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Do ethnicity and gender moderate the influence of posttraumatic stress disorder on time to smoking lapse?

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HIGHLIGHTS

- Black ethnicity significantly moderated the effect of PTSD on time to first smoking lapse.
- PTSD significantly predicted time to smoking lapse for White smokers only.
- White smokers without PTSD lapsed at a slower rate compared to all other participants.
- Socioeconomic status predicted rate of smoking lapse independent of ethnicity.

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ABSTRACT

Background: Following a smoking cessation attempt, smokers with posttraumatic stress disorder (PTSD) experience smoking relapse at a higher and faster rate. Black ethnicity and female gender are also associated with lower success rates following smoking cessation. No study to date has prospectively examined how ethnicity and gender may moderate the effect of PTSD on smoking relapse. It was hypothesized that female gender and Black ethnicity would significantly predict early lapse after quitting; further, it was predicted that ethnicity and gender would moderate the effect of PTSD on relapse rate.
Methods: Smokers with PTSD (n = 48) and without PTSD (n = 56) completed ecological momentary assessment (EMA) the week after a quit date, and self-initiated EMA entries after smoking lapse. Smoking abstinence was biologically verified. The sample included Black (62%) and White (38%) participants, and was 50% female. Study hypotheses were tested with Cox proportional hazards regression modeling time to first smoking lapse.
Results: Study results confirmed the main hypothesis, with a significant PTSD × Ethnicity interaction emerging. The effect of PTSD on smoking relapse was significant for White participants but not for Black participants. No significant gender moderation was found.
Conclusion: Taken together, study results support previous research, and suggest that the relationship between smoking and PTSD is stronger for White smokers than for minorities. This study has significant implications for research in smoking and mental disease, as well as for smoking cessation treatments for Black smokers.

1. Introduction

Posttraumatic stress disorder (PTSD) presents a significant barrier to smoking cessation in the general population (Hapke et al., 2005). Around 45% of individuals with PTSD are current smokers, and PTSD is associated with an increased likelihood of being a smoker (Feldner, Babson, & Zvolensky, 2007). Evidence suggests that smoking increases the risk of developing PTSD (Breslau, Novak, & Kessler, 2004; Koenen et al., 2005). Moreover, PTSD smokers are less able to quit smoking and have a shorter time to first smoking lapse within the first week of a quit attempt (Zvolensky et al., 2008). It is theorized that core features of PTSD, including trauma symptoms and increased negative affect, represent key risk factors for smoking lapse and relapse (Beckham, Calhoun, Dennis, Wilson, & Dedert, 2013; Beckham et al., 2007; Cook,

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McFall, Calhoun, & Beckham, 2007). Additionally, individuals with PTSD experience more intense withdrawal symptoms during smoking cessation, which could also increase the risk for smoking relapse (Dedert et al., 2012). Since smoking is related to PTSD symptoms and PTSD symptoms can in turn increase the risk for smoking relapse, it is essential to further investigate early lapse in PTSD smokers.

Rates of smoking relapse within the general population are also affected by gender and ethnicity (Japuntich et al., 2011). In a large-scale clinical trial testing the efficacy and effectiveness of different types of smoking cessation treatment, both females (compared to males) and Black smokers (compared to White smokers) were more likely to relapse following a quit attempt, largely regardless of treatment used (Piper et al., 2010). It is theorized that ethnic and gender differences in nicotine metabolism (Hukkanen, Jacob, & Benowitz, 2005) – possibly related in part to genetic polymorphism of the CYP2A6 gene (Derby et al., 2008) – significantly contribute to increased susceptibility of smoking relapse. Specifically, females may be more highly addicted to nicotine due to their faster nicotine metabolism, which likely increases their level of dependence (Benowitz, Lessov-Schlaggar, Swan, & Jacob, 2006). In contrast, smokers of African and Asian descent generally metabolize nicotine more slowly than smokers of European descent (Nakajima et al., 2006); yet Black smokers take in significantly more nicotine per cigarette and are more highly addicted compared to White smokers (Benowitz, 2008; Perez-Stable, Herrera, Jacob, & Benowitz, 1998). These data, taken together, suggest that women and Black smokers have increased risk for smoking lapse following a quit attempt.

1.1. Ethnicity × psychiatric illness interaction predicts smoking cessation

In addition to main effects of ethnicity and PTSD on smoking cessation, ethnicity may moderate the effect of PTSD on smoking cessation. Differences in smoking rates between ethnicities are likely influenced by several societal and cultural factors, as well as individual differences. A nationally representative study found that for minorities (defined as Black and Hispanic respondents) there was no significant relationship between past-30-day psychological distress and current smoking status or cigarettes smoked per day. However, there was a significant association of psychological distress with smoking status in White respondents (Kiviniemi, Orom, & Giovino, 2011). While an association between general distress and smoking status has clinical relevance, it is important to determine whether the same relationship may or may not be present when considering an interaction between ethnicity and specific psychiatric diagnoses. Another nationally representative study of Black Americans found that the presence of a lifetime or current psychiatric disorder was significantly associated with current smoking status. In addition, past year and past month psychiatric disorders were significantly associated with lower odds of being at least one year abstinent (Hickman, Delucchi, & Prochaska, 2010). Existing knowledge regarding the interaction between ethnicity and psychiatric disorders is limited because previous research has relied on retrospective report and has not examined specific psychiatric disorders, such as PTSD. There is a need for research that utilizes prospective methodology to monitor post-quit lapse events as they occur.

1.2. Significance

The effects of major sociodemographic factors such as ethnicity and gender on smoking cessation in PTSD are particularly important because women and Black Americans are more likely to have PTSD, and are more likely to have difficulty quitting smoking (Benowitz, 2008; Brewin, Andrews, & Valentine, 2000). As these groups are overrepresented among PTSD smokers, it is important to investigate how ethnicity and gender influence cessation behaviors in smokers with PTSD. The aim of the current study is to provide the first prospective investigation of the moderating effect of ethnicity on PTSD with regard to smoking lapse following a quit attempt. The study hypotheses were: 1) ethnicity will significantly predict lapse after quitting, with Black smokers exhibiting a faster lapse rate compared to Whites; 2) female gender will be associated with faster lapse rate; 3) ethnicity will moderate the effect of PTSD on lapse rate, such that Black smokers will exhibit a smaller effect of PTSD on lapse rate; and 4) gender will also moderate the effect of PTSD on lapse rate, such that women will have a larger effect of PTSD on lapse rate.

2. Material and methods

2.1. Participants

Data for the current study were taken from a larger study investigating early smoking lapse in smokers with and without PTSD (Beckham et al., 2013). Participants were Black and White smokers with PTSD ($n = 48$) and a comparison group with no current Axis I psychiatric disorders ($n = 56$). Eligibility criteria included smoking at least 10 cigarettes daily for the past year, willingness to make a smoking cessation attempt, and aged 18–65. One hundred ninety-nine individuals were recruited and screened for study inclusion. During screening, participants meeting criteria for current alcohol or other substance abuse or dependence, psychotic disorder, or bipolar disorder with active manic symptoms were excluded from both groups ($n = 41$). Additionally, potential participants were excluded from either group if they used non-cigarette forms of nicotine, had major unstable medical problems or major respiratory disorders, or used bupropion or benzodiazepines ($n = 13$). Participants were eliminated from the comparison group if they met criteria for lifetime PTSD, major depressive disorder, panic disorder, specific phobia, generalized anxiety disorder, obsessive compulsive disorder, bipolar disorder, dysthymia, or an eating disorder ($n = 36$). Participant data for ethnicities other than Black or White ($n = 5$) were excluded from analysis.

2.2. Procedures

A more detailed description of study procedures is available in a previously published study (Beckham et al., 2013). Participants were recruited via flyers posted in medical centers and in the community, and via word of mouth. Participants completed a screening session, two smoking cessation counseling sessions based on the NCI Freshstart program (Rosenbaum & O'Shea, 1992), and one week of electronic diary (ED) monitoring following a quit date set by the participant. On the quit date and every two days following the quit date, participants returned to the laboratory for bioverification of smoking abstinence by providing expired carbon monoxide (CO) and saliva to be tested for cotinine level. Electronic diary monitoring and bioverification continued for seven days post-quit. Participants were paid $750 for their complete participation.

2.3. Measures

At screening, each participant provided sociodemographic information and smoking history, and completed measures of nicotine dependence (Fagerström Test of Nicotine Dependence [FTND; Heatherton, Kozlowski, Frecker, & Fagerström, 1991]), smoking cessation self-efficacy (Relapse Situation Efficacy Questionnaire [Gwaltney, 2001]), and PTSD symptom severity (Davidson Trauma Scale [Davidson et al., 1997]). Socioeconomic status (SES) was calculated with the Hollingshead two-factor index of social position (Hollingshead & Redlich, 1958). Psychiatric disorders were assessed using the Structured Clinical Interview for *DSM-IV* Axis I disorders (SCID-I; First, Spitzer, Gibbon, & Williams, 1994) and the Clinician Administered PTSD Scale (CAPS; Blake et al., 1995), with excellent interrater reliability ($\kappa = .95$).

Each participant self-reported their ethnicity. Participants were asked to choose one ethnic group with the following response options: