Adv. Behav. Res. Ther. Vol. 14, pp. 169–193, 1992.
Printed in Great Britain.

0146-6402/92 $15.00

THE RELATION OF AFFECTIVE PROCESSING MEASURES AND SMOKING MOTIVATION INDICES AMONG COLLEGE-AGE SMOKERS

David W. Wetter,* Thomas H. Brandon,† and Timothy B. Baker*

*University of Wisconsin, Madison, U.S.A.
†State University of New York at Binghamton, U.S.A.

Abstract — Two studies examined the relation among affective processing measures as assessed by the Affective Information Processing Questionnaire (AIPQ) and smoking indices. The AIPQ assesses attributional style, expectations regarding the strength, frequency, and duration of affective reactions, and expectations regarding the controllability of affective reactions both by smoking and by other means in response to a series of vignettes depicting stressful situations. In the first study, 195 undergraduates completed the AIPQ along with measures of affect and smoking. Results indicated satisfactory reliability for the AIPQ scales. A subsample of Study 1 subjects (n=49) were exposed to a laboratory stressor in Study 2. Results indicated that the affect control expectations measures predicted post-stressor measures of negative affect, urge to smoke, negative reinforcement from smoking, and alveolar carbon monoxide value. Attributional style and expectations regarding affective reactions did not consistently predict post-stressor measures. The relation of affective processing to smoking motivation and relapse is discussed.

INTRODUCTION

A substantial body of research suggests that relapse to substance use is characterized by the presence of a stressor or negative affect (Brandon, Tiffany, Obremski, & Baker, 1990; Cummings, Gordon, & Marlatt, 1980; Marlatt, 1982; Marlatt & Gordon, 1980; O'Connell & Martin, 1987; Shiffman, 1982, 1984). Studies examining the correlates of urges also underscore the relation between drug motivation and negative affect (Payne, Schare, Levis, & Colletti, in press; Sherman, Morse, & Baker, 1986) and the neuropharmacologic bases of addictive drug actions are consistent with the notion that negative affect and drug motivational processes are functionally linked (Wise, 1988). In particular, drug may ameliorate negative affect. Negative affect, therefore, signals the opportunity for negative reinforcement.

While it is obviously important to study the link between affective and drug motivational processing simply to attain a better understanding of the nature of drug motivation, there is a practical reason for characterizing the relation as well. If affective change serves as a setting event for drug self-administration, then the assessment of affective lability or intensity

Address correspondence to: Dr T. Baker, Department of Psychology, University of Wisconsin, Madison, WI 53706, U.S.A.

should index relapse vulnerability. Indeed, there is suggestive evidence that a tendency toward affective lability or intensity, in particular negative affect, predicts inability to quit using cigarettes and vulnerability to relapse (Glassman et al., 1988; Rausch, Nichinson, Lamke, & Matloff, 1990).

Although trait affect or affective disorder may predict drug motivation and vulnerability to relapse, there are reasons to believe alternative methods may prove superior. An analysis of relapse episodes and relapse crises suggests that relapse may often be preceded by phasic rather than tonic negative affect states. In fact, the evidence that trait negative affect per se predicts relapse vulnerability is mixed (Pomerleau, Adkins, & Pertschuk, 1978). It may that vulnerability to *phasic* affective reactions is more tightly linked to drug urges and relapse vulnerability.

The prototypic relapse episode appears to be one in which individuals respond to a stressor with negative affect. Perhaps the individuals at greatest risk for relapse are those likely to react phasically to stressors with severe negative affect (frequent, prolonged, and intense) and who view smoking as a sole or optimal means of coping with negative affect. Thus, two major assessment targets should be severity of future phasic affective reactions and expectations about affect coping.

In the following research we attempted to assess future phasic affective reactions through attributional style and affect expectations measures. We attempted to measure affect-coping through measures that elicited subjects' expectations of coping abilities. Justification of these assessment strategies follows.

Attributional Style

Attributional style may be considered to be a relatively stable and consistent pattern of interpreting events. More specifically, a "helpless" attributional style is posited to be a risk factor for depression. A helpless attributional style was originally construed as a tendency to make internal, stable, and global attributions for negative events (Abramson, Seligman, & Teasdale, 1978). More recently, Abramson, Metalsky, and Alloy (1989) have deemphasized internality and focused on stable and global attributions as vulnerability factors in "hopelessness" depression. The internality dimension has been hypothesized in this formulation to affect self-esteem but need not necessarily show any relationship with depression. While attributional style has occasionally been found to move concomitantly with depression (Eaves & Rush, 1984; Hamilton & Abramson, 1983), substantial evidence also exists for atributional style as a relatively stable characteristic that precedes depression (Brown & Siegel, 1988; Golin, Sweeney, & Schaeffer, 1981; Sacks & Bugental, 1987; Seligman et al., 1984).

Abramson et al. (1989) propose a diathesis–stress model in which attributional style acts as a diathesis and the occurrence of negative life events acts as the stressor. There is substantial evidence that attributional style can predict affective responses to stressors (Cutrona, 1983; Metalsky, Halberstadt, & Abramson, 1987; O'Hara, Rehm, & Campbell, 1982; Rothwell & Williams, 1983; Sacks & Bugental, 1987). A helpless attributional style is more likely to lead to dysfunctional attributions and negative affect in response to stressors and negative life events.

Although research utilizing attributional style measures has been primarily concerned with depression, the smoking literature indicates that relapse is associated not only with depression but with anger and anxiety as well (Brandon et al., 1990; Shiffman, 1982). Withdrawal is also characterized by negative affect, particularly with regard to anxiety and aggression/irritability (Baker, Sherman, & Morse, 1987; Hughes & Hatsukami, 1986). Thus, causal attributions for events eliciting anger and anxiety as well as depression, may be important in predicting relapse and smoking motivation. Therefore, this research attempts to measure attributional style for negative events related to anger, anxiety, and depression — the three negative emotions most commonly linked to relapse.

Affect Expectations and Affect Control Expectations

Several researchers have proposed that individuals have representations or models of affective states and that these representations can guide affective processing or responding (Kuhl, 1986; Mandler, 1975). Affect representations or expectations may be related to relapse vulnerability in two ways. First, it may be that the best predictor of affective reactions to future stressors is an individual's self-prediction or expectations regarding such reactions. Considerable research shows that direct, self-predictions often are the most valid predictors of future behaviors (Osberg & Shrauger, 1986). Second, regardless of whether expectations of future affective responses are valid predictors of affect, they may nevertheless play a causal role in relapse. This would occur if coping decisions are made on the basis of expected affective consequences rather than actual affective reactions per se.

There is evidence that people base coping plans or decisions on how they view or represent the problem that confronts them. For instance, affective reactions to cancer are best predicted by the patient's personal model of his/her illness (Easterling & Leventhal, 1988). In addition, expectations that an individual can regulate one's negative emotions have been found to predict coping behavior in response to a romantic breakup (Mearns, 1991). In a similar vein, affective reactions to stressors and plans for coping with that affect may be predicted by an individual's expectations regarding

that affect. Thus, expectations of prolonged, aversive affects, perceived to be resistant to modification (by means other than smoking), should lead to greater urges and smoking likelihood because of smoking's ability (perceived or actual) to attenuate negative affect. For example, a person who views anxiety as a relatively mild emotional state that will pass quickly, may simply wait for the affect to subside. However, if anxiety is viewed as persistent and severe, and controllable only by smoking, then smoking seems likely in anxiety-eliciting situations. This research addresses whether self-reported expectations about affective reactions (affect expectations and affect control expectations) are related to urges and smoking motivation.

Affective Response Model of Relapse

In summary, the tested model suggests that attributional style, affect expectations, and affect control expectations act as stable person factors that influence relapse. Dysfunctional attributional styles lead to an increase in acute negative affective reactions to stressors, and perhaps, to chronic negative affect. Thus, attributional style sets the stage for drug use by leading to negative affective states. Once negative affect is activated an individual makes decisions about his or her affective coping based on expectations regarding the intensity, frequency, duration, and controllability of the affect. The more intense, persistent, and uncontrollable (by means other than smoking) these expectations are, the greater the likelihood of urges and drug self-administration. The motivation to use drug increases during negative affects because the drug user expects drug to ameliorate negative affect.

STUDY 1

The primary goal of Study 1 was to develop measures of attributional style, affect expectations, and affect control expectations and to assess the reliability and validity of these instruments.

Method

Subjects

197 introductory psychology students participated in this experiment in exchange for extra credit points. Two subjects are not included in the analyses because of unscorable computer answer sheets, leaving a total of 195 subjects of which 137 were smokers and 58 were nonsmokers. Over half of the smokers and nonsmokers were female (smokers, female=72, male=65; nonsmokers, female=40, male=18). The mean age of the sample was 19.4 (range 17–52) and smokers and nonsmokers did not

differ. Smokers consumed an average of 14.2 (range 10–40) cigarettes per day, had smoked regularly for an average of 3.1 years (range 0.5–37), and had an average alveolar carbon monoxide value of 20.1 (range 10–44) parts per million. Carbon monoxide levels were available only for the subset of smokers who had previously indicated that they intended to participate in Study 2 (n=99). There were no gender differences on any of the smoking variables.

Instruments

Smoking Status Questionnaire (SSQ). This measure gathers self-report data regarding past and present smoking status and includes a modified version of the Fagerstrom Tolerance Questionnaire (Fagerstrom, 1978; Fagerstrom & Bates, 1981; Moore, Schneider, & Ryan, 1987).

Positive and Negative Affect Scale (PANAS). The PANAS (Watson, Clark, & Tellegen, 1988) measures levels of positive and negative affect. Each item was rated for the subjects' mood during the previous week. Negative affect scores were computed by summing the scores for all negative affect items. Positive affect scores were formed in an analogous fashion.

Affective Information Processing Questionnaire (AIPQ). This questionnaire presents subjects with a series of 32 vignettes designed to elicit anger, anxiety, or depression. Subjects are to respond to each vignette as if the situation had happened to them. Each vignette was followed by questions assessing: the nature of the affect elicited (subjects identify the affect as depression, anxiety, or anger); a causal attribution for the event (written response); the placement of the attribution along the causal dimensions of internality, stability, and globality; the frequency with which the affect is experienced; the duration of the affect (six options ranging from one minute or less to greater than one day); the strength of the affect; the controllability of the affect by smoking; and the controllability of the affect by means other than smoking. All responses were on a ten-point Likert scale except where indicated above. The questions were used for determining attributional style (composed of stability and globality), internality, affect expectations (composed of frequency, strength, and duration), and affect control expectations scores (see Table 1).

Expanded Attributional Style Questionnaire (Expanded ASQ). This scale (Peterson & Villanova, 1988) assesses attributions and the placement of attributions along the causal dimensions of internality, stability, and globality for a series of 24 vignettes designed to elicit negative affective states. Attributional style scores are the sum of the causal dimension scores. This questionnaire was given to a subset of subjects (n=133) in order to assess the validity of the AIPQ.

Table 1. Scales on the Affective Information Processing Questionnaire

Attributional Style with Respect to Causes of Stressful Events	
Attributional Style Composite	
Global:	The cause will affect many areas of life.
Stable:	The cause will persist over time.
Internality:	The cause is something about me, rather than due to external factors.
Affect Expectations	
Affect Expectations Composite	
Strength:	The estimated magnitude of affective reactions.
Frequency:	The estimated frequency with which this affect occurs.
Duration:	The estimated persistence of the affective reaction.
Affect Control Expectations	
Control Without Smoking:	The expectations of ability to control the affect by means other than smoking.
Control With Smoking:	The expectations of ability to control the affect by smoking.

Note: Responses relevant to the above dimensions were gathered with respect to vignettes depicting stressful events.

Carbon monoxide (CO) measures. Breath carbon monoxide samples were available for a subset of smokers (n=99). CO samples were taken immediately upon arrival for the study and were used to estimate nicotine ingestion. CO values are reported in parts per million (ppm) and were measured using an Ecolyzer by Energetics Science.

Procedure

Introductory psychology students received extra credit points in exchange for serving as subjects. Groups of approximately 10 subjects reported to a classroom for 2 to 2½ hours where they completed the above questionnaires. A subset of smokers gave a breath sample. Subjects were told that the study was concerned with how smokers and nonsmokers "think." Subjects who met criteria for Study 2 were scheduled for an individual experimental session the following week and were randomly assigned to conditions.

RESULTS

Study 1

All analyses included both smokers and nonsmokers except where noted.

Scale reliabilities for the AIPQ

Coefficient alpha reliabilities were computed for items on the AIPQ and the Expanded ASQ. As can be seen from Table 2, internal consistency reliability coefficients for the causal dimensions on the total AIPQ were satisfactory ranging from .71 for Internality to .89 for Globality and Stability. These values are similar to those found for the Expanded ASQ. Thus, reliability of the causal dimension items on the AIPQ appears equivalent to that of the Expanded ASQ. When the globality and stability items on the AIPQ were summed to form an Attributional Style score, coefficient alpha was .90.

Reliabilities for the affect expectation items were also satisfactory (Table 2), as was the Affect Expectations Composite formed by summing the strength, frequency, and duration items. Since affect control with smoking is relevant only to smokers, reliabilities for both of the affect control expectations items were computed for the total sample and for the smokers alone. Again, these reliabilities were quite satisfactory. Overall, the AIPQ has good internal consistency.

