Published in final edited form as:

J Nerv Ment Dis. 2009 February ; 197(2): 111–116. doi:10.1097/NMD.0b013e3181961683.

Negative Affectivity as a Moderator of the Association Between Smoking Status and Anxiety Sensitivity, Anxiety Symptoms, and Perceived Health Among Young Adults

Alison C. McLeish, PhD^{*}, Michael J. Zvolensky, PhD[†], Erin C. Marshall, BA[†], and Teresa M. Leyro, BA[†]

^{*}Department of Psychiatry and Human Behavior, University of Mississippi Medical Center, Jackson, Mississippi;

[†]Department of Psychology, The University of Vermont, Burlington, Vermont.

Abstract

The present investigation evaluated the moderational role of negative affectivity in the relation between smoking status and panic-relevant symptoms in a young adult sample ($n = 222$; 123 females; mean age = 22.45 years, $SD = 8.08$). Consistent with the prediction, negative affectivity moderated the association of smoking status with anxious arousal symptoms, anxiety sensitivity, and perceived health. Specifically, greater negative affectivity was associated with higher levels of anxious arousal and anxiety sensitivity and lower levels of perceived health among smokers compared to nonsmokers. The effects were evident after controlling for the variance accounted for by alcohol use problems and gender. Findings are discussed with regard to the role of negative affectivity in the relation between smoking and panic-related processes.

Keywords

Smoking; negative affectivity; anxiety; anxiety sensitivity; perceived health

There has been increased recognition that psychiatric symptoms and disorders co-occur at elevated rates among smokers compared with nonsmokers (Lasser et al., 2000). Although past work examining smoking-psychopathology relations has principally focused on schizophrenia, attention deficit problems, and depression (Kalman et al., 2005), scholars have increasingly extended such work to anxiety symptoms and disorders (Morissette et al., 2007). One promising line of inquiry has focused on exploring the role of smoking in the severity and onset and maintenance of panic psychopathology. This corpus of work has indicated that daily smoking is associated with greater severity of anxiety symptoms and panic attacks (Zvolensky et al., 2003), an increased risk for developing panic attacks and panic disorder (Breslau and Klein, 1999; Isensee et al., 2003), as well as increases in the levels of anticipatory anxiety about panic episodes over time (McLeish et al., 2007).

Although this work suggests a clinically relevant association between daily smoking and panic-relevant symptoms, considerably less scientific attention has focused on the individual difference factors that qualify such relations. Thus, there is little knowledge about the individual-based factors that alter the strength or direction of the relation between smoking and panic psychopathology processes. One possible individual difference candidate for better understanding the smoking-panic association is negative affectivity, reflecting a generalized tendency to experience a wide range of negative affect states. A large body of empirical work suggests personality variables that reflect a generalized disposition to experience negative affect provide a common and relatively stable diathesis for anxiety- and mood-related disorders (Brown et al., 1998; Trull and Sher, 1994). Such personality variables are largely genetically based, arise early in the developmental lifespan, and may confer risk for cigarette smoking (Lerman et al., 1999).

Negative affectivity is relevant to panic disorder, specifically in the sense that contemporary models of the etiology of the disorder posit that a generalized tendency to experience negative affect may enhance the tendency to develop conditioned emotional responses to bodily cues (Bouton et al., 2001). Empirical study of negative affectivity with regard to smoking-panic relations, however, is unfortunately limited. Of the few studies in this domain, one addressed the role of neuroticism in the relation between panic and smoking (Goodwin and Hamilton, 2002). Results indicated that negative affectivity was a significant predictor of the co-occurrence of panic disorder and smoking, suggesting that this factor may be a shared vulnerability for the co-occurrence of these problems. In another study, negative affectivity was found to moderate the effects of maximum smoking frequency on lifetime history of panic disorder after controlling for drug dependence, alcohol dependence, major depression, dysthymia, and gender (Zvolensky et al., 2006a). These effects were specific to panic disorder, as no such moderational effects were apparent for other anxiety disorders. Such findings suggest that there may be segments of the smoking population who are at a relatively greater risk for panic-related problems by virtue of individual differences in the tendency to experience negative affect.

Given these findings, there is merit to further exploring the role of negative affectivity in smoking-panic relations. Smoking promotes a number of aversive internal sensations, including with drawal symptoms, cardiopulmonary impairment, and respiratory irritations, as well as medical diseases (USDHHS, 2004). Among individuals with high levels of negative affectivity, such sensations are likely to produce heightened negative emotional responses and would increase the likelihood that the individual would develop conditioned negative emotional responses to these internal cues (Bouton et al., 2001). Specifically, negative affectivity may increase the likelihood that such internal cues will be experienced with greater levels of fear and anxiety, thereby increasing the risk for developing panic-related problems via interoceptive conditioning (Barlow, 2002; Bouton et al., 2001).

An individual with high negative affectivity experiencing internal cues related to smoking would therefore be exposed to more frequent and intense aversive interoceptive learning trials. In this manner, smoking-related cues concerning somatic arousal or other interoceptive experiences are more likely to become phobic stimuli (Barlow, 2002; Bouton et al., 2001). Additionally, individuals experiencing negative physical sensations as

especially distressing and intense may be more likely to rate their health as poor (Gregor et al., 2005). Thus, smokers compared with nonsmokers high in negative affectivity may be more apt to experience elevated levels of anxiety, fears of the negative consequences of internal sensations (anxiety sensitivity), and lower levels of perceived health.

Together, the goal of the current study was to extend extant research on the negative affectivity-smoking interaction to a between-subjects perspective (smoker vs. nonsmoker). It was hypothesized that, after accounting for the variance associated with gender and alcohol use problems, negative affectivity would moderate the relation between smoking status and panic-relevant variables (anxiety sensitivity, anxiety symptoms, and perceived health). Specifically, it was expected that smokers high in negative affectivity would report the highest levels of anxiety sensitivity and anxiety symptoms, and the lowest levels of perceived health.

METHODS

Participants

The sample consisted of 222 young adults (123 women; $M_{\text{age}} = 22.45$ years, $SD = 8.08$) from a community from greater Burlington, VT. The racial composition of the studied sample generally reflected that of the local population (State of Vermont Department of Health, 2006): approximately 94% of the sample was white, 2% African-American, 1% Hispanic, 2% Asian, and 1% other. Approximately half of the sample (46.8%; $n = 104$) were daily smokers, with an average daily smoking rate of 17.59 cigarettes ($SD = 7.03$). Participants who were smokers had smoked cigarettes daily for an average of 9 ($SD = 10.5$) years, began cigarette smoking at a mean age of 13.49 ($SD = 2.93$) years, and considered themselves daily smokers by a mean age of 15.86 ($SD = 2.84$) years. The average level of nicotine dependence, as indexed by the Fagerström Test for Nicotine Dependence (FTND; Heatherton et al., 1991) was 3.38 ($SD = 1.81$); this reflects a low level of overall nicotine dependence (Heatherton et al., 1991).

Participants were administered the Structured Clinical Interview for DSM-IV Axis I Disorders-Non-Patient Edition by trained raters (First et al., 1995). The participants reported the following history of (current or past) psychiatric problems: 10% had major depressive disorder, 5% had post-traumatic stress disorder, 2% had social phobia, 2% had generalized anxiety disorder, and 1% had obsessive-compulsive disorder. Participants with a diagnosis of panic disorder were excluded from the study as the aim of the study was to examine these processes from an etiological framework. If smokers with panic disorder were included in the present investigation, it would not be possible to rule out whether any observed effects are attributable to such conditions rather than the smoking rate by negative affectivity interaction.

Measures

Structured Clinical Interview for DSM-IV Axis I Disorders–Non-Patient Edition

The Structured Clinical Interview for DSM-IV Axis I Disorders–Non-Patient SCID-NP (First et al., 1995) is a well-established diagnostic interview for psychiatric problems. The interview was administered to determine participants' history of psychiatric problems.

Smoking History Questionnaire

Smoking history and pattern were assessed with the Smoking History Questionnaire (Brown et al., 2002), which includes items pertaining to smoking status, rate, age of onset at initiation, and years of being a daily smoker. The Smoking History Questionnaire has been successfully used in previous studies and has been identified as a psychometrically sound descriptive measure of smoking history (Zvolensky et al., 2005).

