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Effects of Intimate Partner Violence, PTSD, and Alcohol Use on Cigarette Smoking in a Nationally Representative Sample

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Abstract

Background and Objectives—Separate literatures indicate that intimate partner violence (IPV), posttraumatic stress disorder (PTSD), and alcohol use are independently associated with increased risk for cigarette smoking. No previous studies have examined the co-occurrence of these problems on smoking quantity and potential gender-specific relationships. This study will address this gap in the literature.

Methods—Data from Wave 2 of the National Epidemiologic Study on Alcohol and Related Conditions (NESARC) were examined. Variables were assessed during the past year. Individuals ($N=25,604$) who reported being married, dating, or involved in a romantic relationship were included.

Results—Among men, PTSD and alcohol use were associated with more cigarettes smoked per day. Among women, PTSD, alcohol use, and IPV victimization were associated with more cigarettes smoked per day. Women who experienced IPV victimization smoked approximately three additional cigarettes per day.

Discussion and Conclusions—IPV victimization, PTSD, and alcohol use were associated with cigarettes smoked among women, while IPV experiences were not associated with smoking risk among men.

Scientific Significance—These findings represent an important contribution to the existing literature in that it elucidates the compounding relationship between a common and complex comorbidity and cigarette smoking. Findings indicate a critical need to implement routine smoking screening and intervention in venues where intimate partner violence is commonly encountered, such as advocacy and substance use treatment settings.

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Declaration of Interest

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

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INTRODUCTION

Cigarette smoking is a leading cause of preventable disease, morbidity, and mortality.¹ Thus, identifying factors that exacerbate smoking risk is paramount to facilitate smoking cessation efforts. The goal of the present study was to examine the extent to which intimate partner violence (IPV) exacerbates smoking risk in the context of two highly prevalent and co-occurring problems: posttraumatic stress disorder (PTSD) and alcohol use. A secondary aim was to examine how these associations differ between men and women.

Both PTSD and alcohol use are salient correlates of cigarette smoking.^{2,3} Approximately half of individuals with PTSD report daily smoking,⁴ making smoking twice as prevalent among individuals with, as compared to without, PTSD.⁵ Individuals with PTSD also incur a two- to fivefold increased risk of nicotine dependence, and individuals with PTSD are significantly more likely to relapse following a quit attempt compared to those without PTSD.⁶

Alcohol use is also associated with significantly increased rates of cigarette smoking,⁷ and cigarette smoking is known to increase alcohol use.⁸ Approximately 35% of individuals with alcohol use disorder also meet criteria for nicotine dependence.⁹ That prevalence rises to approximately 80% among individuals in treatment for alcohol use disorder.¹⁰ The combination of smoking and alcohol use is particularly malignant, as morbidity and mortality associated with co-occurrence is substantially higher than singular use of alcohol or tobacco.¹ Notably, recent studies from large representative samples have also demonstrated that co-occurring PTSD and alcohol use substantially exacerbate smoking risk and associated rates of disability.¹¹

A separate, emergent body of research has found that intimate partner violence (IPV) is associated with cigarette smoking.¹² Most studies have focused on the increased risk of cigarette smoking among women who experience IPV victimization. Findings indicate that up to 70% of IPV-victimized women smoke cigarettes.^{12,13} Other studies have documented the high prevalence of smoking among men and women who have perpetrated IPV.^{14,15} Despite abundant literature establishing PTSD and alcohol use as both precipitants and antecedents of IPV, only one study to date has directly examined the associations between PTSD, alcohol use, and smoking status among women experiencing IPV victimization.¹⁶ An additional limitation of the existing literature on IPV and smoking is that studies have focused primarily on smoking status or nicotine dependence rather than examining the quantity and frequency of cigarette smoking, which may facilitate a more nuanced understanding of the association between IPV and smoking.

The self-medication hypothesis, which asserts that individuals may use substances to mitigate psychological distress,¹⁷ may help explain how PTSD, alcohol use, and IPV are associated with smoking. This theory has often been used to explain the common co-occurrence of smoking with PTSD and alcohol use separately.^{4,18} It has also been applied to the associations between IPV and substance use.¹⁶

The critical gap remaining in this literature is that no studies have examined the extent to which the confluence of PTSD, alcohol use, and IPV exacerbates smoking. Further, gender

differences in these associations remain unexamined. Women incur heightened risk for trauma exposure, PTSD, substance use disorders, and their comorbidity compared to men.^{19,20} Women also commonly have more difficulty quitting smoking compared to men.^{21–23} Several gender-specific factors may contribute to this discrepancy. For example, there are differences in pharmacotherapy efficacy across genders^{24,25} and levels of ovarian hormones have been associated with the likelihood of abstinence, potentially protecting against craving and relapse.²⁶

Addressing these gaps is critical because complex comorbidities, including IPV, are known to result in more negative health and treatment outcomes compared to single diagnoses.^{11,27} Thus, the goal of this study was to examine (1) the *direct associations* between PTSD, alcohol use, IPV victimization and perpetration, and cigarette smoking, and (2) the *additive effects* of PTSD, alcohol use, and IPV victimization and perpetration on cigarette smoking. Given that more women compared to men report IPV victimization²⁸ and that some barriers to smoking cessation are gender-specific,²⁹ a third goal was to examine whether these associations differ between men and women. We hypothesized that PTSD, alcohol use, IPV victimization, and perpetration would be independently and collectively associated with more cigarette smoking. Examining these questions may improve our understanding of the increased health risks posed by the co-occurrence of these highly prevalent problems, and may inform the development of novel pathways to intervention.

METHODS

Sample

This study examined data from Wave 2 of the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC), completed during 2004–2005 (Wave 1 2001–2002). A complete description of the NESARC survey methodology can be found in previous publications.^{30,31} Surveys were administered utilizing computer-assisted, face-to-face interviews. The current sample consists of a subset of the 34,653 completed Wave 2 interviews, retaining respondents who (1) indicated being married, dating, or involved in a romantic relationship, (2) responded to all 12 survey questions regarding IPV victimization and perpetration, (3) provided sufficient responses to survey questions on traumatic experiences necessary to diagnose PTSD, and (4) provided sufficient responses to questions regarding the use of alcohol and cigarettes. After applying these inclusion rules, the final sample included 25,604 Wave 2 respondents ($n=11,176$ men and 13,836 women).

All analyses incorporated the survey weights that were constructed to represent the adult, non-institutionalized adult US population. The regression models were estimated using SAS 9.4 and Stata 12.1 software packages, and all variances were adjusted to allow for NESARC's complex multi-stage survey design.

Measures

Posttraumatic Stress Disorder—The Alcohol Use Disorder and Associated Disabilities Interview Schedule-IV (AUDADIS-IV) was used to assess past 12-month PTSD symptoms according to Diagnostic and Statistical Manual of Mental Disorders Fourth

Edition DSM-IV³² criteria. Data collected prior to Wave 1 and since Wave 1 were coded during post-processing of Wave 2 NESARC items. “Since last interview” diagnosis was treated as a dichotomous variable ($0=No\ PTSD$, $1=PTSD\ present$). The reliability and validity of this instrument has been reported previously.³³

Alcohol Use—In order to create a discrete measure of alcohol use, NESARC items on frequency of drinking occasions in the past year and quantity of drinks usually consumed when drinking during the past year were multiplied into a pseudo-continuous estimate of drinks consumed during the past year. This approach creates five consumption groups (0 =non-drinker, 1 =1–10 drinks in past 12 months, 2 =11–100 drinks in past 12 months, 3 =101–500 drinks in past 12 months, 4 =500 or more drinks in past 12 months) which are all well represented in the data.

Intimate Partner Violence—The indicators for IPV perpetration and IPV victimization were coded as equal to one if there was endorsement of at least one of the six IPV items. The six IPV items (using the victimization phrasing; each item was also posed to elicit endorsement of perpetration of IPV) were “How often did your spouse/partner (1) push, grab, or shove you in the past year?, (2) slap, kick, bite, or hit you in the past year?, (3) threaten you with a weapon like a knife or gun in the past year?, (4) cut or bruise you in the past year?, (5) force you to have sex with him/her in the past year?, and (6) injure you enough that you had to get medical care in the past year?” Non-endorsement of all six items resulted in a zero code, and both indicators were left blank if there was a refusal to answer any of the 12 overall IPV items. This exclusion rule affected <1% of potential responses.

Cigarette Smoking—The number of cigarettes smoked per day was estimated from two NESARC items similar to the alcohol use questions on frequency and usual amount during the past 12 months. Responses for “Usual frequency when smoked cigarettes in past year,” in addition to not smoking, could indicate daily smoking, 5–6 days a week, 3–4 days a week, 1–2 days a week, 2–3 days a month, or once a month or less. Of the 5,285 smokers in our sample, 4,541 indicated daily smoking (87.2% of the weighted sample). Participants were also asked to report their “Usual quantity when smoked cigarettes in the past year.” As with alcohol use, we used approximate midpoints of the categories to quantify frequency, and multiplied the frequency by the usual quantity to obtain the cigarettes smoked per day measure. Among both men and women, cigarettes smoked per day ranged from 0–60.

