Expert consensus has indicated that cigarette smokers with psychiatric disorders are a particularly high-risk group of smokers (Ziedonis et al., 2008). Among the various psychiatric symptoms and psychopathologies, depressive and anxiety syndromes—that is, emotional disorders—are highly prevalent in the general population and comorbid with smoking (Leventhal, Ramsey, Brown, LaChance, & Kahler, 2008; Piper, Cook, Schlam, Jorenby, & Baker, 2011; Piper et al., 2010). Among current smokers, emotional disorders significantly increase risk of smoking cessation failure (Hall, Muñoz, & Reus, 1994; Hitsman, Borrelli, McChar-gue, Spring, & Niaura, 2003; Piper et al., 2011), heighten severity of tobacco withdrawal (Marshall, Johnson, Bergman, Gibson, & Zvolensky, 2009; Piper et al., 2010), and contribute to maladaptive cognitive beliefs and cognitive–affective reactions to tobacco use (Vujanovic, Marshall, Gibson, & Zvolensky, 2010). Also, although smoking cessation may produce acute changes in mood during the first few days of cessation (i.e., increases in negative affect; Berlin, Chen, & Covey, 2010; West & Hajek, 1997), it appears that successfully quitting smoking and maintaining abstinence can decrease risk for experiencing more severe negative emotional symptoms. For instance, successful smoking cessation appears to decrease or have no effects on emotional disorder symptoms (Kahler, Spillane, Busch, & Leventhal, 2011). Based upon such work, scholars have seen merit in better understanding and clinically targeting emotional disorders to improve cessation outcomes (e.g., Feldner, Smith, Monson, & Zvolensky, 2013; Hertzberg, Moore, Feldman, & Beckham, 2001; MacPherson et al., 2010; McFall et al., 2010; Richards, Cohen, Morrell, Watson, & Low, 2013).
Despite the empirically robust and clinically significant relation between emotional disorders and smoking, remarkably little is known about the core mechanisms underlying this association. Anxiety sensitivity is a cognitive–affective transdiagnostic factor that has been most commonly conceptualized as an individual difference factor related to sensitivity to aversive internal states of anxiety (i.e., how one reacts to aversive internal states; Reiss, Peterson, Gursky, & McNally, 1986). Anxiety sensitivity is a relatively stable, but malleable, construct that is implicated in the increased development and maintenance of various emotional symptoms and disorders (e.g., panic attacks, depressive symptoms, major depression, suicide, panic disorder, posttraumatic stress disorder; Capron, Norr, Zvolensky, & Schmidt, 2014; Hayward, Killen, Kraemer, & Taylor, 2000; Marshall, Miles, & Stewart, 2010; McNally, 2002; Schmidt, Zvolensky, & Maner, 2006; Taylor, 2003), and is distinguishable theoretically and empirically from anxiety symptoms and other negative affective states like depressive symptoms (Rapee & Medoro, 1994; Schmidt et al., 2006).

Research has also indicated that anxiety sensitivity is related to smoking behavior. For example, anxiety sensitivity is positively correlated with smoking motives to reduce negative affect (e.g., Battista et al., 2008; Comeau, Stewart, & Loba, 2001) and beliefs (i.e., expectancies) that smoking will reduce negative affect (Johnson, Farris, Schmidt, Smits, & Zvolensky, 2013). Recent research has found that higher levels of anxiety sensitivity were predictive of greater increases in positive affect after cigarette smoking, and therefore, high-anxiety sensitive smokers appear particularly susceptible to mood enhancement from smoking (Wong et al., 2013). Other work has found that smoking reduces anxiety in highly anxiety sensitive smokers who smoked during a stressful situation (speech task), but not in a no-stress situation (Evatt & Kassel, 2010). These data suggest highly anxiety sensitive smokers are particularly sensitive to anxiety reduction from smoking during stressful situations. From a cessation perspective, smokers higher in anxiety sensitivity, relative to those lower therein, perceive quitting as more difficult (Zvolensky, Vujanovic, et al., 2007) and experience more intense nicotine withdrawal during early phases in quitting (Johnson, Stewart, Rosenfield, Steeves, & Zvolensky, 2012; Langdon et al., 2013). Moreover, higher levels of anxiety sensitivity are related to greater odds of early smoking lapse (Brown, Kahler, Zvolensky, Lejuez, & Ramsey, 2001) and relapse during quit attempts (Assayag, Bernstein, Zvolensky, Steeves, & Stewart, 2012; Zvolensky et al., 2006; Zvolensky, Stewart, Vujanovic, Gavric, & Steeves, 2009). It is important to note that, the observed effects of anxiety-sensitivity smoking do not appear to be explained by smoking rate, gender, or concurrent substance use (e.g., alcohol, cannabis), panic-attack history, or trait-like negative mood propensity (Johnson et al., 2013; Wong et al., 2013).

