Original investigation

The Role of Anxiety Sensitivity in the Relation Between Trait Worry and Smoking Behavior

Hyaneyoung Olvera¹, Jafar Bakhshaie MD¹, Lorra Garey BA¹, Charles Jardin MDiv¹, Norman B. Schmidt PhD², Michael J. Zvolensky PhD^{1,3}

¹Department of Psychology, University of Houston, Houston, TX; ²Department of Psychology, Florida State University, Tallahassee, FL; ³Department of Behavioral Sciences, University of Texas MD Anderson Cancer Center, Houston, TX

Corresponding Author: Jafar Bakhshaie, MD, Department of Psychology, University of Houston, 126 Heyne Building, Houston, TX 77204, USA. Telephone: 713-743-8056; Fax: 713-743-8588; E-mail: jafar.bakhshaie@gmail.com

Abstract

Introduction: Smoking and anxiety disorders frequently co-occur. Trait worry is a core symptom of anxiety disorders. While research suggests worry processes may be important to certain smoking behaviors, the mechanisms explicating these relations remain unknown.

Method: The current study examined anxiety sensitivity (AS) as a potential mediator for the relation between trait worry and number of years being a daily smoker, latency to first cigarette of the day, smoking rate, heaviness of smoking, and nicotine dependence among treatment-seeking daily smokers ($N = 376$; 47% female; $M_{\text{age}} = 37.76$, $SD = 13.46$).

Results: Consistent with prediction, AS significantly mediated the relations between trait worry and the studied smoking variables.

Conclusion: The present findings suggest it may be useful to clinically address AS among worry-prone, treatment-seeking daily smokers in order to address smoking behavior.

Introduction

Smoking and anxiety disorders frequently co-occur.¹ Robust empirical evidence suggests that elevated anxiety symptoms and their clinical disorders decrease quit success,² increase severity of tobacco withdrawal,³ and contribute to maladaptive cognitive beliefs and cognitive-affective reactions to tobacco.⁴ Additionally, smoking can increase the risk for anxiety disorders⁵ and exacerbate the severity of anxiety symptoms.⁶ Although considerable extant work has concentrated on the association of anxiety symptoms and disorders with smoking, far less scholarly effort has focused on the processes contributing to smoking behavior itself (e.g., severity of nicotine dependence, longevity of smoking career).

Trait worry, which reflects excessive, unrealistic thoughts focused on the possibility of future negative events,^{7,8} is a core symptomatic feature of anxiety disorders.⁹ Trait worry is most strongly associated with generalized anxiety disorder (GAD; Ruscio¹⁰). Notably, individuals with GAD are approximately twice as likely to smoke relative

to individuals without this disorder,¹¹ report higher nicotine dependence,¹² and demonstrate lower success in quitting.² Also, heavy smoking (more than 20 cigarettes per day) in adolescence increases the risk for developing GAD,¹³ and smoking onset tends to precede GAD onset.¹⁴ Both theoretical and empirical evidence indicate that trait worry is a distinct psychological construct from GAD as well as other anxiety symptoms.¹⁵ Moreover, trait worry is associated with smoking to reduce negative affect, stronger beliefs that smoking will reduce negative affect, and greater perceived barriers for quitting.⁴

While worry processes may be important to certain smoking behaviors, the mechanisms explicating these relations remain unknown. This limitation is unfortunate, as there exists a growing recognition that how one responds to aversive internal or emotional states may play a pivotal role in smoking processes.^{16,17} A promising construct to better understand the worry-smoking relation is anxiety sensitivity (AS). AS is an individual difference factor related to sensitivity to aversive internal states of anxiety.¹⁸ AS has been implicated in the development and maintenance of panic attacks,

anxiety/depressive symptoms, and other emotional disorders.^{19–24} AS is empirically and theoretically distinguishable from trait or state anxiety symptoms, including worry and other negative affect states (e.g., depression; Floyd et al.²⁵ and Rapee and Medoro²⁶).

