



The effect of social anxiety on urge and craving among, smokers with and without anxiety disorders



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ABSTRACT

Background: Despite the often social nature of smoking, relatively little research has been conducted on the relationship between smoking and social anxiety disorder (SAD).

Method: Participants ($N=99$) included 34 smokers without current mental health disorders, 37 smokers with SAD, and 28 smokers who met criteria for other anxiety disorder diagnoses (e.g., panic disorder or generalized anxiety disorder, but not SAD). Nicotine and placebo patches were administered to participants in a counterbalanced manner across two assessment days. Urge and craving were assessed before and after a 5-h nicotine absorption/deprivation period.

Results: Compared to smokers without current mental health disorders, smokers with SAD did not report greater nicotine dependence, but did endorse greater motivation to use nicotine to avoid negative outcomes. In addition, after controlling for demographic variables, smoking characteristics, pre-deprivation urge and craving, and other anxiety/depression symptoms, social anxiety symptoms uniquely predicted urge and craving in the placebo patch condition; however, social anxiety had no influence on urge and craving in the nicotine patch condition.

Conclusions: These findings suggest that one potential reason that smokers with SAD may have worse cessation outcomes is that they may experience higher levels of craving and urge to smoke during quit attempts. Thus, during a quit attempt, particularly in the absence of nicotine replacement therapy, smokers with SAD are likely to benefit from additional treatment aimed at managing or reducing their social anxiety symptoms.

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1. Introduction

The relationship between smoking and some anxiety disorders is fairly well-established, particularly with respect to panic disorder/agoraphobia and post-traumatic stress disorder (Morissette et al., 2007; Zvolensky et al., 2003; Lasser et al., 2000). In contrast, despite the often social nature of smoking, far less attention has been paid to the relationship between smoking and social anxiety

disorder (SAD). This neglect in the literature is surprising given previous estimates that approximately 14–32% of individuals with SAD are tobacco smokers (e.g., Morissette et al., 2007), with lower point prevalence estimates likely reflecting the exclusion of frequently comorbid alcohol and substance use disorders (cf. Baker-Morissette et al., 2004).

Social learning theory (Marlatt and Gordon, 1985) may be especially relevant to understanding the relationship between continued tobacco use, nicotine dependence, and SAD. Social learning theory purports that relapse to smoking occurs in response to high-risk situations, including stressful emotional and social situations. Smoking-related stimuli are also theorized to trigger increased cravings and urges (e.g., Ferguson and Shiffman, 2009; Tong et al., 2007). According to this theory, decreased self-efficacy, in

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combination with the positively reinforcing value of the drug, culminates in a relapse to smoking. Following this lapse, the person experiences conflict and may resort to smoking to cope. Thus, continued drug use is driven by the positive reinforcement of the drug as well as negative reinforcement through relief of negative affect. Consistent with social learning theory, early studies laid a foundation of research examining the inter-relationship between smoking and social stressors (e.g., Hatch et al., 1983; Niaura et al., 1992). More recently, Buckner and Vinci (2013) found that among undergraduate smokers ($N=91$), social anxiety was associated with smoking motives and daily smoking status among women and dependence severity among men. Similarly, in an undergraduate sample of 38 regular smokers, Watson and colleagues (2012) found that social anxiety predicted smoking to cope behaviors and number of cigarettes that participants estimated they would need to smoke to feel comfortable in social situations. Interestingly, social anxiety symptoms predicted increases in craving during nicotine deprivation, but not during nicotine satiation (via cigarettes), suggesting that social anxiety might not only contribute to maintenance of smoking behaviors but also have differential effects depending on smoking status/nicotine state.

With respect to SAD, smoking, and their temporal relationship, Johnson et al. (2000) found that tobacco use did not prospectively confer increased risk for the development of SAD. However, reciprocal relationships between social anxiety and risk for nicotine dependence have been reported (e.g., Dierker et al., 2001; Sonntag et al., 2000). In addition, Piper et al. (2010) found that patients with SAD or panic attacks had greater quit-day negative effect compared to smokers without anxiety disorders. Smokers who met lifetime criteria for anxiety disorders were also less likely to be abstinent at 8 weeks and 6 months following a quit attempt relative to smokers without anxiety disorders, although differences were not found among smokers with anxiety disorders. An analysis of National Comorbidity Survey–Replication data also failed to find that SAD uniquely influenced smoking outcomes at 12 months; however, SAD was associated with lifetime heavy smoking, nicotine dependence, and failed quit attempts (Cougler et al., 2010). These findings are consistent with those of Goodwin and colleagues (2012) who found that SAD was associated with increased risk for nicotine dependence among cigarette users [odds ratio (OR) = 1.69] after accounting for demographic variables and other psychiatric disorders.

