Published in final edited form as:

Am J Drug Alcohol Abuse. 2013 May ; 39(3): 186–193. doi:10.3109/00952990.2013.785557.

Changes in Smoking for Adults with and without Alcohol and Drug Use Disorders: Longitudinal Evaluation in the U.S. Population

Andrea H. Weinberger, Ph.D.^{1,2,3}, Corey E. Pilver, Ph.D.⁴, Rani A. Hoff, Ph.D.^{1,2,5,6}, Carolyn M. Mazure, Ph.D.^{1,2}, and Sherry A. McKee, Ph.D.^{1,2,3}

¹Department of Psychiatry, Yale University School of Medicine, New Haven, CT 06519 USA

²Women's Health Research at Yale, Yale University School of Medicine, New Haven, CT 06520 USA

³Cancer Prevention and Control Research Program, Yale Cancer Center, New Haven, CT 06520 USA

⁴Department of Biostatistics, Yale School of Public Health, New Haven, CT 06510 USA

⁵Department of Public Health, Yale University School of Medicine, New Haven, CT 06520 USA

⁶National Center for PTSD, Evaluation Division; VA CT Healthcare Center, West Haven, CT 06516 USA

Abstract

Background—Little is known about the smoking cessation and smoking relapse behavior of adults with alcohol use disorders (AUDs) and drug use disorders (DUDs).

Objectives—The current study used longitudinal data from a representative sample of the U.S. adult population to examine changes in smoking over three years for men and women with and without AUD and DUD diagnoses.

Methods—Participants were current or former daily cigarette smokers at Wave 1 of the National Epidemiologic Survey on Alcohol and Related Conditions who completed the Wave 2 assessment three years later (n=11,973; 46% female). Analyses examined the main and gender-specific effects of AUD and DUD diagnoses on smoking cessation and smoking relapse.

Results—Wave 1 Current Daily Smokers with a Current AUD (OR=0.70, 95% CI=0.55, 0.89), Past AUD (OR=0.73, 95% CI=0.60, 0.89), Current DUD (OR=0.48, 95% CI=0.31, 0.76), and Past DUD (OR=0.62, 95% CI=0.49, 0.79) were less likely to have quit smoking at Wave 2 than those with no AUD or DUD diagnosis. Wave 1 Former Daily Smokers with a Current AUD (OR=2.26, 95% CI=1.36, 3.73), Current DUD (OR=7.97, 95% CI=2.51, 25.34), and Past DUD (OR=2.69, 95% CI=1.84, 3.95) were more likely to have relapsed to smoking at Wave 2 than those with no AUD or DUD diagnosis. The gender-by-diagnosis interactions were not significant.

Conclusion—Current and Past AUDs and DUDs were associated with a decreased likelihood of quitting smoking while Current AUDs, Current DUDs, and Past DUDs were associated with an increased likelihood of smoking relapse.

INTRODUCTION

Adults in the general U.S. adult population with alcohol use disorders (AUDs) and non-alcohol drug use disorders (DUDs) report prevalences of cigarettes smoking that are at least 2-3 times the prevalence of adults without AUDs and DUDs (1, 2). Smoking results in serious health consequences for all smokers (3-5) and the use of tobacco and alcohol together, compared to either substance alone, increases the risk of smoking-related diseases (6, 7). Smoking is the leading preventable cause of mortality and morbidity in the U.S. (5, 8) and a major cause of mortality for adults with AUDs and DUDs (9, 10).

Cross-sectional epidemiological data suggest that smokers with current and past AUDs and DUDs report lower quit rates than adults with no current or past AUDs or DUDs (1, 2, 11). In addition, remission from DUDs (i.e., no DUD diagnosis in the past year) is associated with greater smoking abstinence compared to a past year DUD diagnosis (12). The majority of studies utilizing epidemiological data to examine smoking cessation and AUDs or DUDs examined quit rates through retrospective self-report (e.g., (1, 11, 12)) or analyzed longitudinal data from a specific geographical area (e.g., (13)). In a representative sample of young adults (ages 21-30) in Michigan (n=1007; (13)), participants with an active AUD were less likely to quit smoking and participants with a remitted AUD were equally likely to quit smoking compared to those with no history of AUDs. To our knowledge, there has not yet been a study that used longitudinal data from adults in the general U.S. population to compare smoking cessation for smokers with and without AUDs and DUDs. In addition, little is known about the association of AUDs and DUDs to smoking relapse in former smokers.

The primary aim of this study was to examine how AUD and DUD diagnoses were associated with changes in smoking behavior (smoking cessation, smoking relapse) over a three-year period within a large, nationally representative sample of the adult U.S. population. We hypothesized that participants with a diagnosis of an AUD or DUD (Current or Past) at the beginning of the three-year period would be associated with a lower likelihood of smoking cessation and a greater likelihood of smoking relapse at the end of the three-year period compared to participants who had never been diagnosed with an AUD or DUD. Our secondary aim was to examine whether gender differences existed in the relationships between AUDs and DUDs and changes in smoking. While men report AUD and DUD diagnoses in greater numbers (14) and are more likely to be current smokers (15) than women, we previously demonstrated that women with current AUDs and DUDs were more likely than men to be current daily smokers (16). Gender differences in associations between AUD, DUD, and smoking may be one potential explanation as to why women have been suggested to have more trouble quitting smoking than men (17-19).

METHODS

Participants and Procedures

This study analyzed population-based longitudinal data collected at two time points from the National Institute on Alcohol Abuse and Alcoholism's National Epidemiologic Survey on Alcohol and Related Conditions (NESARC; Wave 1, 2001-2002, n=43,093; Wave 2, 2004-2005, n=34,653). Slightly more than eighty-six percent of the Wave 1 sample (n=34,653 out of 39,959 eligible participants; 86.7%) completed the Wave 2 assessment. Wave 2 interviews occurred an average of 36.6 months after the Wave 1 interviews. Participants were non-institutionalized United States civilian adults (ages 18 and older) in all 50 states and the District of Columbia. African-Americans, Hispanics, and young adults (ages 18-24) were oversampled. More details about the NESARC sampling, purpose, and weight procedures can be found in (20, 21).

Analytic sample

The Alcohol Use Disorders and Associated Disabilities Interview Schedule-DSM-IV (AUDADIS-IV; (22, 23)) was administered to assess smoking behavior in Wave 1 and Wave 2. Using methods similar to our prior investigations of depressive disorders (24, 25), we identified two, non-overlapping subsamples: Wave 1 Current Daily Smokers and Wave 1 Former Daily Smokers. Wave 1 Current Daily Smokers were defined as individuals who (1) smoked 100 or more cigarettes in their lifetime; and, (2) smoked cigarettes every day at the time of the Wave 1 assessment. We identified 6,545 individuals who met criteria to be defined as Wave 1 Current Daily Smokers and provided valid data on their smoking status at Wave 2. Wave 1 Former Daily Smokers were defined as individuals who (1) smoked 100 or more cigarettes in their lifetime; (2) smoked cigarettes before the 12 months preceding the Wave 1 assessment (but not during those 12 months); and, (3) smoked cigarettes every day in the period when they had last smoked. We identified 5,428 individuals who met criteria to be defined as Wave 1 Former Daily Smokers and provided valid data on their smoking status at Wave 2.

Measures

Dependent variables: Changes in Smoking Status—Among Wave 1 Current Daily Smokers, the binary dependent variable of interest was “Smoking Cessation”. Smoking Cessation was defined by whether Wave 1 Current Daily Smokers had quit smoking at Wave 2 (coded as “1”; participants who had not smoked cigarettes in the 12 months preceding the Wave 2 interview; i.e., Quitters) or if they were still current smokers at Wave 2 (coded as “0”; participants who indicated that they smoked any cigarettes in the 12 months preceding the Wave 2 interview; i.e., Stable Current Smokers). It should be noted that, in order to create a conservative definition of “Smoking Cessation” (i.e., participants who were able to maintain abstinence for at least a year), participants who quit recently but also reported smoking cigarettes within the 12 months prior to the Wave 2 interview would have been classified as “current smokers.” Nearly 95% of participants defined as current smokers at Wave 2 reported that they smoked every day and had smoked within 24 hours of the Wave 2 interview. Only 1% of Wave 2 Current Smokers reported smoking less than 1 time per week at the time of the interview. Wave 2 Current Smokers reported smoking an average of 17.6 cigarettes per day (SEM=0.20). This data suggests that few participants who were defined as current smokers at Wave 2 were either current non-daily smokers or recently abstinent.

Among Wave 1 Former Smokers, the binary dependent variable of interest was “Smoking Relapse”. Smoking Relapse was denoted by whether Wave 1 Former Smokers had relapsed to smoking at Wave 2 (coded as “1”; participants who indicated that they smoked any cigarettes in the 12 months preceding the Wave 2 interview; i.e., Relapsers) or if they remained former smokers at Wave 2 (coded as “0”; participants who indicated that they had not smoked cigarettes in the 12 months preceding the Wave 2 interview; i.e., Stable Former Smokers).