AIPQ interscale correlations

Attributional Style scores were computed by summing across the dimensions of globality and stability with scales keyed so that high

Table 2. AIPQ Scale Reliabilities

	AIPQ	Expanded ASQ
Causal Dimensions		
Internal	.71	.65
Global	.89	.91
Stable	.89	.90
Attributional Style	.90	
Affect Expectations		
Strength	.93	
Frequency	.95	
Duration	.89	
Affect Expectations Composite	.95	
Affect Control Expectations		
Affect Control Without Smoking	.97 (.95)	
Affect Control With Smoking	.98 (.96)	

Note: Values in parentheses are reliability coefficients calculated for smokers only. All subjects, $n=195$; smokers, $n=137$.

scores indicate more global and stable styles. Causal dimension items and Attributional Style were initially computed separately for vignettes depicting anger, anxiety, and depression. Due to the high correlations among AIPQ variables across the different negative affects, all measures reported here are collapsed across affects. Globality for the AIPQ was significantly correlated with both Internality and Stability, $r(n=195)=.42$, $p<.001$ and $r(n=195)=.18$, $p=.01$. Stability and Internality were uncorrelated. Attributional Style was significantly correlated with Internality $r(n=195)=.31$, $p<.001$. Each causal dimension on the AIPQ correlated significantly with that same dimension on the ASQ, $r(n=133)=.40$ to $r(n=133)=.66$. Finally, the high correlation between the two Attributional Style composites, $r(n=133)=.67$, $p<.001$, provides concurrent validity evidence for the AIPQ as a measure of attributional style.

Table 3 illustrates the pattern of correlations among affect expectations and affect control expectations items. Since different scales were used for different types of items, raw scores were transformed into z-scores. All scales were keyed such that high scores indicate increased strength, frequency, duration, and control. An Affect Expectations Composite was computed by summing the z-scores of the strength, frequency, and duration items. For all subjects and for smokers alone, moderate to high correlations were found among the Strength, Frequency, and Duration scales.

Expectations regarding the controllability of the affect by smoking is meaningful only for subjects who smoke. For smokers, Affect Control Without Smoking was inversely related to the Strength, Frequency, and Duration of negative affect ratings (Table 3). A significant negative correlation was found between Affect Control With Smoking and Affect Control Without Smoking. In addition, the Affect Expectations Composite, Frequency, and Duration scores were positively related to Affect Control With Smoking.

The Affect Expectations Composite was positively related to Attributional Style for all subjects, $r(n=195)=.52$, $p<.001$, and for smokers, $(n=137)=.43$, $p<.001$. Affect control expectations were unrelated to Attributional Style.

PANAS and AIPQ corrrelations

Negative Affect was directly related to Attributional Style, the Affect Expectations Composite, and Affect Control With Smoking among smokers (Table 4). Positive Affect was inversely related to Attributional Style and the Affect Expectations Composite, and was directly related to Affect Control Without Smoking among smokers.

Table 3. AIPQ Affect Expectations and Affect Control Expectations Interscale Correlations

	Affect Expectations			Affect Control Expectations	
	Strength	Frequency	Duration	Control w/o smoking	Control w/ smoking
All subjects					
Affect Expectations Composite	.86 ***	.76 ***	.85 ***		
Strength		.46 ***	.67 ***		
Frequency			.42 ***		
Smokers					
Affect Expectations Composite	.86 ***	.77 ***	.83 ***	−.27 **	.27 **
Strength		.47 ***	.65 ***	−.20 *	.15
Frequency			.41 ***	−.24 **	.32 ***
Duration				−.22 *	.19 *
Affect Control w/o Smoking					−.47 ***

* $p<.05$. ** $p<.01$. *** $p<.001$. Note: The Affect Expectations Composite scores are computed by summing the strength, frequency, and duration scores.

Table 4. AIPQ and PANAS Correlations

	Positive affect	Negative affect
All subjects		
Attributional Style	−.21 **	.37 ***
Internality	.01	.13
Affect Expect. Composite	−.25 ***	.45 ***
Smokers		
Attributional Style	−.30 ***	.35 ***
Internality	−.05	.14
Affect Expect. Composite	−.27 ***	.45 ***
Affect Control w/o Smoking	.24 **	−.09
Affect Control w/ Smoking	−.12	.21 **

* $p<.05$. ** $p<.01$. *** $p<.001$.

AIPQ differences associated with smoking status and gender

There were significant differences between smokers and nonsmokers on Affect Control Without Smoking and Affect Control With Smoking. As would be expected, smokers were more likely to believe that they could control their mood with smoking than were nonsmokers, means 3.0 versus 0.4, $t(193)=-10.9$, $p<.001$. Smokers also indicated that their affect was less controllable by means other than smoking, means 5.4 versus 8.5, $t(193)=12.4$, $p<.001$. Smokers and nonsmokers did not differ on the affect expectations subscales, the Affect Expectations Composite, Attributional Style, or on the causal dimensions.

For smokers, the Affect Expectations Composite was negatively correlated with years of smoking, $r(n=137)=-.22$, $p=.01$, and the rate of smoking, $(n=137)=-.25$, $p=.004$. Affect Control Without Smoking and Attributional Style were negatively related to the CO measure, $r(n=99)=-.22$, $p=.03$, $r(n=99)=-.22$, $p=.03$, respectively. Affect Control With Smoking was not correlated with the smoking measures.

Gender differences emerged on the Affect Expectations Composite and on the Strength subscale. For all subjects, females had higher Affect Expectations Composite scores, $t(193)=2.4$, $p=.02$, and Strength subscale scores than did males, $t(193)=3.0$, $p=.003$. Female smokers also had higher Affect Expectations Composite scores, means .44 for females versus −.60 for males (sum of z-scores for the strength, frequency, and duration subscales), $t(135)=2.5$, $p=.01$, and Strength subscale scores than did male smokers, means .28 versus −.34 (z-scores), $t(135)=3.7$, $p<.001$. There were no other gender differences.

DISCUSSION

Study 1

The results of Study 1 indicate that the internal consistency of the AIPQ is satisfactory for all scales and quite high for most of the scales. The relations among Attributional Style, the Affect Expectations Composite, and the affect control expectations were as expected for the most part, i.e., Attributional Style and the Affect Expectations Composite were positively related to Negative Affect, negatively related to Affect Control Without Smoking and Positive Affect, and positively related to each other. Individuals who have expectations of more frequent, severe, and persistent negative affect tend to have more helpless attributional styles and higher levels of negative affect than those individuals with less severe affect expectations. In addition, these individuals believe that their control of negative affect by means other than smoking is low. The surprising finding was that as expectations of negative affect become more severe, ratings of control over that affect by smoking increase while ratings of affect control by means other than smoking decrease. Moreover, as expectations of affect control with smoking increase, so do concurrent levels of negative affect. These findings suggest that smokers may envision several plausible methods of coping with mild negative affect but view smoking as the most effective method of coping with more severe negative affect.

Study 2

This study was designed to determine the predictive relation between affective processing measures and smokers' affective and motivational reactions to an acute, laboratory stressor. More specifically, the study compared scores on Negative Affect, Attributional Style, the Affect Expectations Composite, and the affect control expectations collected during Study 1 with measures of motivation to smoke and nicotine self-administration following a performance-demand stressor given one week later. Subjects were randomly assigned to conditions in a 2 × 2 factorial design. The first factor consisted of either a positive or negative affect manipulation. The positive affect manipulation was included to test several auxiliary hypotheses not relevant to the current study. Only data from the negative affect manipulation condition will be reported here. Measures not relevant to the current study are not reported here.

The second factor was smoking status. Subjects either continued smoking normally prior to the experimental session (continuing smokers) or remained abstinent for 24 hours prior to the experimental session (withdrawing smokers). Subjects were exposed to an experimental stressor (the negative affect manipulation) because we hypothesized that the

major predictive constructs assessed (attributional style, expectations about affective reactions, and expectations about affect control) would be especially predictive of affective and drug-motivational responses elicited by stressors, i.e., in a situation that resembles the prototypic relapse episode. We manipulated smoking status because we believed that withdrawal would increase smokers' affective reactions to the stressor and would increase the coherence between affective processing and measures of motivation to smoke.

STUDY 2

Method

Subjects

Sixty-three introductory psychology students participated in this experiment in exchange for extra credit points. All subjects smoked at least 10 cigarettes per day and had a CO level of at least 10 ppm when measured during Study 1. Previous research suggests that smokers and nonsmokers can be discriminated by CO levels of 5–8 ppm (Crowley, Andrew, Cheney, Zerbe, & Petty, 1989; Frederiksen & Martin, 1979; Vogt, Selvin, Widdowson, & Hulley, 1977). We used a slightly higher CO cut-off for smoking to reduce the likelihood of including noninhalers or occasional smokers in the sample. Breath samples were taken immediately upon the subject's arrival for Study 2. To be considered a valid subject, continuing smokers had to have a CO level greater than or equal to 10 ppm. Withdrawing smokers had to have a CO level less than their CO level as measured during Study 1, in addition to reporting that they were abstinent for the preceding 24 hours. All withdrawing subjects except for 1 had a CO level of less than 10 ppm upon initiating participation in Study 2. Six continuing subjects were withdrawn from participation at this time because their CO level was too low and three withdrawing subjects were withdrawn because their CO level was greater than it had been during Study 1. One withdrawing subject and one continuing subject dropped out of the study and three other subjects were lost for other reasons (withdrawing = 2, continuing = 1). Seven males (continuing = 4, withdrawing = 3) and seven females were lost (continuing = 4, withdrawing = 3), resulting in a total of 49 subjects.

Subjects had smoked for an average of 3.5 (range 0.5–18) years, smoked an average of 17.7 (range 10–40) cigarettes per day, had an average Fagerstrom score of 3.8 (range 2–7), and had an average CO value of 20.8 (range 10–44) ppm (measured during Study 1). There were no baseline differences between the withdrawing and continuing groups on any of the AIPQ measures, on the PANAS, or on any of the smoking measures except for their initial Study 2 CO value with withdrawing smokers having a mean

CO value of 7.1 (range 3–13) ppm and continuing smokers having a mean value of 21.2 (range 10–36) ppm, $t(47) = -7.39$, $p < .001$.

Instruments

Only those instruments not described in Study 1 will be listed here.

Withdrawal Rating Form (WRF). The WRF (Shiffman & Jarvik, 1976) measures symptoms of nicotine withdrawal. Scores are calculated for craving, psychological discomfort, sedation/stimulation, physical symptoms, appetite, and for the total scale.

Mood Adjective Check List (MACL). The MACL (Nowlis, 1965) measures current levels of positive and negative affect. The negative affect scores used in the present study were composed of the aggression, anxiety, and sadness scales.

Attribution Questionnaire. The attribution questionnaire was derived from the AIPQ and is designed to be administered *following a stressor.* The questionnaire measures the affect elicited (depression, anger, anxiety), expectations regarding the elicited affect, a causal attribution, and the placement of the attribution along the causal dimensions.

Urge Ratings. Three items assessing urge to smoke were embedded in other questionnaires. These items were converted to *z*-scores and then combined to yield a self-report measure of urge. These items included "craving a cigarette," "desire for a cigarette right now," and "if you were free to smoke, what is the likelihood that you would smoke immediately?"

Cigarette Rating Form (CRF). The CRF assesses subjective responses to smoking a cigarette and includes items assessing negative reinforcement, positive reinforcement, and negative consequences. The negative reinforcement scale was used in this study and it includes items such as "the cigarette improved my mood" and "the cigarette relieved my smoking urges."

Debriefing Questionnaire. This questionnaire asked subjects if they had any suspicions regarding the true purpose of the study.

Procedure

All subjects reported to an experimental room approximately one week following their completion of Study 1 and had their CO measured. Withdrawing subjects had been instructed after Study 1 to stop smoking 24 hours prior to the experimental session.

Subjects were told that the study examined differences between smokers and nonsmokers on measures of "thinking." Subjects then printed their name on a sham payment receipt form which was used as part of the affect manipulation and completed the WRF.

The next portion of the experiment consisted of the affect manipulation. Subjects were administered portions of the Weschsler Adult Intelligence

Scale (WAIS) block design subtest. The WAIS manual was set up so that subjects could clearly see the cover indicating that it was an IQ test. Preceding the block design, an opposite-sex experimenter gave subjects six quarters and told them that for every design that they completed faster than the average college freshman they would be given another quarter and for every design on which they took longer than the average college freshman they would lose a quarter. In fact, subjects always received a quarter after each of the first two designs and then had one taken away for the next six designs so that they finished with two quarters. Subjects then signed the sham payment receipt form and indicated the amount of money they were paid. There were ten previous entries on each sheet dated over the past two weeks. The entries indicated that all of the previous subjects had won more money than the subject.

Manipulation checks on the affect manipulation indicated that subjects in the negative affect condition rated their performance on the block design as a failure while subjects in the positive affect condition (the results of which are not reported here) rated their performance as very successful (means 3.1 versus 8.5 respectively), $t(93)=16.27$, $p<.001$. However, subjects in the negative affect condition did not experience a significantly greater amount of negative affect in response to the manipulation than did subjects in the positive affect condition (means 5.8 versus 5.1), $t(93)=-1.09$, $p=.28$.

