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Associations Between Marijuana Use and Involuntary Job Loss in US-representative longitudinal and cross-sectional samples

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Abstract

Objective: To investigate whether marijuana use is associated with involuntary job loss

Methods: Multivariable survey logistic analysis of longitudinal (2001–2002/2003–2004) and cross-sectional data (2012–2013) from National Epidemiologic Survey on Alcohol and Related Conditions (NESARC).

Results: Marijuana use increased for all user groups with most workers who use marijuana using marijuana monthly (2.7% in 2001–2002 and 10.8% in 2012–2013). Past year marijuana users in 2001–2002 had higher odds of involuntary job loss in 2003–2004 (OR 1.27; 95% CI 1.13–1.41). Daily marijuana use is associated with higher odds of job loss in adjusted analyses using longitudinal (OR 2.18; 95% CI 1.71–2.77) and cross-sectional data (OR 1.40; 95% CI 1.06–1.86). Income significantly modifies these effects.

Conclusions: Findings indicate that job loss may be an overlooked social cost of marijuana use for US workers. Future studies using an occupational health perspective are needed.

Keywords

drug use; marijuana; National Epidemiologic Survey on Alcohol and Related Conditions; job loss

INTRODUCTION

Marijuana use is increasing in the US. From 2001–2002 to 2012–2013, past year marijuana use significantly increased from 4.1% to 9.5% among the general US population, and from 1.5% to 2.9% for DSM-IV marijuana use disorder.^{1,2} Particularly among blacks and Hispanics, past year marijuana use increased from 4.7% to 12.7% and 3.3% to 8.4%, respectively.² Black and Hispanic populations also experienced notable increases in past year DSM-IV marijuana use disorder, from 1.8% to 4.6% and 1.2% to 2.8%, respectively.²

Marijuana use among working populations remains an understudied and controversial topic. One potential concern is that studies of substance use by workers could be misused to place

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blame or onus for action on workers in lieu of advocating for engineering controls proven to protect workers' health.³ The ambiguous legal framework surrounding marijuana use adds further complications.^{3,4} While all types of marijuana use are criminalized at the federal government level in the US, there is an increasing trend at state levels in liberalization of laws governing recreational and medical uses.⁵ However, courts have yielded different results for workers whose unemployment benefits and/or workers compensation claims were denied because they used marijuana in states where use is legal. For some workers, the court system upheld the denial, while the denial was reversed in other cases.³ Generally, marijuana use remains strong grounds for firing employees.^{3,6}

Understanding whether involuntary job loss is a potential consequence of marijuana use is particularly important for the field of occupational health, given current trends towards marijuana use liberalization and reports of increased marijuana use nationally. The controversial legal framework surrounding legal use by workers adds further impetus to this need to understand whether marijuana use is associated with involuntary job loss. Workers who experience involuntary job loss often suffer negative health, social, and economic impacts.^{10,11} Involuntary job loss is a stressful life event where the impact is often compounded by further stress from income loss or economic decline.¹⁰ Additionally, job loss influences workers' risks for occupational injuries. Even when workers who experienced job loss find new employment, the risk of occupational injury is relatively higher in the first month on a new job, and declines over time.¹²

The current study investigates whether marijuana use is associated with involuntary job loss using nationally representative data. Few empirical studies of this association exist. The few existing studies on marijuana use among workers have focused on associations with either unemployment or wages.⁷⁻⁹ These studies found positive, negative, and no associations between marijuana use and these employment outcomes.⁷⁻⁹ In addition to investigating involuntary job loss, the current study investigates general marijuana use as well as intensity of use. A study that considered intensity of marijuana use in investigating impacts on employment outcomes found that only heavy use was associated with negative employment outcomes.⁷

The current study further investigates whether any associations between marijuana use and involuntary job loss vary by race/ethnicity and income. Despite relatively similar rates of substance misuse, racial/ethnic minority and low-income populations have historically shouldered higher social costs, such as greater likelihood of involvement with the child welfare or criminal justice systems.¹³⁻¹⁷ The study's hypotheses are: (1) Workers who report past year marijuana use will have higher odds of job loss compared to nonusers; (2) The odds of job loss will increase with intensity of use when comparing nonuse to daily, weekly, and monthly or less marijuana use; and (3) Significant interaction by race/ethnicity and income levels will exist in any associations between marijuana use and job loss.

METHODS

This study uses data from the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC), a nationally representative household survey of adults with

oversampling of blacks, Hispanics, and young adults. A detailed description of the multistage probability sampling procedures for NESARC are available online, and published elsewhere.^{18,19} NESARC was first fielded in 2001–2002 as a longitudinal survey, yielding 43,093 adults; the 2003–2004 follow-up survey yielded 34,653 (80%).¹⁸ In 2012–2013, NESARC was again fielded to a cross-sectional sample that was updated to be nationally representative.¹⁹ NESARC data was collected using AUDADIS-IV (2001–2002 and 2003–2004 samples) and AUDADIS-V (2012–2013 sample), structured interviews that use computer-assisted personal interviewing. A Spanish version of the interview was administered to respondents who chose to be interviewed in Spanish.²⁰ Weights were calculated to adjust for nonresponse.

The analytical sample includes all respondents who meet the Bureau of Labor Statistics classification as labor force participants by working or actively seeking work. The number of participants are 23,580, 23,063, and 23,540 respondents in 2001–2002 (wave 1), 2003–2004 (wave 2), and 2012–2013 (wave 3), respectively. We exclude those missing data on marijuana use ($n = 17$ for the wave 1/wave 2 analysis and $n = 9$ for the wave 3 analysis), employment outcomes ($n = 37$ for the wave 1/wave 2 analysis and $n = 11$ for the wave 3 analysis), and covariate data ($n = 1,616$ for the wave 1/wave 2 analysis and $n = 2,092$ for the wave 3 analysis).

