Pain intensity and smoking behavior among treatment seeking smokers

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ABSTRACT

Empirical evidence supporting the interplay between pain intensity and tobacco smoking has been growing. The current investigation advances this work in three important ways: (1) controlling for negative affectivity and gender; (2) examining pain intensity in smokers from a community sample, rather than specialized pain treatment centers; and, (3) studying smokers who are highly motivated to quit. Participants were adult smokers ($N=112$; 35% female; $M_{age}=41.4$, SD$=13.1$) participating in a larger study examining barriers to cessation during a self-guided quit attempt. At baseline, participants completed self-report measures on pain intensity and smoking severity outcomes. As hypothesized, more intense pain was significantly associated with all four smoking severity variables: years as a daily smoker, current cigarettes per day, cigarettes per day during the heaviest lifetime smoking period, and current level of nicotine dependence. These associations remained when taking into account the variance accounted for by gender and negative affectivity. These data provide evidence that more intense pain is related to more severe smoking behavior and nicotine dependence. Pain reduction could be an important target in regard to smokers with chronic pain.

1. Introduction

Chronic pain and tobacco addiction are both highly prevalent conditions that are theorized to interact in a bidirectional manner (Ditre et al., 2008, 2011; Parkerson et al., 2013). Tobacco addiction is a risk factor for chronic pain (Shiri et al., 2010; Sugiyama et al., 2010), and individuals who live with painful conditions are more likely to be dependent on nicotine (Cook et al., 2007; Fertig et al., 1986; Heckman et al., 2012; Jarvik et al., 1989; Pomerleau, 1986). The integrative reciprocal model of pain and smoking posits a positive feedback loop between pain and tobacco smoking that leads to worsening of both conditions (Ditre et al., 2008). Prior research has demonstrated positive associations between pain intensity and smoking behavior among persons in the general population (Hahn et al., 2006) and among those with chronically painful conditions (e.g., Andersson et al., 1998; Deyo and Bass,

1989; Kaila-Kangas et al., 2003; Melis et al., 2010; Oleske et al., 2004; Riley et al., 2004; Saag et al., 1997; Scott et al., 1999; Yunus et al., 2002).

Although promising, previous research in this emerging domain has been limited in three key ways. First, previous studies of pain intensity and smoking behavior have failed to account for the influence of negative affectivity, thus potentially obscuring the extent to which pain intensity may be uniquely related to smoking behavior above and beyond the broad-based tendency to experience negative emotional states. This information is important because elucidating the extent to which pain is associated with smoking outcomes over and above general factors, such as negative affectivity, may usefully inform whether smoking cessation interventions should target pain in addition to affective states. Moreover, although gender has been controlled for when looking at association between pain status and smoking (e.g., Zvolensky et al., 2009, 2010), previous work has not examined or adjusted for the role of gender in "pain intensity-smoking" relation. Given that gender has been shown to influence both pain ratings and smoking behavior (Jamner et al., 1998; Unrod et al., 2004), it is important to determine the unique contribution of both pain and

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gender when examining smoking behavior.

Second, past work has focused almost exclusively on treatment-seeking pain patients, which may have resulted in a severity range restriction governing or influencing the strength of past observed associations (i.e., a Berskon's bias, wherein the most severe cases are studied, (Roberts et al., 1978). In a recent example of research on pain-smoking relationship among treatment seeking smokers, Bastian et al. (2015) examined the role of smoking behavior on pain intensity. In multivariate analysis, they found no association between abstinence and subsequent pain intensity. However, no study among treatment seeking smokers has evaluated the association of pain intensity with smoking behavior as a *criterion* variable in the context of other relevant factors. An important next step is to evaluate the role of pain severity more generally, including those with little or no pain, moderate pain, and severe pain in terms of smoking behavior. Indeed, examining relations between pain intensity and smoking in a sample experiencing a wide range of pain will likely yield valuable and novel information regarding the nature of these associations.

Third, past work has infrequently included participants endorsing high levels of motivation to quit smoking. It may be especially important to understand the association of pain intensity with severity of smoking behavior among smokers who are more willing to quit in order to better understand how pain may impact the quit experience. This knowledge could guide interventions addressing pain as a potential barrier to quit.

In sum, addressing the above-mentioned gaps in the literature will yield key insights into pain-smoking associations. To do so, the present study evaluated the association between intensity of past-month pain, ("none to mild" versus "moderate to severe"), and several indices of smoking severity, including smoking rate per day, number of years being a daily smoker, levels of smoking per day during the heaviest smoking period, and nicotine dependence among a community-based sample of daily smokers participating in a study of self-guided quit attempt. This research represents a theory-driven test of hypotheses geared toward empirically understanding the relation between "smoking behavior" and "pain intensity." We hypothesized that "moderate to severe" past-month pain (relative to lower levels of past-month pain) would be associated with more severe smoking behavior, and that these relations would remain significant even after accounting for variance due to participant gender and negative affectivity.