Demographic Covariates—All demographic covariates were analyzed categorically: Race (1 =White, 2 =non-Hispanic, 3 =Black, non-Hispanic, 4 =Other/non-Hispanic, 5 =Hispanic/Latino); Education (1 =<high school, 2 =high school, 3 =some college, 4 =college degree); Income (1 =<\$20,000; 2 =\$20,000–35,000; 3 =\$35,000–70,000; 4 =>\$70,000); Employment (1 =employed, 2 =unemployed, 3 =not in labor force); Relationship status (1 =married, 2 =widowed/divorced/separated, 3 = never married).

Data Analysis

Demographics were used as control variables in the multivariate regressions. In tests of equal proportions (t -tests for continuous variables, chi-squared- and F -tests for categorical

variables; test statistics available upon request), none of the variables or groups of variables were distributed equivalently for smokers and non-smokers for either men or women at the 95% or 99% significance levels. Each model was run separately for the men and women.

Additionally, the six cross-product combinations of the four variables of interest were coded in order to evaluate possible interactions between alcohol use, PTSD, IPV perpetration, IPV victimization and (1) smoking status and (2) quantity of cigarette smoking. The three cross-product variables containing alcohol use are distributed discretely from 0 to 4, while the other three are dichotomous (0, 1) variables. We estimated a second regression model to measure possible interactions between variables of interest upon smoking status and daily smoking quantities.

In order to test the robustness of the model specification, we examined three-way interactions between PTSD, alcohol use, and IPV. Additionally, we estimated effects while sequentially omitting one of our four variables of interest from each model. A third model replaced the categorical measure of alcohol use with the measure of drinks per year. Finally, we re-estimated the equations using Tobit regression methods to allow for the possible effects of left-censoring (at zero) in the distribution of the number of cigarettes smoked per day.

RESULTS

Demographic Characteristics

Descriptive statistics for the sample are presented in Table 1. As can be seen, 2,610 of 11,768 men (22.5% of the weighted sample) were current smokers at the time of the interview, as were 2,675 of 13,836 (19.7%) of women. Notably, statistically significant differences emerged between smokers and non-smokers within both sexes on each variable examined: men smoked significantly more cigarettes than women (16.6 cigarettes per day for men, 13.7 per day for women; $t=14.6$, $p<.001$).

Associations With PTSD, Alcohol Use, and IPV Among Men

Results of regressions examining correlates of smoking status among men and women are presented in Table 2. Alcohol use and PTSD were associated with a greater likelihood of being a smoker among men. Results of logistic regressions examining correlates of smoking quantity for men and women, respectively, are presented in Table 3. Among men, cigarettes smoked per day were positively and significantly correlated with alcohol use and PTSD, such that men who drank more alcohol smoked approximately one-half additional cigarette per day ($\beta=.55$, 95% CI = [.39, .71], per unit increase in drinking frequency category) and men who met diagnostic criteria for PTSD smoked approximately two additional cigarettes per day compared to those who did not meet criteria for PTSD ($\beta=2.04$, 95% CI = [.98, 3.10]). Approximately 13.5% of men endorsed IPV victimization and 9.6% perpetration. There was no significant relationship between IPV (either perpetration or victimization) and smoking quantity among men.

Associations With PTSD, Alcohol Use, and IPV Among Women

Alcohol use, PTSD, and both IPV victimization and perpetration were associated with a greater likelihood of being a smoker among women. Cigarette smoking quantities for women were correlated with alcohol use and PTSD, and by roughly similar proportions among men. Approximately 14.0% of women endorsed IPV victimization and 17.4% perpetration. In contrast to men, women who experienced IPV victimization smoked one more cigarette per day compared to women who did not experience IPV victimization ($\beta = 1.24$, 95% CI = [.19, 2.29]).

Interactive Effects Among Men

No significant interactions emerged among men with regard to smoking status among men. We examined interactive effects on smoking quantity between the four variables of interest, such that indications for more than one of the variables might have an effect on smoking that was larger (or smaller) than the sum of the individual effects. Table 3 presents the results from the interactions estimated for men and women, respectively. No statistically significant interactions emerged among men with regard to smoking quantity.

Interactive Effects Among Women

The interaction of (1) IPV victimization with IPV perpetration and (2) alcohol use and PTSD were statistically significant with regard to smoking status. First, findings indicate that while women reported either IPV victimization or perpetration were more likely to smoke, women who reported both IPV victimization and perpetration had the same smoking likelihood as women who reported neither. Second, women who reported PTSD and greater alcohol use incurred an increased likelihood of smoking.

Only the interaction of IPV perpetration *and* victimization was statistically significant with regard to smoking quantity. The findings show that IPV perpetration (without IPV victimization) was not associated with a significant difference in quantity of cigarettes smoked per day among women. However, IPV victimization (without IPV perpetration) was associated with smoking quantity: Women with PTSD and alcohol use who experienced IPV victimization, but not IPV perpetration, smoked approximately three additional cigarettes per day compared to women with PTSD and alcohol use who neither experienced IPV victimization nor perpetration ($\beta = 2.98$, 95% CI = [.30, 5.66]).