Recent research suggests AS is related to smoking. For example, higher levels of AS are associated with smoking motives to reduce negative affect^{27,28} and negative affect reduction expectancies.²⁹ Higher levels of AS are also predictive of greater increases in positive affect pre- to post-cigarette use³⁰ and cigarette smoking after stressful situations that reduce subjective anxiety.^{31,32} Smokers with higher AS perceive quitting as more difficult,²⁹ experience more intense nicotine withdrawal during the early phases of quitting,³³ and smoke in an inflexible manner during stressful situations.³⁴ While elevated AS predicts greater odds of early lapse³⁵ and relapse,³⁶ reductions in AS appear to be related to increased rates of cessation success.^{37,38}

It is unclear whether AS may maintain an explanatory role in worry-smoking relations. Theoretically, it is possible that smokers with an elevated tendency to worry may be more likely to experience visceral anxiety (e.g., AS) because smoking behavior itself produces many salient and aversive internal sensations (e.g., withdrawal symptoms, respiratory impairment, physical illness) and AS, in turn, contributes to more severe smoking behavior.³⁵ To test this research question, we examined, among treatment-seeking daily smokers, whether AS explained the relations between trait worry and number of years being a daily smoker, latency to first cigarette of the day, smoking rate, a “heaviness” of smoking index, and nicotine dependence.

Method

Participants

The sample consisted of 376 treatment-seeking adult daily smokers (47% female; $M_{age} = 37.76$; $SD = 13.46$; age range: 18–65 years) who reported smoking at least eight cigarettes a day and had been smoking during the past year (mean of breath CO = 21 parts per million, $SD = 11.8$; Brown et al.³⁹). Exclusion criteria included suicidality and psychosis. The racial and ethnic distribution of this sample was as follows: 88.3% identified as White/Caucasian; 5.9% as Black/Non-Hispanic; 0.5% as Black/Hispanic; 2.4% as Hispanic; 0.80% as Asian; and 2.1% as “Other.” Within the sample, 42.4% met criteria for at least one past year Axis I diagnosis; the most common diagnoses were social anxiety disorder (9.9%), current major depressive episode (4%), posttraumatic stress disorder (3.5%), and GAD (3.5%). Participants reported smoking an average of 18.6 cigarettes per day ($SD = 9.4$; range = 8–85), smoking their first cigarette at 14.7 years of age ($SD = 3.4$), and smoking regularly at 17.2 years of age ($SD = 3.5$). The average score on the Fagerström Test for Nicotine Dependence (FTND; Heatherton et al.⁴⁰) was 5.5 ($SD = 2.2$), indicating moderate overall levels of nicotine dependence.

Measures

Demographics Questionnaire

Demographic information collected included gender, age, race, educational level, marital status, and employment status.

Structured Clinical Interview-Non-Patient Version for DSM-IV

Diagnostic assessments of past year Axis I psychopathology were conducted using the Structured Clinical Interview-Non-Patient Version for DSM-IV (SCID-I/NP),⁴¹ which were administered by

trained research assistants or doctoral-level staff and supervised by independent doctoral-level professionals. Interviews were audio-taped and the reliability of a random selection of 12.5% of interviews were checked (MJZ) for accuracy; no cases of (diagnostic coding) disagreement were noted.

Smoking History Questionnaire

The Smoking History Questionnaire (SHQ) is a self-report questionnaire used to assess smoking history (e.g., onset of regular daily smoking), 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; Brown et al.³⁹). In the present study, the SHQ was employed to describe the sample on smoking history and patterns of use.

Fagerström Test for Nicotine Dependence

The FTND is a 6-item scale that assesses gradations in tobacco dependence.⁴⁰ Scores range from 0 to 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.^{40,42} In the current sample, the FTND total score internal consistency was found to be acceptable (Cronbach’s $\alpha = .56$). For the present study, we used the following items as criterion variables: “How many minutes after you wake do you smoke your first cigarette?” and “How many cigarettes a day do you smoke?” Both items are scored between 0 and 3. Consistent with previous research,⁴³ these two items were used to create a “heaviness of smoking” index.

Medical History Form

A medical history checklist was used to assess current and lifetime medical illnesses and current use of prescribed medication. For current and lifetime medical illnesses, a composite variable was computed for the present study as an index of tobacco-related medical illnesses, 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 to create a total score (observed range from 0 to 4), with greater scores reflecting the occurrence of multiple markers of tobacco-related illnesses.