Overall, there is consistent empirical evidence that emotional disorders are significantly related to smoking processes, but it remains unclear what cognitive–affective processes may underlie such linkages. Anxiety sensitivity is one promising construct that might, at least partially, account for the relations between anxiety/depression disorders and various smoking processes. In this sense, it is theoretically a mediator (Hayes, 2009), as emotional disorders might give rise to anxiety sensitivity, which might in turn give rise to various cognitive and behavioral aspects of smoking. This work sits on the backdrop of the growing general recognition that how one responds to aversive internal or emotional states (perceived and/or actual) might play a central role in smoking processes and cessation behavior (e.g., Brown et al., 2009; Gifford & Lillis, 2009). Specifically, anxiety sensitivity might underlie emotional psychopathology because it might promote the perception that internal cues are aversive, driving the tendency to escape/avoid such sensations through smoking. Accordingly, individuals with emotional disorders, partly as a result of high anxiety sensitivity levels, may be more apt to smoke to help diminish anxiety and other aversive states (Cohen et al., 2009). Moreover, smoking abstinence exacerbates such states in regular smokers (Leventhal et al., 2010). Collectively, such processes could ultimately increase dependence on nicotine, pose barriers to cessation, and generate unpleasant symptoms upon deprivation.

With this background, the present investigation provides an empirical test of the role of anxiety sensitivity in the relation between emotional disorders and three common and clinically relevant smoking processes, including nicotine dependence, perceived barriers to smoking cessation, and severity of problematic symptoms while quitting. It was hypothesized that variance in anxiety sensitivity would explain (i.e., statistically mediate and theoretically underpin) the relation between current (past-year) emotional disorders (depressive and anxiety disorders) and smoking processes among treatment-seeking smokers, and that such effects would not be better accounted for by gender, tobacco-related medical problems, alcohol problems, cannabis use, or trait-like propensity to experience negative mood (i.e., negative affectivity; Johnson et al., 2013).

Method

Participants

Participants (N = 465) were adult treatment-seeking daily smokers, M_age = 36.6, SD = 13.59, almost half of them women (48.4%). [Overlapping sample as reported in Farris, Zvolensky, Blalock, & Schmidt, 2014; Zvolensky et al., 2014.] Participants primarily identified as White (86.0%), African American (8.1%), Hispanic (2.4%), Asian (1.1%), and other (2.4%). Participants were generally well-educated, with 74.0% indicating that they had completed at least some college. In terms of relationship status, 43.9% reported marital status as never married, 33.3% as married/cohabiting, 20.9% as divorced/separated, and 1.9% as widowed. The average daily smoking rate of this sample was 16.7 (SD = 9.92) cigarettes per day and on average, moderate levels of nicotine dependence as were reported on the Fagerström Test for Nicotine Dependence (FTND), M = 5.2, SD = 2.27. Participants reported having started smoking at age 14.9 (SD = 3.47), daily smoking at age 17.4 (SD = 3.78), and during their heaviest period of smoking, were smoking at a rate of 25.0 (SD = 12.61) cigarettes per day. A small percentage of participants reported current use of cigars (14.0%) and smokeless tobacco (4.1%). Participants reported 3.4 (SD = 2.49) previous quit attempts. Slightly more than one quarter of the participants (29.5%) reported a tobacco-related illness (e.g., heart problems, hypertension, respiratory disease, and/or asthma).