DISCUSSION

Existing literature has demonstrated (1) separate links between PTSD, alcohol use, IPV, and smoking, (2) PTSD and alcohol use are salient correlates of IPV victimization and perpetration, and (3) co-occurring PTSD and alcohol use is associated with increased smoking risk. However, this is the first study to examine the effects of PTSD, alcohol use, and IPV on cigarette smoking. While the early existing literature on IPV and smoking has frequently limited its examinations to compare smokers versus non-smokers, and some studies have limited examinations only to tobacco-dependent individuals, the current study generalizes to a wider range of individuals by examining quantity of cigarette smoking. Our findings echo those from previous studies indicating associations between PTSD, alcohol

use, IPV, and smoking status among men and women. Notably, the finding that women who reported bidirectional IPV did not incur additional smoking risk compared to those who experienced no IPV is novel. While lifetime rates of IPV victimization are slightly higher among women compared to men, bidirectional IPV is the most prevalent form of IPV.³⁴ This finding speaks to the necessity of examining the effects of both IPV victimization and perpetration in future smoking studies as differing stress and addiction related dynamics may underlie smoking behaviors when different forms of IPV are present in intimate relationships.

Consistent with existing literature, this study found associations between PTSD and alcohol use in the number of cigarettes smoked per day among men in a nationally representative sample. Among women, PTSD, alcohol use, and IPV victimization were independently associated with the number of cigarettes smoked per day. These findings extend the existing literature by demonstrating that among women only, IPV is associated with increased cigarette smoking after accounting for the effects of PTSD and alcohol use. In contrast, neither IPV victimization nor perpetration was associated with cigarette use among men. The current findings have general and gender-specific implications for identifying and intervening with those in need of smoking cessation treatment.

There is accumulating literature suggesting that the effects of stress differentially influence men and women, and that women may be particularly susceptible to the negative impact of stress on addictive behaviors.³⁵ The gender differences observed in this study are especially notable in light of findings indicating that women have a more difficult time quitting smoking compared to men.³⁶ Existing literature also demonstrates that women are more prone to trauma exposure and the development of PTSD compared to men, and that co-occurring substance use disorders present with a more challenging course of treatment and associated disabilities among women.³⁷ The addition of IPV victimization as it contributes to cigarette smoking adds an important variable to be carefully considered among female smokers and is a unique contribution over other well-established smoking correlates. In light of the literature documenting the chronic and severe effects of IPV victimization on women,³⁸ this study highlights IPV and its co-occurrence with PTSD and alcohol use as additional reasons why some women may have more difficulty quitting smoking than men. Thus, the current findings underscore the importance of screening and intervening with women, particularly when multiple risk factors are present.

In the current study, we examined both IPV victimization and perpetration, whereas previous studies have overlooked this important distinction. Bidirectional IPV, where both partners within a dyad are using aggression against the other, is the most prevalent type of IPV.³⁴ Therefore, an approach taking both IPV victimization and perpetration into account is more generalizable than previous studies that have only focused on victimization. In the current study, significant associations between IPV perpetration and smoking were not observed; however, previous research^{14,15} suggests a high prevalence of cigarette smoking among men and women in court-mandated batterer intervention programs. A recent study conducted using NESARC data also demonstrated robust associations between smoking and both IPV victimization and perpetration.³⁹ This study examined smoking status rather than smoking quantity, and compared levels of IPV perpetration, which are factors that may partially

account for differences in results. Collectively, these findings indicate a critical need to examine the pathways to smoking among individuals experiencing a variety of types and severity of IPV. Additionally, existing literature has not examined longitudinal associations between these variables such as order of onset and effects of comorbidity and interventions on changes in smoking. Future studies examining these questions are essential.

Public Health Implications

The current study has several important clinical implications. The findings support those of previous studies in that individuals who meet diagnostic criteria and/or seek treatment for PTSD or alcohol problems should be screened for both cigarette smoking and IPV. Importantly, individuals seeking resources related to IPV should also be screened for cigarette smoking. Brief interventions have been developed and tested in settings such as primary care and OB/GYN settings.^{40,41} Venues including mental health and substance use treatment, and IPV advocacy locations may provide valuable intervention opportunities. The present study is the first to our knowledge to quantify the association between IPV and women's smoking in the context of other associated risk factors (eg, PTSD, alcohol use). Findings from this nationally representative sample indicate that women who experience IPV, PTSD, and alcohol use smoke three additional cigarettes per day. Over time, the cumulative effects of this additional smoking will likely result in a variety of otherwise preventable and costly health problems among women.

