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Treatment Attrition: Associations with Negative Affect Smoking Motives and Barriers to Quitting Among Treatment-Seeking Smokers

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Abstract

Introduction—Pre-treatment attrition and perceived barriers for quitting are clinically important processes involved in early phases of quitting smoking. However, less is known about the constructs that may contribute to these processes such as negative affect reduction smoking motives.

Method—The current study sought to evaluate the relation between negative affect reduction smoking motives with pre-treatment attrition and perceived barriers for quitting in a sample of 425 treatment-seeking smokers (48.5% female; $M_{age} = 37.69$; $SD = 13.61$) enrolled in a smoking cessation study examining the efficacy of a transdiagnostic panic-smoking cessation treatment relative to a standard smoking cessation treatment.

Results—Results indicated that greater negative affect reduction smoking motives was associated with an increased likelihood of treatment initiation (Odds Ratio = 1.49, CI: 1.09, 2.04). Additionally, negative affect reduction smoking motives was associated with greater perceived barriers for cessation among pre-treatment drop-outs and treatment initiators.

Conclusions—This initial investigation provides evidence for the possible clinical utility in addressing negative affect reduction smoking motives during early stages of quitting. Additionally, such findings could potentially inform the development of personalized, early stages of quitting interventions for smoking cessation.

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Keywords

Smoking; Negative Affect; Barriers to Quitting; Motives; Treatment Attrition

Treating tobacco dependence is a dynamic, chronic process (The Tobacco, Dependence Clinical Practice Guideline, Staff, & Consortium, 2000). In fact, smoking cessation involves specific phases, including Motivation (the period prior to a smoker being ready to make a quit attempt), Precessation (the several week period prior to a quit attempt after a smoker has committed to making a quit attempt), Cessation (the two week period following and including a quit attempt), and Maintenance (beyond the two week post-quit period that focuses on the maintenance of abstinence; Baker et al., 2011). Smokers may vary in their engagement and success/challenges in different phases, yet each phase offers clinically-important opportunities for intervention (Baker et al., 2011). Although the majority of empirical work has sought to explicate smoking cessation outcomes and maintenance processes (Ockene et al., 2000), less attention has addressed ‘early problems’ in quitting (MacPherson, Stipelman, Duplinsky, Brown, & Lejuez, 2008). Two ‘early quit problems’ in need of further study include pre-treatment attrition (or drop out prior to attending a treatment session) and perceived barriers for quitting (e.g., individual differences in perceptions of smoking cessation stressors that interfere with one’s ability to engage in quitting behavior; Macnee & Talsma, 1995a). Indeed, both pre-treatment attrition and perceived barriers to quitting relate to early problems in quitting (Ahluwalia et al., 2002; Macnee & Talsma, 1995b), yet each taps into unique aspects of these problems that may not be captured by the other. Specifically, pre-treatment attrition reflects treatment drop out (MacPherson et al., 2008) and perceived barriers for quitting reflects the cognitive appraisal of potential barriers for quitting (Macnee & Talsma, 1995a). Both constitute important ‘early quit problems’ that may negatively impact cessation and promote smoking maintenance (Ahluwalia et al., 2002; Macnee & Talsma, 1995b).

In terms of pre-treatment attrition, available work suggests that eligible treatment participants who fail to initiate treatment after a baseline appointment tend to be less educated, younger, and may have other health-related problems or vulnerability characteristics (e.g., high body mass index) relative to their treatment-initiating counterparts (Ahluwalia et al., 2002; Copeland, Martin, Geiselman, Rash, & Kendzor, 2006). Smokers who drop out prior to initiating treatment also report greater anxiety sensitivity, lower distress tolerance (MacPherson et al., 2008), and less motivation to quit than smokers who initiate treatment (Ahluwalia et al., 2002). These data collectively suggest that there are a variety of sociodemographic factors and individual difference characteristics related to pre-treatment attrition. Yet, beyond this work, little is known about predictors of pre-treatment attrition. This neglect is unfortunate considering robust empirical evidence for a strong dose-response relationship between smoking cessation treatment attendance and smoking abstinence and reduction (Amanda Baker et al., 2006; Fiore et al., 2000).

Another set of factors that may impact treatment engagement is perceived barriers for smoking cessation. Past work indicates perceived barriers for cessation are related to several emotion regulatory processes that may negatively impact cessation treatment, including

greater negative reinforcement smoking outcome expectancies (Foster, Zvolensky, Garey, Ditte, & Schmidt, 2014; Johnson, Farris, Schmidt, & Zvolensky, 2012; Peasley-Miklus, McLeish, Schmidt, & Zvolensky, 2012), anxiety sensitivity (Gonzalez, Zvolensky, Vujanovic, Leyro, & Marshall, 2008), and distress intolerance (Kraemer, McLeish, Jeffries, Avallone, & Luberto, 2013). Theoretically, because smoking may alleviate negative affect states (Kassel, Stroud, & Paronis, 2003), individuals with greater perceived barriers or stressors about quitting may be more apt to regulate their stress by smoking, which in turn, may be related to vulnerability for smoking persistence and dependence (West, Hajek, & Belcher, 1989). Thus, perceived barriers for quitting may play a central role in theoretical models of smoking maintenance and relapse.

Given that pre-treatment attrition and perceived barriers for quitting are clinically important processes involved with 'early quit problems,' there is a need to expand work focused on identifying associated factors. Smoking motives offer theoretically promising, yet previously unexplored potential influences on both pre-treatment attrition and perceived barriers. Smoking motives refer to one's specific reasons for smoking (Ikard, Green, & Horn, 1969). Extensive research has been devoted to understanding and developing theoretical frameworks for smoking motives and their relation to smoking behavior (Ikard et al., 1969; Piper et al., 2004; Tate, Schmitz, & Stanton, 1991). Although there are distinct models of smoking motivation, one consistent observation is that the motivation to smoke to reduce/manage negative affect is frequently associated with poor smoking-related outcomes, such as higher rates of nicotine dependence and lower quit rates (Baker, Brandon, & Chassin, 2004; Copeland, Brandon, & Quinn, 1995; Farris, Zvolensky, Beckham, Vujanovic, & Schmidt, 2014; Fidler & West, 2009; Kassel et al., 2003). It is also possible that negative affect reduction smoking motives are relevant to better understanding early problems with quitting. For instance, individuals who frequently smoke to reduce negative affect may be at increased risk for adverse early smoking challenges because they rely heavily on smoking to manage life stress and emotional distress (Farris, Zvolensky, & Schmidt, 2015). In fact, smoking to reduce negative affect is related to, yet distinct from, emotional problems, ranging from anxiety to depressive symptoms (Brown et al., 2001; Mahaffey et al., 2015). Thus, smokers who are more motivated to smoke for negative affect reduction reasons may be more apt to engage in treatment because the difficulties they faced when attempting to quit in the past may have provided insight that they need additional guidance and specialized treatment to address their unique challenges. Conversely, smokers less motivated to smoke for negative affect reduction reasons may be less apt to engage because they have not experienced the additional, affective regulation challenges to a similar degree as those who use smoking to cope with negative affect.

An understanding of how specific domains of smoking motives relate to treatment attrition and perceived barriers for quitting that may impede treatment engagement has the potential to inform universal and targeted treatment efforts. Yet, little empirical work has focused on elucidating the relations between motives and these behavioral (pre-treatment attrition) and cognitive (perceived barriers for quitting) smoking processes. Thus, the current study sought to evaluate the relation between negative affect reduction smoking motives and pre-treatment attrition and perceptions of barriers for quitting. We hypothesized that lower negative affect reduction smoking motives would predict a greater likelihood of pre-treatment attrition and

greater negative affect reduction smoking motives would predict a greater likelihood of initiating treatment. Moreover, we hypothesized that greater negative affect reduction smoking motives would relate to greater perceived barriers for smoking cessation for both pre-treatment drop-outs and treatment initiators.

METHODS

Participants

Participants were 579 treatment-seeking adult daily smokers provided at least partial baseline self-report data for the current trial. Of those who provided baseline data, 425 (48.5% female; $M_{\text{age}} = 37.69$; $SD = 13.61$) were deemed eligible for the trial and comprise the current study sample. Exclusion criteria included current suicidality warranting immediate intervention and psychosis. The racial and ethnic distribution of this sample was as follows: 84.7% identified as White/Caucasian; 9.4% as Black/Non-Hispanic; 0.5% as Black/Hispanic; 2.6% as Hispanic; 1.2% as Asian; and 1.6% as 'Other.' More than one-fourth (26.6%) of participants completed high school or less, 33.6% completed some college, 10.1% earned a 2-year college degree, and 14.4% earned a 4-year degree. Regarding marital status, 35.5% were married or living with someone, 41.2% were never married, 16.9% were divorced, 4.0% were separated, and 2.4% were widowed. The average daily smoking rate of this sample was 16.5 ($SD = 9.54$) cigarettes per day, and participants reported daily smoking for an average of 19.3 years ($SD = 13.42$). Participants reported a moderate level of nicotine dependence (Fagerström Test for Nicotine Dependence: $M = 5.13$, $SD = 2.21$; Heatherton, Kozlowski, Frecker, & Fagerström, 1991).