Of the sample, 34.0% met criteria for primary current, i.e., past-year, anxiety or depressive disorders. Of those with past-year...
emotional disorders, specific diagnoses included social anxiety disorder (30.4%), generalized anxiety disorder (14.6%), specific phobia (12.1%), major depressive disorder (12.0%), posttraumatic stress disorder (8.9%), panic disorder with or without agoraphobia (6.4%), dysthymia (5.7%), anxiety disorder not otherwise specified (NOS; 4.4%), obsessive–compulsive disorder (3.2%), depressive disorder NOS (1.3%), and agoraphobia without panic disorder (0.6%). Overall, the average global assessment of functioning (GAF) rating for the sample was 73.4 (SD = 11.04), suggesting mild functional impairment.

**Predictor Variable: SCID-I/NP**

Current (past-year) mood and anxiety disorders were assessed with the Structured Clinical Interview for DSM–IV–TR Axis I Disorders: Nonpatient Version (SCID-I/NP; First, Spitzer, Gibbon, & Williams, 2007). Interviews were administered by trained research assistants or doctoral-level staff and supervised by independent doctoral-level professionals. All cases were checked by two independent raters for diagnostic accuracy (no discrepancies were noted). A dichotomous variable was created to reflect each of those who met criteria for a primary depressive or anxiety disorder (1 = current emotional disorder); all other participants were coded as the reference group (0 = no current emotional disorder); this variable was the predictor in all analyses. Past emotional disorders (successfully treated or remitted), as indexed by a lifetime history, were not grouped with current emotional disorders. This approach was employed to provide a more conservative and rigorous test of the study hypotheses, and was conceptually the most relevant, given that current anxiety or mood psychopathology would most directly relate to anxiety sensitivity.

**Mediator: Anxiety Sensitivity Index-III (ASI-III)**

The ASI-III (Taylor et al., 2007) is an 18-item measure in which respondents indicate the extent to which they are concerned about possible negative consequences of anxiety-related symptoms (e.g., “It scares me when my heart beats rapidly”). The ASI-III was derived, in part, from the 16-item ASI (Reiss et al., 1986). Responses are rated on a 5-point Likert scale ranging from 0 (very little) to 4 (very much) and summed to create a total score. The ASI-III has strong and improved psychometric properties relative to previous measures of the construct (Taylor et al., 2007). In the present investigation, the total score was utilized as the mediator; internal constancy was excellent in the current sample (Cronbach’s α = .93).

**Dependent Measures**

**Smoking History Questionnaire (SHQ).** The SHQ (Brown, Lejuez, Kahler, & Strong, 2002) is a self-report questionnaire used to assess smoking history (e.g., onset of regular daily smoking) and pattern (e.g., number of cigarettes consumed per day), and problematic symptoms experienced during past quit attempts (e.g., weight gain, nausea, irritability, and anxiety). In the present study, as in past work (e.g., Zvolensky, Farris, Schmidt, & Smits, 2014), the SHQ was employed to describe the sample on smoking history and patterns of use (e.g., smoking rate), and to create a mean composite score of the severity of problematic symptoms experienced during past quit attempts by computing an average score for severity of past symptoms endorsed as problematic in previous quit attempts. The symptoms included: weight gain, increased eating, digestive problems, nausea, headaches, drowsiness, depressed mood, fatigue, insomnia, difficulty concentrating, heart pounding or sweating, decreased heart rate, irritability, restlessness, anxiety, and tobacco craving. These symptoms are common aspects of nicotine withdrawal, but there are also other common symptoms of internal distress not formally included in strict definitions of nicotine withdrawal.

**Fagerström Test for Nicotine Dependence (FTND).** The FTND (Heatherton, Kozlowski, Frecker, & Fagerström, 1991) is a 6-item scale that assessesgradations in tobacco dependence. Scores range from 0–10, with higher scores reflecting high levels of physiological dependence on nicotine. The FTND has adequate internal consistency, positive relations with key smoking variables (e.g., saliva cotinine), and high test–retest reliability (Heatherton et al., 1991; Pomerleau, Carton, Lutzké, Flessland, & Pomerleau, 1994). The FTND total score was used as a criterion variable in the present study (Cronbach’s α = .64).

