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Gender differences in the comorbidity of smoking behavior and major depression

Mathilde M. Husky^{1,3}, Carolyn M. Mazure^{1,3}, Prashni Paliwal^{1,3}, and Sherry A. McKee^{2,3}

¹ Department of Psychiatry, Yale University School of Medicine, 200 College Street, Suite 208, New Haven, CT 06520, USA

² Department of Psychiatry, Yale University School of Medicine, Substance Abuse Center – CMHC, 34 Park Street, Suite S-211, New Haven, CT 06519, USA

³ Women's Health Research at Yale, Yale University School of Medicine, 200 College Street, Suite 208, New Haven, CT 06520, USA

Abstract

Objective—The present investigation sought to determine whether smoking behavior was associated with current or lifetime major depression and whether this association was greater in women.

Methods—Data were derived from the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC; Wave 1, 2001-2002, n = 42,565). Relationships between smoking status (daily, occasional, prior) and DSM-IV major depression (current or lifetime) by gender were assessed in terms of odds ratios using logistic regressions.

Results—Current (daily, occasional) and prior smoking significantly increased odds of having current or prior major depression. These associations varied as a function of gender. Women with prior smoking were at significantly higher risk of current and past depression than men (OR: 1.53 vs 1.36; 1.72 vs 1.36), as was true for current occasional (OR: 1.92 vs 1.39; 1.90 vs 1.30) and daily smoking (OR: 2.52 vs 1.95; 1.84 vs 1.48).

Conclusions—The association between smoking and current or past depression is not necessarily limited to smoking that meets criteria for nicotine dependence, and is more potent in women. Smoking-cessation interventions for this population should consider the role that depression may play in failure to quit and smoking relapse, particularly in women.

Keywords

Comorbidity; Gender; Smoking; Major Depression

1. Introduction

Smoking is associated with substantial health risks and is the leading preventable cause of death in the United States (U.S. Department of Health and Human Services 1994).

Epidemiological data have demonstrated the existence of a strong relationship between

Corresponding author: Mathilde Husky, Ph.D., Department of Psychiatry, Yale School of Medicine, 200 College Street, Suite 208, New Haven CT 06520, mathilde.husky@yale.edu.

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psychiatric disorders and smoking (Glassman et al. 1990; Lasser et al. 2000; Grant et al. 2004). In particular, the association of major depression and smoking has been extensively documented (Breslau et al. 1993; Fergusson et al. 1996).

We know that smoking is less common in women than it is in men (Grant et al. 2004), while women have higher rates of major depression as compared to men (Kessler et al. 2005). Yet, we do not know whether smoking is differentially associated with lifetime major depression in women compared to men. There are several noteworthy gender differences in the association of negative affect and smoking behavior. While negative affect is associated with smoking in both women and men, it is more strongly related to smoking in women (McKee et al. 2003). Furthermore, women have greater expectations that smoking will reduce negative affect (Brandon and Baker 1991), and report that they are more likely to smoke in response to negative affect or stress (Livson and Leino 1988). Identifying possible gender differences in the relationship between depression and smoking could refine our understanding of the comorbidity of smoking and depression, and therefore contribute to more targeted smoking cessation interventions.

In order to identify potential gender differences in the patterns of comorbidity between smoking and depression, it is important to explore both current and prior major depression, and to use a wide range of smoking behaviors. Unlike a continuous measure of depressive symptomatology, the examination of clinical depression allows the identification of those who have experienced a previous depressive episode and those who have not, thereby making a distinction between prior depression and current depression. This distinction could inform the relationship between smoking and depression even after a depressive episode has remitted. With regard to the assessment of smoking, the Department of Health and Human Services' Clinical Practice Guidelines have urged health professionals to screen for all tobacco use, as opposed to nicotine dependence only (Fiore et al. 2000; U.S. Preventive Services Task Force 2003). Furthermore, current smokers are likely to present with significant tobacco-related health problems, and represent a much larger portion of the population than do smokers who meet criteria for DSM-IV nicotine dependence (Grant et al. 2004). Understanding gender differences in the co-occurrence of smoking and depression can be enhanced by examining a wide range of smoking behaviors rather than nicotine dependence alone. In an effort to identify gender differences in the patterns of comorbidity between major depression and smoking, the present investigation uses a wide range of smoking behaviors (not limited to nicotine dependence), and considers both current and lifetime major depression in a nationally representative sample.

2. Methods

2.1. Data source

The National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) study (Wave 1, 2001-2002) was carried out by the National Institute on Alcohol Abuse and Alcoholism. Personal interviews were conducted with 43,093 civilian, noninstitutionalized adults, residing in the United States. The response rate was 81%. African-Americans, Hispanics, and young adults (ages 18 to 24) were oversampled. In our analyses, the data were weighted to account for oversampling and to adjust for nonresponse. The weighted data were further adjusted to be representative of the U.S. civilian population using the 2000 Decennial Census. Further details of the sampling, purpose, and weighting have been published elsewhere (Grant et al. 2003).

2. 2. Smoking Behavior

We coded the NESARC data into the following categories for past 12-month cigarette use. *Daily*: Someone who at the time of the survey is smoking cigarettes at least once per day. *Occasional*: Someone who currently smokes cigarettes but not every day. *Ex-Smoker*: A non-user who has previously been a daily or occasional smoker. *Never-Smoker*: Non-user who did not exceed experimenter status on any tobacco product (i.e., less than 100 cigarettes, less than 50 cigars, less than 50 instances of pipe smoking, less than 20 instances of snuff use, less than 20 instances of chewing tobacco use). Smoking status was assessed with the following variables; 'tobacco use status' (current user, ex-user, lifetime nonuser), 'cigarette smoking status' (smoked in the past 12 months, smoked prior to the last 12 months), and 'usual frequency when smoked'.