Of the sample, 42.2% met criteria for at least one current (past year) psychological disorder which included: social anxiety disorder (11.1%), major depressive disorder (4.0%), posttraumatic stress disorder (3.1%), generalized anxiety disorder (5.4%), specific phobia (4.9%), panic disorder with or without agoraphobia (0.5%), alcohol use disorder (4.2%), anxiety disorder not otherwise specified (0.9%), obsessive-compulsive disorder (1.4%), dysthymia (1.7%), cannabis use disorder (1.9%), bipolar disorder (0.4%), anorexia nervosa (0.2%), and depressive disorder not otherwise specified (0.5%).

Measures

Demographics Questionnaire—Demographic information collected included gender, age, race, educational level, and marital status. These items were used to describe the sample, and gender was included as a covariate.

Diagnostic Interview—The Structured Clinical Interview for DSM-IV Diagnosis of Axis I Disorders Non-Patient Version (SCID-NP) was used to describe the presence of current psychological disorders of the sample (First, Spitzer, Gibbon, & Williams, 2007). All interviews were administered by advanced doctoral level therapists and supervised by a licensed clinical psychologist. All interviews were audio-taped and reliability of 12.5% of interviews were checked for accuracy; no cases of disagreement were noted.

Medical History Form—A medical history checklist was used to assess current and lifetime medical problems. As in past work (Buckner et al., 2015; Farris, Zvolensky, Blalock, & Schmidt, 2014; Leventhal, Zvolensky, & Schmidt, 2011), a composite variable was computed as an index of tobacco-related medical problems (labeled ‘Health’). Specifically, items in which participants indicated having ever been diagnosed (heart problems, hypertension, respiratory disease, or asthma; all coded 0 [*no*] or 1 [*yes*]) were summed and a total score was created, with greater scores reflecting the occurrence of multiple markers of tobacco-related disease.

Positive and Negative Affect Schedule (PANAS)—The PANAS (Watson, Clark, & Tellegen, 1988) measured the extent to which participants experienced 20 different feelings and emotions on a scale ranging from 1 (*Very slightly or not at all*) to 5 (*Extremely*). The measure yields two factors, negative and positive affect, and has strong documented psychometric properties (Watson et al., 1988). The PANAS has demonstrated high levels of internal consistency across clinical and non-clinical samples (Cronbach’s $\alpha = .85$ to $.93$; Watson et al., 2007). The PANAS negative affect (PANAS-NA) subscale was utilized in the present study ($\alpha = 0.90$).

Latency to First Cigarette—The Fagerström Test for Nicotine Dependence (FTND) is a 6-item scale that assesses gradations in tobacco dependence (Heatherton, Kozlowski, Frecker, & Fagerstrom, 1991). Scores range from 0-10, with higher scores reflecting high levels of physiological dependence on nicotine. The FTND has adequate internal consistency, positive relations with key smoking variables (e.g., saliva cotinine), high test-retest reliability (Heatherton, Kozlowski, Frecker, & Fagerstrom, 1991; Pomerleau, Carton, Lutzke, Flessland, & Pomerleau, 1994), and demonstrated acceptable internal consistency in the present sample ($\alpha = .65$). The first item of the FTND, latency to first cigarette of the day (i.e., “How many minutes after you wake do you smoke your first cigarette?” on a scale ranging from 0 [*after 60 minutes*] to 3 [*within 5 minutes*]), served as an index of nicotine dependence (Baker, Piper, McCarthy, Bolt, Smith, Kim, Colby, Conti, Giovino, Hatsukami, et al., 2007). Latency to first cigarette of the day is considered the single most reliable indicator of nicotine dependence and accounts for much of the predictive validity attributed to the FTND (Baker, Piper, McCarthy, Bolt, Smith, Kim, Colby, Conti, Giovino, & Hatsukami, 2007; Fagerstrom, 2003).

Smoking History Questionnaire (SHQ)—The SHQ was used to assess smoking rate, years of daily smoking, and other smoking characteristics (Brown, Lejuez, Kahler, & Strong, 2002). Smoking rate was obtained from the question, “Since you started regular daily smoking, what is the average number of cigarettes you smoked per day?” Participants were also asked, “For how many years, altogether, have you been a regular daily smoker?”

Reasons for Smoking (RFS)—The RFS (Ikard et al., 1969) was used to assess the role of different smoking motives. The psychometric properties of this scale, including measures of factor structure, internal consistency, and test–retest reliability, have been well-established (Shiffman, 1993). The version of the RFS used in this study consists of 23 items, which comprise 6 subscales: Habitual (e.g., “I’ve found a cigarette in my mouth and didn’t

remember putting it there”), Addictive (e.g., “Between cigarettes, I get a craving only a cigarette can satisfy”), Pleasure (e.g., “I find cigarettes pleasurable”), Stimulation (e.g., “I like smoking when I am busy and working hard”), Sensorimotor (e.g., “Part of the enjoyment of smoking a cigarette comes from the steps I take to light up”), and Negative Affect Reduction (e.g., “When I feel uncomfortable or upset about something, I light up a cigarette”). Items are rated on a 1 (*never*) to 5 (*always*) scale. RFS subscales demonstrated acceptable to good internal consistency in the current sample (Habitual: $\alpha = 0.69$; Addictive: $\alpha = 0.77$; Pleasure: $\alpha = 0.81$; Stimulation: $\alpha = 0.82$; Sensorimotor: $\alpha = 0.76$; Negative Affect Reduction: $\alpha = 0.88$).

Barriers to Cessation Scale (BCS)—The BCS assessed barriers, or specific stressors, associated with smoking cessation (Macnee & Talsma, 1995a). The BCS is a 19-item measure on which respondents indicate, on a 4-point Likert-style scale (0 [*not a barrier*] to 3 [*large barrier*]), the extent to which they identify with each of the identified barriers to cessation. The BCS has been found to have good internal consistency for total score (Cronbach's $\alpha = .81-.87$; (Macnee & Talsma, 1995a). The BCS had good internal consistency in the current sample ($\alpha = 0.89$).

Pre-Treatment Attrition—Based on prior research (MacPherson et al., 2008), participants eligible for the treatment were divided into those who completed the baseline assessment and attended at least one treatment session (coded ‘1’; treatment initiators) and those who completed the baseline assessment and did not attend any treatment session (coded ‘0; pre-treatment drop-outs’).

Procedure

Data for the present study was collected during a large, multi-site randomized controlled clinical trial examining the efficacy of two smoking cessation interventions described in detail elsewhere (Schmidt, Raines, Allan, & Zvolensky, 2015). Participants were recruited at two sites (Vermont, Florida). Interested persons responding to community-based advertisements (e.g., flyers, newspaper ads, radio announcements) contacted the research team and were provided with a detailed description of the study via phone. Participants were then screened for initial eligibility, and if eligible, scheduled for an appointment at the University of Vermont or Florida State University; depending on which site they were recruited. Eligibility included (a) being between ages 18–65, (b) reporting smoking eight or more cigarettes per day, and (c) reporting motivation to quit rated as at least 5 or higher on a 10-point scale. After providing written informed consent, participants were interviewed using the SCID-I/NP and completed a computerized self-report assessment battery as well as biochemical verification of smoking status.

Regarding the interventions, eligible participants were randomly assigned to one of two smoking cessation treatment programs and scheduled for treatment initiation approximately 1–2 weeks after the baseline assessment. Participants were informed of their condition assignment upon arrival at their first treatment session. Smoking cessation treatment consisted of either (a) Smoking Cessation Program or (b) Panic-Smoking Prevention Program. Both treatment groups received nicotine replacement therapy via the transdermal

nicotine patch, which was initiated at treatment Session 4 (quit-day). Treatment consisted of four 60-min weekly sessions conducted by trained doctoral-level graduate students. All treatment was supervised by principal investigators (MJZ and NBS) and checked for treatment fidelity by independent reviewers. Participants were compensated \$12.50 for completing the baseline visit and an additional \$25 if they completed all treatment sessions. Data collection began in 2007 and concluded in 2014. The study protocol was approved by the Institutional Review Boards at the University of Vermont and Florida State University (clinicaltrials.gov # NCT01753141).

Analytic Strategy

First, descriptive analyses and zero-order correlations were examined among study variables. Second, to address our first aim, a logistic regression model of pre-treatment attrition (initiators: $n = 353$; pre-treatment drop-outs: $n = 72$) was estimated that included covariates (e.g., gender, tobacco-related health problems, latency to first cigarette of the day, and PANASNA) and the six RFS subscales. All predictors were forced into the model as a block. Third, to address our second aim, the incremental predictive validity of negative affect reduction smoking motives on BCS was examined using hierarchical multiple linear regression (Cohen & Cohen, 1983). At Step 1, covariates were entered. At Step 2, RFS Habitual, Addictive, Pleasure, Stimulation, and Sensorimotor subscales were entered. At Step 3, RFS Negative Affect Reduction subscale was entered. Subsequently, the incremental predictive validity of negative affect reduction smoking motives on BCS was examined separately by pre-treatment attrition using the hierarchical multiple linear regression model outlined above. Finally, to examine differences in strength of relation among RFS-negative affect reduction and BCS, unstandardized regression coefficients were compared across treatment initiation (Cohen, 1983)

RESULTS

Bivariate Correlations

Table 1 presents frequency, means, and standard deviations for all study variables. Table 2 contains bivariate correlations across all study variables. The RFS Negative Affect Reduction subscale was significantly associated with pre-attrition ($r = .12, p = .01$), such that greater negative affect reduction smoking motives was associated with greater treatment initiation. RFS Negative Affect Reduction subscale was significantly associated with perceived barriers to cessation ($r = .52, p < .01$).

Treatment Initiation

The overall logistic regression model was significant ($X^2 = 20.16, df = 10, p = .03$) with a Nagelkerke R^2 of .08. The PANAS-NA and RFS Negative Affect Reduction subscale emerged as significant predictors; see Table 3. Greater negativity affectivity (PANAS-NA) was associated with pre-treatment attrition, whereas greater negative affect reduction smoking motives was associated with an increased likelihood treatment initiation. Results from an unadjusted model confirmed that RFS Negative Affect Reduction subscale is a predictor of treatment initiation ($X^2 = 6.20, df = 1, p = .01$; Nagelkerke $R^2 = .02$; Odds Ratio = 1.49, CI: 1.09, 2.04).

Perceived Barriers for Cessation

Hierarchical multiple linear regression models examined by pre-treatment attrition indicated significant overall models for both groups for perceived barriers for cessation. Fisher's Z-test indicated no significant differences between groups ($Z = 1.20, p = .23$). Among treatment initiators, Step 1 accounted for 18.6% of the variance in perceived barriers for quitting with gender and PANAS-NA as significant predictors. Step 2 accounted for 38.6% of the variance with gender, PANAS-NA, RFS Addictive, and RFS Sensorimotor subscales as significant predictors ($R^2 = .20, p < .001$). Step 3 accounted for 39.4% of the variance with gender, PANAS-NA, RFS Addictive, RFS Sensorimotor, and RFS Negative Affect Reduction subscales as significant predictors ($R^2 = .01, p = .04$). See Table 4.

Among pre-treatment drop-outs, Step 1 accounted for 17.2% of the variance with PANAS-NA as a significant predictor. Step 2 accounted for 46.7% of the variance with RFS Addiction and RFS Stimulation subscales as significant predictors ($R^2 = .30, p < .001$). Step 3 accounted for 51.9% of the variance with RFS Negative Affect Reduction subscale as a significant predictor ($R^2 = .05, p = .01$). After controlling for covariates, the strength of the association between RFS Negative Affect Reduction subscale and BCS was not statistically different across pre-treatment drop-outs and treatment initiators, but approached significance ($Z = 1.44, p = .07$). See Table 4.

DISCUSSION

The current study was an initial investigation of negative affect reduction smoking motives in terms of better understanding pre-treatment attrition and perceived barriers to cessation. As expected, greater negative affect reduction smoking motives predicted a greater likelihood of initiating treatment. Results suggest that negative affect reduction smoking motives may positively impact treatment initiation. Specifically, smokers who report greater negative affect reduction smoking motives may be more apt to initiate treatment because they experience more affective distress and corresponding problems in quitting while trying to quit, and therefore, understand their need for assistance during the quit process. Indeed, prior work suggests negative affect reduction smoking motives is associated with more severe smoking, including greater nicotine dependence (Farris, Leventhal, Schmidt, & Zvolensky, 2015; Smith et al., 2010), fewer quit attempts (Bacio, Guzman, Shapiro, & Ray, 2014), and more severe withdrawal-related problems and symptoms during quitting (Farris, Leventhal, et al., 2015). Thus, consistent with past work, the current findings suggest smokers with greater motivation to smoke to manage their negative affect as a particularly vulnerable subset of the smoking population. Indeed, while these smokers may be more likely to initiate treatment, without specialized care to address their personal needs, their likelihood of quit success may be significantly diminished. Future work is needed to empirically explore the nature of treatment engagement and outcomes among smokers with a heightened tendency to smoke to manage negative affect in the same overarching model.

Also, as predicted, negative affect reduction smoking motives was associated with perceived barriers to cessation among pre-treatment drop-outs and treatment initiators. As an interpretative caveat, however, it is important to note the conceptual and statistical overlap in negative affect reduction smoking motives and perceived barriers to cessation (27% shared

variance). Nevertheless, the current findings provide evidence that negative affect reduction smoking motives may be uniquely associated with perceived barriers to cessation for smokers who enter treatment as well as those who are likely to drop out prior to initiating treatment. Indeed, across all models, the observed effects were evident after accounting for gender, tobacco-related medical illness, latency to first cigarette of the day, negative affectivity, and other smoking motives. Moreover, whereas only negative affect reduction smoking motives was related to barriers to cessation among pre-treatment drop-outs, sensorimotor and addictive smoking motives were significantly related to barriers to cessation among treatment initiators. Thus, these data suggest that multiple domains of smoking motives may impact perceptions of challenges for quitting among treatment initiators. Accordingly, negative affect reduction smoking motives appears to be a significant contributor to perceptions of challenges for quitting among all smokers, but particularly for smokers more likely to drop out prior to initiating treatment.

The current findings provide evidence for the clinical utility in addressing negative affect reduction smoking motives during early stages of quitting. Indeed, the current work could potentially inform the development of personalized, early stages of quitting interventions for smoking cessation. For example, based on current findings, it may be advisable to address negative affect reduction smoking motives in the context of a smoking cessation treatment. Indeed, identifying an individual's motives for smoking and providing psychoeducation on poor smoking outcomes associated with such maladaptive motivational cognitions may lead to better smoking outcomes. In addition, present findings suggest that smokers with lower elevations in negative affect reduction smoking motives may not perceive themselves as needing additional assistance with quitting and therefore not initiate treatment. Given the low success rate of smoking cessation (Centers for Disease Control and Prevention [CDC], 2002), clinicians could use a smokers rating for negative affect reduction smoking motives and classify smokers who may be in the greatest need of additional support. Indeed, providing psychoeducation using motivational techniques on the importance of attending treatment to these smokers may yield increased treatment attendance rates (Benson, Stronks, Willemsen, Bogaerts, & Nierkens, 2014), and subsequently enhance outcomes.

Although not a primary aim of the investigation, it is noteworthy that the trait like propensity toward negative affect predicted an increased likelihood of drop out prior to initiating treatment. This finding provides evidence that trait characteristics and motives for behavior are distinct constructs that uniquely relate to smoking outcomes, including treatment initiation. Thus, despite negative affect and negative affect reduction smoking motives having approximately 13% shared variance, the constructs demonstrate unique predictive relations and should be considered individually in empirical work.

There are a number of study caveats. First, our sample consisted of community-recruited, treatment-seeking daily cigarette smokers with moderate levels of nicotine dependence. Second, the sample was largely comprised of primarily White smokers. It will be impactful for future studies to replicate findings among a more ethnically/racially diverse sample of smokers. Third, the current study focused on pre-treatment attrition and did not examine quit behavior. Future studies should examine the relationships of negative affect reduction motives, barriers to cessation, and pre-treatment attrition with quit behavior, including the

nature of quit attempts and cessation success. Fourth, time between the baseline appointment and first treatment session varied slightly between participants. Consistent with extant literature indicating the importance of time to treatment initiation in retention (see Stark, 1992), it may be advisable for future work to examine this variable as a predictor of pre-treatment attrition. Lastly, although negative affect reduction smoking motives significantly predicted pre-treatment attrition, the magnitude of this association was small. Future work should focus on additional baseline predictors that may identify smokers most susceptible to pre-treatment attrition.

Overall, the present study serves as an initial investigation on the impact of negative affect reduction smoking motives on two ‘early quit problems.’ The current work adds to the burgeoning literature focused on improving our understanding of predictors of treatment initiation. Future work could build upon this initial investigation by exploring unique pre-treatment predictors of treatment attrition defined not only as dropping out prior to completing any treatment, but also as dropping out after initiating treatment.

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Highlights

- Motivation to smoke to reduce negative affect was associated with treatment initiation.
- Motivation to smoke to reduce negative affect was associated with perceived barriers to cessation.
- Potential utility in addressing motives to smoke for negative affect reduction during early stages of quitting.

Table 1

Descriptive Statistics for Study Variables

Categorical Variable	Overall Sample (N = 425)		Initiators (N = 353)		Pre-Treatment Drop-Outs (N = 72)	
	n	%	n	%	N	%
Gender						
Male	219	51.5	178	50.4	41	56.9
Female	206	48.5	175	49.6	31	43.1
Continuous Variables	Mean	SD	Mean	SD	Mean	SD
Health	0.37	0.62	0.36	0.61	0.44	0.65
LFCD	1.92	0.92	1.96	0.88	1.69	1.06
PANAS-NA	18.74	6.87	18.50	6.81	19.82	7.15
BCS	24.86	11.00	25.09	10.94	23.71	11.33
RFS-Habitual	2.29	0.70	2.30	0.69	2.24	0.70
RFS-Addictive	3.26	0.77	3.28	0.79	3.16	0.66
RFS-Pleasure	3.73	0.81	3.73	0.81	3.69	0.83
RFS-Stimulation	2.64	0.92	2.68	0.93	2.45	0.84
RFS-Sensorimotor	2.44	0.97	2.42	0.97	2.55	0.97
RFS-NR	3.43	0.80	3.47	0.77	3.21	0.89

Note. Health = larger scores reflected occurrence of multiple markers of tobacco-related disease; LFCD = Latency to first cigarette of the day taken from Fagerström Test for Nicotine Dependence (Heatherton, Kozlowski, Frecker, & Fagerstrom, 1991); PANAS-NA = Positive and Negative Affect Schedule-Negative Affect Subscale (Watson et al., 1988); BCS = Barriers to Cessation Scale (Macnee et al., 1995); RFS = Reason for Smoking Scale (Ikard et al., 1969).

Table 2

Correlations among Study Variables

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1. Gender	--											
2. Health	-.02	--										
3. LFCD	-.02	-.02	--									
4. PANAS-NA	.12*	-.01	-.06	--								
5. Treatment Initiation Status	.05	-.05	.11*	-.07	--							
6. BCS	.26***	-.06	.03	.36***	.05	--						
7. RFS-Habitual	.03	.06	.27***	.17***	.03	.20	--					
8. RFS-Addictive	.16***	-.01	.24***	.23***	.06	.51***	.48***	--				
9. RFS-Pleasure	.07	-.06	.04	.03	.02	.26***	-.004	.32***	--			
10. RFS-Stimulation	.06	-.04	.14**	.20***	.09	.34***	.37***	.46***	.25***	--		
11. RFS-Sensorimotor	-.04	-.04	-.05	.19***	-.05	.34***	.27***	.34***	.29***	.37***	--	
12. RFS-NA	.24***	-.11*	.21*	.36***	.12*	.52***	.42***	.66***	.29***	.54***	.36***	--

Note. N = 425

Gender: 1 = Male and 2 = Female; Health = larger scores reflected occurrence of multiple markers of tobacco-related disease; LFCD = Latency to first cigarette of the day taken from Fagerström Test for Nicotine Dependence (Heatherton, Kozlowski, Frecker, & Fagerstrom, 1991); PANAS-NA = Positive and Negative Affect Schedule-Negative Affect Subscale (Watson et al., 1988); BCS = Barriers to Cessation Scale (Macnee et al., 1995); RFS = Reason for Smoking Scale (Kard et al., 1969).

p < .001

**
p < 0.01

*
p < 0.05

Table 3

Logistic regression model of treatment initiation (1 = initiated treatment)

Variable	Odds ratio	95% Confidence interval
Gender	1.16	0.67, 2.01
Health	0.88	0.58, 1.33
LFCD	1.21	0.90, 1.62
PANAS-NA	0.94 [*]	0.92, 0.99
RFS-Habitual	0.88	0.54, 1.41
RFS-Addictive	0.92	0.56, 1.52
RFS-Pleasure	0.95	0.66, 1.36
RFS-Stimulation	1.26	0.88, 1.81
RFS-Sensorimotor	0.77	0.57, 1.06
RFS-NR	1.77 [*]	1.06, 2.95

Note. N = 425

Gender: 1 = Male and 2 = Female; Level of Education: 1 = 6th grade or less to 8 = Completed graduate or professional schooling; Health = larger scores reflected occurrence of multiple markers of tobacco-related disease; LFCD = Latency to first cigarette of the day taken from Fagerström Test for Nicotine Dependence (Heatherton, Kozlowski, Frecker, & Fagerstrom, 1991); PANAS-NA = Positive and Negative Affect Schedule-Negative Affect Subscale (Watson et al., 1988); RFS = Reason for Smoking Scale (Ikard et al., 1969).

*
p < 0.05

Table 4

Hierarchical Regression Analyses Predicting Perceived Barriers to Cessation from Reasons for Smoking Subscales while Controlling for Covariates

Treatment Initiators (N = 353)							
Criterion			Predictor	B	SE	t	β
BCS	Step 1	Covariates	Gender	4.91	1.06	4.62	0.23***
			Health	-0.89	0.87	-1.03	-0.05
			LFCD	0.66	0.60	1.10	0.05
			PANAS-NA	0.55	0.08	6.97	0.34***
BCS	Step 2	Covariates and RFS subscales Except NR	Gender	4.14	0.95	4.36	0.19***
			Health	-0.51	0.76	-0.67	-0.03
			LFCD	-0.68	0.57	-1.19	-0.06
			PANAS-NA	0.37	0.07	5.16	0.23***
			RFS-Habitual	-1.05	0.82	-1.28	-0.07
			RFS-Addictive	5.23	0.79	6.60	0.38***
			RFS-Pleasure	0.69	0.64	1.08	0.05
			RFS-Stimulation	0.63	0.60	1.05	0.05
			RFS-Sensorimotor	1.71	0.56	3.07	0.15**
BCS	Step 3	Covariates and All RFS subscales	Gender	3.71	0.97	3.83	0.17***
			Health	-0.33	0.76	-0.43	-0.02
			LFCD	-0.79	0.57	-1.39	-0.06
			PANAS-NA	0.33	0.07	4.50	0.20***
			RFS-Habitual	-1.25	0.82	-1.52	-0.08
			RFS-Addictive	4.50	0.86	5.23	0.32***
			RFS-Pleasure	0.57	0.64	0.89	0.04
			RFS-Stimulation	0.30	0.62	0.49	0.03
			RFS-Sensorimotor	1.60	0.56	2.87	0.14**
		RFS-NR	1.90	0.91	2.10	0.14*	
Treatment Non-Initiators (N = 72)							
Criterion			Predictor	B	SE B	t	β
BCS	Step 1	Covariates	Gender	3.87	2.64	1.47	0.17
			Health	-0.85	2.04	-0.42	-0.05
			LFCD	0.16	1.24	0.13	0.02
			PANAS-NA	0.54	0.18	3.00	0.34**
BCS	Step 2	Covariates and RFS subscales Except NR	Gender	2.24	2.29	0.98	0.10
			Health	-0.43	1.74	-0.25	-0.03

Treatment Initiators (N = 353)							
Criterion			Predictor	B	SE	t	β
			LFCD	0.77	1.11	0.70	0.07
			PANAS-NA	0.20	0.18	1.12	0.12
			RFS-Habitual	-2.70	1.97	-1.37	-0.17
			RFS-Addictive	7.15	2.02	3.54	0.42**
			RFS-Pleasure	0.80	1.49	0.54	0.06
			RFS-Stimulation	3.12	1.56	2.00	0.23*
			RFS-Sensorimotor	2.32	1.28	1.82	0.20
BCS	Step 3	Covariates and All RFS subscales	Gender	1.67	2.21	0.76	0.07
			Health	0.54	1.71	0.32	0.03
			LFCD	0.40	1.07	0.37	0.04
			PANAS-NA	0.10	0.17	0.56	0.06
			RFS-Habitual	-2.69	1.88	-1.43	-0.17
			RFS-Addictive	4.31	2.23	1.93	0.25
			RFS-Pleasure	0.36	1.44	0.25	0.03
			RFS-Stimulation	1.33	1.65	0.80	0.10
			RFS-Sensorimotor	1.84	1.24	1.49	0.16
			RFS-NR	5.02	1.96	2.56	0.39*

Note.

Gender: 1 = Male and 2 = Female; Health = larger scores reflected occurrence of multiple markers of tobacco-related disease; LFCD = Latency to first cigarette of the day taken from Fagerström Test for Nicotine Dependence (Heatherton, Kozlowski, Frecker, & Fagerstrom, 1991); PANAS-NA = Positive and Negative Affect Schedule-Negative Affect Subscale (Watson et al., 1988); BCS = Barriers to Cessation Scale (Macnee et al., 1995); RFS = Reason for Smoking Scale (Ikard et al., 1969).

p < .001

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p < .01

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p < .05.