Independent variables—Diagnostic criteria for AUDs and DUDs were assessed at Wave 1 using the AUDADIS-IV (22) which has demonstrated good reliability for the measurement of AUDs and DUDs (23, 26). The AUDADIS-IV uses DSM-IV (27) diagnostic criteria to assess alcohol abuse; alcohol dependence; and abuse and dependence of 10 types of drugs (cannabis, sedatives, tranquilizers, opiates, heroin, stimulants, cocaine, hallucinogens, inhalants, solvents). For our analyses, the AUD and DUD variables included both abuse and dependence diagnoses similar to our previous investigation (16). The DUD variable included diagnoses for any of the ten categories of drugs assessed by the

AUDADIS-IV, similar to previous NESARC investigations (e.g., (12, 14, 16)). The DUD variable did not include alcohol or nicotine use disorders.

AUD was a categorical variable with three mutually-exclusive responses: Current (AUD was present in the twelve months directly preceding the Wave 1 assessment), Past (AUD was present prior to the twelve months directly preceding the Wave 1 assessment, but absent during the twelve months directly preceding the Wave 1 assessment), and Never (no current or past diagnosis of AUD). Similarly, DUD was a categorical variable with three mutually-exclusive responses following the same criteria as AUD. A Cannabis Use Disorders (CUD) variable was created as a categorical variable with three mutually-exclusive responses following the same criteria as AUDs and DUDs.

Demographics—Wave 1 demographic information included age (18-29, 30-44, 45 and older), race/ethnicity (Non-Hispanic White, Non-Hispanic Black, Non-Hispanic Other, Hispanic), education (Less than High School, High School Graduate, Attended/Completed College), and marital status (Married, Not Married). Demographic variable categories were created based on the convention of prior work (14).

Psychiatric Disorders—The AUDADIS-IV uses DSM-IV (27) diagnostic criteria to assess Axis I psychiatric disorders and has demonstrated adequate reliability for the assessment of these disorders (23). Psychiatric covariates for these analyses were manic disorders (manic disorder, hypomanic disorder), depressive disorders (major depressive disorder, dysthymia), and anxiety disorders (panic disorder with or without agoraphobia, agoraphobia, social phobia, specific phobia, or generalized anxiety disorder). Each psychiatric disorder (depressive, manic, anxiety) was constructed as a categorical variable with three mutually-exclusive responses: Current (disorder was present in the twelve months directly preceding the Wave 1 assessment), Past (disorder was present prior to the twelve months directly preceding the Wave 1 assessment, but absent during the twelve months directly preceding the Wave 1 assessment), and Never (no current or past history of the disorder).

Statistical Analyses

Data were analyzed using SUDAAN (Research Triangle Institute, 2001), a software package that adjusts for characteristics of complex survey sampling designs. NESARC-calculated weights were used to account for nonresponse; attrition; oversampling of African-Americans, Hispanics, and young adults; and to be representative of demographics of the U.S. civilian adult population based on the 2000 decennial census. We built a series of logistic regression models using PROC RLOGIST. These models were constructed separately for Wave 1 Current Daily Smokers and Wave 1 Former Daily Smokers. The dependent variables of interest were smoking cessation for Wave 1 Current Daily Smokers and smoking relapse for Wave 1 Former Daily Smokers. We ran one set of models for each independent variable (AUD, DUD) which had three levels as defined above (Current, Past, Never). We first generated the main effect of the disorder (either AUD or DUD) as an unadjusted odds ratio (OR) and its associated 95% Confidence Interval (95% CI). We then calculated the unique effects of each disorder among women and among men (gender-specific ORs and their associated 95% CIs), as well as the interaction ORs (Interaction OR = $OR_{\text{women}}/OR_{\text{men}}$). An interaction was considered to be statistically significant when the 95% CI of the interaction OR did not include 1.0 (the corresponding p-value was less than 0.05). We repeated the main effects analysis for CUDs. Due to small sample sizes, the interactive effects of CUD and gender on changes in smoking were not calculated. Additional models were analyzed that controlled for psychiatric disorders (as listed above) and either AUD or DUD (in the analysis of the other disorder; e.g., analyses of DUD

controlled for AUD). Statistical tests were two-tailed and differences were considered significant when $p < 0.05$.

RESULTS

Demographics

The demographics of this sample ($n=11,973$) have been previously reported (24, 25) and are summarized below. Overall, approximately half of the sample was male (54%), 45 years old or older (57%), and attended or completed college (48.5%). The majority of the sample was Caucasian (79%) and married (64.2%). Wave 1 Current Daily Smokers reported smoking 17.3 cigarettes per day ($SEM=0.08$) while Wave 1 Former Daily Smokers reported smoking 20.3 cigarettes per day when they were smokers ($SEM=0.13$).

