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Negative mood regulation mediates the relationship between distraction and engagement in pleasurable activities among college smokers

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Abstract

Smoking for negative mood alleviation is a strong predictor of early smoking and early dependence among undergraduates. Little is known about whether adaptive cognitive coping processes (e.g., distraction) may help decrease the likelihood of student smoking for negative mood regulation. The present study tested the hypothesis that distraction would predict (a) greater engagement in adaptive pleasant pastimes and (b) lower rates of smoking behavior among undergraduates ($n = 162$, 41.9% female). We further assessed whether negative mood regulation expectations would explain both relationships. Results indicated that negative mood regulation fully mediated the relationship between distraction and engagement in pleasurable activities among college smokers. Although the relationships among distraction, negative mood regulation, and cigarette consumption were not significant, they were in the expected direction (negative). Results from the present study point to the importance of prevention efforts focused on enhancing cognitive coping skills in college smokers. Such a focus may lead to more frequent adaptive cognitive coping during negative mood states, presumably instead of smoking.

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1. Introduction

More than 430,000 Americans die each year from smoking-related illnesses, making smoking the leading cause of preventable death in the United States (Fiore et al., 2000). Alarming, college-aged adults represent the largest age group reporting current cigarette use (Substance Abuse and Mental Health Services Administration [SAMHSA], 2005). Specifically, 39.5% of the 18–25 year olds surveyed reported smoking cigarettes in the past month, as compared to 11.9% among those individuals aged 12–17 and 24.1% among those aged 26 or older (SAMHSA, 2005). Despite these estimates, results from existing cessation trials for college-aged smokers have been tenuous at best (O’Neill, Gillispie, & Slobin, 2000) and are comparable to the poor abstinence rates following treatment of late adolescent smokers (Moolchan, Ernst, & Henningfield, 2000).

Prior research suggests that young adults report emotion regulation as one of the most important reasons for continued use of cigarettes (Spielberger, Foreyt, Reheiser, & Poston, 1998). For example, cross-sectional studies indicate that symptoms of depression predict initiation (Escobedo, Reddy, & Giovino, 1998; Patton et al., 1998), experimentation, (Patton et al., 1998; Wang, Fitzhugh, Eddy, Fu, & Turner, 1997), and progression to regular cigarette smoking among young adults (Patton et al., 1996). Among college-aged male smokers, lower levels of positive affect and higher levels of negative affect also predict dependence on cigarettes (McChargue, Cohen, & Cook, 2004a). Similarly, college female smokers reporting elevated symptoms of depression have been shown to be more dependent on nicotine than their non-depressed peers (McChargue, Cohen, & Cook, 2004b). Finally, situations that have the ability to induce negative moods have been shown to be strongly associated with cigarette smoking (Spielberger & Jacobs, 1982). Despite evidence linking negative moods to increased smoking, little is known about adaptive processes that may serve to decrease mood regulating smoking behavior.

One plausible adaptive coping process, primarily studied among depressed individuals, is the cognitive response style of distraction. According to response styles theory, distraction is defined as a process of deflecting attention from negative internal states (e.g., depressed mood) to more pleasant external stimuli (e.g., engaging in an enjoyable activity with friends) that may serve to divert an individual’s maladaptive pattern of responding to negative mood states (Nolen-Hoeksema, 1991). Specifically, depressed and non-depressed individuals who use pleasant distracting activities to aid in alleviating negative mood states significantly reduce the duration (Nolen-Hoeksema, 1991) and severity (Nolen-Hoeksema & Morrow, 1993) of their depressed moods. Furthermore, distraction has been positively associated with higher negative mood regulation expectations (Flett, Blankstein, & Obertynski, 1996) and increased positive affect (Stone, Kennedy-Moore, & Neale, 1995).

