an HIV test than those without mental illness.

Only about half (48.5%) of adults with mental illness had an HIV test. Implementing routine HIV testing in mental health settings (where screening is low due to: limited availability of on-site testing, clinician discomfort providing risk reduction counseling and administering HIV tests, and provider concerns that HIV testing may detract from the delivery of mental health care) and targeting outreach and testing campaigns towards those with mental illness may help improve testing rates in this at-risk population.^{37–40} In addition, mentally ill persons who use illicit drugs should be screened for HIV when initiating treatment for substance abuse.⁴¹ Lastly, linkage to and retention in HIV care are necessary, given poorer HIV outcomes for persons with versus those without psychiatric disorders.^{42–44}

Our study had several limitations. Because individuals self-reported HIV testing and mental health status, responses may be influenced by recall and social desirability bias. However, rates of self-reported psychiatric disorders in our sample compared favorably with the 12-month prevalence rates of these disorders based on structured diagnostic interviews in a national probability sample.⁴⁵ The survey did not include a comprehensive evaluation of all mental illnesses, thus adults classified as having no mental illness may have had undiagnosed psychiatric disorders or disorders other than the ones examined. Since CDC issued their routine HIV testing recommendations in 2006, our 2007 results may not reflect full implementation of these recommendations. In addition, because NHIS excludes institutionalized populations (e.g., persons living in long-term care facilities, correctional institutions), our results can be generalized only to US adults outside these institutions. Lastly, additional data are needed to better understand specific barriers to HIV testing among individuals with mental health conditions and in mental health settings.

Our findings that more persons with mental illness were tested for HIV is encouraging. However, about half of mentally ill individuals in the US have never been tested for HIV. This provides a significant opportunity for public health prevention efforts. Given the increased HIV risk in this population, targeted programs focused on persons with psychiatric disorders are needed, as well as interventions for linkage to and retention in HIV care.

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APPENDIX 1. CHARACTERISTICS ASSOCIATED WITH HIV TESTING (EXCLUDING THOSE AT HIGHER RISK OF HIV RISK IN THE LAST 12 MONTHS)—NHIS 2007

	Adjusted prevalence ratio (95% CI)	p Value ^f
<i>Mental illness diagnoses/symptoms (Ref: no mental illness)</i>		
Persons with schizophrenia ^a	1.68 (1.30–2.18)	<0.01
Persons with bipolar disorder ^b	1.62 (1.42–1.85)	<0.01
Persons with depression/anxiety ^c	1.32 (1.25–1.39)	<0.01
<i>Age, years (Ref: 18–24)</i>		
25–44	1.40 (1.29–1.51)	<0.01
45–64	0.85 (0.78–0.92)	<0.01
65 and above	0.32 (0.28–0.37)	<0.01
<i>Sex (Ref: male)</i>		
Female	1.15 (1.09–1.20)	<0.01
<i>Race/ethnicity (Ref: white, non-Hispanic)</i>		
Black, non-Hispanic	1.61 (1.53–1.70)	<0.01
Hispanic	1.18 (1.10–1.26)	<0.01
Other race	0.99 (0.90–1.08)	0.76
<i>Marital status (Ref: married/living with partner)</i>		
Never married	0.81 (0.75–0.87)	<0.01
Widowed/divorced/separated never married	1.08 (1.02–1.14)	<0.01
<i>Total combined family income (Ref: <\$20,000)</i>		
\$20,000–\$54,999	0.95 (0.89–1.01)	0.10
\$55,000–\$74,999	0.91 (0.84–0.99)	0.03
\$75,000 and over	0.94 (0.88–1.01)	0.10
<i>Education (Ref: less than high school)</i>		
High school graduate	0.94 (0.87–1.01)	0.11
Some college and bachelor's degree	1.18 (1.10–1.27)	<0.01
Masters, doctorate, or professional school degree	1.30 (1.18–1.42)	<0.01
<i>Active substance abuse (Ref: no)^d</i>		
Yes	1.18 (0.90–1.56)	0.26
<i>Excessive alcohol or tobacco use (Ref: no)^e</i>		
Yes	1.18 (1.09–1.28)	<0.01

CI, confidence interval; Ref, reference group.

^aCategory includes persons with schizophrenia, as well as other psychiatric disorders.

^bCategory includes persons with bipolar disease, as well as other psychiatric disorders, except schizophrenia.

^cCategory includes only persons with symptoms of depression and/or anxiety;

^dBased on responses to the following question: “During the past 12 months, have you had substance abuse, other than alcohol or tobacco?”

^eBased on responses to the following question: “During the past 12 months, have you had excessive use of alcohol or tobacco?”

^fCompared to the reference level for each variable.