Prevalence of Wave 1 AUD and DUD Diagnoses by Gender

The prevalence of Current and Past AUDs was higher among men compared to women (Current AUD: 14.9% vs. 7.3%; Past AUD: 40.7% vs. 24.8%). Among Wave 1 Current Daily Smokers, the prevalence of Current AUDs and Past AUDs was 21.3% and 38.5% among men, and 11.0% and 25.7% among women, respectively ($p < 0.0001$). Among Wave 1 Former Daily Smokers, the prevalence of Current AUDs and Past AUDs was 7.6% and 43.2% among men, and 2.4% and 23.6% among women, respectively ($p < 0.0001$).

The prevalence of Current and Past DUDs was higher for men than women (Current DUD: 4.1% vs. 2.6%; Past DUD: 17.1% vs. 11.7%). Among Wave 1 Current Daily Smokers, the prevalence of Current DUDs and Past DUDs was 6.8% and 21.1% among men, and 4.0% and 14.3% among women, respectively ($p < 0.0001$). Among Wave 1 Former Daily Smokers, the prevalence of Current DUDs and Past DUDs was 1.0% and 12.4% among men, and 0.8% and 8.4% among women, respectively ($p < 0.01$).

Smoking Cessation among Wave 1 Current Daily Smokers (Table 1)

Wave 1 Current Daily Smokers with a Current AUD exhibited a 30% lower likelihood of having quit smoking at Wave 2 ($p < 0.01$) and Wave 1 Current Daily Smokers with a Past AUD showed a 27% lower likelihood of having quit smoking at Wave 2 ($p < 0.01$) compared to Wave 1 Current Daily Smokers with no current or past AUD diagnosis. Analyses that controlled for psychiatric disorders and DUDs resulted in a similar pattern of results for smoking cessation as the analyses described above (data not shown).

Similarly, Wave 1 Current Daily Smokers with a Current DUD showed a 52% lower likelihood of having quit smoking at Wave 2 ($p < 0.01$) and Wave 1 Current Daily Smokers with a Past DUD showed a 38% lower likelihood of having quit smoking at Wave 2 ($p < 0.001$) compared to Wave 1 Current Daily Smokers who had no current or past DUD diagnosis. The interaction odds ratios were not statistically significant for either AUD or DUD, suggesting that gender did not modify the association between AUD or DUD and smoking cessation. Analyses that controlled for psychiatric disorders and AUDs resulted in a similar pattern of results for smoking cessation as the analyses described above (data not shown).

Smoking Relapse among Wave 1 Former Daily Smokers (Table 2)

Compared to participants with no history of the respective disorder, Wave 1 Former Daily Smokers with Current AUD, Current DUD, and Past DUD diagnoses showed a 126% ($p < 0.01$), 697% ($p < 0.001$), and 169% ($p < 0.0001$) greater likelihood of having relapsed to smoking at Wave 2, respectively. A Past AUD was not significantly associated with smoking relapse. No interaction terms were statistically significant, indicating that gender

did not modify the association between AUD, DUD, and smoking relapse. Analyses that controlled for psychiatric disorders and the drug-related disorder that was not the variable of interest (i.e., controlled for AUD in the analysis of DUD and vice versa) resulted in a similar pattern of results for smoking relapse as the analyses described above (data not shown).

Changes in Smoking for Wave 1 Current and Former Daily Smokers with CUDs

Among Wave 1 Current Daily Smokers, there were 247 participants who met criteria for Current CUD and 914 participants who met criteria for Past CUD at the Wave 1 assessment. Compared to Wave 1 Current Daily Smokers with no history of CUDs (15.8%), Wave 1 Current Daily Smokers with Current and Past CUDs were less likely to have quit smoking at the Wave 2 assessment (Current CUD 8.7%, OR=0.51, 95% CI=0.30, 0.84; Past CUD 11.5%, OR=0.69, 95% CI=0.53, 0.89). Among Wave 1 Former Daily Smokers, there were 32 participants who met criteria for Current CUD and 503 participants who met criteria for Past CUD at the Wave 1 assessment. Compared to Wave 1 Former Daily Smokers with no history of CUDs (3.75%), Wave 1 Former Daily Smokers with Current and Past CUDs were more likely to have relapsed to smoking at the Wave 2 assessment (Current CUD 23.9%, OR=8.04, 95% CI=1.91, 33.87; Past CUD 7.5%, OR=2.09, 95% CI=1.34, 3.26).

DISCUSSION

The current study used longitudinal data from a nationally representative sample of the U.S. adult population to examine changes in smoking over three years in adults with and without AUD and DUD diagnoses. Prevalences of AUDs and DUDs were higher for Wave 1 Current Daily Smokers than Wave 1 Former Daily Smokers and higher for men than women in both smoking groups. Current and Past AUDs, DUDs, and CUDs were associated with a decreased likelihood of smoking cessation while Current AUDs, Current DUDs, Current CUDs, Past DUDs, and Past CUDs were associated with an increased likelihood of smoking relapse. Finally, the relationships of AUD and DUD diagnoses to changes in smoking were similar for men and women.

