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Short Communication

An Examination of the Indirect Effect of Anxiety Sensitivity in terms of Asthma and Smoking Cessation Processes

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HIGHLIGHTS

- Smoking is more common among individuals with asthma compare to those without
- Anxiety sensitivity negative impacts both smoking and asthma
- Examined the indirect effect of anxiety sensitivity in terms of asthma and cessation processes
- Significant indirect effect for nicotine dependence motives and motivation to quit
- No significant indirect effect for duration of longest quit attempt.

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ABSTRACT

Introduction: Despite the increased rates of smoking and poor cessation outcomes among individuals with asthma relative to those without, little scholarly attention has examined mechanisms linking asthma to smoking cessation processes. The current study sought to examine the indirect effect of anxiety sensitivity in terms of asthma and smoking cessation processes (i.e., duration of longest quit attempt, motivation to quit smoking, smoking dependence motives).
Methods: Participants were 90 regular daily smokers: 43 with asthma (51.2% male, $M_{age} = 38.0$ years, $SD = 12.5$) and 47 without asthma (46.8% male, $M_{age} = 35.4$ years, $SD = 11.2$) who were participating in a larger smoking cessation study. Data from the baseline (pre-quit attempt) assessment session were used.
Results: After accounting for the effects of gender, race, daily smoking rate, and negative affectivity, asthma status was indirectly related to motives for smoking related to nicotine dependence and motivation to quit smoking through anxiety sensitivity. There was no significant indirect effect for duration of longest quit attempt.
Conclusions: These findings suggest that smokers with asthma may be particularly fearful of physiological arousal, which in turn, may account for greater motivation to quit smoking, but also stronger dependence motives for smoking.

1. Introduction

Cigarette smoking is more common among individuals with asthma compared to those without (Gwynn, 2004; McLeish, Cougle, & Zvolensky, 2011), resulting in greater asthma severity, poorer asthma control, and more frequent healthcare utilization (Althuis, Sexton, & Prybylski, 1999; Eisner & Iribarren, 2007; McLeish & Zvolensky, 2010; Siroux, Pin, Oryszczyn, Le Moual, & Kauffmann, 2000). Although quitting smoking results in significant improvements in lung function, reductions in asthma medication use, and improved quality of life (Chaudhuri et al., 2006; Tønnesen et al., 2005), little is known about factors that influence smoking cessation among smokers with asthma. This lack of attention is unfortunate as smokers with asthma are less successful than smokers without when trying to quit, despite making more quit attempts (Avallone et al., 2013; Fennerty et al., 1987,1987; Tønnesen et al., 2005).

One factor that may be important to examine in terms of asthma-smoking relations is the cognitive risk factor of anxiety sensitivity, defined as the fear of arousal-related sensations (McNally, 2002; Reiss, Peterson, Gursky, & McNally, 1986). Research suggests that anxiety sensitivity serves as a risk factor for both smoking and asthma, resulting in poorer outcomes in both domains. For example, anxiety sensitivity predicts panic in response to asthma symptoms, poorer asthma control, and poorer asthma related quality of life (Avallone, McLeish, Luberto, &

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Bernstein, 2012; Carr, Lehrer, & Hochron, 1995; McLeish, Zvolensky, & Luberto, 2011) as well as greater perceived barriers to cessation and increased withdrawal symptoms and risk of lapse and relapse during a quit attempt (Johnson, Farris, Schmidt, Smits, & Zvolensky, 2013; Johnson, Stewart, Rosenfield, Steeves, & Zvolensky, 2012; Mullane et al., 2008).

In the only study, to date, examining the role of anxiety sensitivity among smokers with asthma, McLeish, Johnson, Avallone, and Zvolensky (in press) found that greater anxiety sensitivity significantly predicted greater barriers to cessation and reasons for quitting related to health concerns and self-control. These findings suggest that anxiety sensitivity does indeed relate to important smoking cessation processes among smokers with asthma; however, this study only examined the main effect of anxiety sensitivity, asthma diagnosis was not objectively verified, and there was no comparison to smokers without asthma. Therefore, the current study sought to build on past work by examining the indirect effect of anxiety sensitivity in terms of asthma status and smoking cessation processes in a sample of smokers with and without asthma enrolled in a smoking cessation study. It was hypothesized that there would be a significant indirect effect of asthma diagnosis on shorter duration of longest quit attempt, greater smoking cessation motives, and greater smoking dependence motives through anxiety sensitivity.

2. Method

2.1. Participants

Participants were 90 daily cigarette smokers between the ages of 18 and 65. For inclusion in the study, participants had to: (1) be a regular smoker (≥10 cigarettes per day) for at least one year; (2) have expired carbon monoxide (CO) levels ≥ 8 parts per million (ppm); (3) report a motivation to quit smoking of at least 5 out of 10; and (4) be interested in quitting smoking in the next month. Participants were excluded from the study based on: (1) current substance dependence (excluding nicotine dependence); (2) decreased smoking rate by more than a half in the past six months; or (3) current, regular use of other tobacco products. Participants in the smokers with asthma group were required to have received a physician diagnosis of asthma prior to the onset of smoking and meet criteria for asthma diagnosis verification using spirometry. The smokers without asthma group ($n = 47$; 46.8% male, $M_{age} = 35.4$ years, $SD = 11.2$) was 56.5% Caucasian, 39.1% African American, and 4.3% Other. On average, smokers without asthma smoked 17.2 ($SD = 11.1$) cigarettes per day and had been regular smokers for 16.2 years ($SD = 9.8$). The smokers with asthma group ($n = 43$; 51.2% male, $M_{age} = 38.0$ years, $SD = 12.5$) was 39.5% Caucasian, 58.1% African American, and 2.3% Other. On average, smokers with asthma smoked 22.3 ($SD = 22.0$) cigarettes per day and had been regular smokers for 19.9 years ($SD = 11.9$).

2.2. Measures

2.2.1. Asthma diagnosis2.2.1. Asthma diagnosis

Asthma status was verified by spirometry using a KoKo Legend spirometer (nSpire Health, Inc., Longmont, CO). Individuals who demonstrated a reduction in FEV_1 and FEV1/FVC values relative to predicted values, with 12% or greater improvement after administration of short-acting bronchodilator (or 20% or greater improvement in FEF_{25-75}) were considered to have a positive asthma status (Alberts, Ferris, Brooks, & Goldman, 1994; National Heart Lung & Blood Institute, 2007).

2.2.2. Expired carbon monoxide (CO)

Biochemical verification of smoking status was completed by CO analysis of breath samples using a Bedfont Micro 4 Smokerlyzer CO Monitor (coVita, Haddonfield, NJ). Obtained values ≥ 8 ppm were considered indicative of regular smoking (Benowitz et al., 2002).

2.2.3. Smoking History Questionnaire (SHQ).

Smoking history and pattern was assessed with the SHQ (Brown, Lejuez, Kahler, & Strong, 2002). The SHQ includes items pertaining to smoking rate, years of being a daily smoker, and duration of longest quit attempt in days.

2.2.4. Positive Affect Negative Affect Schedule (PANAS).

The PANAS (Watson, Clark, & Tellegen, 1988) is a measure of general positive and negative emotional states commonly used in psychopathology research (Watson, 2000). In the present study, only the negative affect subscale (PANAS-NA) was used.

2.2.5. Anxiety Sensitivity Index-3 (ASI-3)

The ASI-3 (Taylor et al., 2007) is an 18-item self-report measure that assesses the degree to which participants fear negative consequences stemming from anxiety symptoms. The ASI-3 has demonstrated the strongest psychometric properties of any current measure of AS (Taylor et al., 2007).

2.2.6. Motivational Aspects of Smoking Cessation (MASC).

The MASC is an 11-item self-report measure that assesses the degree to which participants are motivated to quit smoking (Rundmo, Smedslund, & Götestam, 1997). The MASC has demonstrated good internal consistency and validity (Rundmo et al., 1997).

2.2.7. Brief Wisconsin Inventory for Smoking Dependence Motives (WISDM-37)

The WISDM-37 (Smith et al., 2010) is 37-item self-report measure of tobacco dependence. It is a shortened version of the original 68-item Wisconsin Inventory for Smoking Dependence Motives (WISDM-68; Piper et al., 2004). The WISDM-37 consists of 11 subscales that load onto two higher order factors: (1) primary dependence motives (automaticity, loss of control, craving, tolerance) and (2) secondary dependence motives (affiliative attachment, cognitive enhancement, cue exposure/associative processes, social/environmental goals, taste, weight control, affective enhancement). The WISDM-37 shows good internal consistency, reliability, concurrent, and predictive validity (Smith et al., 2010).

2.3. Procedure

Participants were daily smokers participating in a larger study examining differences between smokers with and without asthma during a self-guided quit attempt. The current study uses data from the study's baseline assessment session, which took place prior to the quit attempt. Individuals interested in participating in the study were screened by phone and eligible participants were scheduled for an in-person baseline visit. After providing informed, written consent, participants had their smoking status and asthma status verified, and completed a self-report assessment battery. Upon completion of the visit, participants were compensated $50.

3. Results

Model fit for the direct and indirect effects of asthma status in terms of smoking cessation motives and smoking dependence motives was very good (see Fig. 1; $X^2(26) = 30.189$, $p = .260$; CFI = .961, RMSEA = .055). Having an asthma diagnosis was not significantly associated with smoking more cigarettes per day, non-white race, or female gender. Based on modification indices, a number of changes were made to the model. Race was allowed to correlate with smoking rate ($r = .03$, $p =$ ns), gender ($r = .21$, $p = .041$), and anxiety sensitivity ($r = .28$, $p = .008$). Negative affectivity was retained as a correlated