Alcohol Use Disorders Identification Test

The Alcohol Use Disorders Identification Test (AUDIT) is a 10-item screening measure developed by the World Health Organization to identify individuals with alcohol problems (Babor et al., 1992). There is a large body of literature indicating that AUDIT has strong and well-established psychometric properties (Saunders et al., 1993). The total score on the AUDIT was used in the present investigation as an index of alcohol use problems.

Positive Affect Negative Affect Schedule

The Positive Affect Negative Affect Schedule (PANAS) is a mood measure commonly used in psychopathology research (Watson et al., 1988). A large body of literature supports the validity of PANAS (Watson, 2000). Only the negative affectivity scale (PANAS-NA) was used in this study.

Anxiety Sensitivity Index

The Anxiety Sensitivity Index (ASI; Reiss et al., 1986) is a well-validated measure that assesses the degree to which participants fear negative consequences stemming from anxiety symptoms. Previous research indicates that the ASI is made up of 1 higher-order factor and 3 lower-order factors: physical, psychological, and social concerns (Rodriguez et al., 2004). In the present investigation, we used the total ASI score, as it represents the global-order AS factor and therefore takes into consideration different types of fears, including fears of panic-related somatic, cognitive, and social cues.

Mood and Anxiety Symptom Questionnaire

The Mood and Anxiety Symptom Questionnaire (MASQ) is a measure of affective symptoms with well-established psychometric properties (Watson et al., 1995). The MASQ Anxious Arousal scale (MASQ-AA) measures the symptoms of somatic tension and arousal (e.g., felt dizzy) and was used in the present investigation as an empirically sound and specific composite for “pure” anxiety symptoms (Watson et al., 1995).

Short-Form General Health Survey

The short-form General Health Survey (GHS) measures individuals' perceptions of their health status and functional limitations (Stewart et al., 1988). Because of the specific relevance of the construct to our hypotheses, only the perceived physical health subscale (PGH) of the GHS was examined in this study. Sample items from the PGH subscale include "I am somewhat ill" and "I am healthy," rated on a 5-point Likert scale (1 = definitely true to 5 = definitely false). The GHS has demonstrated adequate reliability and validity (Stewart et al., 1988).

Procedure

Participants responding to community-based advertisements for a research study focused on emotion were scheduled for an individual appointment by a trained research assistant. After providing informed, written consent, participants were administered the structured clinical interview and were then asked to complete a self-report battery to assess smoking and affect-related variables. Upon completion of the study, participants were debriefed regarding the aims of the study and compensated \$20 for their efforts.

Analytic Approach

The main and interactive effects of smoking status and negative affectivity for the primary dependent variables were evaluated using a hierarchical multiple regression procedure (Cohen and Cohen, 1983). Separate models were constructed for predicting anxiety sensitivity, anxious arousal, and perceived general health. Gender and alcohol use problems were simultaneously entered as covariates at step one in the model to control for these theoretically relevant factors. At the second step in the model, the main effects for smoking status (smoker/nonsmoker) and negative affectivity (mean-centered) were simultaneously entered into the model to estimate the amount of variance accounted for by these variables individually. At the third step, the interaction term between smoking status and negative affectivity was entered into the model (Baron and Kenny, 1986).

RESULTS

Zero-Order Associations Among the Predictor Variables

Table 1 presents associations among predictor and criterion variables as well as means and standard deviations of these variables. Smoking status was significantly associated with negative affectivity ($r = 0.19$, $p < 0.01$) and all of the criterion variables (range: 0.29–0.41). Negative affectivity was also significantly associated with all of the criterion variables (range: 0.56–0.65).

Regression Equations

The results of the 3 regression analyses are presented in Table 2. For anxiety sensitivity, the first step accounted for 1.8% of the variance. Alcohol use problems was not a significant predictor at step 1; however, there was a nonsignificant trend for gender ($p = 0.052$). Step 2 of the model predicted 44.3% of unique variance. There were significant main effects for

smoking status and negative affectivity. As hypothesized, the interaction between negative affectivity and smoking status significantly predicted anxiety sensitivity above and beyond steps 1 and 2 in the model; the interaction accounted for 1.8% of unique variance.