The relationships found between AUDs and DUDs and decreased likelihood of quitting smoking were consistent with reports using retrospective data (1, 11). The relationships of Current AUDs to smoking cessation in both this study and Breslau et al (13) were significant. Further, Breslau and colleagues (13) found that smokers with remitted AUDs did not differ significantly from smokers with no history of AUD in terms of smoking cessation in contrast to our study's finding of a decreased likelihood of smoking cessation for smokers with past AUDs. Differences in results for smokers with past AUDs in Breslau et al (13)'s study and our study may have been related to differences in the samples (e.g., adults in Michigan versus adults in the U.S.) or the timing of assessments of smoking or AUDs. For example, Breslau et al (13) asked participants about the timing of AUDs in the year prior to when the participants quit smoking. In addition, while Breslau et al (13) collected longitudinal data, the smoking cessation data was combined from the two assessments points meaning that the analyses of quitting included participants who quit smoking before the first assessment and between the first and second assessment.

Our findings are also consistent with our previous investigations of changes in smoking for adults with and without depressive disorders (24, 25). The relationship of Current AUDs and Current DUDs to smoking cessation was similar in magnitude to the relationship for Current MDD (OR=0.72; 95% CI= 0.54, 0.97) and Current Dysthymia (OR=0.47; 95% CI=0.27, 0.81) respectively. The relationships of Past AUDs and DUDs to smoking cessation were comparable to Past MDD (OR=0.66; 95% CI= 0.50, 0.87) and Past Minor Depression (OR=0.65; 95% CI=0.46, 0.93). The relationship of Current AUDs and DUDs to smoking relapse was similar to (Current AUDs) or greater than (Current DUDs) the relationships for

Current MDD (OR=2.27; 95% CI= 1.32, 3.85) and Current Dysthymia (OR=2.27; 95% CI=1.04, 5.00). The relationship of Past DUD to smoking relapse was similar to Past Dysthymia (OR=2.70; 95% CI= 1.09, 6.67).

A review of studies on AUDs and smoking cessation (11) found that, while epidemiological studies reported lower lifetime quit rates for smokers with AUDs, treatment studies found no difference in smoking outcomes for smokers with and without AUDs across several pharmacological treatments (e.g., bupropion, nicotine replacement therapy). More research is needed to understand these differences in epidemiological and clinical study outcomes. Differences in smoking cessation outcomes for smokers with AUDs and SUDs compared to other smokers, such as those found in this study, may be due to differences in reduced attempts or a reduced ability to quit. Smokers with AUDs and DUDs report motivation to quit smoking that is similar to other smokers (28, 29); however, more data is needed to determine whether this motivation translates into equivalent attempts to quit smoking (see (11)). Further, the most common form of smoking cessation attempt is to quit without formal treatment (30). Smokers with current AUDs and DUDs report greater withdrawal symptoms (31-33) which may make it more difficult to quit smoking without pharmacological treatment. Third, as our data suggest, there may be differences between smokers with and without AUDs and DUDs in long term quitting success (i.e., avoidance of smoking relapse). If so, smokers with AUDs and DUDs may benefit from longer treatment periods and on-going monitoring of slips to prevent smoking relapse. More research is needed in each of these areas to better understand the process of smoking cessation and relapse for adults with AUDs and DUDs.

Women are more susceptible to some smoking-related illnesses (34-36) and face gender-specific smoking consequences (4). Our previous analyses found a stronger relationship between current AUDs or DUDs and current smoking for women than men (16) while the current analyses found no difference in the relationships between AUDs and DUDs and smoking cessation and smoking relapse for men and women. Treatment studies rarely examine outcomes by gender (37-39) so it is important to include gender in both epidemiological and treatment studies of smoking in order to identify areas of gender similarities and differences to improve cessation outcomes for all smokers.

Limitations of the current study must be noted. The sample included noninstitutionalized adults who were at least 18 years old and living in the U.S. who primarily identified as Caucasian and results may not generalize to other groups. A range of specific classes of drugs are associated with smoking (e.g., (2, 40, 41)) but our analyses of specific drugs were limited by sample size. Future research with larger numbers of adults using specific classes of drugs, such as clinical samples, would help to determine whether the association of DUDs and changes in smoking differs by specific drug or by combinations of drugs. Due the small samples of participants using specific substances, we were unable to determine whether differences in smoking cessation were due to the use of drugs or due to specific aspects of drug abuse and dependence (e.g., drug-related problems). Future research should examine differences in the relationships of drug use, drug abuse, and drug dependence to smoking cessation and smoking relapse. There was limited information about changes in smoking between the two data time-points (e.g., smoking treatments, length of failed quit attempts, context of relapses). Finally, while outside the scope of this study, future research should examine potential reasons for the relationships between AUDs, DUDs, and differences in smoking behavior; how specific treatment-, quit-, and relapse-related variables differ for smokers with and without AUDs and DUDs; and how these variables could be used in intervention efforts to improve smoking outcomes.