**Barriers to Cessation Scale (BCS).** The BCS (Macnee & Talsma, 1995) is a self-report assessment of perceived barriers associated with quitting smoking. Specifically, the BCS is a 19-item measure on which respondents indicate, on a 4-point Likert scale (0 = not a barrier or not applicable to 3 = large barrier), the degree to which they identify with each of the listed barriers (e.g., “weight gain,” “friends encouraging you to smoke,” “fear of failing to quit”). Scores are summed and a total score is derived. The BCS has strong psychometric properties, including content and predictive validity, internal consistency, and reliability (Macnee & Talsma, 1995). The BCS total score was used as a criterion variable in the present study; Cronbach’s α = .89 in the present sample.

**Descriptive Measures and Covariates**

**Demographics Questionnaire.** Demographic information collected included gender, age, race, educational level, marital status, and employment status. These data were used for descriptive purposes and gender was entered as a covariate in all analyses.

**Medical history form.** A medical history checklist was used to assess medically based exclusionary criteria for the current study. A composite variable was computed for the present study as an index of tobacco-related medical problems, which was entered as a covariate in all models. Items in which participants indicated having ever been diagnosed (heart problems, hypertension, respiratory disease, and asthma; all coded 0 = no, 1 = yes) were summed and a total score was created (observed range from 0–3), with greater scores reflecting the occurrence of multiple markers of tobacco-related disease.

**Alcohol Use Disorders Identification Test (AUDIT).** The AUDIT (Babor, de la Fuente, Saunders, & Grant, 1992) is a 10-item self-report measure developed to identify individuals with alcohol problems. Total scores range from 0 to 30, with higher scores reflecting more hazardous drinking. The psychometric properties are well-documented (Babor et al., 1992). In the present study, the AUDIT total score was used as a covariate in all analyses; internal consistency was good (Cronbach’s α = .84).
Marijuana Smoking History Questionnaire (MSHQ). The MSHQ (Bonn-Miller & Zvolensky, 2009) is a 40-item measure that assesses cannabis-use history and patterns of use. One item was used in the current study to determine status of marijuana use in the past 30 days: “Please rate your marijuana use in the past 30 days.” Responses range from 0 = no use, 4 = once a week, to 8 = more than once a day. This item was dichotomously coded to reflect a marijuana use status variable (0 = no use; 1 = past 30-day use), which was entered as a covariate in all analyses.

Positive and Negative Affect Scale (PANAS). The PANAS (Watson, Clark, & Tellegen, 1988) is a self-report measure that requires participants to rate the extent to which they experience each of 20 different feelings and emotions (e.g., nervous, interested) based on a Likert scale that ranges from 1 (very slightly or not at all) to 5 (extremely). The measure yields two factors, negative and positive affect, and has strong documented psychometric properties (Watson et al., 1988). The negative affectivity subscale was used as a covariate in the present study; internal consistency was excellent (Cronbach’s α = .90).

Procedure

Adult daily smokers were recruited from the community (via flyers, newspaper ads, radio announcements) to participate in a large randomized controlled trial examining the efficacy of two smoking-cessation interventions (clinicaltrials.gov #NCT01753141). The current study was based on secondary analyses of baseline (pretreatment) data for a subset of the sample. Inclusion criteria for the parent study included daily cigarette use (average ≥ 8 cigarettes per day for at least 1 year), aged between 18–65, and reported motivation to quit smoking (scored at least 5 on a 10-point scale). Exclusion criteria included: inability to give informed consent, current use of smoking-cessation products or treatment, past-month suicidality, and history of psychotic-spectrum disorders. Participants provided informed consent prior to participation and the study protocol was approved by the institutional review boards where the study took place. All study procedures and treatment of human subjects were conducted in compliance with ethical standards of the American Psychological Association. Individuals responding to study advertisements were scheduled for an in-person, baseline assessment and were evaluated according to study inclusion and exclusion criteria. After providing written informed consent, participants were interviewed using the SCID-I/NP and completed a computerized battery of self-report questionnaires.