Alcohol Use Disorders Identification Test

The Alcohol Use Disorders Identification Test (AUDIT)⁴⁴ 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. In the present study, the AUDIT total score (AUDIT) internal consistency was good (Cronbach’s $\alpha = .84$).

Positive and Negative Affect Scale

The Positive and Negative Affect Scale (PANAS)⁴⁵ 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. The negative affectivity subscale (PANAS-NA) internal consistency was excellent in the present sample (Cronbach’s $\alpha = .90$).

Penn State Worry Questionnaire

The Penn State Worry Questionnaire (PSWQ)⁴⁶ is a 16-item measure of trait worry. Items are rated on a 5-point Likert-type scale (5 reverse-scored items) and assess the excessiveness and uncontrollability of worry (e.g., “Once I start worrying, I cannot stop”). This scale has demonstrated good psychometric properties, including internal consistency, test–retest reliability, and discriminate validity.^{9,46–48} The PSWQ demonstrated good internal consistency in the current sample (Cronbach’s $\alpha = .80$).

Anxiety Sensitivity Index-3

The Anxiety Sensitivity Index-3 (ASI-3)⁴⁹ is an 18-item measure derived from the ASI questionnaire. 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”). 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-3 has strong and improved psychometric properties relative to previous measures of the construct.⁴⁹ In the present investigation, internal constancy was excellent (Cronbach’s $\alpha = .93$).

Procedure

Adult daily smokers were recruited from the community to participate in a large randomized controlled dual-site clinical trial examining the efficacy of two smoking cessation interventions. Individuals responding to study advertisements were scheduled for an in-person, baseline assessment to evaluate 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. The study protocol was approved by the Institutional Review Board at each study site; all study procedures and treatment of human subjects were conducted in compliance with ethical standards of the American Psychological Association. The current study is based on secondary analyses of baseline (pretreatment) data for a subset of the sample, which was selected on the basis of complete data for all studied variables. These data have not been reported previously.

Data Analytic Strategy

The INDIRECT macro⁵⁰ was used to test the proposed mediation hypotheses. This macro is a computational tool for observed variable mediation analysis based on ordinary least squares regression which also uses bootstrapping technique to quantify the indirect effect. Bootstrapping is a nonparametric method of estimating the

sampling distribution of an estimator based on resampling with replacement. Using bootstrap method, the indirect effect (mediation pathway) will be computed for each of the samples and the results will be an empirically generated sampling distribution.^{51,52} The model included PSWQ as the predictor and ASI-3 as a potential mediator (see Figure 1). Separate models were conducted for the dependent variables. Covariates included gender, presentation of at least one past year Axis I disorder, PANAS-NA, AUDIT, past year nonalcoholic substance abuse or dependence, tobacco-related physical illness, and current use of prescribed medication. Simple delta method solution⁵³ using a SAS macro was also applied as another method to investigate the indirect effect CIs.⁵⁴ This method uses Taylor series approximation to estimate the SE of the constructed variable effect, which is applicable for both continuous and binary independent variables. This SE estimate can then be used to compute confidence limits for sampling variability of the effects of this variable. R^2 (coefficient of determination) was used to index the fit of each model. R^2 is the square of the coefficient of multiple correlation and measures how well the regression line correlates with the real data (i.e., model fit; Draper and Smith⁵⁵). The semipartial correlations calculated to depict the correlation between the residualized predictor and the criterion variable (after removing common variance with other predictors). The square of the semipartial can be interpreted as the proportion of the variance in criterion variable contributed uniquely by the predictor.⁵⁵ Five thousand bootstrap resamplings for CIs were conducted to detect the indirect effects of the proposed predictor on criterion variables through the proposed mediator (i.e., the product of the “beta coefficients” of “Path A” from predictor to mediator and “Path B” from mediator to criterion variable; Figure 1). For this investigation, based on recommendations for reducing type I error,^{56,57} percentile-based (PB) CIs was used. A bootstrap-CI for the product of the paths between predictor and mediator and the mediator and criterion variable, respectively, that does not include zero provides evidence of a significant indirect effect of the predictor on the criterion variable through the mediator.^{50,58} To present the relative impact of the indirect pathway, the fraction of the overall effect of PSWQ that was mediated (i.e., the product of the “beta coefficients” divided by total effects of predictor on criterion variable ($A*B/C$; Figure 1)) was calculated for each significant indirect effect.⁵⁰

Results

Descriptive data and fit indices of the all variables included in the models are presented in Table 1.