Acknowledgments

Sources of Support:

This work was supported by the National Institutes of Health grants R03-DA027052 (to AHW), P50-DA033945 (ORWH & NIDA; to SAM), RL1-DA024857 (to SAM), and an Interdisciplinary Research Education Grant (RL5DA024858, to CMM); NIMH training grant: T32-MH014235 (to CEP); *Women's Health Research at Yale*; the Yale Cancer Center, and the State of Connecticut, Department of Mental Health and Addiction Services.

REFERENCES

1. Lasser K, Boyd JW, Woolhandler S, Himmelstein DU, McCormick D, Bor DH. Smoking and mental illness: A population-based prevalence study. *JAMA*. 2000; 284:2606–2610. [PubMed: 11086367]
2. Kalman D, Morrisette SB, George TP. Co-morbidity of smoking with psychiatric and substance use disorders. *Am J Addict*. 2005; 14(2):106–123. [PubMed: 16019961]
3. USDHHS. The Health Consequences of Smoking: A Report of the Surgeon General. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; Atlanta, GA: 2004.
4. USDHHS. Women and Smoking. A Report of the Surgeon General. U.S. Department of Health and Human Services; Rockville, MD: 2001.
5. CDC. Smoking-attributable mortality, years of potential life lost, and productivity losses---United States, 2000--2004. *Morbidity and Mortality World Report (MMWR)*. 2008; 57(45):1226–1228.
6. Kalman D, Kim S, DiGirolamo G, Smelson D, Ziedonis D. Addressing tobacco use disorder in smokers in early remission from alcohol dependence: The case for integrating smoking cessation services in substance use disorder treatment programs. *Clinical Psychology Review*. 2010; 30:12–24. [PubMed: 19748166]
7. McKee SA, Weinberger AH. How can our knowledge of alcohol-tobacco interactions inform treatment for alcohol use? *Annu Rev Clin Psychol*. in press.
8. Mokdad AH, Marks JS, Stroup DF, Gerberding JL. Actual causes of death in the United States, 2000. *JAMA*. 2004; 291(10):1238–1245. [PubMed: 15010446]
9. Hurt RD, Offord KP, Croghan IT, Gomez-Dahl L, Kottke TE, Morse RM, Melton LJ. Mortality following inpatient addictions treatment. Role of tobacco use in a community-based cohort. *JAMA*. 1996; 275(14):1097–1103. [PubMed: 8601929]
10. Hser YI, McCarthy WJ, Anglin MD. Tobacco use as a distal predictor of mortality among long-term narcotic addicts. *Prev Med*. 1994; 23:61–69. [PubMed: 8016035]
11. Hughes JR, Kalman D. Do smokers with alcohol problems have more difficulty quitting? *Drug and Alcohol Dependence*. 2006; 82:91–102.
12. Agosti V, Levin FR. Does remission from alcohol and drug use disorders increase the likelihood of smoking cessation among nicotine dependent young adults? *Soc Psychiatry Psychiatr Epidemiol*. 2009; 44:120–124. [PubMed: 18695973]
13. Breslau N, Peterson E, Schultz L, Andreski P, Chilcoat H. Are smokers with alcohol disorders less likely to quit? *Am J Public Health*. 1996; 86(7):985–990. [PubMed: 8669523]
14. Grant BF, Hasin DS, Chou P, Stinson FS, Dawson DA. Nicotine dependence and psychiatric disorders in the United States. *Arch Gen Psychiatry*. 2004; 61:1107–1115. [PubMed: 15520358]
15. CDC. Vital signs: Current cigarette smoking among adults aged 18 years --- United States, 2005--2010. *MMWR*. 2011; 60(35):1207–1212. [PubMed: 21900875]
16. Husky MM, Paliwal P, Mazure CM, McKee SA. Gender differences in association with substance use diagnoses and smoking. *J Addict Med*. 2007; 1(3):161–164. [PubMed: 21768952]
17. Perkins KA, Scott J. Sex differences in long-term smoking cessation rates due to nicotine patch. *Nicotine Tob Res*. 2008; 10(7):1245–1251. [PubMed: 18629735]
18. Perkins KA. Smoking cessation in women: Special considerations. *CNS Drugs*. 2001; 15(5):391–411. [PubMed: 11475944]
19. Wetter DW, Kenford SL, Smith SS, Fiore MC, Jorenby DE, Baker TB. Gender differences in smoking cessation. *J Consult Clin Psychol*. 1999; 67:555–562. [PubMed: 10450626]