To date, limited research has evaluated predictors of response to nicotine-replacement therapy (NRT) versus placebo in smokers with SAD. In a placebo-controlled laboratory assessment investigating the effects of NRT among smokers with and without anxiety disorders (including SAD), Morissette et al. (2012) found that although NRT attenuated urge during a general deprivation period, no significant differences were observed between those with and without anxiety disorders. Given the accumulating literature demonstrating differences in smoking characteristics between the anxiety disorders (Morissette et al., 2007), these findings led to the question of whether subsets of smokers with certain anxiety disorders would have differential responses to NRT. Social anxiety was of particular interest given findings by Watson et al. (2012) that social anxiety predicted increased craving during nicotine deprivation, but not during nicotine satiation via cigarettes. To that end, this study aimed to expand upon Morissette et al. (2012) and Watson et al. (2012) to understand the relationship between social anxiety and transdermal nicotine. We hypothesized that, compared to smokers without a mental health disorder, smokers with SAD would be more nicotine dependent and more likely to smoke to reduce negative affect (i.e., negative reinforcement). We also hypothesized that social anxiety symptoms would uniquely predict urge and craving in the placebo patch condition after controlling for

demographic variables, smoking characteristics, pre-deprivation urge and craving, and other anxiety/depression symptoms.

2. Methods

2.1. Participants

Smokers with and without anxiety disorders were recruited through advertisements in local newspapers and websites as part of a larger cue-reactivity study (Morissette et al., 2012). To be eligible, participants had to be 18 or older, English-speaking, daily moderate to heavy smokers [10–40 cigarettes per day (cpd) for at least one year] with a CO level of 8 ppm or higher. In addition, participants had to either meet full diagnostic criteria for at least one anxiety disorder (SAD, panic disorder, generalized anxiety disorder [GAD], obsessive compulsive disorder [OCD], post-traumatic stress disorder [PTSD]) or else have no current psychiatric diagnosis to be included in the no mental health disorders group. Because comorbidity is common among the anxiety and mood disorders, participants in the anxiety disorder groups were not excluded from the study if they met criteria for additional disorders with the exception of current substance use disorders and psychosis, as smokers with these conditions would likely have qualitatively different smoking patterns. Participants were also excluded if they reported suicidality warranting crisis intervention or had patch contraindications (e.g., an allergy to adhesive tape, heart disease, or high blood pressure [defined as 140/90 or higher]). Participants taking psychotropic medications were also required to be on a stable dose for at least three months so that reported symptoms were not reflective of starting or stopping medications.

The final sample of 99 participants contained 37 smokers with SAD (as well as a variety of other disorders), 28 smokers who met criteria for another anxiety disorder diagnosis (e.g., panic disorder, GAD, but not SAD), and 34 smokers without current mental health disorders. With respect to diagnostic comorbidity, the smokers with SAD group had an average of 2.6 ($SD=1.1$) current mental health disorders (including SAD), whereas smokers with other anxiety disorders had an average of 2.3 ($SD=1.4$) mental health disorders. This difference was not statistically significant [$t(59)=1.116$, *ns*]. Other current disorders present within the smokers with SAD group included depression ($n=15$), panic disorder ($n=13$), specific phobia ($n=10$), OCD ($n=9$), GAD ($n=3$), PTSD ($n=2$), and bipolar disorder ($n=1$). The smokers with other anxiety disorders group included specific phobia ($n=14$), OCD ($n=12$), GAD ($n=9$), PTSD ($n=6$), panic disorder ($n=6$), and depression ($n=5$).

Across groups, the sample was comprised primarily of European-Americans ($n=64$) and African-Americans ($n=25$). Approximately 41% of the sample was female ($n=41$). Participants' mean age was 39.5 years ($SD=11.8$). Participants had 13.8 years ($SD=2.2$) of education on average and reported smoking an average of 18.9 cigarettes per day ($SD=6.4$) for 13.5 years ($SD=10.2$). Participants' mean score on the Fagerström Test for Nicotine Dependence (Heatherton et al., 1991) was 3.9 ($SD=1.3$) across all three groups, reflecting moderate levels of dependence among the sample.

2.2. Procedures

Procedures are detailed in Morissette et al. (2012). Briefly, initial eligibility was determined during a telephone screen, after which potential participants were scheduled for two assessment sessions with 48 h in between. Participants were instructed to refrain from using alcohol for 12 h prior to each assessment day to account for acute withdrawal or the consequences of recent intoxication. They were also instructed to drink caffeine and smoke as usual to ensure they were not in caffeine and nicotine withdrawal prior to the assessment day. Each assessment day was identical, except for the diagnostic interview and standardized measures, which were completed on opposite days during the 5-h patch absorption period in a counterbalanced fashion.

At the beginning of the first assessment day, smoking status was verified by a CO monitor, blood pressure was taken, and a pregnancy test was given to female participants. Participants then smoked one cigarette and waited a standardized deprivation period of 30 min, during which time the pre-patch absorption measures of urge and craving were completed. Following the 30-min deprivation period, participants were randomly given either the nicotine (21 mg) or placebo patch. Whichever patch was given during the first day, the alternate was assigned on the second day. The randomization was pre-assigned so that patch status was double-blind between the investigator and participants. Participants then waited a 5-h patch absorption (nicotine group) or deprivation (placebo) period. The 5-h absorption period was chosen to ensure that nicotine fully absorbed across participants. Participants completed a diagnostic assessment on one assessment day and trait self-report measures on the other in a counter-balanced fashion to protect against order effects. During the remaining time of the 5-h absorption period, participants were allowed to read a magazine, book, or watch a movie (containing no smoking cues) in a private office. During the last 15 min of each 5-h absorption period, participants completed identical measures to those completed prior to the absorption period.

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