Data-Analytic Strategy

First, correlations among emotional disorders (depressive/anxiety psychopathology), anxiety sensitivity, and the criterion variables (nicotine dependence, perceived barriers to smoking cessation, and severity of problematic symptoms reported in past quit attempts) were examined. Three mediator models were conducted next to examine the impact of anxiety sensitivity in regard to the relation between past-year emotional disorders and the three criterion outcomes (see Figure 1). Gender, tobacco-related medical problems, alcohol-use problems (AUDIT), cannabis-use status (per MSHQ), and negative affectivity (PANAS-NA) were included as covariates in the models for all analyses. Each of these variables could serve as “third variables” in the relations between anxiety sensitivity, current emotional disorders, and the studied smoking criterion variables; thus, by controlling for these factors, the unique effects of anxiety sensitivity can be tested. The analyses were conducted using PROCESS, a conditional modeling program that utilizes an ordinary least-squares-based path-analytical framework to test for both direct and indirect effects (Hayes, 2013). All relative indirect effects were subjected to follow-up bootstrap analyses with 10,000 re-samples. A 95th-percentile confidence interval (CI) was derived for significance testing (as recommended by Hayes, 2009; Preacher & Hayes, 2004, 2008).

Results

As illustrated in Table 1, having a current emotional disorder was positively associated with female gender, higher levels of negative affectivity, higher anxiety sensitivity, greater perceived barriers to smoking cessation, and increased severity of problematic symptoms while quitting in past attempts. Anxiety sensitivity (the mediator) also was significantly and positively associated with alcohol use, negative affectivity, nicotine dependence, perceived barriers to smoking cessation, and severity of problems experienced while quitting in past attempts; correlations were small to moderate in strength. Additionally, being male was significantly associated with more problematic drinking, whereas being female was related to higher levels of negative affect, perceived barriers to smoking cessation, and severity of problematic symptoms while quitting in past attempts.

Results for paths a, b, c, and c’ are presented in Table 2, which correspond to each of the three models. The estimates of the indirect effects were the paths tested for mediation, which are also presented in Table 2.

The total effects model accounted for significant variance in nicotine dependence (R²1,x = .039, df = 6, 458, F = 3.071, p = .006). The full model with the mediator predicted significant variance in nicotine dependence (R²2,x = .063, df = 9, 457, F = 3.661, p = .0007). There was a significant direct effect of current emotional disorder on nicotine dependence after controlling for the anxiety sensitivity. The indirect effect revealed that emotional disorders were predictive of higher levels of nicotine dependence scores indirectly through higher levels of anxiety sensitivity.

In terms of perceived barriers to smoking cessation, the total effect model was significant (R²2,x = .169, df = 6, 458, F =
Discussion

The present study indicated that significant variance was explained by anxiety sensitivity in the relation of past-year emotional disorder to and nicotine dependence, perceived barriers for quitting, and problematic symptoms reported in past quit attempts. There appears to be a direct effect of having a current emotional disorder in terms of higher levels of nicotine dependence and more problematic symptoms during prior cessation attempts. In both cases, anxiety sensitivity indirectly accounted for the effect of current emotional disorders on nicotine dependence and problematic quit symptoms, which supported the mediation hypothesis. Although the direct effect of current emotional disorders on perceived barriers for quitting was not significant, findings revealed a robust indirect relation between emotional disorders and perceived barriers via anxiety sensitivity. Overall, the present findings consistently indicated, across three different smoking processes, that anxiety sensitivity may, at least partially, indirectly account for the link between current emotional disorders and various clinically relevant smoking processes among treatment-seeking smokers. Notably, the observed effect of anxiety sensitivity was evident above and beyond the variance accounted for by gender, tobacco-related medical problems, alcohol problems, cannabis use, and negative affectivity. That is, the observed anxiety sensitivity effects were incremental and could not be attributed to these factors. Together, these results highlight the theoretical and potential clinical significance of anxiety sensitivity in explaining the role of emotional disorders and select smoking processes. The model tested assumes that a major reason why active emotional disorders are associated with smoking outcomes is because people with (vs. without) emotional disorders tend to have higher anxiety sensitivity levels, which ultimately, may increase vulnerability to more severe and persistent smoking patterns. Because other theoretical models could be possible based on the current data and cross-sectional design, and the pattern/sequencing of these associations was not tested here, the proposed model could benefit from further evaluation using longitudinal designs.

The present data raise the possibility that anxiety sensitivity may be an important mechanism linking emotional disorder and smoking. Anxiety sensitivity may underlie or exacerbate existing emotional psychopathology because those with high anxiety sensitivity perceive unpleasant sensations as more aversive and are thus driven to avoid experiencing such sensations, which in turn may prevent extinction of anxiety responses and negatively reinforce fears and emotional pathology (Taylor, 1999). As a result, individuals with active (current) emotional disorders due 15.532, p < .0001), as was the full model with the mediator (R²M = .181, df = 7, 457, F = 14.460, p < .0001). The direct effect of emotional disorder on barriers to smoking cessation after controlling for the mediator was nonsignificant. Regarding the test of the indirect effect, current emotional disorders were predictive of greater perceived barriers to smoking cessation indirectly through higher levels of anxiety sensitivity.

In terms of severity of problematic symptoms while attempting to quit in the past, the total effects model accounted for significant variance (R²M = .216, df = 6, 458, F = 21.073, p < .0001). The full model with the mediator also predicted significant variance in severity of problematic symptoms reported during past quit attempts (R²M = .248, df = 7, 457, F = 21.569, p < .0001); there was a nonsignificant direct effect of current emotional disorder on severity of problematic symptoms reported in past quit attempts, controlling for anxiety sensitivity. To test mediation, the indirect effect was estimated and revealed that current emotional disorders were predictive of greater severity of problematic quit symptoms indirectly through higher levels of anxiety sensitivity.

Table 1
Descriptive Statistics and Correlations for Study Variables (N = 465)

<table>
<thead>
<tr>
<th>Variable</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>M (SD) or n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Gender (% female)</td>
<td>-0.02</td>
<td>-0.03</td>
<td>-0.06</td>
<td>-0.04</td>
<td>-0.02</td>
<td>-0.01</td>
<td>-0.01</td>
<td>-0.01</td>
<td>-0.01</td>
<td>0.08%</td>
</tr>
<tr>
<td>2. Medical problems</td>
<td>-0.04</td>
<td>-0.03</td>
<td>-0.06</td>
<td>-0.04</td>
<td>-0.02</td>
<td>-0.01</td>
<td>-0.01</td>
<td>-0.01</td>
<td>-0.01</td>
<td>0.08%</td>
</tr>
<tr>
<td>3. AUDIT total</td>
<td>0.19</td>
<td>0.24</td>
<td>0.21</td>
<td>0.18</td>
<td>0.16</td>
<td>0.14</td>
<td>0.09</td>
<td>0.05</td>
<td>-0.02</td>
<td>0.02</td>
</tr>
<tr>
<td>4. Cannabis use (% Y)</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.04</td>
<td>0.04</td>
<td>0.02</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
</tr>
<tr>
<td>5. PANAS-NA</td>
<td>0.38</td>
<td>0.36</td>
<td>0.35</td>
<td>0.34</td>
<td>0.33</td>
<td>0.32</td>
<td>0.31</td>
<td>0.30</td>
<td>0.29</td>
<td>0.29</td>
</tr>
<tr>
<td>6. Emotional DX (% Y)</td>
<td>0.13</td>
<td>0.12</td>
<td>0.11</td>
<td>0.10</td>
<td>0.09</td>
<td>0.08</td>
<td>0.07</td>
<td>0.06</td>
<td>0.05</td>
<td>0.05</td>
</tr>
<tr>
<td>7. ASI-3 total</td>
<td>0.17</td>
<td>0.16</td>
<td>0.15</td>
<td>0.14</td>
<td>0.13</td>
<td>0.12</td>
<td>0.11</td>
<td>0.10</td>
<td>0.09</td>
<td>0.09</td>
</tr>
<tr>
<td>8. FTND total</td>
<td>0.19</td>
<td>0.18</td>
<td>0.17</td>
<td>0.16</td>
<td>0.15</td>
<td>0.14</td>
<td>0.13</td>
<td>0.12</td>
<td>0.11</td>
<td>0.11</td>
</tr>
<tr>
<td>9. BCS total</td>
<td>0.51</td>
<td>0.51</td>
<td>0.51</td>
<td>0.50</td>
<td>0.50</td>
<td>0.49</td>
<td>0.49</td>
<td>0.49</td>
<td>0.48</td>
<td>0.48</td>
</tr>
<tr>
<td>10. Quit problems</td>
<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
</tr>
</tbody>
</table>