2. 3. Major depression

Current (past 12 months), lifetime, and absence of lifetime major depression criteria were assessed with the Alcohol Use Disorders and Associated Disabilities Interview Schedule - DSM-IV (AUDADIS-IV; (Grant et al. 2001). The AUDADIS uses DSM-IV (American Psychiatric Association 1994) criteria to determine diagnostic status, and has demonstrated adequate reliability and validity (Grant et al. 2003).

2. 4. Overview of analyses

In order to determine the prevalence of smoking behaviors and major depression in the sample, we estimated weighted design-based proportions. Estimates of the proportions were computed using SURVEYFREQ in SAS version 9.0, which takes into account the complex sampling design of NESARC. Because we were interested in investigating whether gender moderated the relationship between smoking and major depression, prevalence rates are presented by gender.

Relationships between current smoking status (daily, occasional, prior, never) and major depression (current, lifetime, none) were assessed in terms of odds ratios using a generalized logit model. The effects for each variable of interest on any given outcome were interpreted relative to our chosen reference outcome (i.e., never smoked, no depression diagnosis). Interactions between gender and current smoking status were performed to investigate whether gender moderated the relationship between smoking behavior and major depression. All models were adjusted for race, education, marital status, and age. Estimates of odds ratios and 95% confidence intervals were generated using SURVEYLOGISTIC procedure to account for the complex sampling design of the NESARC data. It computed the variances of the odds ratios using a Taylor expansion approximation.

3. Results

The prevalence of smoking behaviors and major depression by gender are presented in Table 1. All Chi squares analyses that were performed to examine gender differences were significant at $p < 0.0005$. Gender was significantly associated both with major depression status and smoking status. Current or lifetime major depression were each more prevalent in women. It was more likely that men never suffered from a mood disorder. Smoking was more prevalent in men than in women. This was true for prior smoking, occasional smoking and daily smoking. Women were more likely to report never having smoked.

The association of smoking status and major depression was found to vary by gender ($\chi^2 = 14.36$, $p < .03$). Table 2 presents associations between current smoking status and major depression status for women, for men, and for both genders. In the overall sample, prior smoking, occasional smoking, and daily smoking increased the odds of presenting with current major

depression (OR: 1.49; 1.69; 2.31, respectively) and with lifetime major depression (OR: 1.58; 1.63; 1.69, respectively). These associations were stronger in women than in men. Associations between occasional smoking and depression were not significant for men.

4. Discussion

The present investigation sought to determine whether there are gender-specific associations between daily, occasional and prior smoking with current and lifetime major depression in a nationally representative sample. Our findings confirm the well-established association between smoking and major depression found in nicotine dependent smokers (Grant et al. 2004) in current daily, occasional, and prior smokers. In addition, our results in the overall sample are consistent with prior findings indicating that smoking behavior increases the odds of presenting with current and lifetime major depression (Breslau et al. 1993; Kendler et al. 1993).

Overall, associations between smoking behavior and depression were more likely in women compared to men, indicating that depression in women is more commonly comorbid with smoking. For example, among daily smokers, women were more likely to meet criteria for current depression, compared to men (O.R., 2.52 vs. 1.95). Additionally, occasional non-daily smoking was associated with increased risk for depression diagnoses in women, but not in men (OR: 1.92 vs 1.39). These findings are consistent with our previous data showing that negative affect is more strongly associated with smoking in women (McKee et al. 2003). Depression is a risk factor for smoking relapse (Murphy et al. 2003), and poor smoking cessation outcomes in women, at least in part, may be due to the higher likelihood of women experiencing the emergence of depressive symptoms during smoking cessation (Killen et al. 2003). Our results support the association between current daily smoking and prior smoking behavior with current or past major depression in both men and women, as well as the association of occasional smoking and current or past depression for women only. While some investigations have failed to document a relationship between depression history and smoking cessation outcomes (see Hitsman et al. 2003, for review), our findings suggest a clinical need for interventions that address the relationship of depression, both past and current, to a range of smoking behaviors. It would be beneficial for future research to investigate potential gender differences in patterns of psychiatric comorbidity in other disorders. Such work would hold the potential for developing specialized or targeted smoking cessation interventions that would be better adapted to fit the population's needs.

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Table 2
Association between smoking behaviors and any major depression status in men and women.

Smoking Status	Current Major Depression			Lifetime Major Depression		
	All OR (CI)	Women OR (95% CI)	Men OR (95% CI)	All OR (95% CI)	Women OR (95% CI)	Men OR (95% CI)
Daily [*]	2.31 (2.08-2.57) ^d	2.52 (2.21-2.88) ^d	1.95 (1.63-2.32) ^d	1.69 (1.52-1.88) ^d	1.84 (1.62-2.09) ^d	1.48 (1.25-1.74) ^d
Occasional [*]	1.69 (1.39-2.06) ^d	1.92 (1.46-2.52) ^d	1.39 (0.99-1.95)	1.63 (1.33-1.99) ^d	1.90 (1.45-2.49) ^d	1.30 (.95-1.78)
Ex-smoker [*]	1.49 (1.29-1.72) ^d	1.53 (1.28-1.83) ^d	1.36 (1.04-1.78) ^c	1.58 (1.41-1.76) ^d	1.72 (1.51-1.96) ^d	1.36 (1.12-1.66) ^b

* Never Smoked as reference category

^a p<.0001

^b p<.01

^c p<.05

All models adjusted for race, education, marital status, and age.