Although distraction has been shown to be an adaptive response to depression, little is known regarding whether such an adaptive response may act as a buffer to health compromising behaviors that are closely tied to mood regulation, such as cigarette smoking. Given that individuals dependent on nicotine have reported that cigarette smoking helps to regulate mood states (Hall, Muñoz, Reus, & Sees, 1993) and that negative affect plays a prominent role in relapse to smoking among those who wish to quit (Shiffman & Waters, 2004), it is plausible that smokers may become dependent on nicotine in part due to mood regulatory processes. To date, it is unclear whether adaptive coping responses to dysphoria can help buffer young smokers from becoming dependent on nicotine.

The present study examines the association between adaptive coping and a lower risk of nicotine dependence (i.e., lower rates of smoking) among a sample of college-aged cigarette smokers. We expected that distraction response style scores would be associated with greater engagement in adaptive pleasurable events and lower levels of smoking behavior. We further tested whether negative mood regulation would explain (mediate) these relationships. Showing that negative mood regulation explains the effect of distraction on pleasurable activities would provide support for the assumption that distracting toward engagement in alternative rewarding behaviors may help prevent smokers from using cigarettes to regulate their moods. The added effect of negative mood regulation explaining distraction's association with lower cigarette consumption would provide further evidence of reduced smoking for negative mood regulating behavior because of the adaptive coping of distraction.

2. Method

2.1. Participants

Undergraduate psychology students ($n = 162$, 41.9% female) participated in the present study to fulfill a course requirement. On average, participants were 19.2 years of age (range = 17–26, $SD = 1.8$). With regard to ethnicity, 87.5% identified themselves as Caucasian, 6.9% as Hispanic, and 2.5% as Other. The sample consisted of 39.4% occasional smokers and 60.6% daily smokers. The mean number of cigarettes smoked per day was 2.16 ($SD = 1.6$) and the mean Fagerström Test of Nicotine Dependence (FTND) score was 2.3 ($SD = 2.5$), indicating that participants, on average, had low levels of nicotine dependence (Fagerström, Heatherton, & Kozlowski, 1990). Twenty-seven percent of the sample indicated that they were currently taking action to quit smoking, and 28.4% indicated that they “thought they should quit smoking, but they were not quite ready”.

2.2. Materials

2.2.1. Distraction

The Response Style Questionnaire (RSQ; Nolen-Hoeksema & Morrow, 1991) was administered in order to measure dispositional distraction responses. The RSQ contains a list of 71 activities that utilize a 4-point Likert scale to report how often participants partake in each activity when experiencing depression (1 = *almost never*, 2 = *sometimes*, 3 = *often*, 4 = *almost always*). The RSQ comprises two subscales: the Rumination Response Scale (RRS) and the Distraction Response Scale (DRS). For purposes of this study, only the DRS was examined. The DRS contains 13 items that ask how frequently individuals participate in pleasant activities as a reaction to their depressive state. In previous studies, the RSQ has been shown to correlate significantly ($r = .61$) with distraction responses in a 30-day diary study of depressed mood (Nolen-Hoeksema & Morrow, 1991; Nolen-Hoeksema, Morrow, & Frederickson, 1993), and has been shown to have good internal consistency (RRS = .89, DRS = .80; Nolen-Hoeksema & Morrow, 1991). In the current study, the DRS demonstrated good internal consistency (Cronbach's $\alpha = .78$; see Table 1 for a list of descriptive statistics for each assessment instrument used in the present study).

Table 1
Descriptive statistics for each assessment instrument

Instrument	Number of items	Mean	Minimum score	Maximum score	SD	Skewness	α	Mean inter-item correlation ^a
DRS	13	40.37	24	60	6.89	0.27	0.78	0.18
NMRS	30	105.59	53	140	16.82	−0.53	0.91	0.26
PES	320	117.09	24	477	56.31	1.78	0.77	0.26
FTND	6	2.29	0	10	2.47	0.93	0.76	0.38

Note: DRS = Distraction Response Scale, NMRS = Negative Mood Regulation Scale, PES = Pleasant Events Schedule, and FTND = Fagerström Test for Nicotine Dependence.

^a Mean inter-item correlations may be low because they include both negative and positive correlations.

2.2.2. Pleasurable events

The Pleasant Events Schedule (PES; MacPhillamy & Lewinsohn, 1982) was used to assess the frequency with which a person engages in rewarding events. The PES is a self-report behavioral inventory composed of 320 items. In the present study, the rate of engagement in rewarding behaviors was assessed by the PES *frequency* subscale, which requires respondents to report how often they have engaged in each event within the previous month using a 3-point scale (0 = *this has not happened in the last 30 days*, 1 = *this has happened a few times (1–6) in the last 30 days*, 2 = *this has happened often (7 or more) in the last 30 days*). Possible total scores range from 0 to 640, with higher scores indicating higher frequency. In past research, the PES has demonstrated fair to adequate test–retest reliability (.81), predictive validity (.65), and concurrent validity (.68–.72) (MacPhillamy & Lewinsohn, 1982). Predictive validity was established between items endorsed on the PES and subsequent daily diaries collected by college students. Construct validity was tested by comparing undergraduate students' responses to their responses on an objective behavioral choice task (MacPhillamy & Lewinsohn, 1982). In the present sample, inter-item reliability was good (Cronbach's $\alpha = .77$), and inter-item correlations ranged from $-.26$ to $.73$ ($M = .26$).

2.2.3. Affect regulation

The Negative Mood Regulation Scale (NMR; Catanzaro & Mearns, 1990) is a 30-item self-report questionnaire that assesses affective regulation, including the frequency and success of attempts to terminate negative moods. Items include statements such as, "When I'm upset I believe that I'll be upset for a long time," and answers range from *Strongly Disagree* to *Strongly Agree*. Originally, the scale included 50 items that measured expectancy of coping behaviors. The NMR contains five different types of items, including general (i.e., negative moods can or cannot be alleviated), cognitive (i.e., thought processes that might manipulate negative moods), behavioral-alone (i.e., actions that influence mood when alone), behavioral-social (i.e., actions that influence mood when with others), and behavioral-unspecified (i.e., actions that influence mood when alone or with other people). These items are grouped into three subscales: general, cognitive, and behavioral. Previous research shows that the NMR demonstrates high internal consistency, with α coefficients ranging from .86 to .92; good test–retest reliability in college students at both 3–4 weeks (.76 for men and .74 for women) and 6–8 weeks (.78 for men and .67 for women); and adequate discriminant validity from the short form of the Beck Depression Inventory ($-.58$ for

men and $-.39$ for women; Beck, Rial, & Rickels, 1974), the Internal External Locus of Control Scale ($-.09$ for men and $-.35$ for women; Rotter, 1966), and the Social Desirability Scale ($.20$ for men and $.23$ for women; Crowne & Marlowe, 1964) when used with a sample of undergraduates from various universities (Catanzaro & Mearns, 1990). In the current study, inter-item reliability was excellent (Cronbach's $\alpha = .91$).

2.2.4. Nicotine dependence

Nicotine dependence was measured using the Fagerström Test for Nicotine Dependence (FTND; Heatherton, Kozlowski, Frecker, & Fagerström, 1991), which is a brief self-report instrument designed to correlate with physiological measures of nicotine tolerance. The FTND consists of six items rated either from 0 to 1 or from 0 to 3 (depending on the question) that can yield a total score of 10, with higher scores indicating greater nicotine dependence. Several studies have shown that this measure demonstrates reasonable internal consistency and validity (Colby, Tiffany, Shiffman, & Niaura, 2000; Heatherton et al., 1991), has a test–retest reliability of $.88$, and a Cronbach's α of $.64$ among non-clinical samples of smokers (Pomerleau, Carton, Lutzke, Flessland, & Pomerleau, 1994). The FTND demonstrated good inter-item reliability in the current study (Cronbach's $\alpha = .76$).

2.2.5. Stage of change

The Contemplation Ladder for Smokers (CL-S; Biener & Abrams, 1991) provides information about an individual's readiness to consider quitting their smoking habit. A 10-step stage ladder, with anchor points at 0 (*No thought of quitting*), 2 (*Think I need to consider quitting someday*), 5 (*Thinking I should quit but not quite ready*), 8 (*Starting to think about how to change my smoking patterns*), and 10 (*Taking action to quit*), provides a visual guide to help participants choose a number that best fits their current status. In the current study, participants were asked to circle the number that best described themselves at “this moment” in regard to their smoking behavior. This ladder approach has been used previously as a means of assessing stage of change (Prochaska, 1994) and has been shown to distinguish between groups who differ in their readiness to quit smoking. The ladder has illustrated concurrent validity with significant correlations with other measures of readiness to make a quit attempt.

2.3. Procedure

Potential participants signed up for assessment sessions that were held weekly in groups of 15–20. Informed consent was obtained prior to participants completing the study questionnaire packet. Rights and privileges of volunteer participants in accordance with the Texas Tech University Institutional Review Board were reviewed before participants gave their informed consent.

2.4. Analytical plan

We tested whether a distraction coping style predicted increased engagement in pleasurable events and decreased cigarette smoking behavior. We further examined whether negative mood regulation expectations mediated distraction's association with pleasurable events and cigarette smoking behavior. In other words, we examined the degree to which negative mood regulation

expectations could *explain* distraction's relationship with pleasurable events and cigarette smoking behavior. Regression-based path models were used to test for mediation (Baron & Kenny, 1986). Gender, smoking-related stage of change, and level of nicotine dependence were entered as covariates, based on information from previous research. Preliminary bivariate correlations were conducted to confirm our choice of covariates, justify mediation analyses, and test for multicollinearity.

Mediation is said to occur when the following conditions are met: (1) the independent variable (distraction coping) significantly predicts the dependent variable (pleasant events), (2) the independent variable significantly predicts the mediator (negative mood regulation), (3) the potential mediator predicts the dependent variable, and (4) the effect of the independent variable on the dependent variable is reduced when the mediator is included in the model (Baron & Kenny, 1986). The Sobel test for mediation (Sobel, 1982) was used to determine whether negative mood regulation fully or partially mediated the relationship between level of distraction coping and number of pleasant events.

We conducted exploratory analyses of moderation when our analyses indicated that mediation was not justified (i.e., when the conditions of mediation, as outlined above, were not met). Moderation is said to occur when the relationship between the independent and dependent variables is different at different levels of the moderator variable. For example, the effect of a hypothetical smoking cessation program (the independent variable) on number of cigarettes smoked per day (the dependent variable) might be non-existent for heavy smokers and moderate smokers, but strong for light smokers (where smoking status is the moderator variable). One of the conditions that must be met when one is testing for either mediation or moderation is that independent variable must significantly predict the dependent variable. However, moderation may still occur in some cases when this criterion is *not* met; therefore, we tested for moderation in such cases. Moderation that occurs when the independent variable is not significantly correlated with the dependent variable may result from threshold effects (i.e., non-linear trends in the data).

3. Results

The preliminary bivariate correlations among level of distraction coping, total number of pleasant events, and negative mood regulation justified examination of negative mood regulation as a mediator of the relationship between level of distraction coping and number of pleasant events, but not cigarette use frequency. Specifically, these three variables demonstrated significant, positive relationships with each other (Table 2). Bivariate correlations also revealed that our hypothesized covariates were significantly correlated with our variables of primary interest. Finally, these correlations indicated no problems with multicollinearity among our predictor variables.

Mediation analyses, as described above, indicated that distraction coping significantly predicted both number of pleasant events ($\beta = .19, p < .05; R^2 = .06, p < .05$) and negative mood regulation ($\beta = .41, p < .001; R^2 = .21, p < .001$). Specifically, number of pleasant events and level of negative mood regulation increased as the degree of distraction coping increased. Negative mood regulation significantly predicted number of pleasant events ($\beta = .20, p < .05; R^2 = .07, p < .05$), such that number of pleasant events increased with level of negative mood regulation. When both distraction coping and negative mood regulation were included in a model predicting number of

Table 2
Intercorrelations among predictor variables, criterion variables, and covariates

Variable	1	2	3	4 ^a	5	6	7
1. Distraction coping	–						
2. Negative mood regulation	0.40**	–					
3. Pleasant events	0.20**	0.23**	–				
4. Gender ^a	–0.16*	–0.04	0.02	–			
5. Stage of change	–0.08	0.03	0.07	–0.21*	–		
6. Nicotine dependence	0.16	–0.18*	0.25**	–0.30**	–0.31**	–	
7. Number of cigarettes per day	–0.02	–0.09	–0.27**	0.18**	0.09	0.74**	–

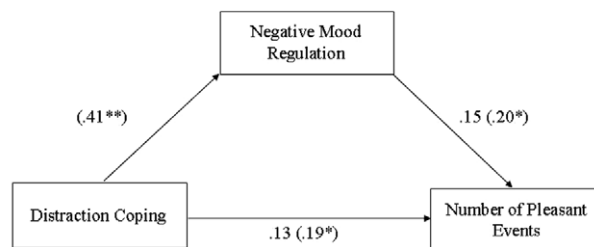
^a Point-biserial correlations.

* $p < .05$, two-tailed.

** $p < .01$.

pleasant events, the relationship between negative mood regulation and number of pleasant events was no longer significant ($\beta = .15$, $p > .10$), and the strength of the relationship between distraction coping and number of pleasant events decreased ($\beta = .13$, $p > .10$). This reduction was statistically significant (Sobel's $t = 2.17$, $p < .05$), which indicates that negative mood regulation fully mediated the relationship between distraction coping and number of pleasant events (Fig. 1). Full (sometimes also referred to as *complete*) mediation is said to occur when the direct effect of the independent variable on the criterion variable is significantly reduced (cf. Sobel's t) when the mediator is included in the regression model, with the result that the direct effect is no longer statistically significant. In this case, full mediation suggests that, in the context of the present study, negative mood regulation is completely responsible for the effect that distraction coping had on number of pleasant events.

Preliminary correlation analyses did not justify examining negative mood regulation as a mediator of the relationship between level of distraction coping and the number of cigarettes smoked per day. However, negative mood regulation was examined in an exploratory post-hoc fashion as a potential moderator of these relationships according to the rationale for moderation described above and using gender, stage of change, and nicotine dependence as covariates. Analyses indicated that negative mood regulation did not moderate the relationship between level of distraction coping and the number of cigarettes smoked per day/level of nicotine dependence. More specif-



Note. * $p < .05$ ** $p < .001$

Fig. 1. Path diagram estimating the relations between distraction coping, negative mood regulation, and number of pleasant events.

ically, the Negative Mood Regulation \times Distraction Coping interaction term was not significant in the analysis predicting number of cigarettes smoked per day ($\beta = .04, p > .05$).

4. Discussion

Our data suggest that college-age smokers' engagement in alternative pleasurable pastimes increases proportionately with their cognitive response style of distraction. Furthermore, the association between distraction and engagement in alternative pleasurable pastimes was completely explained by elevated expectations to regulate negative mood states. In other words, our data indicate that college smokers who use distraction as a coping strategy are more likely to engage in pleasant activities in order to regulate their mood. It was anticipated that negative mood regulation would also serve as a mediator or moderator of the relationship between distraction coping and number of cigarettes smoked per day, but support for this mediation hypothesis was not found.

For the most part, cross-sectional data indicate that initiation, experimentation, and progression to daily smoking rates are enhanced when young smokers presumably use cigarettes to effectively dispel negative mood states (Escobedo et al., 1998; Patton et al., 1996, 1998). For example, the expectation to alleviate negative mood states has been shown to explain the strong association between college smoker status and a history of major depression (McChargue, Spring, Cook, & Neumann, 2004), and female college-age smokers tend to become dependent to nicotine early if they experience depression (McChargue et al., 2004b). Further, longitudinal data reveal that dispositional negative affect and positive smoking expectancies are significantly related to smoking behavior both within and across time (Cohen, McCarthy, Brown, & Myers, 2002). Thus, the extent to which college smokers with greater cognitive coping skills turn to other activities to alleviate negative mood states may help buffer college-age smokers from solely using cigarettes as a coping strategy for negative moods.

Although our smoking behavior data do not show the expected results, the data are not entirely inconsistent with our interpretations. For example, the correlation between the number of cigarettes smoked per day and pleasant pastimes was significant and in the expected direction (i.e., negative; $r = -.27, 95\% \text{ CI} = -.12, -.43$). In addition, non-significant relationships of the number of cigarettes smoked per day with negative mood regulation ($r = -.09, 95\% \text{ CI} = -.25, .07$) and with distraction coping were also negative ($r = -.02, 95\% \text{ CI} = -.18, .14$). It is reasonable to predict that, given both a larger sample size and participants who are heavier smokers, these results may reach significance, in which case the data would suggest that as a person increases his or her alternative pleasurable activities, he or she will smoke less. Such individuals may also have fewer expectations about regulating negative moods that are linked to smoking behavior and fewer cognitive coping skills. Further, it has been shown that smoking behavior among younger, less experienced smokers does not completely mimic the smoking behavior of older, more experienced smokers (Cohen, Myers, & Kelly, 2002). That is, it is more common for a college-aged smoker to smoke only on weekends compared to their older peers, thus bringing down their average number of cigarettes per day.

Certain limitations should be considered when interpreting the results. First, the PES, NMRS, and DRS exhibited less than ideal inter-item correlations (IICs). With regard to the PES, it is

important to consider that it measures the *frequency* with which individuals engage in pleasant events; therefore, the construct in question is defined by the *number of pleasant events*, rather than which pleasant events are endorsed. The PES comprises a wide variety of activities that different people might find enjoyable, and these activities do not necessarily need to be correlated with each other. For example, in our sample talking about sports was negatively correlated with meditating or doing yoga. Even though both of these activities are likely to be considered pleasant by someone, it is understandable why they are negatively related: talking during meditation is contrary to the very point of the exercise. The IICs for the NMRS and DRS are more difficult to explain, although it should be noted that the IICs for the NMRS approach acceptability. Therefore, study results should be accepted with caution until they can be replicated.

Second, the ability to generalize to other populations and settings was limited because the present study utilized a convenience sample of predominately Caucasian introductory psychology students at one southwest university who reported relatively low nicotine dependence levels. Thus, the extent to which these findings can be generalized to more highly dependent smokers, older smokers, or young smokers who are not attending college has yet to be determined. Third, because of the cross-sectional design, future research should develop prospective studies in order to assess causal inferences of these relationships. Future research should also explore whether distraction is indeed the catalyst for a healthier lifestyle by testing the hypothesis that young smokers who utilize a distraction response style have lower smoking rates and engage in more adaptive behaviors over time. If such evidence is shown to be correct, then the next step may be to test whether training adolescents to adaptively cope with negative moods by using distraction may act to prevent individuals from becoming dependent to nicotine later in life. Finally, the relatively low rates of smoking behavior and nicotine dependence in the sample may have generated a floor effect that attenuated the sensitivity of our test of the relationship between distraction coping and smoking behavior. Nevertheless, the finding that college smokers engage in distracting pleasurable events to regulate negative mood suggests the need for additional studies in this area.

In sum, the present study provides preliminary evidence that adaptive coping responses among college-aged smokers may serve as a buffer against the development of nicotine dependence due to the fact that they have other ways to cope with negative affect. Even though engagement in pleasant activities and smoking rate were found to be negatively correlated in the present study, this relationship does not necessarily indicate that engaging in pleasant activities leads to reduced smoking. It could be that reduced smoking leads to an increase in pleasant activities (e.g., via improved physical health) or the relationship could be due to some third factor. Given the cross-sectional design of the study, it is recommended that future research ask such questions prospectively. In addition, our findings implicate prevention efforts, specifically primary prevention efforts focused on enhancing the cognitive coping skills in college students. Such a focus may lead to more frequent adaptive cognitive coping, thereby decreasing smoking rates in this population.

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