Study Measures

Marijuana use and DSM disorder: The reliability and validity of AUDADIS-based marijuana use and disorder modules have been documented using clinical and general samples.^{21–23} Study participants who answered yes to the question asking if they used marijuana in the last 12 months were classified as past-year users, while those who answered no were classified as nonusers. Past-year users were further classified according to whether they reported using daily, weekly, monthly or less than monthly. The AUDADIS-IV collected data on 38 symptoms, which were used to ascertain whether past-year marijuana users met the DSM-IV criteria for marijuana use disorder (2001–2002 and 2003–2004 samples), while the AUDADIS-V collected data on 48 symptoms, which were used to ascertain whether past-year marijuana users met the DSM-V criteria for marijuana use disorder (2012–2013 sample).^{21–23}

Involuntary job loss: Involuntary job loss was defined according to responses to the question, “During the last 12 months, were you fired or laid off from a job.” Respondents who replied “Yes” were classified as having experienced job loss in the past 12 months, while respondents who replied “No” were classified as not having experienced job loss in the past 12 months.

Covariates

Respondent characteristics

Conflict at work: binary variable indicating whether a respondent had trouble with a boss or a coworker in the past 12 months.

Government aid as a child: binary variable indicating whether a respondent's family received money from government assistance programs before the age of 18, such as welfare, food stamps, general assistance, Aid to Families with Dependent Children or Temporary Assistance for Needy Families.

Household income: categorical variable indicating a respondent's total household income for the last 12 months (<\$20,000, \$20,000–34,999, \$35,000–69,999, and >\$70,000).

Race: categorical variable indicating a respondent's racial and ethnic classification (non-Hispanic white, non-Hispanic black, Hispanic, and other).

Gender: binary variable indicating whether a respondent is male or female.

Age: categorical variable indicating a respondent's age range at the time of survey administration (18–29, 30–44, 45–55, 55–65, and 65+)

Education: categorical variable indicating a respondent's highest grade or year of school completed (<high school, high school graduate or GED, some college, college, and graduate or professional studies)

Marital status: categorical variable indicating a respondent's current marital status (married or living with someone as if married; widowed, divorced, or separated; and never married)

Nativity: binary variable indicating whether a respondent was born in the US or outside of the US

Census region: categorical variable indicating a respondent's census region (Northeast, Midwest, South, and West).

Occupational class: categorical variable indicating the occupational class of the respondent's current or most recent job (white collar, blue collar, service, and other). The variable was created based on 2003 major occupational codes from the Bureau of Labor Statistics, where 1–5, 6–8, 9–12, and 13–14 were classified as white, service, blue collar, and other workers, respectively.²⁴

Respondent health and drug profile

General health: categorical variable for how a respondent classifies his/her health in general (excellent, very good, good, fair, and poor).

Lifetime mental health problems: categorical variable indicating whether a respondent has had a lifetime mental health problem, including major depressive episode, dysthymia, manic episode, hypomanic episode, bipolar disorder, specific phobia, social phobia, panic disorder, agoraphobia, generalized anxiety disorder, posttraumatic stress disorder, anorexia nervosa, bulimia nervosa, binge eating disorder, schizotypal personality disorder, personality disorder, conduct disorder and antisocial disorder. The variables for the 2001–2002 and

2003–2004 samples were based on the DSM-IV criteria, while the 2012–2013 sample was based on the DSM-V criteria.

Alcohol disorder: binary variable indicating whether a respondent has had a lifetime alcohol use disorder. The variables for the 2001–2002 and 2003–2004 samples were based on the DSM-IV alcohol abuse and dependence criteria, while the variable for the 2012–2013 sample was based on the DSM-V alcohol use disorder criteria.

Family history of alcohol use disorder: binary variable indicating whether a respondent had a blood or natural father or mother who was ever an alcoholic or problem drinker.

Other drug disorder: binary variable indicating whether a respondent has had a lifetime other drug use disorder. The variables for the 2001–2002 and 2003–2004 samples were based on the DSM-IV abuse and dependence criteria, while the variable for the 2012–2013 sample was based on the DSM-V use disorder criteria. The other drugs considered were sedatives, opioids, cocaine, stimulants, hallucinogens, inhalants/solvents, club drugs, and heroin.

STATISTICAL ANALYSES

All analyses were conducted using SAS version 9.4 (SAS Institute Inc., Cary, North Carolina). The software's survey commands (i.e. *proc survey* commands) were used to account for the complex survey design of NESARC and to maintain the clustering structure of the full sample when taking subsets for data analysis. Survey weights provided by the survey developers were used to estimate weighted descriptive statistics and weighted logistic regression models so that the study findings were reflective of the entire labor force in the US. A p-value < 0.05 was used to determine statistical significance.

Descriptive statistics were obtained on the study variables for the overall sample. Weighted percentages and their standard errors were reported. Weighted logistic regression models were used to test the study hypotheses. Odds ratios and their 95% confidence intervals were computed from the weighted logistic regression models. Separate models were estimated for the longitudinal and cross-sectional samples. Multivariable weighted logistic regression models controlled for conflict at work, government aide as a child, household income, race, gender, age, education, marital status, nativity, census region, occupational class, general health status, lifetime mental health problems, lifetime alcohol use disorder, lifetime other drug use disorder, family history of drug disorder. Interaction terms for marijuana use and race and marijuana use and income level were added to the multivariable weighted logistic regression models to test for interaction effects by race/ethnicity and income levels (hypothesis 3).

RESULTS

In 2001–2002, 4.53% of the workers reported any past year use of marijuana, while the figure rose to 10.27% in 2012–2013 (Table 1). Published studies of marijuana use using the same datasets and definition of use indicated comparable prevalence of 4.1% and 9.5%,

respectively, for the general population.² Similar patterns were observed for past year use meeting the DSM-IV criteria for disorder; among workers the prevalence was 1.21% in 2001–2002 and 2.63% in 2012–2013, while published studies indicate it was 1.5% and 2.9%, respectively, for the general population.

