



Anxiety sensitivity facets in relation to tobacco use, abstinence-related problems, and cognitions in treatment-seeking smokers



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HIGHLIGHTS

- We examined anxiety sensitivity (AS) facets in relation to smoking measures.
- AS physical and cognitive concerns were related to tobacco dependence severity.
- AS social concerns were related to positive and negative reinforcement variables.
- All three AS facets were related to the greater abstinence-related problems.
- Additional treatment methods may benefit smokers high in AS social concerns.

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ABSTRACT

Anxiety sensitivity (AS)—fear of anxiety-related experiences—has been implicated in smoking motivation and maintenance. In a cross-sectional design, we examined AS facets (physical, cognitive, and social concerns) in relation to tobacco use, abstinence-related problems, and cognitions in 473 treatment-seeking smokers. After controlling for sex, race, age, educational attainment, hypertension status, and neuroticism, linear regression models indicated that AS physical and cognitive concerns were associated with tobacco dependence severity ($\beta = .13-.14, p < .01$), particularly the severity of persistent smoking regardless of context or time of day ($\beta = .14-.17, p < .01$). All three AS facets were related to more severe problems during past quit attempts ($\beta = .23-.27, p < .001$). AS cognitive and social concerns were related to negative affect reduction smoking motives ($\beta = .14, p < .01$), but only the social concerns aspect of AS was related to pleasurable relaxation smoking motives and positive and negative reinforcement-related smoking outcome expectancies ($\beta = .14-.17, p < .01$). These data suggest that AS physical and cognitive concerns are associated with negative reinforcement-related smoking variables (e.g., abstinence-related problems), whereas the social concerns aspect of AS is associated with positive and negative reinforcement-related smoking variables. Together with past findings, current findings can usefully guide AS-oriented smoking cessation treatment development and refinement.

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1. Introduction

Anxiety sensitivity (AS), the tendency to fear anxiety-related experiences (Reiss, Peterson, Gursky, & McNally, 1986), is a relatively stable but malleable personality trait that is empirically and theoretically distinguishable from anxiety and other negative affective states (Grant, Beck, & Davila, 2007; McNally, 2002; Naragon-Gainey, 2010; Schmidt, Zvolensky, & Maner, 2006; Zavas, Rijdsdijk, & Eley, 2012). Indeed, AS

plays a key role in the development of many forms of emotional pathology (Naragon-Gainey, 2010; Olatunji & Wolitzky-Taylor, 2009; Schmidt et al., 2006). Furthermore, reductions in AS accompany improvements in treatment outcome for anxiety psychopathology (Simon et al., 2004), demonstrating that AS may be involved in the maintenance of emotional disorders.

Given that individuals with emotional disorders are more likely to smoke cigarettes (Goodwin, Zvolensky, Keyes, & Hasin, 2012; Lawrence, Mitrou, & Zubrick, 2009), exhibit tobacco dependence (Goodwin et al., 2012; Grant, Hasin, Chou, Stinson, & Dawson, 2004), and display smoking relapse (Piper, Cook, Schlam, Jorenby, & Baker, 2011; Piper, Smith, Schlam, et al., 2010; Weinberger, Desai, & McKee,

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2010), it is not surprising that AS has also been increasingly implicated in persistent cigarette smoking. AS has been associated with smoking status (McLeish, Zvolensky, Yartz, & Leyro, 2008; Zvolensky, Forsyth, Fuse, Feldner, & Leen-Feldner, 2002), greater perceived barriers to smoking cessation (Gonzalez, Zvolensky, Vujanovic, Leyro, & Marshall, 2009; Gregor, Zvolensky, McLeish, Bernstein, & Morissette, 2008; Johnson, Farris, Schmidt, Smits, & Zvolensky, 2013; Johnson, Farris, Schmidt, & Zvolensky, 2012), and greater odds of smoking lapse (Assayag, Bernstein, Zvolensky, Steeves, & Stewart, 2012; Brown, Kahler, Zvolensky, Lejuez, & Ramsey, 2001) and relapse (Assayag et al., 2012; Zvolensky et al., 2007). A prominent theory is that high-AS individuals may be more likely to smoke for the negative affect (NA) alleviating (i.e., negative reinforcing) effects of smoking (Guillot, Pang, & Leventhal, 2014; Leventhal & Zvolensky, 2015). High-AS smokers report experiencing more severe withdrawal symptoms (Johnson, Stewart, Rosenfield, Steeves, & Zvolensky, 2012; Langdon et al., 2013; Marshall, Johnson, Bergman, Gibson, & Zvolensky, 2009) and stronger motives and expectations in regard to reducing NA by smoking (Gonzalez et al., 2009; Gregor et al., 2008; Johnson, Farris, et al., 2012; Johnson et al., 2013), and AS associations with smoking-related variables have persisted when controlling for anxiety, depression, NA, daily cigarette use, and tobacco dependence severity (Guillot, Zvolensky, & Leventhal, 2015; Zvolensky, Stewart, Vujanovic, Gavric, & Steeves, 2009; Zvolensky, Vujanovic, Miller, et al., 2007). Additionally, two experimental studies have shown that high-AS individuals report greater NA reduction from smoking subsequent to laboratory-induced social stress (Evatt & Kassel, 2010; Perkins, Karelitz, Giedgowd, Conklin, & Sayette, 2010). Thus, it appears that AS is a risk factor for smoking largely due to its ability to heighten NA in response to stressors (e.g., tobacco withdrawal), which in turn increases negative reinforcement smoking motivation.

Although prior smoking-oriented work has largely focused on AS as a single dimension, factor analyses of the Anxiety Sensitivity Index (ASI) (Patterson, Jepsen, Loughhead, et al., 2010) and its most recent version, the ASI-3 (Taylor, Zvolensky, Cox, et al., 2007), generally have revealed three lower-order factors: physical concerns (fear that anxiety-related physical symptoms may be harmful), cognitive concerns (fear that cognitive difficulties common to anxiety may indicate mental abnormality), and social concerns (fear that others may notice anxiety symptoms) (Farris et al., 2015; Naragon-Gainey, 2010; Taylor et al., 2007). Yet, relatively few studies have examined smoking variables in relation to the three AS facets, and extant work shows that different facets of AS have different smoking-related correlates. AS physical and cognitive concerns have been consistently associated with greater negative reinforcement-related smoking motives and expectancies (Battista et al., 2008; Guillot et al., 2015; Zvolensky et al., 2004, 2006), whereas only one study has associated AS cognitive concerns with positive reinforcement-related smoking motives (Battista et al., 2008). Although most studies have reported no relationship between AS facets and cigarette frequency or dependence severity (Guillot et al., 2015; Zvolensky et al., 2004, 2006), one study reported that all three AS facets were associated with daily cigarette consumption (Zvolensky, Bernstein, et al., 2007). Then in a recent study of non-treatment-seeking smokers (Guillot et al., 2015), we found that AS physical and cognitive concerns were associated with more severe (retrospectively reported) problems during tobacco abstinence; all three AS components were associated with stronger negative reinforcement-related smoking outcome expectancies; only AS social concerns were associated with stronger positive reinforcement-related smoking outcome expectancies; and none of the AS facets were associated with tobacco dependence severity or subtypes. However, no prior study has examined AS facets in relation to smoking outcome expectancies or tobacco dependence severity or dependence subtypes in treatment-seeking smokers. Also, our recent study (Guillot et al., 2015) is the only AS facet study to investigate tobacco abstinence-related problems, and no other study has associated AS social concerns with positive or negative

reinforcement-related smoking motives or expectancies. Further examining such understudied AS-smoking relations could benefit individualized smoking cessation treatments for high-AS smokers who have different fears regarding anxiety-related experiences.

As hypothesized previously (Guillot et al., 2015), individuals higher in AS physical concerns may be prone to smoke because they believe smoking will minimize aversive physical sensations associated with tobacco abstinence, such as hunger and changes in heart rate (Hughes, 2007; Leventhal, Waters, Moolchan, Heishman, & Pickworth, 2010) (related to negative reinforcement). Individuals higher in AS cognitive concerns may be prone to smoke because they believe smoking will improve their mood and concentration difficulties associated with tobacco abstinence (Hughes, 2007; Leventhal et al., 2010) (related to negative reinforcement). Lastly, individuals higher in AS social concerns may be prone to smoke because they believe it will enhance their social comfort (Buckner & Vinci, 2013; Otsuki, 2009) (related to positive reinforcement).

Hence, we examined whether our prior findings in non-treatment-seeking smokers would be replicated in a treatment-seeking sample of smokers and hypothesized that: (1) all three AS components will be associated with greater negative reinforcement-related smoking motives and expectancies; (2) AS physical and cognitive concerns will be associated with greater severity of abstinence-related problems; (3) only AS social concerns will be associated with greater positive reinforcement-related smoking motives and expectancies; and (4) none of the AS facets will be associated with daily cigarette consumption or tobacco dependence severity or subtypes.

2. Methods

2.1. Participants

Participants were 473 treatment-seeking smokers (47.4% female; age: $M = 37.3$, $SD = 13.4$) who took part in a larger, tobacco cessation study, of whom 85.0% were White, 9.5% were Black, and 5.5% were of another race (e.g., Asian or mixed) or did not specify their race. Participants generally were well-educated, with 73.2% indicating that they had completed at least some college. The current report is based on secondary analyses of baseline (pre-treatment) data for a subset of the larger sample. Eligible participants were at least 18 years old, reported smoking an average of 8+ cigs/day for at least one year, and reported motivation to quit smoking of at least 5 on a 10-point scale. Exclusion criteria included current use of smoking cessation products or treatment, current suicidality requiring immediate intervention, and history of psychotic-spectrum disorders. On average, participants reported initiating regular smoking at 17.5 ($SD = 4.0$) years of age and being a regular smoker for 18.8 ($SD = 13.3$) years. Participants' mean score on the Fagerström Test for Nicotine Dependence was 5.2 ($SD = 2.3$), indicative of moderate tobacco dependence (Fagerstrom, Heatherton, & Kozlowski, 1990).

2.2. Measures

2.2.1. Anxiety Sensitivity Index–3 (ASI-3)

The ASI-3 (Reiss et al., 1986; Taylor et al., 2007) assesses fearfulness of anxiety-related experiences. The ASI-3 consists of a Total Scale (18 items) and three 6-item subscales: Physical Concerns (e.g., "It scares me when my heart beats rapidly"), Cognitive Concerns (e.g., "When my thoughts seem to speed up, I worry that I might be going crazy"), and Social Concerns (e.g., "I worry that other people will notice my anxiety") (Taylor et al., 2007). Responses are rated on a 5-point Likert scale ranging from 0 (*very little*) to 4 (*very much*). The ASI-3 has been validated for use in smokers (Farris et al., 2015).

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