Limitations

This study includes several limitations. Different types and levels of severity of IPV (eg, psychological, physical, sexual) are known to differentially influence negative sequelae such as PTSD and alcohol use.⁴² Preliminary findings indicate that a similar differential association may also be true for smoking.¹³ While the IPV measure utilized here is not thorough enough to appropriately examine those differences, future research should examine causal pathways between different forms and severity levels of IPV and smoking in the context of PTSD and alcohol use. Future research can improve on the use of retrospective self-report by employing real-time and technologically assisted assessment methods. While these methods are in place in current smoking research, no studies to our knowledge have applied them to IPV populations to examine smoking.

While we cannot make attributions regarding subjective experiences of additive stress associated with various problems in this sample, future studies should examine cumulative and acute stress as predictors of smoking behaviors. Future studies should aim to assess the extent to which a dose-response association exists between co-occurring mental health, alcohol use, and IPV to elucidate the additive relationships found here. Perhaps, greater severity or complexity of comorbidity is associated with greater cigarette smoking. Finally, the use of cross-sectional data does not allow for causal inferences. The literature would benefit from future use of longitudinal analyses.

CONCLUSIONS

In summary, the current study examined the extent to which IPV was associated with greater cigarette smoking above that posed by PTSD and alcohol use. Men and women with PTSD smoked approximately two more cigarettes per day compared to those without PTSD. IPV victimization, but not perpetration, added substantially to smoking risk among women only; women who reported IPV victimization in addition to PTSD and alcohol use smoked approximately three more cigarettes per day compared to women with PTSD and alcohol use who neither experienced IPV victimization nor perpetration. These findings emphasize the detrimental health effects incurred by the highly prevalent co-occurrence of PTSD, alcohol use, and IPV among women. These findings also add to the literature urging providers in a variety of settings to assess and intervene on tobacco use, particularly among individuals who also have PTSD, drink alcohol, or report IPV.

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References

1. Centers for Disease Control and Prevention. Smoking-attributable mortality, years of potential life lost, and productivity losses—United States, 2000–2004. *MMWR*. 2008; 57:1226–1228. [PubMed: 19008791]
2. Anthony JC, Echeagaray-Wagner F. Epidemiologic analysis of alcohol and tobacco use—patterns of co-occurring consumption and dependence in the United States. *Alcohol Res Health*. 2000; 24:201–208. [PubMed: 15986714]
3. Lawrence D, Considine J, Mitrou F, et al. Anxiety disorders and cigarette smoking: Results from the Australian Survey of Mental Health and Wellbeing. *Aust N Z J Psychiatry*. 2010; 44:520–527. [PubMed: 20482412]
4. Feldner MT, Babson KA, Zvolensky MJ. Smoking, traumatic event exposure, and post-traumatic stress: A critical review of the empirical literature. *Clin Psychol Rev*. 2007; 27:14–45. [PubMed: 17034916]
5. Hapke U, Schumann A, Rumpf H, et al. Association of smoking and nicotine dependence with trauma and posttraumatic stress disorder in a general population sample. *J Nerv Ment Dis*. 2005; 193:843–846. [PubMed: 16319709]
6. Zvolensky MJ, Gibson LE, Vujanovic AA, et al. Impact of posttraumatic stress disorder on early smoking lapse and relapse during a self-guided quit attempt among community-recruited daily smokers. *Nicotine Tob Res*. 2008; 10:1415–1427. [PubMed: 18686190]
7. McKee SA, Krishnan-Sarin S, Shi J, et al. Modeling the effect of alcohol on smoking lapse behavior. *Psychopharmacology*. 2006; 189:201–210. [PubMed: 17013640]
8. Barrett SP, Tichauer M, Leyton M, et al. Nicotine increases alcohol self-administration in non-dependent male smokers. *Drug Alcohol Depend*. 2006; 81:197–204. [PubMed: 16054779]
9. Grant BF, Hasin DS, Chou SP, et al. Nicotine dependence and psychiatric disorders in the United States. *Arch Gen Psychiatry*. 2004; 61:1107–1115. [PubMed: 15520358]
10. Kalman D, Kim S, DiGirolamo G, et al. 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. *Clin Psychol Rev*. 2010; 30:12–24. [PubMed: 19748166]