For those who experienced involuntary job loss, the prevalence of marijuana use was relatively higher. For this group, past year marijuana use was 12.6% in 2001–2002 and 22.9% in 2012–2013. In the same period, the prevalence of DSM-IV marijuana use disorder was 4.4% and 6.6%, respectively.

Generally, the pattern for frequency of use is that most workers who use marijuana in the past year used it monthly or less (2.7% in 2001–2002, 10.8% in 2012–2013). Workers who experienced job loss had higher prevalence of monthly or less past year marijuana use (6.8% and 10.8% in 2001–2002 and 2012–2013, respectively). A slightly higher proportion of workers used marijuana daily compared to weekly in 2001–2002 (0.97% vs. 0.88%) and in 2012–2013 (3% vs. 2.7%). Similar patterns were observed among the sample that experienced involuntary job loss (7.6% vs. 4.6%).

Multivariable models

Any past year marijuana use and involuntary job loss: We found support for our first hypothesis that workers reporting past year marijuana use will have higher odds of job loss compared to those reporting nonuse. Table 2 presents these results from unadjusted and adjusted models. In both unadjusted and adjusted models, workers who reported any past year marijuana use had higher odds of reporting involuntary job loss, compared to those reporting nonuse. Specifically, workers who reported past year marijuana use in 2001–2002 had higher odds of involuntary job loss in 2003–2004 (OR 1.27; 95%CI 1.13–1.41), compared to those reporting nonuse in 2001–2002. Similar results emerged from analyses using cross-sectional data from 2012–2013; these found that workers who reported past year use had higher odds of job loss (OR 1.50; 95%CI 1.24–1.81).

Frequency of marijuana use and involuntary job loss: Table 3 presents results from models estimating associations between frequency of marijuana use and involuntary job loss using longitudinal and cross-sectional samples. Our second hypothesis is that the odds of job loss will increase with intensity of use when comparing nonuse to daily, weekly, and monthly or less marijuana use. The results indicate that, compared to nonuse, daily use of marijuana is associated with higher odds of job loss in adjusted analyses using longitudinal (OR 2.18; 95%CI 1.71–2.77) and cross-sectional data (OR 1.40; 95%CI 1.06–1.86).

More complex associations were found for weekly use of marijuana, compared to nonuse. While the longitudinal data found lower odds of job loss for weekly versus nonuse of marijuana (OR 0.86; 95%CI 0.77–0.97), the cross-sectional analysis indicated higher odds of job loss (OR 1.48; 95%CI 1.03–2.14). The association between monthly or less use of marijuana and job loss was not statistically significant (OR 1.09; 95%CI 0.95–1.25) in the longitudinal analysis, while it was significant for the cross-sectional associations (OR 1.57; 95%CI 1.24–2.00).

Interaction by race/ethnicity and income: Results from the type 3 analysis of effects using longitudinal and cross-sectional samples indicated no interaction between race/ethnicity and past year marijuana use ($p>0.15$) and for frequency of marijuana use ($p>0.61$). These results indicate there is insufficient evidence for the first part of our hypothesis 3. However, type 3 tests indicate significant interaction effects of income and past year marijuana use ($p=0.008$ using longitudinal data and $p=0.01$ using cross-sectional data), and for frequency of marijuana use using cross-sectional data ($p<0.0001$), but not for analysis using longitudinal data ($p>0.09$).

In Table 4, we present the results for the interactions between past year marijuana use and household income. Compared to non-use, past year marijuana use was associated with higher odds of involuntary job loss in all income categories. In both the longitudinal and cross-sectional analyses, the results were significant for the lowest and highest income categories. For the longitudinal analyses, the odds ratios for the lowest and highest income categories were 1.46 (95% CI 1.19–1.80) and 1.54 (95% CI 1.20–1.98), respectively. For the cross-sectional analysis, the odds ratios for the lowest and highest income categories were 1.36 (95% CI 1.01–1.82) and 2.63 (95% CI 1.76–3.94), respectively.

In the longitudinal analyses examining frequency of use, we found that compared to nonuse, daily use of marijuana was significantly associated with higher odds of involuntary job loss in all income categories. Compared to nonuse, weekly marijuana use was not significantly associated with job loss in the two lowest income categories, but the association was significant in the two highest income categories. Interestingly, in these income categories, the odds of job loss were significantly lower among weekly users of marijuana than non-users (OR 0.74, 95% CI 0.67–0.82; and OR 0.23, 95% CI 0.21–0.25, respectively, for those earning \$35,000–69,999 and greater than \$70,000). Monthly or less marijuana use, compared to nonuse, was only significantly associated with involuntary job loss in the highest income category, with monthly or less users of marijuana having higher odds of job loss compared to non-users (OR 1.75, 95% CI 1.32–2.32).

DISCUSSION

In this study, we found that the levels of marijuana use among workers are increasing and generally comparable to levels of use found in the general US population. We investigated whether workers' marijuana use was associated with involuntary job loss using nationally-representative and longitudinal data from 2001–2002 and 2003–2004, and cross-sectional data from 2012–2013. Although the data is not longitudinal across waves 1–2 and wave 3, this study indicates that overall, the detrimental effects of marijuana use on involuntary job loss is increasing over time. We found substantial support for our first hypothesis that marijuana use in the past year is associated with increased likelihood of involuntary job loss. Workers' odds of job loss increased 27% in the longitudinal analysis and 50% in the cross-sectional analysis. When frequency of marijuana use was considered, the results differed. Compared to nonuse, daily use of marijuana was associated with increased odds of involuntary use, in both longitudinal and cross-sectional analyses. However, compared to nonuse, weekly use was associated with 14% lower odds of involuntary job loss in the

longitudinal analysis; whereas in the cross-sectional analysis, weekly use was associated with 48% increased odds of job loss.