Figure 1. Proposed model: anxiety sensitivity as a potential mediator of the association between trait worry and smoking behaviors. Smoking criterion variables examined included: (a) number of years being a daily smoker; (b) smoking rate; (c) latency to first cigarette of the day; (d) “heaviness” of smoking; and (e) nicotine dependence.

Table 1. Zero-Order Correlations Among Theoretically Relevant Variables

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Mean or % (SD or gender)
1. Gender	–	.172**	.133*	–.135**	.016	.019	.236**	.103*	.008	–.054	–.023	.004	.248**	.090	47% (female)
2. Axis I disorder		–	.353**	.176**	.331**	.064	.098	–.061	.070	.025	.056	.073	.344**	.387**	42.4%
3. PANSA-NA			–	.237**	.159**	.012	.072	–.195**	–.041	.009	–.021	.029	.720**	.629**	19.00 (6.98)
4. AUDIT				–	.143**	–.104*	–.030	–.268**	–.108*	–.068	–.112*	–.111*	.092	.166**	5.89 (5.82)
5. Nonalcoholic substance					–	–.085	–.058	–.163**	.002	.014	.002	–.035	.080	.133*	7.5%
6. Tob-Med						–	.296**	.275**	–.018	–.014	–.018	–.033	–.042	.045	0.37 (0.63)
7. Medication							–	.370**	.045	.067	.068	.104*	.089	.087	46%
8. Years daily smoker								–	.215**	.288**	.296**	.325**	–.100	–.033	19.68 (13.28)
9. Latency to first cigarette									–	.396**	.859**	.791**	.035	.067	2.03 (0.88)
10. Smoking rate										–	.809**	.684**	.072	.103*	1.03 (0.76)
11. Heaviness of smoking											–	.886**	.062	.099	3.06 (1.37)
12. Nicotine dependence												–	.097	.57**	5.50 (2.16)
13. PSWQ													–	.55**	43.38 (14.26)
14. ASI-3														–	14.77 (12.10)

Axis I disorder: SCID-based diagnosis at least one past year Axis I disorder; PANAS-NA = sum of 10-item negative subscale of Positive and Negative Affect Scale (PANAS; Watson et al.⁴⁵); AUDIT = total score of the Alcohol Use Disorders Identification Test⁴⁶; Nonalcoholic substance = SCID-based diagnosis of past year nonalcoholic substance abuse or dependence; Tob-Med = Medical Screening Questionnaire; number of years being a daily smoker (SHQ; Brown et al.³⁹); Medication = current use of prescribed medication; Latency to first cigarette of the day; Smoking rate; Heaviness of smoking, and Nicotine dependence = Fagerström Test for Nicotine Dependence (FTND; Heatherton et al.⁴⁰); PSWQ = Penn State Worry Questionnaire⁴⁶; ASI-3 = Anxiety Sensitivity Index-III Total Score.⁴⁹

* $p < .05$; ** $p < .001$.