20. Grant, BF.; Moore, TC.; Shepard, J.; Kaplan, K. Source and accuracy statement for wave 1 of the 2001-2002 National Epidemiologic Survey on Alcohol and Related Conditions (NESARC). National Institute on Alcohol Abuse and Alcoholism; Bethesda, MD: 2003.
21. Grant, BF.; Kaplan, KD. Source and accuracy statement: The wave 2 National Epidemiologic Survey on Alcohol and Related Conditions (NESARC). National Institute on Alcohol Abuse and Alcoholism; Rockville, MD: 2005.
22. Grant, BF.; Dawson, DA.; Hasin, DS. The Alcohol Use Disorders and Associated Disabilities Interview Schedule-Version for DSM-IV (AUDADIS-IV). National Institute on Alcohol Abuse and Alcoholism; Bethesda, MD: 2001.
23. Grant BF, Dawson DA, Stinson FS, Chou PS, Kay W, Pickering R. The Alcohol Use Disorder and Associated Disabilities Schedule (AUDADIS): Reliability of alcohol consumption, tobacco use, family history of depression, and psychiatric diagnostic modules in a general population. *Drug Alcohol Depend.* 2003; 71:7–16. [PubMed: 12821201]
24. Weinberger AH, Pilver CE, Desai R, Mazure CM, McKee SA. The relationship of minor depression, dysthymia, and gender to changes in smoking in current and former smokers: Longitudinal evaluation of the U.S. population. *Drug Alcohol Depend.* 2013; 127(1-3):170–176. [PubMed: 22809897]
25. Weinberger AH, Pilver CE, Desai R, Mazure CM, McKee SA. The relationship of major depressive disorder and gender to changes in smoking for current and former smokers: Longitudinal evaluation of the U.S. population. *Addiction.* 2012; 107:1847–1856. [PubMed: 22429388]
26. Grant BF, Harford TC, Dawson DA, Chou PS, Pickering RP. The alcohol use disorder and associated disabilities interview schedule (AUDADIS): Reliability of alcohol and drug modules in a general population sample. *Drug Alcohol Depend.* 1995; 39:37–44. [PubMed: 7587973]
27. APA. Diagnostic and statistical manual of mental disorders, 4th ed. (DSM-IV). American Psychiatric Association; Washington DC: 1994.
28. Sees KL, Clark HW. Substance abusers want to stop smoking! *Alcohol Clin Exp Res.* 1991; 15:152.
29. Novy P, Hughes JR, Callas P. A comparison of recovering alcoholic and non-alcoholic smokers. *Drug Alcohol Depend.* 2001; 65(1):17–23. [PubMed: 11714586]
30. Shiffman S, Brockwell SE, Pillitteri JL, Gitchell JG. Use of smoking-cessation treatments in the United States. *Am J Prev Med.* 2008; 34(2):102–111. [PubMed: 18201639]
31. Weinberger AH, Desai R, McKee SA. Nicotine withdrawal in U.S. smokers with current mood, anxiety, alcohol, and substance use disorders. *Drug Alcohol Depend.* 2010; 108:7–12. [PubMed: 20006451]
32. Madden PAF, Bucholz KK, Dinwiddie SH, Slutske WS, Bierut LJ, Statham DJ, Dunne MP, Martin NG, Heath AC. Nicotine withdrawal in women. *Addiction.* 1997; 92(7):889–902. [PubMed: 9293047]
33. Marks JL, Hill EM, Pomerleau CS, Mudd SA, Blow FC. Nicotine dependence and withdrawal in alcoholic and nonalcoholic ever-smokers. *J Subst Abuse Treat.* 1997; 14(6):521–527. [PubMed: 9437623]
34. Ceribelli A, Pino MS, Cecere FL. Gender differences: Implications for clinical trials and practice. *J Thorac Oncol.* 2007; 2(5 Suppl):S15–S18. [PubMed: 17457223]
35. Kiyohara C, Ohno Y. Sex differences in lung cancer susceptibility: A review. *Gend Med.* 2010; 7(5):381–401. [PubMed: 21056866]
36. Thun MJ, Carter BD, Feskanich D, Freedman ND, Prentice R, Lopez AD, Hartge P, Gapstur SM. 50-year trends in smoking-related mortality in the United States. *N Engl J Med.* 2013; 368:351–364. [PubMed: 23343064]
37. Dickerson DL, Leeman RF, Mazure CM, O'Malley SS. The inclusion of women and minorities in smoking cessation clinical trials: A systematic review. *Am J Addict.* 2009; 18(1):21–28. [PubMed: 19219662]
38. Piper ME, Fox BJ, Welsch SK, Fiore MC, Baker TB. Gender and racial/ethnic differences in tobacco-dependence treatment: A commentary and research recommendations. *Nicotine Tob Res.* 2001; 3(4):291–297. [PubMed: 11767718]