A secondary aim of our study was to examine if there were any differences in the association between marijuana use and involuntary job loss by race/ethnicity and household income. We did not find any significant interaction with race and marijuana use; however, we found significant interaction of household income and both any marijuana use and frequency of marijuana use. Those in the highest and lowest income brackets had higher odds of job loss associated with their marijuana use compared to nonusers from the same income levels. Among the higher income categories, we also see a potential protective effect of weekly marijuana use, which was also observed in the main effects analysis. The range of protective and detrimental effects observed in the interaction between the frequency of marijuana use and level of income illustrates that the relationship between marijuana use and job loss is complicated. Future studies examining the pathways from marijuana use to job loss over time can help further elucidate why and how marijuana use affects job loss, which in turn will help target high risk groups experiencing job loss and prevent current marijuana users in the workforce from further experiencing job loss.

The differing results on job loss by frequency of marijuana use, compared to results by any marijuana use in the past year, may indicate the different types of marijuana users: experimental users, persistent users who are recreational, and persistent users.⁷ Weekly use of marijuana, rather than daily, may suggest more recreational use, and lower likelihood of a substance use disorder.¹ The literature suggests that low or moderate drug use by adults is unlikely to cause harm, while problematic use (heavy use) can have negative wage effects.⁷ There seems to be a threshold where marijuana use may result in chronic absenteeism and frequent spells out of the labor market, rather than be protective or promote job productivity.⁸ One possible explanation for the differing results of weekly marijuana use on job loss for the longitudinal and cross-sectional analyses may be that the weekly users in the later, cross-sectional analyses may be chronic users for a longer time period. Or it may be that experimental users over time find an appropriate dose, or later abstain from daily use, so that the longitudinal data represents their reduced use of marijuana over time.

Another explanation for the observed protective effect of weekly marijuana use may be that the participants use marijuana only on the weekends, which would not be detrimental to one's job. It is also reasonable to think that those who use marijuana daily might differ from those who only use marijuana on the weekends, in terms of rationale for engaging in substance abuse (i.e. primary coping mechanism or dependency versus recreational use).

An additional consideration for the differing results may be that broader economic forces may have impacted job loss, which we have been unable to adjust for in our analyses. This may confound the results, as an economic recession may be associated with increased drug use as well as increased job loss.²⁵ The Great Recession of 2007–2009 was a particularly difficult time period, with almost one in six workers having lost their jobs.²⁵ The employment consequences of job loss of this recession period have been quite severe, with very low rates of reemployment and difficulty finding full-time employment through 2013.²⁵

We expected the associations between marijuana use and involuntary job loss to be different by race/ethnicity. Based on the frequency of marijuana use by race/ethnicity, there were sufficient numbers of marijuana users to test for interaction effects; however, none were found. Racial/ethnic minority populations usually bear disproportionate social costs for substance use.¹⁷ We did not find evidence of this for the association between marijuana use and job loss.

One limitation of the study is that we could not pinpoint the exact time of day or week during which workers used marijuana. There may be differences between those who use daily and only on the weekends that might further disentangle the effects of marijuana use on involuntary job loss. Another limitation is that although we provide two waves of data, this is still a relatively short time frame to examine the dynamics of marijuana use. We do not know if the participants who indicate they have used marijuana in the past year are experimental, one-time users or chronic users. Although we observed that the prevalence of marijuana use has increased in wave 3 of our study and that it has more detrimental effects on job loss, we cannot causally state whether this is the result of long-term, chronic, or short-term use.

Future studies may want to examine marijuana use over longer periods of time to tease out whether the potentially harmful effects of marijuana use are immediate, or if there are delayed or cumulative effects of drug use. Further insights may be gained by examining start of first drug use (whether it occurred in adolescence or at later ages). The literature suggests detrimental effects of marijuana on educational outcomes for adolescents.⁷ Educational outcomes are correlated with occupation and income, and examining first drug use may help further distinguish the subtypes of marijuana users to identify those at highest risk. Another avenue to explore would be to look at how many years an individual has been employed, and whether a job is the first job for an individual, as there seems to be differential effects of drug use and wages by the stage of one's career.⁸

Given these limitations, we still find that our study adds to the literature, as it is the first study to examine marijuana use and involuntary job loss among those actively in the workforce. Furthermore, we provide analyses on three waves of nationally representative data, of which two waves are longitudinal data. We improve upon the limitations of cross-sectional analyses, suggesting the effects of marijuana use may not only be immediate, but have detrimental effects over the next year as well.

CONCLUSION

Overall, we observed significant associations between marijuana use and involuntary job loss, based on analyses of both cross-sectional and longitudinal data from multiple years. We found an increasing trend in the effect of marijuana use on involuntary job loss from 2003–2004 to 2012–2013. Furthermore, we found that there was significant interaction between household income and marijuana use. For any use of marijuana in the past year, those in the highest and lowest income categories were at significantly increased odds of involuntary job loss. For frequency of use, we see that there is a potential protective effect of marijuana use among those who use marijuana weekly, among the highest income categories.

The present paper's focus on job loss is particularly important for occupational health researchers and practitioners to consider given the proven detrimental impacts of job loss on workers' health.^{26,27} Studies demonstrate that the impacts of job loss on workers' wellbeing goes beyond the immediate loss of income or status.¹⁰ Job loss may place workers who move to new jobs at higher risk for occupational injuries because the risk of occupational injury is higher during the first month on the job.¹² In addition, job loss places workers at higher risk for metabolic changes and weight gain, which are risk factors for injury and ill-health.^{27,28} Further studies could potentially examine the effects of marijuana use over longer periods of time. Also, given the critical role that psychosocial and physical stress have been demonstrated to play in substance abuse, future studies should investigate how working conditions may influence frequency of use, as well as change in frequency of use. Additionally, further exploring the potential u-shape effect of marijuana use by daily versus weekly use may help clarify the ongoing debate on whether marijuana use is harmful to employment outcomes.