Subjects then completed the MACL, the Attribution Questionnaire, and were told that they would be able to smoke upon completion of the next task that consisted of tracing several designs. It was anticipated that smokers highly motivated to smoke would complete the tracing task faster and make more errors than less motivated smokers.

Upon completion of the tracing task, subjects smoked one of their own cigarettes through a flow transducer that permitted assessment of smoking topography. Topography measures (e.g., puff duration, puff volume, and number of puffs) were recorded on a Grass polygraph and flow values were digitized and recorded on-line by a computer. The experimenter left the room prior to the tracing task and remained absent until the subjects indicated that they had finished smoking the cigarette. Subjects then completed the CRF, had their CO measured, completed the Debriefing Questionnaire, were verbally debriefed, and signed a legitimate payment receipt form.

RESULTS

Study 2

The relationships among independent and dependent variables were assessed by examining zero-order correlations and by hierarchical multiple

regression analyses. When assessing the effects of the AIPQ variables, smoking status (withdrawing versus continuing) was entered into the regression equation only if there was a significant group difference. The two affect control expectations items were entered as a set. We expected these items to operate together, i.e., urges and smoking self-administration values should be greater when expectations of control with smoking are high and expectations of control without smoking are low. Two-way interactions were tested but higher order interactions were not. While some interaction effects were found in this research, we do not discuss them because they conformed to no consistent pattern and were of little practical or theoretical significance.

Relationships Among Independent Variables

The AIPQ scale scores and PANAS Negative Affect scores are from the test administrations that occurred in Study 1, one week prior to the experimental session of Study 2. The pattern of correlations among the AIPQ variables for this subsample of Study 1 subjects was, therefore, very similar to that seen in Study 1.

Relationships Among Dependent Variables

The dependent variables showed weak to moderate coherence (Table 5). The tracing task was designed to act as a behavioral measure of urge such that individuals with greater urges to smoke might complete the task faster and make more errors than those individuals with lesser urges. The number of errors made (tracing errors) and the time from starting the tracing task to beginning to smoke (tracing time) were the tracing task measures. Self-reported Urge was significantly correlated with tracing errors but not with tracing time. Tracing errors were negatively related to tracing time.

Smoking topography measures showed little coherence. Based on this lack of coherence, a single measure that was a composite of several topography measures was chosen to represent self-administration. Total puff volume was computed by summing puff volume over all puffs. This provides assessment of the total amount of smoke ingestion. Total puff volume was positively correlated with tracing errors and negatively correlated with tracing time (Table 5). Thus, among the urge and self-administration measures, tracing errors were found to be significantly correlated with Self-reported Urge and total puff volume while tracing time was negatively related to total puff volume. These relationships indicate moderate levels of coherence among urge and self-administration measures and provide suggestive evidence that the tracing task measures have some validity as behavioral measures of urge.

Table 5. Correlations Among Dependent Measures

	Urge	Tracing errors	Tracing time	Negative reinf.	CO post-stressor	Total puff volume
Post-Stressor neg. affect	.22	−.04	.15	.17	−.20	−.21
Urge		.34*	−.12	.38**	.06	−.12
Tracing errors			−.39*	.29*	.11	.36*
Tracing time				−.22	−.06	−.38*
Negative reinforcement					.13	.18
CO post-stressor						.08

*$p < .05$, **$p < .01$, ***$p < .001$. Note: Since some tracing task and smoking topography data were missing the number of cases used in the correlation matrix range between 40 and 49.

The magnitude of Negative Reinforcement reported following smoking was positively related to Self-reported Urge and tracing errors. Post-stressor CO values were not related to any other dependent measure.

Prediction of Affective and Smoking Measures

Post-stressor attributions

Post-stressor Attribution scores for subjects' performance on the block design task were a composite of the post-stressor stability and globality causal dimensions. There were no smoking status or gender differences on Post-stressor Attribution scores. Post-stressor Attribution scores were correlated with both Attributional Style, $r(n=49)=.43, p=.002$, and AIPQ Internality, $r(n=49)=.30, p=.04$. Attributional Style remained significant after partialling out AIPQ Internality, $\beta=.37$, $sr^2=.12$, $t=2.6$, $p=.01$, while AIPQ Internality was no longer significant after partialling out Attributional Style. PANAS Negative Affect did not predict Post-stressor Attributions.

Post-stressor negative affect

There was no effect of smoking status or gender on negative affect following the stressor as measured by the MACL. Zero-order correlations showed that years smoking, rate of smoking, and Fagerstrom score were not related to Post-stressor Negative Affect. PANAS Negative Affect measured during Study 1 was significantly related to Post-stressor Negative Affect, $r(n=49)=.35$, $p=.01$. Two AIPQ variables were significantly related to Post-stressor Negative Affect, Internality, $r(n=49)=.33, p=.02$, and Affect Control With Smoking, $r(n=49)=.29$, $p=.04$.

To determine whether affective processing variables predict stress-elicited affective reaction variance beyond that predicted by trait affect, we entered affective processing variables into regression equations after partialling out trait affect variance (PANAS Negative Affect). Significant relationships were found for Internality, $\beta=.29$, $sr^2=.09$, $t=2.2$, $p=.03$, and the set of Affect Control Expectations, $sR^2=.16$, change in $F=5.0$, $p=.01$. The beta value for Affect Control With Smoking was .37, $t=2.7$, $p=.01$. For Affect Control Without Smoking, the beta value was .35, $t=2.5$, $p=.01$. Thus, post-stressor residual negative affect tended to increase with increases in the internality of the causal attribution and with increases in expectations of affect control both with and without smoking.

Post-stressor urge

Self-reported Urge in response to the stressor was not related to smoking

status, gender, smoking measures, trait negative affect, or the AIPQ measures although the Affect Expectations Composite and Attributional Style approached conventional levels of significance, $r(n=49)=.27$, $p=.06$, and $r(n=49)=.25$, $p=.08$, respectively.

Because there was a significant effect of smoking status on baseline craving ratings prior to the stressor as measured by the WRF-Craving subscale, $t(47)=2.7$, $p=.01$, we felt that urges in response to the stressor might be masked by these differences. Thus, we regressed Post-stressor Urge on the AIPQ variables and PANAS Negative Affect after partialling out the effects of Baseline Craving. Baseline Craving was significantly related to Post-stressor Urge, $r(n=49)=.74$, $p<.001$. PANAS Negative Affect was positively related to Post-stressor Residual Urge, $\beta=.20$, $sr^2=.04$, $t=2.1$, $p=.03$. The Affect Expectations Composite was also a significant predictor of Post-stressor Residual Urge, $\beta=.26$, $sr^2=.07$, $t=2.8$, $p=.007$, such that expectations of intense, frequent, and persistent negative affect were associated with greater urge ratings. The Affect Expectations Composite remained a significant predictor even after partialling out PANAS Negative Affect, $\beta=.22$, $sr^2=.04$, $t=2.2$, $p=.03$. Although the set of Affect Control Expectations was not significant, Expectations of Affect Control With Smoking was significant within the set, $\beta=.21$, $t=2.0$, $p=.05$, suggesting that post-stressor residual urge tends to increase with increases in expectations of affect control with smoking.