39. Weinberger AH, Mazure CM, Morlett A, McKee SA. Two decades of smoking cessation treatment research on smokers with depression: 1990-2010. *Nicotine Tob Res.* in press.
40. Weinberger AH, Sofuoglu M. The impact of cigarette smoking on stimulant addiction. *Am J Drug Alcohol Abuse.* 2009; 35(1):12–17. [PubMed: 19152200]
41. Agrawal A, Lynskey MT. Tobacco and cannabis co-occurrence: Does route of administration matter? *Drug Alcohol Depend.* 2009; 99:240–247. [PubMed: 18926646]

Table 1

The Main and Gender-Specific Relationships of Alcohol Use Disorders (AUDs) and Drug Use Disorders (DUDs) to Changes in Smoking for Wave 1 Current Daily Smokers.

	Wave 1 Current Daily Smokers (n=6,545)			
	% Quitters (n=999)	OR	95% CI	p-value
Main Effects of AUDs				
Current	12.4	0.70	0.55, 0.89	0.0050
Past	12.9	0.73	0.60, 0.89	0.0024
Never	16.9	1.00	---	---
Gender * AUD Interaction				
Women				
Current	11.2	0.61	0.40, 0.94	0.0260
Past	10.8	0.58	0.44, 0.78	0.0004
Never	17.2	1.00	---	---
Men				
Current	13.0	0.75	0.54, 1.05	0.0893
Past	14.2	0.83	0.63, 1.11	0.2065
Never	16.5	1.00	---	---
Interaction OR (Women vs. Men)				
Current vs. Never	---	0.81	0.46, 1.42	0.4585
Past vs. Never	---	0.70	0.46, 1.06	0.0882
Main Effects of DUD				
Current	8.6	0.48	0.31, 0.76	0.0019
Past	10.8	0.62	0.49, 0.79	0.0002
Never	16.3	1.00	---	---
Gender * DUD Interaction				
Women				
Current	9.4	0.56	0.29, 1.09	0.0875
Past	12.3	0.76	0.52, 1.10	0.1380
Never	15.6	1.00	---	---
Men				
Current	8.2	0.44	0.25, 0.76	0.0042
Past	9.9	0.54	0.39, 0.74	0.0003
Never	16.9	1.00	---	---
Interaction OR (Women vs. Men)				
Current vs. Never	---	1.28	0.56, 2.93	0.5531
Past vs. Never	---	1.41	0.85, 2.33	0.1789

Key: AUDs, alcohol use disorders; DUDs, drug use disorders; OR, odds ratio; CI, confidence interval

Table 2

The Main and Gender-Specific Relationships Alcohol Use Disorders (AUDs) and Drug Use Disorders (DUDs) to Changes in Smoking for Wave 1 Former Daily Smokers.

	Wave 1 Former Daily Smokers (n=5,428)			
	% Relapsers (n=239)	OR	95% CI	p-value
Main Effects of AUDs				
Current	8.9	2.26	1.36, 3.73	0.0019
Past	3.6	0.86	0.59, 1.26	0.4335
Never	4.2	1.00	---	---
Gender * AUD Interaction				
Women				
Current	12.1	2.66	0.96, 7.37	0.0591
Past	5.1	1.03	0.63, 1.68	0.8969
Never	4.9	1.00	---	---
Men				
Current	8.2	2.63	1.41, 4.91	0.0030
Past	3.0	0.91	0.54, 1.54	0.7259
Never	3.3	1.00	---	---
Interaction OR (Women vs. Men)				
Current vs. Never	---	1.01	0.30, 3.40	0.9820
Past vs. Never	---	1.13	0.57, 2.25	0.7178
Main Effects of DUD				
Current	22.4	7.97	2.51, 25.34	0.0006
Past	8.9	2.69	1.84, 3.95	<0.0001
Never	3.5	1.00	---	---
Gender * DUD Interaction				
Women				
Current	11.3	2.59	0.52, 13.02	0.2434
Past	9.5	2.14	1.18, 3.89	0.0130
Never	4.7	1.00	---	---
Men				
Current	29.0	15.90	3.70, 68.43	0.0003
Past	8.5	3.63	2.17, 6.05	<0.0001
Never	2.5	1.00	---	---
Interaction OR (Women vs. Men)				
Current vs. Never	---	0.16	0.02, 1.51	0.1083
Past vs. Never	---	0.59	0.26, 1.32	0.1961

Key: AUDs, alcohol use disorders; DUDs, drug use disorders; OR, odds ratio; CI, confidence interval