In regard to anxious arousal, the first step accounted for 3% of the variance. Gender was not a significant predictor at step 1; however, there was a nonsignificant trend for alcohol use problems predicting anxious arousal ($p = 0.052$). Step 2 accounted for 38.5% of unique variance, with significant main effects for both smoking status and negative affectivity. As predicted, the interaction between negative affectivity and smoking status significantly predicted anxious arousal symptoms above and beyond steps 1 and 2 in the model; the interaction accounted for 2% of unique variance.

In regard to perceived general health, step 1 of the model accounted for 0.7% of unique variance; there were no significant predictors at step 1 of the model. Step 2 accounted for 41.1% of unique variance, with significant main effects for both smoking status and negative affectivity. As hypothesized, the interaction between negative affectivity and smoking status significantly predicted perceived general health above and beyond steps 1 and 2 in the model; the interaction accounted for 2.8% of unique variance.

Graphical Representation of the Statistically Significant Interactions

Significant interactions were examined in regard to the hypothesized moderation both graphically (Cohen and Cohen, 1983) and analytically (Holmbeck, 2002) to determine direction and significance. First, on the basis of the recommendations of Cohen and Cohen (1983), the form of these interactions was examined by inserting specific values for each predictor variable into the regression equations associated with the described analysis. Figures 1, 2, and 3 present the form of the interactions that generally supported our hypotheses. Specifically, having a positive smoking status combined with higher levels of negative affectivity was associated with greater anxiety sensitivity (Fig. 1) and anxious arousal (Fig. 2), and lower levels of perceived general health (Fig. 3) in comparison with being high on only one or neither of these factors. Furthermore, on the basis of recommendations of Holmbeck (2002), probing analyses were conducted on the data to examine moderation. Results indicated that, as expected, anxiety sensitivity was higher among smokers when negative affectivity was high ($t = 4.09$, $\beta = 0.31$, $p < 0.01$). A similar pattern was evident for anxious arousal symptoms ($t = 4.30$, $\beta = 0.34$, $p < 0.01$). Lastly, as expected, perceived health was lowest among smokers when negative affectivity was high ($t = -6.50$, $\beta = -0.50$, $p < 0.01$).

DISCUSSION

The purpose of the present study was to examine whether negative affectivity may moderate the association between smoking status and panic-relevant variables. Consistent with prediction, there was a significant interactive effect between negative affectivity and smoking status in regard to anxiety sensitivity, anxious arousal symptoms, and perceived health. Inspection of the form of these interactions indicated that smokers high in negative affectivity reported the highest levels of anxiety sensitivity and anxious arousal (Figs. 1 and 2) and the lowest levels of perceived health (Fig. 3). These significant interactive effects,

ranging in size from 2% to 3% of unique variance, were above and beyond variance accounted for by theoretically relevant covariates as well as the respective main effects. Thus, there was overarching consistency in this crosssectional study that negative affectivity is an important individual difference factor in terms of better understanding the relation between cigarette smoking and panic-relevant processes among young adults. The potential clinical significance of the observed effects should be understood within the context in which they were examined, namely, after controlling for the variance associated with a number of theoretically relevant factors (range, 41%–46%). Overall, these findings are consistent with those of previous research examining the role of negative affectivity in the smoking-panic disorder association among daily smokers (Zvolensky et al., 2006a) and extends it to a between-subjects model (smoker vs. nonsmoker).

Although not the primary study objective, it is noteworthy that negative affectivity and smoking status shared little variance with one another (Table 1; $r = 0.19$, 3% shared variance). This finding is important because it indicates that these 2 factors are tapping different types of processes. This finding, in conjunction with the documented interaction, suggests that it may be fruitful to target daily smokers high in negative affectivity as an “at risk population” for developing future panic psychopathology. For example, by employing integrated smoking-panic intervention protocols among high negative affectivity smokers before they have developed panic psychopathology, it may be possible to prevent the future development of such problems (Zvolensky et al., 2006b). Indeed, a primary implication of the present findings is that there may be segments of the cigarette smoking population who are at a relatively greater risk for concurrent anxiety symptoms and panic-related beliefs by virtue of daily cigarette smoking and individual differences in negative affectivity. The identification of such effects is clinically important as it helps to refine our understanding of complex associations between drug behavior and panic vulnerability.

