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Visceral sensitivity, anxiety, and smoking among treatment-seeking smokers

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HIGHLIGHT

- Visceral sensitivity via anxiety symptoms on cigarette dependence was significant.
- Visceral sensitivity via anxiety symptoms on somatic expectancies was significant.
- Visceral sensitivity via anxiety symptoms on harmful consequences was significant.
- Visceral sensitivity via anxiety symptoms on barriers to cessation was significant.

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ABSTRACT

It is widely recognized that smoking is related to abdominal pain and discomfort, as well as gastrointestinal disorders. Research has shown that visceral sensitivity, experiencing anxiety around gastrointestinal sensations, is associated with poorer gastrointestinal health and related health outcomes. Visceral sensitivity also increases anxiety symptoms and mediates the relation with other risk factors, including gastrointestinal distress. No work to date, however, has evaluated visceral sensitivity in the context of smoking despite the strong association between smoking and poor physical and mental health. The current study sought to examine visceral sensitivity as a unique predictor of cigarette dependence, threat-related smoking abstinence expectancies (somatic symptoms and harmful consequences), and perceived barriers for cessation via anxiety symptoms. Eighty-four treatment seeking adult daily smokers (M_{age} = 45.1 years [*SD* = 10.4]; 71.6% male) participated in this study. There was a statistically significant indirect effect of visceral sensitivity via general anxiety symptoms on cigarette dependence (*b* = 0.02, *SE* = 0.01, Bootstrapped 95% CI [0.006, 0.05]), smoking abstinence somatic expectancies (*b* = 0.10, *SE* = 0.03, Bootstrapped 95% CI [0.03, 0.19]), smoking abstinence harmful experiences (*b* = 0.13, *SE* = 0.05, Bootstrapped 95% CI [0.03, 0.25]), and barriers to cessation (*b* = 0.05, *SE* = 0.06, Bootstrapped 95% CI [0.01, 0.13]). Overall, the present study serves as an initial investigation into the nature of the associations between visceral sensitivity, anxiety symptoms, and clinically significant smoking processes among treatment-seeking smokers. Future work is needed to explore the extent to which anxiety accounts for relations between visceral sensitivity and other smoking processes (e.g., withdrawal, cessation outcome).

1. Introduction

There is wide recognition that smoking is related to abdominal pain and discomfort, including Irritable Bowel Syndrome (IBS) and other functional gastrointestinal (GI) disorders (Lakatos, 2009). In fact, research has illustrated that smoking is related to heart burn (Lakatos, 2009), stomach ulcers (Lakatos, 2009), chronic inflammation in the bowels (USDHHS, 2004), stomach and colon cancer (Hannan, Jacobs, & Thun, 2009), among other GI-related problems (e.g., gallstones; Tolstrup, Kristiansen, Becker, & Grønbæk, 2009). The prevalence of smoking among persons with GI disturbances and clinical conditions is estimated to be at least twice the rate observed in the general population (Garrow & Delegge, 2010; Sandler, 1990).

Given the heterogeneity of GI-related symptoms and disorders, scholars have sought to identify common processes that may undergird such clinical complex and varied presentations (Leventhal & Zvolensky,

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2015). One such construct is visceral sensitivity (Labus et al., 2004). Visceral sensitivity reflects anxiety about GI sensations and the context that may occasion them (Labus, Mayer, Chang, Bolus, & Naliboff, 2007). Research suggests visceral sensitivity is related to, but unique from, anxiety symptoms and associated with poorer GI and related health outcomes among persons with and without IBS (Drossman et al., 1988). Other work has documented the clinically significant role of visceral sensitivity in the treatment of GI disorders (Hazlett-Stevens, Craske, Mayer, Chang, & Naliboff, 2003); reductions in visceral sensitivity, rather than anxiety in general, contribute to improvements in GI clinical outcome. For example, visceral sensitivity is an active element of change in the treatment of IBS (Craske et al., 2011).

Despite the substantive co-occurrence of smoking and GI symptoms and disorders, there is presently no empirical understanding of visceral sensitivity in the context of smoking. Several smoking-related factors that have consistently been shown to predict poorer cessation outcomes include greater cigarette dependence (Heatherton, Kozlowski, Frecker, & Fagerström, 1991) and stronger expectancies for negative outcomes associated with quitting and abstinence (Abrams, Zvolensky, Dorman, Gonzalez, & Mayer, 2011; Farris, Langdon, DiBello, & Zvolensky, 2015). Yet, this work has not yet been extended to the study of visceral sensitivity. Numerous studies suggest that visceral sensitivity increases anxiety symptom severity and mediates the relation between other risk factors (e.g., neuroticism) and GI symptom distress (Hazlett-Stevens et al., 2003). Drawing from such (indirect) work, greater visceral sensitivity among smokers may be associated with greater anxiety symptom severity, which in turn, would be expected to be related to more severe smoking behavior and threat-based smoking cognition. Indeed, heightened anxiety may contribute to a threat-based emotional state(s) wherein smokers are more apt to smoke because it may offer perceived or objective relief from such aversive interoceptive states.

Together, the current study sought to test the hypothesis that, among treatment-seeking smokers, visceral sensitivity would be related to cigarette dependence, threat-related smoking abstinence expectancies (somatic symptoms and harmful consequences), and perceived barriers for cessation via anxiety symptoms. All effects were expected to be evident above and beyond the variance accounted for by gender, psychopathology, and perceived health status.

2. Method

2.1. Participants

Participants were 84 adult daily smokers (M_{age} = 45.1 years [*SD* = 10.4]; 71.6% male) seeking smoking cessation treatment. On average, the sample reported 5.3 (*SD* = 8.3) serious quit attempts in their lifetime. Age of onset for regular smoking was 17.5 years (*SD* = 5.3). Most of the sample (78.5%) had at least one Axis I diagnosis. Please find the detailed demographic characteristics of the participants in Table 1.

Table 1
Sample characteristics.

Variable	Mean(SD) or % (n)
Race/ethnicity	
Black/African American	65.1% (55)
White	29.1% (24)
"Other"	4.7% (4)
Asian	1.2% (1)
Marital status	
Single/never married	62.5% (52)
Divorced	11.4% (9)
Married	9.1% (8)
Live with partner	8.0% (7)
Separated	5.7% (5)
Widowed	3.4% (3)
Education status	
< 7 years formal education	1.1% (1)
Junior high school	5.7% (5)
Partial high school	11.4% (10)
High school/GED	34.1% (29)
Partial college	31.8% (27)
College degree	8.0% (6)
Graduate school	8.0% (6)
Resident status	
Urban area	65.9% (55)
Suburban AREA	22.7% (19)
Rural area	11.4% (10)
Employment status	
Full-time	17.2% (14)
Part-time	26.4% (22)
Public or private assistance	20.7% (17)
Dependence on spouse or student status	5.7% (6)
Unemployment	29.9% (25)
Income	
Less than $5000 a year	39.2% (33)
$5000–$9999	16.6% (14)
$10,000–$14,999	15.4% (13)
$15,000–$24,999	7.1% (6)
$25,000–$34,999	11.9% (10)
More than $34,999 a year	9.5% (8)
Axis I diagnosis	
Major depressive disorder	17.8% (15)
Substance use disorder	15.9% (12)
Posttraumatic stress disorder	12.3% (10)
Bipolar I/II	12.3% (10)
Social anxiety disorder	10.8% (9)
Alcohol use disorder	10.7% (9)
Generalized anxiety disorder	7.4% (6)
Dysthymia	3.2% (3)
Specific phobia	1.9% (2)
Panic disorder	1.8% (2)
Agoraphobia	1.8% (2)
Anxiety not otherwise specified	1.8% (2)
Obsessive-compulsive disorder	1.8% (2)

2.2. Measures

2.2.1. Demographics questionnaire

Demographic information collected included gender, age, race/ethnicity, income, marital status, education, resident status, and employment status.

2.2.2. Structured clinical interview for DSM-IV disorders (SCID-I; First, Spitzer, Gibbon, & Williams, 2002)

The SCID-I is a clinician-administered diagnostic assessment used to assess the presence of psychopathology. In the current study, the SCID-I was administered by trained doctoral students under the supervision of a clinical psychologist. It was used to index current (past month) Axis I diagnoses. The SCID-I has demonstrated good reliability (Zanarini et al., 2000) and excellent validity (Basco et al., 2000) in past work. All assessments were reviewed by an independent for between-rater agreement; no cases of disagreement were noted.

2.2.3. The short-form health survey (SF-36; Ware & Sherbourne, 1992)

The short-form health survey (SF-36) is a 36-item survey that assesses physical and mental health-related quality of life and functional impairment. The SF-36 has demonstrated good psychometric properties (Ware & Sherbourne, 1992). In the current study, the response to the question "In general, would you say your health is: excellent, very good, good, fair, poor" was included as a covariate.

2.2.4. Mood anxiety symptom questionnaire short form (MASQ; Watson & Clark, 1991)

The MASQ is a 62-item self-report measure of affective symptoms. Participants rate each item (e.g., "felt dizzy") on a Likert scale from 1 (*not at all*) to 5 (*extremely*). The MASQ short form contains two scales assessing symptoms of anxiety and two scales measuring symptoms of