Tracing task measures

There were no smoking status or gender differences on the tracing task measures and no significant correlations with any of the AIPQ variables or PANAS Negative Affect. Rate of smoking was correlated with tracing errors, $r(n=46)=.41$, $p=.005$, and tracing time, $r(n=44)=-.35$, $p=.02$. Years smoking and Fagerstrom score were unrelated to tracing task scores.

Because the tracing task measures were designed to measure urge, Baseline craving was entered first into all regression equations and was significant for tracing errors, $r(n=46)=.31$, $p=.03$. Baseline Craving was not related to tracing time. No significant relationships with the AIPQ variables or PANAS Negative Affect were found.

Post-stressor negative reinforcement

There were no smoking status differences on the Negative Reinforcement subscale of the CRF. Zero-order correlations revealed that Negative Reinforcement scores were not related to smoking measures or to PANAS Negative Affect. Negative Reinforcement was significantly related to Affect Control With Smoking, $r(n=49)=.38$, $p=.008$, and was close to

significance for the Affect Expectations Composite, $r(n=49)=.26$, $p=.07$. Multiple regression analysis indicated that the Affect Control Expectations set was significant, $R^2=.14$, $F=3.8$, $p=.03$. Affect Control With Smoking was significant within the set, $\beta=.37$, $t=2.5$, $p=.02$, while Affect Control Without Smoking was not, $\beta=-.02$, $t=-0.113$, $p=.91$. These results suggest that as expectations of affect control with smoking increase so does the negative reinforcement reported following a post-stressor cigarette.

Post-stressor smoking self-administration

Not surprisingly, there was a significant difference between smoking status groups on post-stressor CO value, $t(47)=-6.7$, $p=.001$, with the mean of the withdrawing group equal to 12.7 ppm and the mean of the continuing group equal to 25.1 ppm. Post-stressor CO values were related to rate of smoking, $r(n=49)=.45$, $p=.001$, Fagerstrom score, $r(n=49)=.48$, $p=.001$, and Affect Control Without Smoking, $r(n=49)=-.41$, $p=.003$.

Since smoking status group differences existed on post-stressor CO, smoking status was entered first into all regression equations examining post-stressor CO, $r(n=49)=.70$, $t=6.7$, $p=.0001$. The only significant predictor of post-stressor residual CO value was the Affect Control Expectations set, $sR^2=.08$, change in $F=4.2$, $p=.02$. Within the set, Affect Control Without Smoking was significant, $\beta=-.31$, $t=-2.9$, $p=.006$, indicating that as affect control without smoking increases, post-stressor residual CO tends to decrease.

There were no smoking status or gender effects for total puff volume nor were any of the AIPQ variables or trait negative affect significantly correlated with total puff volume.

GENERAL DISCUSSION

The major AIPQ scales appeared to be both reliable and valid. Not only were internal consistency measures acceptable, but patterns of inter-correlations supported their construct validity. Smokers reporting helpless attributional styles expected to experience more severe, frequent, and prolonged negative affects. Moreover, attributional style was directly related to negative affect and inversely related to positive affect. In addition, the AIPQ Attributional Style measure was correlated with an accepted measure of attributional style, the Expanded Attributional Style Questionnaire. There was also some evidence of predictive validity for the Attributional Style scale as scores on this measure predicted causal attributions made for a stressor encountered one week after AIPQ completion. However, attributional style was unsuccessful in predicting

affective reactions to the stressor, which does raise concerns abut its valid use in this research.

The affect expectations measure also seemed to have desirable psychometric properties. In addition to high reliability, it had good concurrent validity, being directly related to negative affect and inversely related to positive affect. It also was directly related to a helpless attributional style. However, as with attributional style, the Affect Expectations Composite failed to predict affective reactions to a stressor, thereby raising questions about its validity as a measure of the tendency to experience strong acute affective reactions. This concern is underscored by the fact that a simple measure of trait negative affect predicted post-stressor negative affect while the attributional style and affect expectations measures did not.

In contrast to the mixed pattern of outcomes for the other AIPQ measures, the affect control questions consistently predicted significant portions of variance in both affective and smoking motivation domains. These measures had very high reliabilities indicating that smokers expected similar levels of affect control with or without smoking across the three types of affects depicted in the vignettes: sadness, anxiety, and anger. There was evidence of high concurrent validity for the affect control items with respect to both affect and smoking motivation. With respect to affect, the control items were related to the Affect Expectations Composite and to positive and negative affect (see Table 4). With respect to smoking motivation, smokers held stronger beliefs than nonsmokers that smoking provides affective control. Smokers were relatively less confident that they could control their emotions by means other than smoking. Additionally, smokers' beliefs that they could control their emotions without smoking were significantly related to their CO levels, an index of their nicotine self-administration. The less smokers believed that they could control their emotions without smoking, the more they smoked.

The affect control measures also showed impressive predictive validity. When measured a week earlier, one or both control measures predicted post-stressor *negative affect* scores from which trait affect variances had been partialled, post-stressor *urge* ratings from which pre-stressor urge variance had been partialled, subjective ratings of *negative reinforcement* derived from smoking a post-stressor cigarette, and self-administration of nicotine as inferred from CO values.

There was little consistency regarding which of the two affect control items was related to affect or smoking dependent measures. For example, affect control with smoking predicted an internal and global attributional style, a severe Affect Expectations Composite, high trait negative affect, high post-stressor negative affect, high post-stressor urge ratings, and high negative reinforcement from smoking ratings. Affect control without

smoking predicted relatively weak Affect Expectations Composite scores, high trait positive affect, high post-stressor negative affect, and low levels of CO both prior to stress (Study 1) and after stress (Study 2). These items tended not to interact and each predicted unique variance, often in different affective or smoking motivation measures.

Perhaps the most straightforward way to categorize the two affect control items is to note that expectations of affect control with smoking was associated with trait negative affect and predicted *future* affective and smoking motivational changes in response to a stressor. Expectations of affect control without smoking was associated with trait positive affect and was largely predictive of *concurrent* smoking and affect dependent measures. This affect control measure was related to several Study 2 measures such as post-stressor CO and post-stressor negative affect, but the relationship with post-stressor CO was statistically redundant with its ability to predict CO significantly at all CO assessments (Study 1 and at the baseline of Study 2). Moreover, while expectations of affect control without smoking did predict affective reaction to the stressor, the predictive relation was an unusual one. This surprising finding was that expectations of affect control without smoking were *directly* related to negative affect following the experimental stressor. The more confidence that subjects had that they could control their affective reactions without smoking, the more affectively disturbed they became after being stressed. It may be that they became disturbed when they discovered that they had greater than expected difficulty controlling the affective reaction engendered by the stressor.

Study 1 may provide some clues as to why the affect control items were predictive of smoking motivational measures. We found that the *more* severe the affect expectation, the *less* control people believe they have over that affect. However, among smokers, the *more* intense the expected negative affect, the *more* control the subject expected to have over that affect by smoking. Moreover, affect control without smoking was inversely related to affect control with smoking. Thus, as smokers' appraisal of control over an affect by smoking increases, their appraisal of controlling that affect without smoking decreases. In other words, it may be that when the expected control over an affect by smoking is fairly high, that expectation undercuts other coping strategies and makes controlling that affect without smoking seem unlikely. In addition, smokers viewed their control over negative affect without smoking to be much less than that indicated by nonsmokers. This result would seem to make coping strategies other than smoking even less likely to be used by smokers as compared to nonsmokers.

In essence, the affect control items were expectancy items similar in nature to items used in other drug expectancy questionnaires (Brandon & Baker, in press; Brown, Goldman, Inn, & Anderson, 1980). Thus, this

research adds weight to the growing evidence that addicts' expectations may predict drug motivation and drug use variance over and above that predicted by drug use history or status per se (Stacy, Newcomb, & Bentler, in press). The present expectancy assessment method differs from others in that affect control expectations are sampled with respect to a series of stressor vignettes and expectations of affect control by means other than drug use are assessed as well. It is currently unknown how the present method of assessing expectancies will compare to other methods.

Several final observations are warranted. Withdrawal did not affect the results which is antagonistic to predictions (Baker et al., 1987) that withdrawal should make addicts susceptible to the affective/drug motivational consequences of stressors. One possible explanation is that subjects were not sufficiently physically dependent to show such an effect. One advantage of using the population that we did is it reflects a range of smoking severity while withdrawal in a group of older, hardcore smokers may have masked other effects. Of course, the younger, college population is less appropriate for modeling relapse.

Measures of drug self-administration (e.g., puff volume) were not highly related to self-reported urges. This is consistent with Tiffany's (1990) notion that urges arise from controlled information processing distinct from the proceduralized production rules that underlie smoking. While it may be the case that smoking *topography* was generally unrelated to urge level, it is important to note that urge reporting was significantly and meaningfully related to other behavioral measures of smoking motivation (tracing errors, tracing time) and to affective processing characteristics, i.e., trait negative affect, the Affect Expectations Composite, and expectations of affect control with smoking. We do not believe that this lack of relation between urge self-reports and topography assays indicates that urge information processing lies outside the information processing sequence that leads to smoking. It is our hypothesis that while urge self-reports and their correlates (e.g., expectancies) do not relate well to molecular samples of highly practiced self-administration sequences, they do relate to more molar samples of drug use behavior (Brandon, Tiffany, & Baker, 1986; Brown, 1985; McAuliffe et al., 1986).

Finally, we did not assess relapse in this study so it is unknown how the assessed variables might relate to relapse vulnerability. In addition, while the withdrawing smokers might be considered to have experienced physiological states similar to those undergone by smokers attempting to quit, it is important to emphasize that these people were not attempting to abstain from smoking.

REFERENCES

Abramson, L. Y., Metalsky, G. I., & Alloy, L. B. (1989). Hopelessness depression: A theory-based subtype of depression. *Psychological Review*, **96,** 358–372.

Abramson, L. Y., Seligman, M. E. P., & Teasdale, J. D. (1978). Learned helplessness in humans: Critique and reformulation. *Journal of Abnormal Psychology*, **87,** 49–74.

Baker, T. B., Sherman, J. E., & Morse, E. (1987). The motivation to use drugs: A psychobiological analysis of urges. In P. C. Rivers (Ed.), *Alcohol and addictive behavior*. Lincoln, NE: University of Nebraska Press.

Brandon, T. H., & Baker, T. B. (in press). The smoking consequences questionnaire: The subjective expected utility of smoking in college students. *Psychological Assessment: A Journal of Consulting and Clinical Psychology*.

Brandon, T. H., Tiffany, S. T., & Baker, T. B. (1986). *The process of smoking relapse*. In F. Tims & C. Leukefeld (Eds.), *Relapse and recovery in drug abuse* (National Institute of Drug Abuse Research Monograph No. 72, pp. 104–117). Washington, DC: U.S. Government Printing Office.

Brandon, T. H., Tiffany, S. T., Obremski, K. M., & Baker, T. B. (1990). Postcessation cigarette use: The process of relapse. *Addictive Behaviors*, **15,** 105–114.

Brown, J. D., & Siegel, J. M. (1988). Attributions for negative life events and depression: The role of perceived control. *Journal of Personality and Social Psychology*, **54,** 316–322.

Brown, S. A. (1985). Reinforcement expectancies and alcoholism treatment outcome after a one-year follow-up. *Journal of Studies on Alcohol*, **46,** 304–308.

Brown, S. A., Goldman, M. A., Inn, A., & Anderson, L. R. (1980). Expectations of reinforcement from alcohol: Their domain and relation to drinking patterns. *Journal of Consulting and Clinical Psychology*, **48,** 419–426.

Crowley, T. J., Andrews, A. E., Cheney, J., Zerbe, G., & Petty, T. L. (1989). Carbon monoxide assessment of smoking in chronic obstructive pulmonary disease. *Addictive Behaviors*, **14,** 493–502.

Cummings, C., Gordon, J. R., & Marlatt, G. A. (1980). Relapse: Prevention and prediction. In W. R. Miller (Ed.), *The addictive behaviors*. New York: Pergamon Press.

Cutrona, C. (1983). Causal attributions and perinatal depression. *Journal of Abnormal Psychology*, **92,** 161–172.

Easterling, D. V., & Leventhal, H. (1988). *The contribution of abstract and concrete cognition to emotion: Judged risk and symptoms as determinants of worry about cancer*. Unpublished manuscript, University of Wisconsin — Madison.

Eaves, G., & Rush, J. A. (1984). Cognitive patterns in symptomatic and remitted uni-polar major depression. *Journal of Abnormal Psychology*, **93,** 31–40.

Fagerstrom, K. O. (1978). Measuring degree of physical dependence to tobacco smoking with reference to individualization of treatment. *Addictive Behaviors*, **3,** 235–241.