There are a number of interpretive caveats and directions for future study that warrant comment. First, the present cross-sectional design does not permit causal-oriented hypothesis testing. Although we attempted to strengthen confidence in the observed findings by controlling for alcohol use problems and gender, the direction of the observed relations cannot be unambiguously determined. Thus, the present data will need to be extended to vulnerability across settings and longer time periods. For example, future research could usefully evaluate whether the negative affectivity by smoking status interaction predicts the future development of panic symptoms and clinical status, using prospective or laboratory-based methodologies. Research could also document whether negative affectivity and cigarette smoking predict panic attack symptoms, using biological challenge procedures or across time, using multiple assessments over time (e.g., baseline, 12-month, 24-month). Second, given that the present sample, by virtue of selection criteria, comprised young adults, the findings may not be generalizable to all segments of society and need to be replicated in other samples (e.g., clinical samples with higher levels of symptomatology). Third, due to the well-documented link between smoking and alcohol use problems and panic psychopathology, we covaried for alcohol use problems in the current study. However, empirical research indicates that smoking is correlated with other types of drug/alcohol use and problems (Amos et al., 2004) and individuals with panic-related problems may use multiple psychoactive substances (Zvolensky et al., 2006b). Thus, a key issue to address in

future research is whether and how other types of substances (e.g., marijuana) affect the negative affectivity-panic association, and how polysubstance use relates to panic vulnerability. Lastly, information on medical problems was not collected for the current sample. It will be important for future studies to covary for medical problems to insure that the observed effects are not attributable to physical problems.

Acknowledgments

Support for Dr. Zvolensky from National Institute on Drug Abuse research grants 1 R01 DA018734-01A1, R03 DA16307-01, and 1 R21 DA016227-01.

REFERENCES

- Amos A, Wiltshire S, Bostock Y, Haw S, McNeill A (2004) "You can't go without a fag. You need it for your hash"- a qualitative exploration of smoking, cannabis and young people. *Addiction*. 99:77–81. [PubMed: 14678065]
- Babor TF, de la Fuente JR, Saunders J, Grant M (1992) *The Alcohol Use Disorders Identification Test: Guidelines for Use in Primary Care*. WHO Publication No. 92.4, Geneva, Switzerland: World Health Organization.
- Barlow D (2002) *Anxiety and Its Disorders: The Nature and Treatment of Anxiety and Panic* (2nd ed). New York (NY): Guilford Press.
- Baron RM, Kenny DA (1986) The moderator-mediator variable distinction in social psychological research: conceptual, strategic and statistical considerations. *J Pers Soc Psychol*. 51:1173–1182. [PubMed: 3806354]
- Bouton M, Mineka S, Barlow D (2001) A modern learning theory perspective on the etiology of panic disorder. *Psychol Rev*. 108:4–32. [PubMed: 11212632]
- Breslau N, Klein DF (1999) Smoking and panic attacks: An epidemiologic investigation. *Arch Gen Psychiatry*. 56:1141–1147. [PubMed: 10591292]
- Brown R, Lejuez C, Kahler C, Strong D (2002) Distress tolerance and duration of past smoking cessation attempts. *J Abnorm Psychol*. 111:180–185. [PubMed: 11866171]
- Brown TA, Chorpita BF, Barlow DH (1998) Structural relationships among dimensions of the *DSM-IV* anxiety and mood disorders and dimensions of negative affect, positive affect and autonomic arousal. *J Abnorm Psychol*. 107:179–192. [PubMed: 9604548]
- Cohen J, Cohen P (1983) *Applied Multiple Regression/Correlation Analysis for the Behavioral Sciences*. Hillsdale, (NJ): Erlbaum.
- First MB, Spitzer RL, Gibbon M, Williams JBW (1995) *Structured Clinical Interview for DSM-IV Axis I Disorders- Non-Patient Edition*. New York (NY): New York State Psychiatric Institute.
- Goodwin R, Hamilton S (2002) Cigarette smoking and panic: The role of neuroticism. *Am J Psychiatry*. 159:1208–1213. [PubMed: 12091201]
- Gregor KL, Zvolensky MJ, Yartz AR (2005) Perceived health among individuals with panic disorder: Association with affect vulnerability and psychiatric disability. *J Nerv Ment Dis*. 193:697–699. [PubMed: 16208168]
- Heatherton T, Kozlowski L, Frecker R, Fagerström K (1991) The Fagerström Test for Nicotine Dependence: A revision of the Fagerström Tolerance Questionnaire. *Br J Addict*. 86:1119–1127. [PubMed: 1932883]
- Holmbeck GN (2002) Post-hoc probing of significant moderational and mediational effects in studies of pediatric populations. *J Pediatr Psychol*. 27:87–96. [PubMed: 11726683]
- Isensee B, Wittchen H-U, Stein MB, Höfler M, Lieb R (2003) Smoking increases the risk of panic: Findings from a prospective community study. *Arch Gen Psychiatry*. 60:692–700. [PubMed: 12860773]
- Kalman D, Morissette SB, George TP (2005) Co-morbidity of smoking and psychiatric and substance use disorders. *Am J Addict*. 14:106–123. [PubMed: 16019961]