Table 2. Model Fit Indices for All Examined Criterion Variables

Criterion variable	ΔR^2 (<i>p</i> value)	Predictors	β	<i>t</i>	Sr ²
Number of years being a regular daily smoker	.31 (.001)	Gender	.025	1.53	.024
		Axis I disorder	-.011	-1.214	-.009
		PANSA-NA	-.242	-3.34	-.149
		AUDIT	-.192	-4.02	-.180
		Nonalcoholic substance	-.080	-1.65	-.074
		Tob-Med	.155	3.24	.145
		Medication	.319	6.6	.295
		PSWQ	.005	0.073	.003
		ASI-3	.125	2.1	.093
Latency to first cigarette of the day	.040 (.08)	Gender	-.039	-0.706	-.036
		Axis I disorder	.084	1.39	.071
		PANSA-NA	-.167	-2.004	-.103
		AUDIT	-.121	-2.202	-.113
		Nonalcoholic substance	-.004	-0.074	-.004
		Tob-Med	-.049	-0.888	-.046
		Medication	.057	0.992	.051
		PSWQ	.076	0.965	.049
		ASI-3	.118	1.709	.088
Smoking rate	.041 (.04)	Gender	-.108	-1.95	-.001
		Axis I disorder	.000	0.014	.000
		PANSA-NA	-.134	-1.61	-.083
		AUDIT	-.093	-1.69	-.087
		Nonalcoholic substance	.025	0.444	.023
		Tob-Med	-.044	-0.797	-.041
		Medication	.095	1.71	.088
		PSWQ	.116	1.47	.075
		ASI-3	.138	2.009	.103
Heaviness of smoking	.053 (.01)	Gender	-.084	-1.52	-.078
		Axis I disorder	.054	0.089	.045
		PANSA-NA	-.177	-2.14	-.109
		AUDIT	-.134	-2.45	-.125
		Nonalcoholic substance	.004	0.079	.004
		Tob-Med	-.056	-1.027	-.052
		Medication	.082	1.61	.082
		PSWQ	.110	1.405	.072
		ASI-3	.152	2.222	.113
Nicotine dependence	.07 (.001)	Gender	-.068	-1.24	-.062
		Axis I disorder	.061	1.017	.051
		PANSA-NA	-.129	-1.57	-.079
		AUDIT	-.145	-2.69	-.136
		Nonalcoholic substance	-.046	-0.84	-.043
		Tob-Med	-.090	-1.68	-.085
		Medication	.125	2.29	.116
		PSWQ	.077	0.999	.050
		ASI-3	.200	2.95	.149

Axis I disorder: SCID-based diagnosis at least one current Axis I disorder; PANAS-NA = sum of 10-item negative subscale of Positive and Negative Affect Scale (PANAS; Watson et al.⁴⁵); AUDIT = total score of the Alcohol Use Disorders Identification Test⁵⁹; Nonalcoholic substance: SCID-based diagnosis of current nonalcoholic substance abuse or dependence; Tob-Med = Medical Screening Questionnaire; number of years being a daily smoker (SHQ; Brown et al.³⁹); Medication = current use of prescribed medication; Latency to first cigarette of the day, Smoking rate, Heaviness of smoking, and Nicotine dependence = Fagerström Test for Nicotine Dependence (FTND; Heatherton et al.⁴⁰); ASI-3 = Anxiety Sensitivity Index-III Total Score; Sr² = squared semipartial correlations.

Using the INDIRECT Macro,⁵⁰ the indirect effects of trait worry on the criterion variables were estimated as the product of the “beta coefficients” predicting ASI-3 from PSWQ (Path A in Figure 1) and each of the criterion variables from ASI-3 (Path B in Figure 1). Bootstrap analysis (5,000 resamples) revealed PSWQ exerted significant positive indirect effects (through ASI-3) on number of years being a regular daily smoker (point estimate = 0.022, PB 95% CI = 0.0001–0.053; the fraction of the overall effect of PSWQ mediated [A*B/C] = 82%), latency to first cigarette of the day (point estimate = 0.0013, PB 95% CI = 0.0001–0.0034; the fraction of

the overall effect of PSWQ mediated [A*B/C] = 22%), smoking rate (point estimate = 0.0014, PB 95% CI = 0.0001–0.0034; the fraction of the overall effect of PSWQ mediated [A*B/C] = 19%), heaviness of smoking (point estimate = 0.0027, PB 95% CI = 0.0002–0.0068; the fraction of the overall effect of PSWQ mediated [A*B/C] = 20%), and nicotine dependence (point estimates = 0.0056, PB 95% CI = 0.0008–0.0130; the fraction of the overall effect of PSWQ mediated [A*B/C] = 33%) (see Table 2). The corresponding 95% CIs using the delta method also did not include zero (0.001–0.042; 0.0003–0.0024; 0.0002–0.0026; 0.0002–0.0052; 0.001–0.0104).