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Table 1.

Past year marijuana use profile and sociodemographic characteristics of US working adults, NESARC longitudinal (2001–2002/2003–2004) and cross-sectional (2012–2013) cohorts

	2001–2002 N=21,932	Job loss in 2003–2004 N=1,514 % (SE)	2012–2013 N=21,439	Job loss in 2012–2013 N=1,907 % (SE)
Past year marijuana use	4.53 (0.08)	12.57 (0.48)	10.27 (0.34)	22.95 (1.30)
Frequency of use				
Daily	0.97 (0.04)	3.02 (0.26)	3.02 (0.15)	7.56 (0.76)
Weekly	0.88 (0.02)	2.76 (0.25)	1.89 (0.11)	4.62 (0.69)
Monthly or less	2.68 (0.06)	6.80 (0.31)	5.36 (0.23)	10.77 (1.00)
No use	95.47 (0.08)	87.43 (0.48)	89.73 (0.34)	77.05 (1.30)
Past year DSM-IV Use disorder	1.21 (0.04)	4.39 (0.25)	2.63 (0.14)	6.65 (0.71)
Race				
White	72.38 (0.24)	62.05 (0.81)	65.33 (0.75)	59.79 (1.56)
Black	10.63 (0.18)	16.65 (0.43)	11.19 (0.60)	16.36 (1.10)
Hispanic	10.91 (0.10)	14.80 (0.42)	16.17 (0.67)	16.89 (1.07)
Asian	4.00 (0.07)	3.49 (0.37)	5.83 (0.47)	4.00 (0.61)
Native American	2.08 (0.11)	3.02 (0.26)	1.47 (0.14)	2.97 (0.63)
Gender				
Male	52.45 (0.22)	57.28 (0.88)	52.47 (0.38)	57.89 (1.63)
Female	47.55 (0.22)	42.72 (0.88)	47.53 (0.38)	42.11 (1.63)
Age				
18–29	23.00 (0.19)	27.98 (0.77)	23.83 (0.42)	36.80 (1.43)
30–44	38.43 (0.21)	40.15 (0.69)	32.56 (0.42)	31.13 (1.61)
45–55	24.17 (0.18)	19.55 (0.61)	23.01 (0.41)	18.25 (1.10)
55–65	11.81 (0.15)	10.60 (0.36)	16.78 (0.34)	12.62 (1.11)
65+	2.59 (0.05)	1.73 (0.16)	3.83 (0.17)	1.19 (0.31)
Education				
<HS	10.14 (0.12)	17.71 (0.60)	9.17 (0.35)	13.46 (0.92)
HS/GED	27.12 (0.26)	29.62 (0.82)	23.95 (0.63)	31.50 (1.30)
Some college	32.38 (0.21)	35.12 (0.64)	33.76 (0.60)	35.97 (1.53)
College	15.97 (0.13)	10.11 (0.34)	16.81 (0.49)	11.01 (1.11)
College+	14.39 (0.13)	7.44 (0.24)	16.31 (0.53)	8.05 (0.77)
Marital status				
Not married	21.38 (0.19)	27.14 (0.69)	23.86 (0.46)	36.85 (1.40)
Widowed/divorced/separated	13.51 (0.13)	18.95 (0.62)	15.88 (0.34)	17.66 (1.08)
Married/living with someone as if married	65.11 (0.17)	53.91 (0.84)	60.25 (0.57)	45.50 (1.39)
Household Income \$				
0–19,999	12.04 (0.16)	22.96 (0.66)	13.39 (0.36)	25.63 (1.31)
20,000–34,999	17.63 (0.16)	22.06 (0.61)	16.89 (0.37)	21.96 (1.15)
35,000–69,999	38.12 (0.20)	33.11 (0.62)	29.88 (0.41)	28.53 (1.31)

	2001–2002 N=21,932	Job loss in 2003–2004 N=1,514 % (SE)	2012–2013 N=21,439	Job loss in 2012–2013 N=1,907 % (SE)
70,000	32.21 (0.18)	21.87 (0.53)	39.84 (0.71)	23.88 (1.52)
Census region				
Northeast	19.37 (0.12)	17.92 (0.63)	18.71 (0.61)	19.46 (1.70)
Midwest	24.73 (0.18)	19.88 (0.61)	21.90 (0.62)	20.36 (1.39)
West	22.15 (0.13)	23.79 (0.72)	36.13 (0.90)	38.17 (1.86)
South	33.76 (0.18)	38.41 (0.89)	23.25 (0.90)	22.01 (1.62)
General Health				
Poor	1.09 (0.05)	2.53 (0.13)	1.24 (0.09)	2.44 (0.38)
Fair	6.27 (0.10)	12.18 (0.51)	9.00 (0.28)	13.43 (1.05)
Good	22.68 (0.20)	29.00 (0.78)	28.07 (0.49)	32.39 (1.62)
Very good	34.46 (0.17)	33.67 (0.87)	36.24 (0.41)	31.56 (1.30)
Excellent	35.50 (0.20)	22.61 (0.61)	25.46 (0.53)	20.19 (1.02)
Nativity				
Foreign-born	13.21 (0.13)	14.17 (0.44)	17.22 (0.50)	11.20 (0.75)
US-born	86.79 (0.13)	85.83 (0.44)	82.78 (0.50)	88.80 (0.75)
Lifetime mental problems				
Yes	27.09 (0.18)	43.75 (0.67)	36.61 (0.60)	47.90 (1.53)
No	72.91 (0.18)	56.25 (0.67)	63.39 (0.60)	52.10 (1.53)
Lifetime alcohol disorder				
Yes	3.29 (0.09)	25.68 (0.75)	33.04 (0.58)	47.71 (1.70)
No	96.71 (0.09)	74.32 (0.75)	66.96 (0.58)	52.29 (1.70)
Lifetime other drug disorder				
Yes	1.95 (0.06)	5.25 (0.27)	5.79 (0.23)	12.20 (1.09)
No	98.05 (0.06)	94.75 (0.27)	94.21 (0.23)	87.80 (1.09)
Family history of drug disorder				
Yes	24.32 (0.19)	-	31.67 (0.46)	41.65 (1.41)
No	75.68 (0.19)	-	68.33 (0.46)	58.35 (1.41)
Government aid as child				
Yes	-	21.20 (0.65)	16.48 (0.40)	26.58 (1.30)
No	-	78.80 (0.65)	83.52 (0.40)	73.42 (1.30)
Employment Status				
Unemployed	3.85 (0.08)	34.25 (0.85)	7.46 (0.21)	45.28 (1.57)
Employed	96.15 (0.08)	65.75 (0.85)	92.54 (0.21)	54.72 (1.57)
Occupational class				
Blue-collar	17.92 (0.20)	33.96 (0.85)	19.01 (0.48)	29.90 (1.54)
Service	15.73 (0.15)	17.35 (0.53)	16.24 (0.37)	19.84 (1.18)
Other	2.56 (0.10)	1.55 (0.29)	2.04 (0.18)	2.54 (0.53)
White collar	63.80 (0.22)	47.14 (0.77)	62.71 (0.58)	47.73 (1.75)

Table 2.

Association between any past year marijuana use and involuntary job loss, NESARC longitudinal (2001–2002/2003–2004) and cross-sectional (2012–2013) cohorts.

	Use in wave 1 & job loss in wave 2 (n=21,932)		Use and job loss in wave 3 (n=21,439)	
	Unadjusted OR (95% CI)	Adjusted OR (95% CI)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Marijuana Use				
Any use	2.31 (2.11, 2.52)	1.27 (1.13, 1.41)	2.96 (2.54, 3.45)	1.50 (1.24, 1.81)
No use	Ref	Ref	Ref	Ref
Conflict at work				
Yes	1.96 (1.84, 2.09)	1.55 (1.45, 1.66)	3.18 (2.75, 3.68)	2.72 (2.32, 3.19)
No	Ref	Ref	Ref	Ref
Race				
Black	1.78 (1.66, 1.90)	1.44 (1.34, 1.55)	1.68 (1.46, 1.93)	1.42 (1.20, 1.67)
Hispanic	1.38 (1.29, 1.48)	1.02 (0.93, 1.11)	1.15 (1.00, 1.33)	1.15 (0.96, 1.38)
Other groups	1.14 (0.97, 1.34)	1.16 (0.97, 1.38)	1.05 (0.79, 1.38)	1.43 (1.04, 1.99)
White	Ref	Ref	Ref	Ref
Gender				
Male	1.18 (1.09, 1.27)	1.19 (1.09, 1.30)	1.27 (1.11, 1.46)	1.16 (0.99, 1.37)
Female	Ref	Ref	Ref	Ref
Age (continuous)	0.97 (0.97, 0.97)	0.98 (0.98, 0.98)	0.97 (0.97, 0.98)	0.99 (0.98, 0.99)
Education				
<HS	3.89 (3.53, 4.29)	2.02 (1.78, 2.28)	3.24 (2.51, 4.18)	1.49 (1.08, 2.05)
HS/GED	2.54 (2.29, 2.83)	1.52 (1.36, 1.71)	2.86 (2.26, 3.63)	1.42 (1.09, 2.05)
Some college	2.17 (2.00, 2.35)	1.40 (1.29, 1.53)	2.27 (1.81, 2.85)	1.30 (1.02, 1.66)
College graduate	1.33 (1.22, 1.46)	1.12 (1.03, 1.23)	1.34 (1.03, 1.76)	1.13 (0.86, 1.48)
College+	Ref	Ref	Ref	Ref
Marital status				
Never married	1.91 (1.76, 2.07)	1.19 (1.09, 1.30)	2.20 (1.94, 2.49)	1.19 (1.03, 1.38)
Widowed/divorced/separated	1.36 (1.23, 1.50)	1.17 (1.05, 1.31)	1.52 (1.30, 1.78)	1.23 (1.05, 1.45)
Married/living with someone as if married	Ref	Ref	Ref	Ref
Household Income				
0–19,999	3.06 (2.81, 3.32)	1.69 (1.51, 1.89)	3.60 (2.96, 4.38)	2.07 (1.64, 2.61)
20,000–34,999	2.53 (2.32, 2.76)	1.59 (1.42, 1.77)	2.31 (1.95, 2.73)	1.53 (1.28, 1.83)
35,000–69,999	1.81 (1.66, 1.97)	1.37 (1.25, 1.50)	1.64 (1.39, 1.94)	1.26 (1.05, 1.51)
70,000	Ref	Ref	Ref	Ref
Census region				
Midwest	1.29 (1.20, 1.39)	1.16 (1.08, 1.25)	0.89 (0.81, 1.11)	0.77 (0.61, 0.98)
South	1.17 (1.10, 1.26)	1.01 (0.94, 1.08)	1.02 (0.82, 1.26)	0.91 (0.72, 1.14)
West	1.18 (1.09, 1.27)	1.08 (1.00, 1.18)	0.90 (0.72, 1.13)	0.84 (0.66, 1.07)
Northeast	Ref	Ref	Ref	Ref
General health				
Poor	2.49 (1.86, 3.33)	1.88 (1.36, 2.61)	2.76 (1.90, 4.02)	1.57 (1.03, 2.38)

	Use in wave 1 & job loss in wave 2 (n=21,932)		Use and job loss in wave 3 (n=21,439)	
	Unadjusted OR (95% CI)	Adjusted OR (95% CI)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Fair	2.11 (1.87, 2.38)	1.55 (1.37, 1.76)	2.01 (1.63, 2.47)	1.29 (1.05, 1.59)
Good	1.35 (1.22, 1.50)	1.11 (1.00, 1.24)	1.50 (1.28, 1.76)	1.17 (0.99, 1.39)
Very good	1.16 (1.07, 1.26)	1.06 (0.98, 1.15)	1.11 (0.96, 1.28)	1.00 (0.86, 1.16)
Excellent	Ref	Ref	Ref	Ref
Nativity				
Foreign-born	0.98 (0.92, 1.04)	0.93 (0.87, 1.00)	0.58 (0.51, 0.68)	0.63 (0.51, 0.77)
US-born	Ref	Ref	Ref	Ref
Lifetime mental problems				
Yes	1.42 (1.32, 1.53)	1.22 (1.13, 1.31)	1.66 (1.48, 1.87)	1.10 (0.96, 1.25)
No	Ref	Ref	Ref	Ref
Alcohol disorder				
Yes	1.75 (1.55, 1.96)	0.95 (0.83, 1.09)	1.96 (1.72, 2.24)	1.34 (1.15, 1.56)
No	Ref	Ref	Ref	Ref
Other drug disorder				
Yes	1.88 (1.62, 2.19)	1.03 (0.88, 1.22)	2.53 (2.03, 3.14)	1.29 (1.02, 1.64)
No	Ref	Ref	Ref	Ref
Family history of drug disorder				
Yes	1.45 (1.36, 1.55)	1.17 (1.09, 1.26)	1.61 (1.42, 1.81)	1.15 (1.02, 1.30)
No	Ref	Ref	Ref	Ref
Government aid as child				
Yes	1.86 (1.70, 2.02)	1.16 (1.09, 1.26)	1.96 (1.73, 2.23)	1.13 (0.96, 1.33)
No	Ref	Ref	Ref	Ref
Occupational class				
Blue-collar	1.98 (1.81, 2.16)	1.31 (1.19, 1.45)	2.22 (1.91, 2.59)	1.64 (1.39, 1.94)
Service	1.52 (1.40, 1.65)	1.05 (0.96, 1.14)	1.67 (1.42, 1.97)	1.08 (0.90, 1.29)
Other	1.37 (1.07, 1.76)	1.11 (0.85, 1.45)	1.71 (1.13, 2.60)	1.44 (0.94, 2.20)
White collar	Ref	Ref	Ref	Ref

Table 3.

Association between frequency of past year marijuana use and involuntary job loss, NESARC longitudinal (2001–2002/2003–2004) and cross-sectional (2012–2013) cohorts

	Use in wave 1 & job loss in wave 2 (n=21,932)		Use and job loss in wave 3 (n=21,439)	
	Unadjusted OR (95% CI)	Adjusted OR (95% CI)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Frequency of use				
Daily	4.59 (3.71, 5.67)	2.18 (1.71, 2.77)	3.41 (2.67, 4.35)	1.40 (1.06, 1.86)
Weekly	1.72 (1.60, 1.84)	0.86 (0.77, 0.97)	3.30 (2.38, 4.56)	1.48 (1.03, 2.14)
Monthly or less	1.79 (1.60, 2.00)	1.09 (0.95, 1.25)	2.60 (2.12, 3.20)	1.57 (1.24, 2.00)
No use	Ref	Ref	Ref	Ref
Conflict at work				
Yes	1.96 (1.84, 2.09)	1.55 (1.45, 1.65)	3.18 (2.75, 3.68)	2.72 (2.31, 3.19)
No	Ref	Ref	Ref	Ref
Race				
Black	1.78 (1.66, 1.90)	1.44 (1.34, 1.54)	1.68 (1.46, 1.93)	1.42 (1.20, 1.68)
Hispanic	1.38 (1.29, 1.48)	1.02 (0.93, 1.12)	1.15 (1.00, 1.33)	1.15 (0.96, 1.38)
Other groups	1.14 (0.97, 1.34)	1.15 (0.97, 1.37)	1.05 (0.79, 1.38)	1.43 (1.04, 1.99)
White	Ref	Ref	Ref	Ref
Gender				
Male	1.18 (1.09, 1.27)	1.20 (1.10, 1.31)	1.27 (1.11, 1.46)	1.17 (0.99, 1.37)
Female	Ref	Ref	Ref	Ref
Age (continuous)	0.97 (0.97, 0.97)	0.98 (0.98, 0.98)	0.97 (0.97, 0.98)	0.99 (0.98, 0.99)
Education				
<HS	3.89 (3.53, 4.29)	1.97 (1.75, 2.23)	3.24 (2.51, 4.18)	1.49 (1.08, 2.05)
HS/GED	2.54 (2.29, 2.83)	1.51 (1.35, 1.70)	2.86 (2.26, 3.63)	1.43 (1.09, 1.87)
Some college	2.17 (2.00, 2.35)	1.41 (1.29, 1.54)	2.27 (1.81, 2.85)	1.30 (1.02, 1.66)
College graduate	1.33 (1.22, 1.46)	1.12 (1.03, 1.23)	1.34 (1.03, 1.76)	1.13 (0.86, 1.48)
College+	Ref	Ref	Ref	Ref
Marital status				
Never married	1.91 (1.76, 2.07)	1.20 (1.09, 1.31)	2.20 (1.94, 2.49)	1.19 (1.03, 1.38)
Widowed/divorced/separated	1.36 (1.23, 1.50)	1.18 (1.05, 1.31)	1.52 (1.30, 1.78)	1.23 (1.04, 1.45)
Married/living with someone as if married	Ref	Ref	Ref	Ref
Household Income				
0–19,999	3.06 (2.81, 3.32)	1.69 (1.52, 1.89)	3.60 (2.96, 4.38)	2.07 (1.65, 2.61)
20,000–34,999	2.53 (2.32, 2.76)	1.59 (1.43, 1.78)	2.31 (1.95, 2.73)	1.53 (1.28, 1.83)
35,000–69,999	1.81 (1.66, 1.97)	1.37 (1.25, 1.50)	1.64 (1.39, 1.94)	1.26 (1.05, 1.51)
70,000	Ref	Ref	Ref	Ref
Census region				
Midwest	1.29 (1.20, 1.39)	1.17 (1.09, 1.26)	0.89 (0.81, 1.11)	0.77 (0.60, 0.98)
South	1.17 (1.10, 1.26)	1.01 (0.95, 1.08)	1.02 (0.82, 1.26)	0.90 (0.72, 1.14)
West	1.18 (1.09, 1.27)	1.08 (0.99, 1.17)	0.90 (0.72, 1.13)	0.84 (0.66, 1.07)
Northeast	Ref	Ref	Ref	Ref

	Use in wave 1 & job loss in wave 2 (n=21,932)		Use and job loss in wave 3 (n=21,439)	
	Unadjusted OR (95% CI)	Adjusted OR (95% CI)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
General health				
Poor	2.49 (1.86, 3.33)	1.92 (1.39, 2.66)	1.11 (0.96, 1.28)	1.57 (1.04, 2.38)
Fair	2.11 (1.87, 2.38)	1.56 (1.37, 1.77)	1.50 (1.28, 1.76)	1.29 (1.05, 1.59)
Good	1.35 (1.22, 1.50)	1.11 (1.00, 1.23)	2.01 (1.63, 2.47)	1.17 (0.99, 1.39)
Very good	1.16 (1.07, 1.26)	1.06 (0.98, 1.16)	2.76 (1.90, 4.02)	1.00 (0.86, 1.16)
Excellent	Ref	Ref	Ref	Ref
Nativity				
Foreign-born	0.98 (0.92, 1.04)	0.94 (0.87, 1.00)	0.58 (0.51, 0.68)	0.63 (0.51, 0.77)
US-born	Ref	Ref	Ref	Ref
Lifetime mental problems				
Yes	1.42 (1.32, 1.53)	1.22 (1.13, 1.31)	1.66 (1.48, 1.87)	1.10 (0.96, 1.25)
No	Ref	Ref	Ref	Ref
Alcohol disorder				
Yes	1.75 (1.55, 1.96)	0.93 (0.81, 1.07)	1.96 (1.72, 2.24)	1.34 (1.15, 1.56)
No	Ref	Ref	Ref	Ref
Other drug disorder				
Yes	1.88 (1.62, 2.19)	1.03 (0.87, 1.21)	2.53 (2.03, 3.14)	1.30 (1.03, 1.64)
No	Ref	Ref	Ref	Ref
Family history of drug disorder				
Yes	1.45 (1.36, 1.55)	1.17 (1.09, 1.26)	1.61 (1.42, 1.81)	1.15 (1.02, 1.30)
No	Ref	Ref	Ref	Ref
Government aid as child				
Yes	1.86 (1.70, 2.02)	1.17 (1.06, 1.29)	1.96 (1.73, 2.23)	1.13 (0.96, 1.33)
No	Ref	Ref	Ref	Ref
Occupational class				
Blue-collar	1.98 (1.81, 2.16)	1.32 (1.19, 1.45)	2.22 (1.91, 2.59)	1.64 (1.40, 1.94)
Service	1.52 (1.40, 1.65)	1.04 (0.95, 1.14)	1.67 (1.42, 1.97)	1.08 (0.90, 1.29)
Other	1.37 (1.07, 1.76)	1.11 (0.85, 1.44)	1.71 (1.13, 2.60)	1.44 (0.94, 2.21)
White collar	Ref	Ref	Ref	Ref

Table 4.

Results for modification of the effect of marijuana use on involuntary job loss by household income, NESARC longitudinal (2001–2002/2003–2004) and cross-sectional (2012–2013) cohorts

Use in wave 1 and job loss in wave 2 (n=21,932), adjusted OR (95% CI)				
	Household Income			
Past year marijuana use	0–9,999	20,000–34,999	35,000–69,999	70,000
Any Use	1.46 (1.19, 1.80)	1.06 (0.88, 1.27)	1.18 (1.001, 1.39)	1.54 (1.20, 1.98)
No Use	Ref	Ref	Ref	Ref
Use and job loss in wave 3 (n=21,439), Adjusted OR (95% CI)				
Any Use	1.36 (1.01, 1.82)	1.08 (0.76, 1.52)	1.38 (0.93, 2.05)	2.63 (1.76, 3.94)
No Use	Ref	Ref	Ref	Ref
Use in wave 1 and job loss in wave 2 (n=21,932), adjusted OR (95% CI)				
	Household Income			
Frequency of use	0–19,999	20,000–34,999	35,000–69,999	70,000
Daily	2.36 (1.57, 3.54)	1.70 (1.07, 2.69)	2.47 (1.71, 3.59)	1.94 (1.05, 3.59)
Weekly	1.15 (0.85, 1.54)	0.87 (0.72, 1.05)	0.74 (0.67, 0.82)	0.23 (0.21, 0.25)
Monthly or less	1.19 (0.92, 1.54)	0.90 (0.74, 1.09)	0.91 (0.75, 1.11)	1.75 (1.32, 2.32)
No use	Ref	Ref	Ref	Ref

* All analyses adjusted for race, sex, age, education, marital status, census region, general health, nativity, lifetime mental problems, lifetime alcohol disorder, lifetime other drug disorder, family history of drug disorder, government aid as child, trouble with boss and occupational class.