- Lasser K, Boyd JW, Woolhandler S, Himmelstein DU, McCormick D, Bor DH (2000) Smoking and mental illness: A population-based prevalence study. *JAMA*. 284:2606–2610. [PubMed: 11086367]
- Lerman C, Caporaso NE, Audrain J, Main D, Bowman ED, Lockshin B, Boyd NR (1999) Evidence suggesting the role of specific genetic factors in cigarette smoking. *Health Psychol*. 18:14–20. [PubMed: 9925041]
- McLeish AC, Zvolensky MJ, Bucossi MM (2007) Interaction between smoking rate and anxiety sensitivity: Relation to anticipatory anxiety and panic-relevant avoidance among daily smokers. *J Anxiety Disord*. 21:849–859. [PubMed: 17166696]
- Morissette SB, Tull MT, Gulliver SB, Kamholz BW, Zimering RT (2007) Anxiety, anxiety disorders, tobacco use and nicotine: A critical review of interrelationships. *Psychol Bull*. 133:245–272. [PubMed: 17338599]
- Reiss S, Peterson RA, Gursky M, McNally RJ (1986) Anxiety, sensitivity, anxiety frequency and the prediction of fearfulness. *Behav Res Ther*. 24:1–8. [PubMed: 3947307]
- Rodriguez BF, Bruce SE, Pagano ME, Spencer MA, Keller MB (2004) Factor structure and stability of the Anxiety Sensitivity Index in a longitudinal study of anxiety disorder patients. *Behav Res Ther*. 42:79–91. [PubMed: 14744525]
- Saunders JB, Aasland OG, Babor TF, de la Fuente JR, Grant M (1993) Development of the AUDIT: WHO collaborative project on early detection of persons with harmful alcohol consumption–II. *Addiction*. 88:791–804. [PubMed: 8329970]
- State of Vermont Department of Health (2006) 2005 Vermont population estimates. Available at: <http://healthvermont.gov/research/2005pop/RACENOTE05.PDF>. Accessed October 18, 2007.
- Stewart A, Hays RD, Ware JE (1988) The MOS short-form general health survey: Reliability and validity in a patient population. *Med Care*. 26:724–735. [PubMed: 3393032]
- Trull T, Sher K (1994) Relationship between the five-factor model of personality and Axis I disorders in a nonclinical sample. *J Abnorm Psychol*. 103:350–360. [PubMed: 8040504]
- U.S. Department of Health and Human Services (2004) The Health Consequences of Smoking: A Report of the Surgeon General. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Disease Prevention and Health Promotion, Office on Smoking and Health.
- Watson D (2000) *Mood and Temperament* New York (NY): Guilford Press.
- Watson D, Clark LA, Tellegen A (1988) Development and validation of brief measures of positive and negative affect: The PANAS scales. *J Pers Soc Psychol*. 54:1063–1070. [PubMed: 3397865]
- Watson D, Clark LA, Weber K, Assenheimer JS, Strauss ME, McCormick RA (1995) Testing a tripartite model: II. Exploring the symptom structure of anxiety and depression in student, adult and patient samples. *J Abnorm Psychol*. 104:15–25. [PubMed: 7897037]
- Zvolensky MJ, Sachs-Ericsson N, Feldner MT, Schmidt NB, Bowman CJ (2006a) Neuroticism moderates the effect of maximum smoking level on lifetime panic disorder: A test using an epidemiologically defined national sample of smokers. *Psychiatry Res*. 141:321–332. [PubMed: 16499972]
- Zvolensky MJ, Schmidt NB, Antony MM, McCabe RE, Forsyth JP, Feldner MT, Leen-Feldner E, Karekla M, Kahler CW (2005) Evaluating the role of panic disorder in emotional sensitivity processes involved with smoking. *J Anxiety Disord*. 19:673–686. [PubMed: 15927780]
- Zvolensky MJ, Schmidt NB, Bernstein A, Keough ME (2006b) Risk-factor research and prevention programs for anxiety disorders: A translational research framework. *Behav Res Ther*. 44:1219–1239. [PubMed: 16867299]
- Zvolensky MJ, Schmidt NB, McCreary BT (2003) The impact of smoking on panic disorder: An initial investigation of a pathoplastic relationship. *J Anxiety Disord*. 17:447–460. [PubMed: 12826091]