Fagerstrom, K. O., & Bates, S. (1981). Compensation and effective smoking by different nicotine dependent smokers. *Addictive Behaviors*, **6,** 331–336.

Frederiksen, L. W., & Martin, J. E. (1979). Carbon monoxide and smoking behavior. *Addictive Behaviors*, **4,** 21–30.

Glassman, A. H., Stetner, F., Walsh, B. J., Raizman, P. S., Fleiss, J. L., Cooper, T. B., & Covey, L. S. (1988). Heavy smokers, smoking cessation, and clonidine. *American Medical Association Journal*, **259,** 2863–2866.

Golin, S., Sweeney, P. D., & Schaeffer, D. E. (1981). The causality of causal attributions in depression: A cross-lagged panel correlation analysis. *Journal of Abnormal Psychology*, **90,** 14–22.

Hamilton, E., & Abramson, L. (1983). Cognitive patterns and major depressive disorder: A longitudinal study in a hospital setting. *Journal of Abnormal Psychology*, **92,** 173–184.

Hughes, J. R., & Hatsukami, D. (1986). Signs and symptoms of tobacco withdrawal. *Archives of General Psychiatry*, **43,** 289–294.

Kuhl, J. (1986). Motivation and information processing: A new look at decision making,

dynamic change, and action control. In R. M. Sorrentino & E. T. Higgins (Eds.), *Motivation & cognition*. New York: Guilford.

Mandler, G. (1975). *Mind and emotions*. New York: Wiley.

Marlatt, G. A. (1982). Relapse preventions: A self-control program for the treatment of addictive behaviors. In R. B. Stuart (Ed.), *Adherence, compliance and generalization in behavioral medicine*. New York: Brunner/Mazel.

Marlatt, G. A., & Gordon, J. R. (1980). Determinants of relapse: Implications for the maintenance of behavior change. In P. O. Davidson & S. M. Davidson (Eds.), *Behavioral medicine: Changing health lifestyle* (pp. 410–452). New York: Brunner/Mazel.

McAuliffe, W. E., Feldman, B., Friedman, R., Launer, E., Magnuson, E., Mahoney, C., Santangelo, S., & Ward, W. (1986). *Explaining relapse to opiate addiction following successful completion of treatment*. In F. M. Tims & C. G. Leukefeld (Eds.), *Relapse and recovery in drug abuse* (National Institute of Drug Abuse Research Monograph No. 72). Washington, DC: U.S. Government Printing Office.

Mearns, J. (1991). Coping with a breakup: Negative mood regulation expectancies and depression following the end of a romantic relationship. *Journal of Personality and Social Psychology*, **60,** 327–334.

Metalsky, G. I., Halberstadt, J. J., & Abramson, L. Y. (1987). Vulnerability to depressive mood reactions: Toward a more powerful test of the diathesis-stress and causal mediation components of the reformulated theory of depression. *Journal of Personality and Social Psychology*, **52,** 386–393.

Moore, B. L., Schneider, J. A., & Ryan, J. J. (1987). Fagerstrom's tolerance questionnaire: Clarification of item and scoring ambiguities. *Addictive Behaviors*, **12,** 67–68.

Nowlis, V. (1965). Research with the mood adjective checklist. In S. S. Tomkins and C. E. Izard (Eds.), *Affect, cognition and personality*. New York: Springer.

O'Connell, K. A., & Martin, E. J. (1987). Highly tempting situations associated with abstinence, temporary lapse, and relapse among participants in smoking cessation programs. *Journal of Consulting and Clinical Psychology*, **55,** 367–371.

O'Hara, M., Rehm, L., & Campbell, S. (1982). Predicting depressive symptomatology: Cognitive-behavioral models and postpartum depression. *Journal of Abnormal Psychology*, **91,** 457–461.

Osberg, T. M., & Shrauger, J. S. (1986). Self-prediction: Exploring the parameters of accuracy. *Journal of Personality and Social Psychology*, **51,** 1044–1057.

Payne, T. J., Schare, M. L., Levis, D. J., & Colletti, G. (in press). Exposure to smoking-relevant cues: Effects on desire to smoke and topographical components of smoking behavior. *Addictive Behaviors*.

Peterson, C., & Villanova, P. (1988). An Expanded Attributional Style Questionnaire. *Journal of Abnormal Psychology*, **97,** 87–89.

Pomerleau, O., Adkins, D., & Pertschuk, M. (1978). Predictors of outcome and recidivism in smoking cessation treatment. *Addictive Behaviors*, **3,** 65–70.

Rausch, J. L., Nichinson, B., Lamke, C., & Matloff, J. (1990). Influence of negative affect on smoking cessation treatment outcome: a pilot study. *British Journal of Addiction*, **85,** 929–933.

Rothwell, N., & Williams, J. M. G. (1983). Attributional style and life events. *British Journal of Clinical Psychology*, **22,** 139–140.

Sacks, C. H., & Bugental, D. B. (1987). Attributions as moderators of affective and behavioral responses to social failure. *Journal of Personality and Social Psychology*, **53,** 939–947.

Seligman, M., Peterson, C., Kaslow, N., Tanenbaum, R., Alloy, L., & Abramson, L. (1984). Attributional style and depressive symptoms among children. *Journal of Abnormal Psychology*, **93,** 235–238.

Sherman, J. E., Morse, E., & Baker, T. B. (1986). Urges/craving to smoke: Preliminary results from withdrawing and continuing smokers. *Advances in Behaviour Research and Therapy*, **8,** 253–269.

Shiffman, S. M. (1982). Relapse following smoking cessation: A situational analysis. *Journal of Consulting and Clinical Psychology*. **50,** 71–86.

Shiffman, S. M. (1984). Cognitive antecedents and sequalae of smoking relapse crises. *Journal of Applied Social Psychology*, **14,** 296–309.

Shiffman, S. M., & Jarvik, M. E. (1976). Trends in withdrawal symptoms in abstinence from cigarette smoking. *Psychopharmacology*, **50,** 35–39.

Stacy, A. W., Newcomb, M. D., & Bentler, P. M. (in press). Cognitive motivation and problem drug use: A nine-year longitudinal study. *Journal of Abnormal Psychology*.

Tiffany, S. T. (1990). A cognitive model of drug urges and drug-use behavior: Role of automatic and nonautomatic processes. *Psychological Review*, **97,** 147–168.

Vogt, T. M., Selvin, S., Widdowson, G., & Hulley, S. B. (1977). Expired air carbon monoxide and serum thiocyanate as objective measures of cigarette exposure. *American Journal of Public Health*, **67,** 545–549.

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology*, **54,** 1063–1070.

Wise, R. (1988). The neurobiology of craving: Implications for the understanding and treatment of addictions. *Journal of Abnormal Psychology*, **97,** 118–132.