To verify the above analyses, we performed two additional tests for each of the models with significant indirect effects. In the first test, we reversed the proposed predictor and mediator variables; in the second test, we reversed the proposed criterion and mediator variables.^{51,60,61} Results of these analyses, based on 5,000 bootstrap resamples, excluded the possibility of mediation in these directions. Specifically, for the models with the trait worry as the proposed mediator of the relation between AS and each criterion variable, there was no evidence of mediation (point estimate = 0.023, PB 95% CI = -0.0101 to 0.143; point estimate = 0.056, PB 95% CI = -0.0034 to 0.0177; point estimate = 0.0095, PB 95% CI = -0.0019 to 0.0313; point estimate = 0.0103, PB 95% CI = -0.0014 to 0.0290; point estimate = 0.0113, PB 95% CI = -0.0039 to 0.0314). Similarly, the verification models with each criterion variable (number of years being a daily smoker, latency to first cigarette of the day, smoking rate, heaviness of smoking index, and nicotine dependence) serving as the mediator of the relation between PSWQ and ASI-3 showed no evidence of mediation (point estimate = 0.008, PB 95% CI = -0.0242 to 0.0243; point estimate = 0.008, PB 95% CI = -0.008 to 0.0027; point estimate = 0.005, PB 95% CI = -0.0010 to 0.0029; point estimate = 0.0018, PB 95% CI = -0.0007 to 0.0050; point estimate = 0.0020, PB 95% CI = -0.0021 to 0.0069).

Discussion

The present study evaluated whether AS partially explained the relations between trait worry and an array of clinically relevant smoking processes among treatment-seeking smokers. Results provide novel empirical evidence that trait worry is significantly related to number of years being a daily smoker, latency to first cigarette of the day, smoking rate, heaviness of smoking index, and nicotine dependence through AS. Specifically, as hypothesized, AS significantly mediated the effect of trait worry on each smoking criterion variable. The observed effects were evident over and above the variance accounted for by gender, alcohol use, negative affectivity, as well as tobacco-related medical illnesses.

Collectively, the present results provide initial empirical evidence that sensitivity to negative internal experiences (AS) may, at least partially, explain the relations between trait worry and smoking behavior. These findings are generally in accord with theoretical models of trait worry that suggest worry may promote hyper-reactivity to potentially evocative stimuli.⁶² Although the present research design does not permit explication of the temporal ordering of the observed associations, we attempted to improve confidence in the observations by evaluating two alternative explanatory models. In the first model, trait worry was proposed to mediate the relations between AS and the smoking criterion variables; and in the second model, each of the hypothesized criterion variables were proposed to mediate the relation between trait worry and AS. Both models were rejected using tests of indirect effect. Thus, trait worry, AS, and the studied smoking variables appear to be more than merely a set of interrelated constructs.

Although not the primary study aim, it is noteworthy trait worry and AS were interrelated, but *distinct*, constructs (these two constructs shared 30% of variance with one another). This observation lends empirical support to the construct validity of these two affective vulnerability processes.

Clinically, the present findings suggest that it may be advisable to understand and address AS among smokers with elevated trait worry during smoking cessation treatment. Generally, programs

aimed at AS reduction have been markedly successful.^{63,64} Growing, albeit somewhat limited, empirical evidence suggests that AS reduction programs for smoking cessation can be integrated into standard smoking cessation treatment.³⁷ Findings from this investigation may serve to conceptually inform the development of specialized intervention strategies for smokers with elevated trait worry. For instance, interoceptive exposure exercises for smoking and non-smoking stimuli may help decrease hypersensitivity to such cues and thereby facilitate greater success in reducing smoking behavior among worry-prone smokers.⁶⁵

There are a number of study limitations. First, it is unknown whether trait worry is causally related to greater AS or the studied smoking variables. 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 more severe smoking populations. Third, the current study relied on validated self-report measures. Future research could benefit by utilizing multimethod approaches. Fourth, the sample was comprised of a relatively homogenous group of treatment-seeking smokers. It will therefore be important for future studies to recruit a more ethnically/racially diverse sample of smokers. Finally, more than 40% of the current study sample had at least one past year Axis I disorder. Future research would benefit from examining the abovementioned relations among the population of smokers with no psychopathology.

Overall, the present study offers novel empirical insight into the nature of the association between trait worry, AS, and smoking behavior among adult treatment-seeking smokers. Future work is needed to explore the extent to which AS accounts for relations between trait worry and other smoking processes (e.g., withdrawal, cessation outcome).

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Declaration of Interests

None declared.

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