11. Forbes MK, Flanagan JC, Barrett EL, et al. Smoking, posttraumatic stress disorder, and alcohol use disorders in a nationally representative sample of Australian men and women. *Drug Alcohol Depend.* 2015; 156:176–183. [PubMed: 26386825]
12. Crane CA, Hawes S, Weinberger AH. Intimate partner violence victimization and cigarette smoking: A meta-analytic review. *Drug Alcohol Depend.* 2014; 140:e39–e40.
13. Jun H, Rich-Edwards JW, Boynton-Jarrett R, et al. Intimate partner violence and cigarette smoking: Association between smoking risk and psychological abuse with and without co-occurrence of physical and sexual abuse. *Am J Public Health.* 2008; 98:527–535. [PubMed: 17600272]
14. Stuart GL, Moore TM, Kahler CW, et al. Cigarette smoking and substance use among men court-referred to domestic violence treatment programs. *Am J Addict.* 2004; 13:319–320. [PubMed: 15370953]
15. Stuart GL, Meehan J, Temple JR, et al. Readiness to quit cigarette smoking, intimate partner violence, and substance abuse among arrested violent women. *Am J Addict.* 2006; 15:396–399. [PubMed: 16966197]
16. Sullivan TP, Flanagan JC, Dudley DN, et al. Correlates of smoking status among women experiencing intimate partner violence: Substance use, posttraumatic stress, and coping. *Am J Addict.* 2015; 24:546–553. [PubMed: 26249027]
17. Khantzian EJ. The self-medication hypothesis of substance use disorders: A reconsideration and recent applications. *Harv Rev Psychiatry.* 1997; 4:231–244. [PubMed: 9385000]
18. Morissette SB, Tull MT, Gulliver SB, et al. Anxiety, anxiety disorders, tobacco use, and nicotine: A critical review of interrelationships. *Psychol Bull.* 2007; 133:245–272. [PubMed: 17338599]
19. Brady KT, Randall CL. Gender differences in substance use disorders. *Psychiatr Clin North Am.* 1999; 22:241–252. [PubMed: 10385931]
20. Sonne SC, Back SE, Zuniga CD, et al. Gender differences in individuals with comorbid alcohol dependence and post-traumatic stress disorder. *Am J Addict.* 2003; 12:412–423. [PubMed: 14660155]
21. Wetter DW, Kenford SL, Smith SS, et al. Gender differences in smoking cessation. *J Consult Clin Psychol.* 1999; 67:555–562. [PubMed: 10450626]
22. Smith PH, Kasza KA, Hyland A, et al. Gender differences in medication use and cigarette smoking cessation: results from the International Tobacco Control Four Country Survey. *Nicotine Tob Res.* 2015; 17:463–472. [PubMed: 25762757]
23. Ward KD, Klesges RC, Zbikowski SM, et al. Gender differences in the outcome of an unaided smoking cessation attempt. *Addict Behav.* 1997; 22:521–533. [PubMed: 9290861]
24. Perkins KA, Scott J. Sex differences in long-term smoking cessation rates due to nicotine patch. *Nicotine Tob Res.* 2008; 10:1245–1250. [PubMed: 18629735]
25. Weinberger AH, Smith PH, Kaufman M, et al. Consideration of sex in clinical trials of transdermal nicotine patch: A systematic review. *Exp Clin Psychopharmacol.* 2014; 22:373–383. [PubMed: 25133506]
26. Saladin ME, McClure EA, Baker NL, et al. Increasing progesterone levels are associated with smoking abstinence among free-cycling women smokers who receive brief pharmacotherapy. *Nicotine Tob Res.* 2015; 17:398–406. [PubMed: 25762749]
27. Petrakis IL, Rosenheck R, Desai R. Substance use comorbidity among veterans with posttraumatic stress disorder and other psychiatric illness. *Am J Addict.* 2011; 20:185–189. [PubMed: 21477045]
28. Black, MC.; Basile, KC.; Breiding, MJ., et al. The National Intimate Partner and Sexual Violence Survey (NISVS): 2010 Summary Report. Atlanta, GA: National Center for Injury Prevention and Control, Centers for Disease Control and Prevention; 2011.
29. Schnoll RA, Patterson F, Lerman C. Treating tobacco dependence in women. *J Women's Health.* 2007; 16:1211–1218.
30. Grant, BF.; Kaplan, KD.; Stinson, FS. Source and Accuracy Statement for the 2004–2005 Wave 2 National Epidemiologic Survey on Alcohol and Related Conditions. Bethesda, MD: National Institute on Alcohol Abuse and Alcoholism; 2005.

31. Grant, BF.; Kaplan, K.; Shepard, J., et al. Source and Accuracy Statement for Wave 1 of the 2001–2002 National Epidemiologic Survey on Alcohol and Related Conditions. Bethesda, MD: National Institute on Alcohol Abuse and Alcoholism; 2003.
32. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. 4. Washington, D.C: Author; 2000.
33. Grant BF, Dawson DA, Stinson FS. The Alcohol Use Disorder and Associated Disabilities Interview Schedule-IV (AUDADIS-IV): Reliability of alcohol consumption, tobacco use, family history of depression and psychiatric diagnostic modules in a general population sample. *Drug Alcohol Depend.* 2003; 71:7–16. [PubMed: 12821201]
34. Straus MA, Ramirez IL. Gender symmetry in prevalence, severity, and chronicity of physical aggression against dating partners by university students in Mexico and USA. *Aggress Behav.* 2007; 33:281–290. [PubMed: 17593556]
35. Moeller FG. Sex, stress, and drug cues in addiction. *Am J Psychiatry.* 2012; 169:351–353. [PubMed: 22476673]
36. Piper ME, Cook JW, Schlam TR. Gender, race, and education differences in abstinence rates among participants in two randomized smoking cessation trials. *Nicotine Tob Res.* 2010; 12:647–657. [PubMed: 20439385]
37. Cohen LR, Hien DA. Treatment outcomes for women with substance abuse and PTSD who have experienced complex trauma. *Psychiatric Serv.* 2014; 57:100–106.
38. Bonomi AE, Thompson RS, Anderson M, et al. Intimate partner violence and women’s physical, mental, and social functioning. *Am J Prev Med.* 2006; 30:458–466. [PubMed: 16704938]
39. Crane CA, Pilver CE, Weinberger AH. Cigarette smoking among intimate partner violence perpetrators and victims: Findings from the National Epidemiologic Survey on alcohol and related conditions. *Am J Addict.* 2014; 23:493–501. [PubMed: 25066781]
40. Flocke SA, Step MM, Antognoli E, et al. A randomized trial to evaluate primary care clinician training to use the teachable moment communication process for smoking cessation counseling. *Prev Med.* 2014; 69:267–273. [PubMed: 25456811]
41. Ondersma SJ, Svikis DS, Lam PK, et al. A randomized trial of computer-delivered brief intervention and low-intensity contingency management for smoking during pregnancy. *Nicotine Tob Res.* 2012; 14:351–360. [PubMed: 22157229]
42. Pico-Alfonso MA, Garcia-Linares MI, Celda-Navarro N, et al. The impact of physical, psychological, and sexual intimate male partner violence on women’s mental health: Depressive symptoms, posttraumatic stress disorder, state anxiety, and suicide. *J Women’s Health.* 2006; 15:599–611.

TABLE 1

Sample demographics and clinical characteristics by smoking status and sex

Variable	Male smoker (<i>n</i> =2,610; 22.5%) % (SE)	Male non-smoker (<i>n</i> =9,158; 77.5%) % (SE)	Female smoker (<i>n</i> =2,675; 19.7%) % (SE)	Female non-smoker (<i>n</i> =11,161; 80.3%) % (SE)
Age	42.6 (.18)	48.5 (10)	41.0 (14.0)	46.9 (10.0)
Race				
White, non-Hispanic	72.5% (.5%)	71.9% (.3%)	78.1% (.5%)	70.4% (.3%)
Black, non-Hispanic	10.0% (.4%)	8.7% (.2%)	09.1% (.2%)	10.1% (.2%)
Other, non-Hispanic	6.7% (.2%)	6.6% (.2%)	6.5% (.3%)	7.0% (.15%)
Hispanic/Latino	10.8% (.3%)	12.8% (.2%)	6.3% (.2%)	12.5% (.16%)
Education				
<High school	19.3% (.6%)	11.4% (.2%)	13.7% (.4%)	10.6% (.2%)
High school	34.7% (.7%)	24.2% (.3%)	34.2% (.6%)	25.4% (.3%)
Some college	32.1% (.6%)	29.5% (.3%)	39.9% (.5%)	32.2% (.3%)
College degree	13.9% (.4%)	34.9% (.3%)	12.3% (.3%)	31.8% (.2%)
Personal income				
<\$20,000	33.2% (.6%)	21.5% (.3%)	58.5% (.6%)	53.2% (.3%)
\$20,000–35,000	26.5% (.5%)	23.6% (.3%)	24.2% (.5%)	21.1% (.2%)
\$35,000–70,000	30.2% (.5%)	33.9% (.3%)	14.6% (.3%)	20.1% (.2%)
>\$70,000	10.1% (.3%)	21.0% (.2%)	2.7% (.09%)	5.6% (.07%)
Employment status				
Employed	77.6% (.5%)	75.2% (.2%)	65.3% (.5%)	62.2% (.4%)
Unemployed	6.2% (.3%)	2.0% (.08%)	6.1% (.3%)	2.2% (.08%)
Not in labor force	16.2% (.5%)	22.8% (.3%)	28.5% (.5%)	35.5% (.4%)
Relationship status				
Married	68.6% (.5%)	81.6% (.2%)	66.9% (.4%)	82.2% (.2%)
Widowed/divorced/separated	12.1% (.5%)	6.5% (.14%)	16.6% (.4%)	7.8% (.13%)
Never married	19.2% (.4%)	11.9% (.2%)	16.5% (.3%)	10.0% (.19%)
Cigarettes per day	16.64 (.16)	–	13.74 (.12)	–
PTSD diagnosis	6.6% (.3%)	3.6% (.14%)	17.3% (.5%)	8.4% (.16%)
Drinks per year (0–4)				
Non-drinker	19.3% (.6%)	28.0% (.3%)	20.9% (.6%)	37.5% (.4%)
1–10 drinks per yr	8.6% (.4%)	11.3% (.2%)	20.4% (.5%)	20.2% (.2%)
11–100 drinks per yr	19.6% (.4%)	20.7% (.2%)	23.9% (.6%)	21.2% (.2%)
101–500 drinks per yr	22.8% (.5%)	27.0% (.3%)	22.9% (.5%)	17.1% (.19%)
501+ drinks per yr	29.7% (.6%)	12.9% (.2%)	12.0% (.4%)	4.0% (.09%)
IPV victimization	8.4% (.3%)	5.1% (.12%)	9.6% (.3%)	4.4% (.12%)
IPV perpetration	5.9% (.2%)	3.7% (.12%)	11.5% (.4%)	5.9% (.15%)

IPV =intimate partner violence.

N=25,604. All non-smoker/smoker differences within the sex-specific subsample are statistically significant at the $\alpha = .001$ level using *t*-tests for continuous variables and Rao–Scott chi-square tests for discrete and categorical variables.

TABLE 2

Results of logistic regression examining associations of PTSD, alcohol use, and IPV with status, by sex

Variable	Men <i>n</i> = 11,768		Women <i>n</i> = 13,836	
	No interaction β (SE)	With interaction β (SE)	No interaction β (SE)	With interaction β (SE)
Alcohol use	.255 ** (.013)	.262 ** (.015)	.343 ** (.010)	.349 ** (.011)
PTSD	.372 ** (.071)	.950 ** (.133)	.618 ** (.042)	.751 ** (.082)
IPV victimization	.089 (.082)	-.331 (.220)	.205 ** (.069)	.537 ** (.203)
IPV perpetration	.071 (.091)	.215 (.209)	.147 * (.058)	.289 * (.123)
Alcohol use * IPV perpetration		-.067 (.066)		.015 (.056)
Alcohol use * IPV victimization		.164 ** (.059)		.061 (.056)
Alcohol use * PTSD		-.250 ** (.040)		-.082 * (.036)
IPV perp. * IPV victimization		.087 (.195)		-.728 ** (.124)
PTSD * IPV perpetration		-.351 (.183)		.135 (.159)
PTSD * IPV victimization		-.017 (.226)		-.213 (.140)
LR	9.86 * 10 ⁶	9.99 * 10 ⁶	1.090 * 10 ⁷	1.102 * 10 ⁷
Wald χ^2	4,986.7	6,295.9	11,368	13,321

IPV =intimate partner violence; PTSD =posttraumatic stress disorder.

Analyses adjusted for demographic variables as listed in Table 1 (age, race/ethnicity, marital status, education, personal income, and labor market status).

LR and Wald tests have 18 d.f. in no interaction model, 24 d.f. in interaction model.

*
 $p < .05$.**
 $p < .01$.

TABLE 3

Results of multivariate regression examining associations of PTSD, alcohol use, and IPV with number of cigarettes smoked per day, by sex ($N=25,604$)

Variable	Men $n = 11,768$		Women $n = 13,836$	
	No interaction β (SE)	With interaction β (SE)	No interaction β (SE)	With interaction β (SE)
Alcohol use	.55 ** (.08)	.56 ** (.09)	.53 ** (.07)	.52 ** (.07)
PTSD	2.04 ** (.54)	3.74 ** (1.12)	1.81 ** (.29)	1.68 ** (.46)
IPV victimization	.73 (.58)	-.07 (1.18)	1.24 * (.53)	2.98 * (1.35)
IPV perpetration	.13 (.66)	.51 (1.30)	-.17 (.39)	-.24 (.52)
Alcohol use * IPV perpetration		.03 (.42)		.32 (.31)
Alcohol use * IPV victimization		.47 (.38)		-.20 (.38)
Alcohol use * PTSD		-.79 (.44)		.06 (.24)
IPV perp. * IPV victimization		-.81 (1.48)		-2.30 * (1.08)
PTSD * IPV perpetration		.04 (2.24)		.98 (.94)
PTSD * IPV victimization		-.57 (1.93)		-1.01 (1.20)
R^2	.0908	.0918	.0970	.0981
Root MSE	8.32	8.32	6.55	6.55

IPV =intimate partner violence; PTSD =posttraumatic stress disorder.

Analyses adjusted for demographic variables as listed in Table 1 (age, race/ethnicity, marital status, education, personal income, and labor market status).

* $p < .05$.

** $p < .01$.