Note. Gender = % listed are female; 0 = male; 1 = female; medical problems = tobacco-related medical problems as indicated by a medical history form; AUDIT = Alcohol Use Disorders Identification Test; cannabis use = past 30 days cannabis-use status per the Marijuana Smoking History Questionnaire; PANAS-NA = Positive and Negative Affect Scale—Negative Affect subscale; ASI-III = Anxiety-Sensitivity Index III; Emotional DX = current (past year) anxiety or depressive disorder per the Structured Clinical Interview of DSM-IV-TR Disorders (SCID-I/NP); FTND = Fagerström Test for Nicotine Dependence total score; BCS total = Barriers to Cessation Scale total score; quit problems = mean severity of problems experienced while quitting per the Smoking History Questionnaire (range 1–5). * Covariates. ** Predictor. † Mediator. ‡ Criterion variables.

*p < .05. **p < .01.
to high anxiety sensitivity may be prone to actions that prevent and attenuate aversive states. We find it interesting that smoking helps to diminish anxiety and other aversive states (Cohen et al., 2009) and smoking abstinence exacerbates such states in regular smokers (Leventhal et al., 2010). Such processes could ultimately increase dependence on nicotine, pose barriers to cessation, and generate unpleasant symptoms upon cessation. Thus, it is possible that anxiety sensitivity may be a common factor that increases vulnerability to both emotional psychopathology and smoking. Hence, anxiety sensitivity may be a central explanatory factor for why people with emotional disorders (at least with active symptomology) may be more prone to smoking.

The present findings serve to conceptually inform the development of specialized intervention strategies for smokers with current emotional disorders. Specialized treatments targeting specific emotional disorders for smoking cessation have been developed (e.g., Feldner et al., 2013; Hertzberg et al., 2001; MacPherson et al., 2010; McFall et al., 2010). Yet, the results of these studies generally suggest rather modest improvements or even mixed results in smoking outcomes (e.g., Brown et al., 2007; Hitsman et al., 2003; Ziedonis et al., 2008). Rather than focus exclusively on the manifest symptoms of depression/anxiety or their diagnostic syndromes, the present data add to a growing theoretical and empirical literature suggesting that there may be merit to identifying and targeting transdiagnostic factors, such as anxiety sensitivity, and their emotional disorder-related sequelae to facilitate cessation success (Zvolensky & Bernstein, 2005). For example, by integrating anxiety sensitivity-reducing methods via psychoeducation, cognitive restructuring, interoceptive exposure, and emotion-regulation strategies into smoking cessation treatment (e.g., Feldner, Zvolensky, Babson, Leen-Feldner, & Schmidt, 2008; Zvolensky, Bogiaizian, Salazar, Farris, & Bakhshaei, 2014; Zvolensky, Yartz, Gregor, Gonzalez, & Bernstein, 2008), it may be possible to facilitate greater success in smoking cessation for smokers with various emotional disorders.

There are a number of interpretive caveats to the present study. First, given the cross-sectional nature of these data, it is unknown whether emotional disorders are causally related to greater anxiety sensitivity, or the criterion smoking processes. Based upon the present results, future prospective studies are necessary to determine the directional effects of these relations. Second, our sample consisted of community-recruited, treatment-seeking daily cigarette smokers with moderate levels of nicotine dependence. Future studies may benefit by sampling from lighter and heavier smoking populations to ensure the generalizability of the results to the general smoking population. It also is noteworthy that the FTND internal consistency was relatively low, an issue often apparent with this measure (Korte, Capron, Zvolensky, & Schmidt, 2013). Yet, Cronbach’s α values are fairly sensitive to the number of items in each scale and it is not uncommon to find lower Cronbach values with shorter scales (e.g., scales with fewer than 10 items; DeVellis, 2003). Third, the sample was largely comprised of a relatively homogenous group of treatment-seeking smokers. To rule out a selection bias and increase the generalizability of these findings, it will be important for future studies to recruit a more diverse sample with regard to ethnic/racial identification and socioeconomic status. Fourth, another limitation of the present study pertains to the retrospective methods used to define more severe problems during participants’ past quit attempts. We selected this measure because it allowed us to capture a historical perspective on severity of symptoms experienced in past attempts. Still, it is possible a recall bias somehow influenced this effect. Based upon the present findings, researchers are now well positioned to conduct a direct, prospective test of the emotional disorder–anxiety sensitivity and smoking model. Finally, due to sample-size restrictions, we could not model the data by specific emotional disorders. It is therefore unclear if anxiety sensitivity may mediate the relation between many or just specific emotional disorders and smoking processes. In addition, past-year coding of emotional disorders could possibly include a remitted case in the most recent

Table 2
Regression Results for the Mediation Models (N = 465)

<table>
<thead>
<tr>
<th>Y</th>
<th>Model</th>
<th>b</th>
<th>SE</th>
<th>t</th>
<th>p</th>
<th>CI (lower)</th>
<th>CI (upper)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>EMO → ASI3 (a)</td>
<td>3.552</td>
<td>1.017</td>
<td>3.494</td>
<td>.0005</td>
<td>1.555</td>
<td>5.550</td>
</tr>
<tr>
<td></td>
<td>ASI3 → FTND (b)</td>
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<td>2.638</td>
<td>.009</td>
<td>.007</td>
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<td>.529</td>
<td>.243</td>
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<td>.030</td>
<td>.052</td>
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<td>.241</td>
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<td>1.106</td>
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<td>.050</td>
<td></td>
<td>.030</td>
<td>.032</td>
<td>.228</td>
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<td>.050</td>
<td>.2615</td>
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<tr>
<td></td>
<td>EMO → BCS (c)</td>
<td>.189</td>
<td>1.089</td>
<td>.173</td>
<td>.063</td>
<td>1.111</td>
<td>3.239</td>
</tr>
<tr>
<td></td>
<td>EMO → ASI → BCS (a'c)</td>
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<td>.320</td>
<td></td>
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<td>.007</td>
<td>.190</td>
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<td>3</td>
<td>ASI3 → PROB (b)</td>
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<td>1.671</td>
<td>.095</td>
<td>.019</td>
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<td>EMO → PROB (c)</td>
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<td>2.366</td>
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<tr>
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<td>EMO → ASI → PROB (a'c)</td>
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<td>.018</td>
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<td>.017</td>
<td>.001</td>
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Note. Path is identified in parenthesis with corresponding letter (a,b, or c'). Path a is equal across all models; therefore, it presented only in the model with Y1 to avoid redundancies. The standard error and 95% CI for a’b are obtained by bootstrap with 10,000 re-samples. EMO (emotional disorder, independent variable: X), ASI3 (anxiety sensitivity) is the mediator; M1 and FTND (Fagerström Test for Nicotine Dependence total score: Y1), BCS (Barriers to Smoking Cessation total score: Y2), and PROB (number of quit problems experienced: Y3) are the outcomes. CI (lower) = lower bound of a 95% confidence interval, CI (upper) = upper bound; → = affects.
period of time (i.e., past month). It is worth noting that among the smokers with no current anxiety or depressive psychopathology, 21.5% (n = 66) and 4.9% (n = 15) met criteria for past mood and anxiety disorders, respectively. Future research could benefit by directly exploring the degree of specificity in the link between anxiety sensitivity and specific emotional disorders and smoking, as well as include additional characterizations of remission status.

Overall, the present study served as an initial investigation into the nature of the association between emotional disorder, anxiety sensitivity, and an array of clinically relevant smoking processes among adult treatment-seeking smokers. Based on these data, future work is needed to explore the extent to which anxiety sensitivity accounts for relations between emotional disorders and other smoking processes (e.g., withdrawal, cessation outcome) so as to further inform clinical assessment and intervention development/refinement for this high-risk group of smokers.

References


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