2. Method

2.1. Participants

Study participants were required to: (1) be between 18 and 65 years of age; (2) report regular daily smoking for at least one year; (3) smoke at least 8 cigarettes per day (verified via expired CO); (4) endorse motivation to quit smoking of at least 5 on a 0–10 point scale; (5) report interest in making a serious quit attempt; and (6) not have decreased their daily cigarette intake by more than half in the past six months. Participants were excluded from the study based on evidence of: (1) limited mental competency (not oriented to person, place, and/or time) and the inability to give informed, voluntary, written consent to participate; (2) self-reported pregnancy or the possibility of being pregnant; (3) current use of nicotine replacement therapy and/or smoking cessation counseling; (4) current or past history of psychotic-spectrum symptoms or disorders; (5) current substance dependence (excluding nicotine dependence); (6) suicidality; and (7) any current use of psychotropic medication that was not stable for at least 3 months. Thirty eight participants were deemed ineligible based on these criteria.

2.2. Measures

Structured Clinical Interview for DSM-IV-TR Axis I Disorders, Non-Patient Version (*SCID-I/NP*). Diagnostic exclusions and prevalence/incidence of current (past month) Axis I diagnoses were assessed via the SCID-NP (First et al., 2002). The non-patient version was utilized as participants enrolled in the present study were not identified as psychiatric patients. The SCID-I/NP follows the DSM-IV-TR (American Psychiatric Association, 1994) diagnosis guidelines and demonstrates good psychometric properties (Shear et al., 2000). Interviews were audio-taped and the reliability of a random selection of 10% of interviews was checked for accuracy. No dissimilarities were observed between the SCID interviewer and an outside rater regarding diagnoses.

Smoking History Questionnaire (*SHQ*) (Brown et al., 2002). The SHQ is a self-report questionnaire used to assess smoking history and pattern (e.g., smoking rate, age of onset of initiation). It has been successfully used in previous studies as a measure of smoking history (Zvolensky et al., 2004). The present study utilized the following variables from the SHQ: number of years being a daily smoker, average number of cigarettes smoked per day (current), average number of cigarettes smoked per day when smoking the heaviest, and mean age of first smoking.

Fagerstrom Test for Nicotine Dependence (*FTND*) (Heatherton et al., 1986). This instrument is a well-established six-item scale designed to assess gradations in tobacco dependence. This measure exhibits good internal consistency, high degrees of test–retest reliability (Pomerleau et al., 1994) and positive relations with key smoking variables (e.g., salivary cotinine; (Heatherton et al., 1986; Payne et al., 1994). The FTND demonstrated typical-range internal consistency among the present study sample (Cronbach's alpha=.59). In the present study, the Heaviness of Smoking index (HSI) derived from the first two items of FTND was used as a criterion variable. The HSI is robustly related to quit behavior (Huang et al., 2008; Chabrol et al., 2005; Etter et al., 1999; Fagerstrom et al., 2012).

The Short-Form General Health Survey (*GHS*) (Stewart et al., 1988) was used to assess current levels of bodily pain. The GHS consists of 20-items that ask respondents to indicate perceptions of their health status on a Likert-type scale. As has been done in past work (Ditre et al., 2011) the current investigation utilized question 2 on the GHS-"How much bodily pain have you had during the past four weeks" with four response options: none, very mild, mild, moderate, and severe. This item indexed non-specific pain; that is, it was not oriented on a particular pain-related medical condition. Based on the response to this question, a dichotomous variable was constructed consisting of two groups: (1) individuals who had experienced moderate to severe pain during the past month; and (2) individuals who had experienced none to mild pain during the past month (i.e. the "pain intensity dichotomy"). Specifically, moderate to severe pain intensity is typically employed as a categorical variable in research on pain-addictive behavior comorbidity and is reliably associated with personal impairment (Candiotti and Gitlin, 2010; Jaffe and Martin, 1990; Passik and Weinreb, 2000).

Positive and Negative Affect Scale (PANAS). Negative affectivity was assessed with the negative affectivity subscale of the PANAS (Watson et al., 1988), a self-report measure that asks participants to rate the extent to which they generally experience each of 10 different feelings and emotions (e.g. nervous) using a Likert scale that ranges from 1 (*Very slightly or not at all*) to 5 (*Extremely*). The measure has strong psychometric properties (Watson et al., 1988). In the present study, the PANAS negative affectivity subscale demonstrated good internal consistency ($\alpha=.92$).