FIGURE 1.

Anxiety sensitivity as a function of negative affectivity and smoking status among nonsmokers and smokers one standard deviation above and/or below the total sample mean for negative affectivity.

FIGURE 2.

Anxious arousal as a function of negative affectivity and smoking status among nonsmokers and smokers one standard deviation above and/or below the total sample mean for negative affectivity.

FIGURE 3.

Perceived general health as a function of negative affectivity and smoking status among nonsmokers and among smokers one standard deviation above and/or below the total sample mean for negative affectivity.

TABLE 1.

Descriptive Data and Intercorrelations Among Predictor and Criterion Variables

	1	2	3	4	5	6	7	M	SD
Gender	—	−0.07	−0.16*	0.12	0.13	0.11	−0.06	—	—
Alcohol	—	—	0.11	0.05	0.03	0.12	−0.05	12.6	7.13
Smoking status	—	—	—	0.19**	0.29**	0.29**	−0.41**	—	—
PANAS-NA	—	—	—	—	0.65**	0.61**	−0.56**	19.5	7.34
ASI	—	—	—	—	—	0.64**	−0.53**	19.6	12.9
MASQ-AA	—	—	—	—	—	—	−0.53**	25.1	8.03
PGH	—	—	—	—	—	—	—	73.3	18.7

* Correlation significant at 0.05 level;

** correlation significant at 0.01 level.

Gender: 1 = male, 2 = female; Alcohol: Alcohol Use Disorders Identification Test (Babor et al., 1992); Smoking status: 0 = nonsmoker, 1 = smoker.

TABLE 2.
Smoking Status by Negative Affectivity Predicting Anxiety Sensitivity, Anxiety Symptoms, and Perceived General Health

	R^2	t (Each Predictor)	β	sr^2	p
Criterion variable: anxiety sensitivity					
Step 1	0.02				ns
Gender		1.95	0.13	0.02	0.052
Alcohol use		0.60	0.04	0.00	ns
Step 2	0.44				<0.01
Smoking status		3.61	0.19	0.06	<0.01
Negative affectivity		11.74	0.61	0.39	<0.01
Step 3	0.02				<0.01
Negative affectivity X smoking status		2.70	0.23	0.03	<0.01
Criterion variable: anxiety symptoms					
Step 1	0.03				<0.05
Gender	1.82	0.12	0.01	ns	
Alcohol use	1.96	0.13	0.02	0.052	
Step 2	0.38				
Smoking status		3.49	0.19	0.05	<0.01
Negative affectivity		10.38	0.56	0.33	<0.01
Step 3	0.02				<0.01
Negative affectivity X smoking status		2.75	0.25	0.03	<0.01
Criterion variable: perceived general health					
Step 1	0.01				ns
Gender		-1.00	-0.07	0.00	ns
Alcohol use		-0.83	-0.06	0.00	ns
Step 2	0.41				<0.01
Smoking status		-6.11	-0.32	0.15	<0.01
Negative affectivity		-9.30	-0.50	0.28	<0.01
Step 3	0.03				<0.01
Negative affectivity X smoking status		-3.30	-0.29	0.05	<0.01

β = standardized beta weight; sr^2 = squared partial correlation.

Gender: 1 = male, 2 = female; Alcohol Use Disorders Identification Test (Babor et al., 1992); Smoking status: 0 = nonsmoker, 1 = smoker.

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript