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## Coping Mediates the Association of Mindfulness with Psychological Stress, Affect, and Depression Among Smokers Preparing to Quit

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### Abstract

It is not surprising that smoking abstinence rates are low given that smoking cessation is associated with increases in negative affect and stress that can persist for months. Mindfulness is one factor that has been broadly linked with enhanced emotional regulation. This study examined baseline associations of self-reported trait mindfulness with psychological stress, negative affect, positive affect, and depression among 158 smokers enrolled in a smoking cessation treatment trial.

Several coping dimensions were evaluated as potential mediators of these associations. Results indicated that mindfulness was negatively associated with psychological stress, negative affect and depression, and positively associated with positive affect. Furthermore, the use of relaxation as a coping strategy independently mediated the association of mindfulness with psychological stress, positive affect, and depression. The robust and consistent pattern that emerged suggests that greater mindfulness may facilitate cessation and attenuate vulnerability to relapse among smokers preparing for cessation. Furthermore, relaxation appears to be a key mechanism underlying these associations. The [ClinicalTrials.gov](https://clinicaltrials.gov/ct2/show/study/NCT00297479) identifier is NCT00297479.

## Keywords

mindfulness; coping; psychological stress; smoking cessation; depression; negative affect

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## Introduction

Nearly 20% of the U. S. population smokes cigarettes, and the vast majority of smokers have significant difficulty with smoking cessation (CDC, 2009). More than 70% of smokers report a desire to quit smoking, and approximately 45% attempt cessation each year (CDC, 2009; Fiore et al., 2008). Unfortunately, less than 10% of smokers who receive formal treatment are able to maintain abstinence for one year (Hughes, Keely, & Naud, 2004; Niaura, Abrams, et al., 1999). These low long-term abstinence rates are not surprising given that smoking cessation is a major life stressor. The majority of smokers experience increased levels of negative affect and psychological stress after cessation that can persist for months, as assessed by both self-report (Gilbert et al., 2002; Piasecki, Fiore, & Baker, 1998) and asymmetries in brain activity (Gilbert et al., 1999). Furthermore, psychological stress, negative affect (Welsch et al., 1999; Wetter, Fiore, Baker, & Young, 1995), and depression (Borrelli, Bock, King, Pinto, & Marcus, 1996; Glassman et al., 1990; Niaura, Britt, et al., 1999) are powerful predictors of smoking relapse. Thus, an important goal for further research is to identify factors that may enhance abstinence rates and prevent smoking relapse.

Mindfulness is one factor that has been found to be broadly linked with lower levels of negative affect, higher levels of positive affect, and enhanced emotional regulation. As defined by Jon Kabat-Zinn, mindfulness means “paying attention in a particular way; on purpose, in the present moment, and nonjudgmentally (Kabat-Zinn, 1994).” Mindfulness reflects the acceptance of experience, a perspective of objectivity, and the ability to respond in a manner that is mindful rather than reactive (Roemer & Orsillo, 2003; Teasdale, 1997). Mindfulness-based interventions have been broadly demonstrated to reduce both self-report and objective indices of negative affect and psychological stress (Baer, 2003; Davidson et al., 2003), and to enhance positive affect (Brown & Ryan, 2003). Smoking cessation and relapse are strongly linked with psychological stress, negative and positive affect and depression (Borrelli, Niaura, et al., 1996; Cinciripini et al., 2003; Glassman et al., 1990; Hughes & Hatsukami, 1986; Kenford et al., 2002; Niaura, Britt, et al., 1999; Welsch et al., 1999; Wetter et al., 1995; Wetter et al., 1999; Wetter et al., 1994), and a growing body of evidence indicates that mindfulness may be associated with smoking relapse. For example,

Vidrine and colleagues (2009) found that smokers reporting greater mindfulness were less nicotine dependent, experienced fewer withdrawal symptoms prior to smoking cessation, and had a stronger sense of agency regarding their ability to successfully achieve abstinence.

Emerging evidence also suggests that mindfulness based treatments for smoking cessation are efficacious. To date, five small published studies have evaluated the efficacy of mindfulness-based treatments for smoking cessation. The results of four of these studies indicated that mindfulness-based treatments were generally associated with enhanced cessation outcomes (Bowen & Marlatt, 2009; Brewer et al., 2011; Davis, Fleming, Bonus, & Baker, 2007; Elwafi, Witkiewitz, Mallik, Thornhill, & Brewer, 2013). One of the five studies found no significant difference between a smoking cessation treatment program that involved mindfulness training and a standard cessation treatment program (Michalsen et al., 2003). Given the promising emerging evidence in support of these treatments, there is a critical need to begin to elucidate mechanisms through which mindfulness enhances smoking cessation outcomes. Examining mechanisms through which mindfulness may influence established predictors of smoking cessation outcomes is also of critical importance.

Coping is one mechanism through which mindfulness may attenuate levels of negative affect and psychological stress. For the purpose of this discussion, coping will be defined as the use of specific cognitive or behavioral actions to handle bothersome daily problems (Stone, Kennedy-Moore, & Neale, 1995). These cognitive and behavioral actions are conceptualized as falling within eight broad dimensions that include situation redefinition, direct action, catharsis, acceptance, seeking social support, distraction, religion, and relaxation. For example, acceptance is a cognitive coping strategy consistent with mindfulness that might be utilized to help manage conflict at work. An individual high in mindfulness may accept that a particular co-worker is difficult to work with and simply choose not to react to this person in an emotional way.

As described above, mindfulness increases early identification of problematic thoughts and feelings (e.g., craving/urges to smoke) which, in turn, promotes the use of adaptive, flexible coping behaviors (Kabat-Zinn, 1990; Linehan, 1993; Roemer & Orsillo, 2003; Teasdale, Segal, & Williams, 1995). Coping behaviors, in turn, are posited to be instrumental in avoiding smoking during high risk situations and they have been demonstrated to be powerful determinants of success (Davis & Glaros, 1986; Hall, Rugg, Tunstall, & Jones, 1984; Shiffman, 1984; Shiffman, Paty, Gnys, Kassel, & Hickcox, 1996; Zelman, Brandon, Jorenby, & Baker, 1992). To the extent that coping is effective in helping individuals to attenuate levels of negative affect, psychological stress, and depression, and to enhance levels of positive affect, it can be conceptualized as an emotion regulation approach. Therefore, it is plausible that coping may serve as a common pathway through which mindfulness leads to improved emotion regulation.

An exhaustive search of PubMed and Psyc Info revealed no published studies that have examined coping or other potential mechanisms underlying the association of trait mindfulness with key variables predictive of smoking cessation outcomes including psychological stress, negative and positive affect, and depression among smokers preparing

for cessation. Given that very little is known about potential mechanisms through which mindfulness impacts affect and psychological stress, such research is clearly needed. To our knowledge, this study will be the first to examine coping as a potential mechanism underlying associations of trait mindfulness with levels of negative and positive affect, depression, and psychological stress.

## Method

### Procedures

Participants were recruited from the Houston metropolitan area via local print media. The current findings are based on individuals who enrolled in the pilot study that preceded a larger clinical trial to evaluate a mindfulness-based treatment for smoking cessation. All data were collected between February 2005 and May 2006, and the current results are based solely upon data collected at the baseline visit. The study was approved by the institutional review board of The University of Texas MD Anderson Cancer Center and was therefore performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments. Informed consent was obtained from all participants prior to inclusion in the study.

Inclusion criteria required a smoking history of at least 5 cigarettes per day for the past year, motivation to achieve abstinence from smoking within 30 days of enrollment, the ability to speak and read in English, and a home address and functioning home phone number. Exclusion criteria included contraindication of nicotine patch use, regular use of tobacco products other than cigarettes, use of nicotine replacement therapies or psychopharmacology for smoking cessation, pregnancy/lactation, and other household members enrolled in the study.

### Participant Characteristics

Participants (N=158) were 44% female; 50% were Caucasian, 34% African American, 10% Hispanic, and 6% other. The mean age was 43.8 years (SD=11.8), and the mean years of education completed was 13.4 (SD=2.5). Thirty-eight % were married or cohabitating with a significant other, and 47% reported an annual household income below \$30,000. Participants smoked an average of 20.8 (SD=9.2) cigarettes per day, for an average of 24.8 (SD=12.1) years. Mean baseline exhaled carbon monoxide level was 21.3 (SD=11.3) parts per million. Mean Heaviness of Smoking Index (HSI) score was 3.4 (SD=1.4). Mean Kentucky Inventory of Mindfulness Skills (KIMS) score (Baer, Smith, & Allen, 2004) was 31.4 (SD=3.8). Descriptive statistics for all key study variables are presented in Table 1. Correlations depicting associations among coping, mindfulness, and psychological stress and affective variables are presented in Table 2.

### Measures

Demographics assessed included age, race/ethnicity, gender, marital status, educational attainment (years completed), employment status, and annual household income. Race/ethnicity was categorized as a four-group variable (non-Latino White, non-Latino Black, Latino, and Other). Marital status, employment status and household income were

dichotomized (married/living with partner versus not married/not living with partner; employed versus not employed; income < \$20,000 versus ≥ \$20,000 per year).

Nicotine Dependence was assessed with the Heaviness of Smoking Index (HSI). The HSI (Kozlowski, Porter, Orleans, Pope, & Heatherton, 1994) comprises two items from the Fagerström Test for Nicotine Dependence (Heatherton, Kozlowski, Frecker, & Fagerstrom, 1991): cigarettes per day (CPD) and time to the first cigarette after waking (TTFC). The HSI has fair internal consistency ( $\alpha=.63$ ; Etter, 2005) and the TTFC item predicts relapse (the shorter TTFC, the higher risk for relapse to smoking; Baker et al., 2007).

Mindfulness was assessed with the Kentucky Inventory of Mindfulness Skills (KIMS; Baer et al., 2004; Brown & Ryan, 2003). Higher scores indicate a greater degree of mindfulness. The KIMS is a 39-item multidimensional measure comprising four subscales: Observing, Describing, Acting with Awareness, and Accepting without Judgment. The KIMS total score is calculated as an average of the four subscale scores, and scores can potentially range from 9.75 to 48.75 (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006). Internal consistency is adequate to good with coefficient alphas ranging from .83 to .91. Test-retest reliability is good with coefficient alphas ranging from .65 to .86 and paired sample t tests revealing no significant differences between administrations (Baer et al., 2004). Convergent validity is supported by significant positive associations between the KIMS and openness to experience ( $r=0.47$ ,  $p<0.01$ ), and emotional intelligence ( $r=0.61$ ,  $p<0.01$ ). Predicted negative correlations were found between the KIMS and neuroticism ( $r=-0.37$ ,  $p<0.01$ ), thought suppression ( $r=-0.42$ ,  $p<0.01$ ) and difficulties in emotional regulation ( $r=-0.56$ ,  $p<0.01$ ; Baer et al., 2006).

Coping was assessed with the eight-item Daily Coping Inventory (Stone et al., 1995). The eight coping dimensions include situation redefinition, direct action, catharsis, acceptance, seeking social support, distraction, religion, and relaxation. The instructions were modified to assess coping related to problems and events that occurred in the past week (rather than day), and read as follows, *“Please think about the events and problems that bothered you most over the last week and decide which choices best describe you. Then choose your answer.”* Each item was rated on a 5-point Likert response scale ranging from “strongly disagree” to “strongly agree.” Each dimension is represented by a single item. Higher scores reflect greater reliance on a particular coping dimension. Catharsis and seeking social support are associated with relatively high levels of negative affect, and acceptance is associated with relatively low levels of negative affect and relatively high levels of positive affect. Use of distraction and relaxation is associated with relatively high levels of positive affect (Stone et al., 1995).

Positive and Negative Affect was assessed using the Positive and Negative Affect Scale (PANAS; Watson, Clark, & Tellegen, 1988). The measure comprises 20 items and two scales, positive affect and negative affect. Each scale comprises 10 adjectives that reflect positive or negative affect. The respondent is asked to rate the extent to which each adjective represents how they felt over the past week on a 5-point Likert response scale ranging from 1 (very slightly or not at all) to 5 (extremely). Internal consistency of the measure is excellent with coefficient alphas ranging from .86 to .90 for positive affect and .84 to .87 for

negative affect. Concurrent validity of the measure is supported by strong correlations of the negative affect scale with measures of general distress, depression, and state anxiety (Watson et al., 1988).

Depression was assessed with the Center for Epidemiologic Studies – Depression Scale (CES-D; Radloff, 1977). The CES-D is a 20-item measure with total scores ranging from 0 to 60. Higher scores reflect greater depression. The internal consistency of the measure is excellent with coefficient alphas ranging from .85 to .90 (Radloff, 1977).

## Data Analysis

The focus of the current study was on trait mindfulness rather than on skills learned through a formal mindfulness-based intervention or training program. This is an important distinction given that the focus of our pilot study was on enhancing levels of mindfulness through a mindfulness-based intervention. We examined coping as a potential mediator of the association of trait mindfulness psychological stress, negative affect, positive affect, and depression. These outcome and mediator variables are of particular interest because they are predictive of smoking cessation and relapse. It was hypothesized that 1) mindfulness would be positively associated with positive affect and negatively associated with psychological stress, negative affect and depression, and 2) coping dimensions would mediate the association between mindfulness and each of these dependent variables. Specifically, individuals with greater trait mindfulness were hypothesized to be more likely to draw upon specific coping dimensions associated with increased positive affect (i.e., acceptance, distraction and relaxation). Use of these coping dimensions was, in turn, hypothesized to be associated with lower levels of psychological stress, negative affect, and depression and greater positive affect. Individuals with lower trait mindfulness were hypothesized to be more likely to draw upon coping dimensions associated with negative affect (i.e., catharsis and seeking social support). Use of these coping dimensions was, in turn, hypothesized to be associated with greater psychological stress, negative affect and depression and less positive affect.

Descriptive statistics were calculated to examine participants' demographic and smoking history characteristics. Next, consistent with Baron and Kenny (1986), the three paths of statistical correlation (a, b, and c) necessary to demonstrate mediation were examined. The statistical significance of associations between mindfulness and the hypothesized mediators (situation redefinition, direct action, catharsis, acceptance, seeking social support, distraction, religion, and relaxation; *a* paths), the hypothesized mediators and psychological stress/affective variables (perceived psychological stress, positive affect, negative affect, depression; *b* paths), and mindfulness and psychological stress/affective variables (*c* paths) were examined using linear regressions.

Mediation analyses were conducted in SAS (version 9.1) using the INDIRECT macro (Preacher & Hayes, 2008). This approach consists of a variant of the Sobel test that incorporates a nonparametric bias-corrected bootstrapping procedure to examine the significance of mediated effects in single and multiple mediation models. The bootstrapping procedure generates an empirical approximation of the sampling distribution of the product of the estimated coefficients in the indirect path with the use of 5,000 resamples with

replacement from the original dataset. Because small sample sizes threaten the assumption of a normal distribution, bootstrapping compensates for this problem by producing an appropriate sampling distribution for the product of the estimated coefficients. The bootstrapping approach offers several advantages over other methods of testing the indirect effect (e.g., causal-step, plain product-of-coefficients) including increased power and better control over the Type I error rates (Preacher & Hayes, 2008). When testing multiple mediators in the same model, this approach results in estimates of the (total) indirect effect for the multiple mediator model, and generates the specific indirect effects of each mediator in the model.

The bootstrapping procedure was first used to independently evaluate each of the eight coping dimensions (situation redefinition, direct action, catharsis, acceptance, seeking social support, distraction, religion, and relaxation) as potential mediators of the association between trait mindfulness and each of the four dependent variables reflecting psychological stress and affect (perceived psychological stress, positive affect, negative affect, depression) in a series of 32 single mediator models. Next, the indirect effects of coping dimensions that emerged as significant or approached significance ( $p < .05$ ) in the single mediator models were evaluated simultaneously in a series of four multiple mediator models with the same dependent variables (perceived psychological stress, positive affect, negative affect, and depression). Finally, the proportion of the mediated effect was calculated for each dependent variable with the following formula: Proportion of the mediated effect (PME) = indirect / total ( $c$ ). All models were adjusted for age, gender, race/ethnicity, educational attainment, household income, and marital status. Due to the preliminary and exploratory nature of this work, we did not adjust for multiple comparisons.

## Results

Each path of the mediation model was assessed, beginning with linear regressions testing the association of mindfulness with the hypothesized mediators ( $a$  paths adjusted for age, gender, race, education, income and marital status). After controlling for demographics, greater mindfulness was significantly associated with greater use of catharsis, seeking social support, religion, and relaxation (all  $p$  values  $< .05$ ; Table 3).

Next, linear regression analyses, adjusted for demographics and mindfulness, were used to evaluate the association between the hypothesized mediators and perceived psychological stress, positive affect, negative affect and depression ( $b$  paths). Results indicated that individuals who reported greater use of direct action, seeking social support, religion and relaxation reported significantly lower levels of perceived psychological stress and higher levels of positive affect. Greater use of catharsis was significantly associated with greater negative affect, and greater use of relaxation was significantly associated with less depression (all  $p$  values  $< .05$ ; Table 4).

Adjusted linear regressions were used to examine the total effect of mindfulness on perceived psychological stress, positive affect, negative affect and depression ( $c$  paths). Greater mindfulness was significantly associated with less perceived psychological stress, greater positive affect, lower negative affect, and less depression ( $p$  values  $< .01$ ; Table 4).

Single mediator models examining coping dimensions as potential mediators of the association between mindfulness and perceived psychological stress indicated that two of the eight coping dimensions, direct action (95% bias corrected and accelerated CI of the indirect effect =  $-.0654$  to  $-.0003$ ;  $p < .05$ ) and relaxation (95% bias corrected and accelerated CI of the indirect effect =  $-.1586$  to  $-.0358$ ;  $p < .01$ ), significantly mediated the association, and that two additional coping dimensions, seeking social support (95% bias corrected and accelerated CI of the indirect effect =  $-.1001$  to  $.0000$ ;  $p = .05$ ) and religion (95% bias corrected and accelerated CI of the indirect effect =  $-.0836$  to  $.0000$ ;  $p = .05$ ), approached significance. All four coping dimensions were included in a multiple mediator model. As expected, there was a significant total effect of mindfulness on perceived psychological stress, such that greater mindfulness was associated with less psychological stress [ $\beta = -.3771$ ,  $SE = .06$ ,  $p < .001$ ]. In this multiple mediator model, coping accounted for 26.0% of the total effect of mindfulness on perceived psychological stress, with mean indirect bootstrap effects for the total model =  $-.0969$ ,  $SE = .04$  (95% bias corrected and accelerated confidence interval [CI] =  $-.1838$  to  $-.0365$ ,  $p < .01$ ). Of the four coping dimensions included in the multiple mediator model, only one (relaxation [CI =  $-.1501$  to  $-.0204$ ];  $p < .01$ ) independently mediated the association between mindfulness and perceived psychological stress over and above the effects of the other coping dimensions. Results were consistent with the interpretation that greater mindfulness was associated with greater use of relaxation as a coping strategy [ $\beta = .0739$ ,  $SE = .02$ ,  $p < .001$ ], which was, in turn, associated with less perceived psychological stress [ $\beta = -.9475$ ,  $SE = .28$ ,  $p < .001$ ]. The proportion of the mediated effect accounted for solely by relaxation in this multiple mediator model was 18.6%.

Single mediator models examining coping dimensions as potential mediators of the association between mindfulness and positive affect indicated that three of the eight coping dimensions examined, seeking social support (CI =  $.0091$  to  $.3109$ ;  $p < .05$ ), religion (CI =  $.0044$  to  $.2470$ ;  $p < .05$ ) and relaxation (CI =  $.0687$  to  $.3623$ ;  $p < .01$ ), significantly mediated the association between mindfulness and positive affect. These three coping dimensions were included in a multiple mediator model. As expected, results indicated a significant total effect of mindfulness on positive affect such that greater mindfulness was associated with greater positive affect [ $\beta = 1.3276$ ,  $SE = .18$ ,  $p < .001$ ]. Multiple mediation analyses indicated that coping was a significant mediator of this association, accounting for 19.4% of the total effect of mindfulness on positive affect, with mean indirect bootstrap effects for the total model =  $.2649$ ,  $SE = .10$  (95% bias corrected and accelerated confidence interval [CI] =  $.0844$  to  $.4757$ ,  $p < .01$ ). Of the three coping dimensions included in the multiple mediator model, only relaxation [CI =  $.0130$  to  $.2931$ ;  $p < .05$ ] independently mediated the association between mindfulness and positive affect over and above the effects of the other coping dimensions. Results indicated that greater mindfulness was associated with more use of relaxation as a coping strategy [ $\beta = .0739$ ,  $SE = .02$ ,  $p < .001$ ], which was associated with greater positive affect [ $\beta = 1.6418$ ,  $SE = .75$ ,  $p < .05$ ]. The proportion of the mediated effect accounted for solely by relaxation in this multiple mediator model was 9.1%.

Single mediator models examining coping dimensions as potential mediators of the association between mindfulness and negative affect revealed that none of the eight coping dimensions examined significantly mediated the association between mindfulness and



negative affect. However, catharsis emerged as a potential suppressor of the association between mindfulness and negative affect. Suppression has been defined by Conger (1974) as, “A variable which increases the predictive validity of another variable by its inclusion in a regression equation.” Predictive validity is measured by the magnitude of the regression coefficient estimate. When the magnitude of the association between an independent variable and dependent variable becomes larger when a third variable is included, it indicates suppression (MacKinnon, Krull, & Lockwood, 2000). In this case, the inclusion of catharsis in the regression model indicated an increase in the strength of association between mindfulness and negative affect rather than a reduction in the association between mindfulness and negative affect, as the magnitude of coefficient estimates of mindfulness changed from  $C = -0.9087$  ( $SE=0.1914$ ) to  $C' = -1.0416$  ( $SE=0.1965$ ) and the 95% bias corrected and accelerated CI of the indirect effect = .0033 to .2866;  $p < .05$ ).

Single mediator models examining coping dimensions as potential mediators of the association between mindfulness and depression indicated that only one of the eight coping dimensions, relaxation ( $CI = -.4619$  to  $-.0220$ ;  $p < .05$ ), significantly mediated the association. Therefore, a multiple mediator analysis was not performed. As expected, results indicated a significant total effect of mindfulness on depression such that greater mindfulness was associated with less depression [ $\beta = -1.0587$ ,  $SE = .27$ ,  $p < .001$ ]. Relaxation accounted for 19.7% of the total effect of mindfulness on depression, with mean indirect bootstrap effects for the total model =  $-.2117$ ,  $SE = .11$  (95% bias corrected and accelerated confidence interval [ $CI$ ] =  $-.4619$  to  $-.0220$ ,  $p < .05$ ). Results indicated that greater mindfulness was associated with more use of relaxation as a coping strategy [ $\beta = .0773$ ,  $SE = .02$ ,  $p < .001$ ], which was associated with less depression [ $\beta = -2.6960$ ,  $SE = 1.12$ ,  $p < .05$ ].

## Discussion

The current study provides evidence that levels of trait mindfulness among smokers are significantly associated with a variety of factors that predict relapse. Consistent with hypotheses, mindfulness was inversely associated with psychological stress, negative affect, and depression, and positively associated with positive affect at the time of enrolment in a smoking cessation treatment trial. These small associations remained significant after adjusting for key demographic variables. Given that psychological stress and affect are potent and consistent predictors of relapse, the results suggest that smokers with higher levels of trait mindfulness may be at lower risk for relapse. The results also provide the first evidence that various coping strategies may mediate the relationship between mindfulness with psychological stress, positive affect, and depression. In particular, relaxation independently mediated the association of mindfulness with each of these variables. Specifically, higher mindfulness was associated with greater use of relaxation, which was in turn, associated with lower psychological stress and depression, and greater positive affect. Taken together, the robust and consistent pattern of associations that emerged between mindfulness and these established predictors of smoking relapse suggests that greater mindfulness could potentially attenuate vulnerability to smoking relapse.

Many established predictors of smoking cessation and relapse (e.g., education, income, gender, cigarettes per day, years smoked) are not easily malleable. In contrast, mindfulness can be targeted and enhanced through intervention (Garland, Gaylord, Boettiger, & Howard, 2010; Schroevers & Brandsma, 2010). Although relatively few studies have evaluated mindfulness-based interventions for smoking (Bowen & Marlatt, 2009; Davis et al., 2007), considerable evidence supports the efficacy of mindfulness based interventions targeting a variety of outcomes and among diverse populations (Carlson, Ursuliak, Goodey, Angen, & Speca, 2001; Davidson et al., 2003; Garland et al., 2010; Kabat-Zinn et al., 1998; Ma & Teasdale, 2004; Speca, Carlson, Goodey, & Angen, 2000; Teasdale et al., 2000).

The lack of association between mindfulness and using acceptance as a coping mechanism was surprising given that a key tenet of mindfulness involves allowing distressing cognitions, emotions, perceptions, and sensations to occupy awareness, without becoming engaged in their content or trying to change them (Kabat-Zinn, 1982). On the other hand, individuals with higher levels of mindfulness may be more adept at relaxing, and previous research indicates that relaxation is associated with greater positive affect (Stone et al., 1995).

Mindfulness was positively associated with the coping dimension of seeking social support, and seeking social support was negatively associated with perceived psychological stress and positively associated with positive affect. Although seeking social support emerged as a mechanism through which mindfulness increased positive affect in a single mediator model, it was no longer an independent mediator when included in a multiple mediator model. This finding highlights the unique contribution of other explanatory mechanisms, namely relaxation. The role of social support in influencing associations between mindfulness, psychological stress, and affect should be more thoroughly examined in future, prospective research.

There is a well-documented association between the use of coping behaviors and the prevention of relapse (Davis & Glaros, 1986; Hall et al., 1984; Shiffman, 1984; Shiffman et al., 1996; Zelman et al., 1992). Furthermore, considerable evidence indicates that coping skills can be enhanced through intervention (Davis & Glaros, 1986; Hall et al., 1984; Shiffman, 1984; Shiffman et al., 1996; Zelman et al., 1992). A key component of mindfulness involves responding rather than reacting, and drawing upon relaxation as a coping strategy is consistent with this. That is, the use of relaxation as an approach to coping is consistent with the mindfulness-based phenomenon of simply noticing emotions, cognitions, perceptions, and sensations in a nonjudgmental manner without impulsively reacting. Thus, interventions that seek to directly enhance mindfulness may also positively impact coping behavior.

In addition to examining the broad construct of trait mindfulness, future research should investigate how individual components of mindfulness (e.g., KIMS subscale scores including Observing, Describing, Acting with Awareness, and Accepting without Judgment) may influence coping processes, psychological stress, and affective variables. Such research may have important treatment implications.

The current study has several limitations. The primary limitation is the cross-sectional nature of the data. Cross-sectional analyses preclude assumptions of temporal associations or causality. Furthermore, the potential for reverse causality in mediational analyses using cross-sectional data cannot be ruled out. The results suggested that mindfulness may be associated with psychological stress, negative affect, positive affect, and depression among smokers prior to beginning a smoking cessation treatment program. This is important because each of these factors has been well established as a predictor of smoking cessation and relapse. However, we are unable to assess whether or not mindfulness was associated with cessation and relapse, and whether psychological stress, negative affect, positive affect, depression, or coping may have mediated or moderated potential associations between mindfulness and cessation outcomes. These questions should be addressed in future studies using longitudinal data.

Second, the current study was unable to evaluate whether mindfulness training enhances mindfulness, and whether increases in mindfulness resulting from training are associated with predictors of relapse or with actual cessation outcomes. However, the results of a recent study that evaluated a mindfulness-based cognitive therapy intervention indicated that mindfulness training was associated with increases in mindfulness and positive affect, and decreases in negative affect. Furthermore, changes in mindfulness were significantly associated with improved affect (Schroevers & Brandsma, 2010).

A third limitation is that we examined multiple hypothesized mediators and dependent variables. Therefore, we conducted a fairly large number of analyses, and it is possible that some of our significant mediation effects may have been an artifact of multiple comparisons. However, due to the preliminary nature of this work, the current study did not adjust for multiple comparisons.

A fourth limitation is that we used a brief coping measure that has been included in previous research in a relatively limited capacity. This coping measure, the Daily Coping Inventory (DCI), was selected because it is much shorter than other established measures of coping and allowed us to reduce participant burden. In addition, the dimensions assessed were conceptually relevant to the coping domains of interest. Future research should either carefully assess the psychometric properties of the DCI or examine associations of mindfulness with coping, psychological stress, and affective outcomes using more extensive and established measures of coping.

Finally, although our analyses controlled for several potential confounders, the degree to which the presence of unknown and unmeasured variables might have influenced the results is unknown. To address this possibility with one plausible variable, we re-ran significant models additionally controlling for nicotine dependence (i.e., cigarettes per day and time to first cigarette after waking). However, results were unchanged in these additional analyses.

## Conclusions

Although most smokers report a desire to achieve abstinence from smoking, and a large proportion attempt smoking cessation every year, an overwhelming majority fail to achieve

and maintain abstinence. The process of smoking cessation is affectively aversive and improvement of emotional regulation during and after cessation could attenuate cessation-related distress and improve treatment outcomes. Mindfulness is associated with enhanced emotional well-being in general (Baer, 2003; Brown & Ryan, 2003; Davidson et al., 2003), and the results of the current study provide the first evidence that trait mindfulness is negatively associated with psychological stress, affect, and depression among smokers assessed at the time of entry into a cessation program. These three variables have been well established in the literature as powerful predictors of relapse. Moreover, the results elucidate coping – specifically relaxation – as an independent common pathway through which mindfulness influences psychological stress, positive affect and depression. As such, interventions that increase mindfulness among smokers may contribute to improved cessation outcomes.

## Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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## References

- Baer RA. Mindfulness training as a clinical intervention: A conceptual and empirical review. *Clinical Psychology: Science and Practice*. 2003; 10:125–143.
- Baer RA, Smith GT, Allen KB. Assessment of mindfulness by self-report: the Kentucky inventory of mindfulness skills. *Assessment*. 2004; 11(3):191–206. [PubMed: 15358875]
- Baer RA, Smith GT, Hopkins J, Krietemeyer J, Toney L. Using self-report assessment methods to explore facets of mindfulness. *Assessment*. 2006; 13(1):27–45. [PubMed: 16443717]
- Baker TB, Piper ME, McCarthy DE, Bolt DM, Smith SS, Kim SY, et al. Time to first cigarette in the morning as an index of ability to quit smoking: implications for nicotine dependence. *Nicotine and Tobacco Research*. 2007; 9(Suppl 4):S555–S570. [PubMed: 18067032]
- Baron RM, Kenny DA. The moderator-mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*. 1986; 51(6):1173–1182. [PubMed: 3806354]
- Borrelli B, Bock B, King T, Pinto B, Marcus BH. The impact of depression on smoking cessation in women. *American Journal of Preventive Medicine*. 1996; 12(5):378–387.
- Borrelli B, Niaura R, Keuthen NJ, Goldstein MG, DePue JD, Murphy C, et al. Development of major depressive disorder during smoking-cessation treatment. *Journal of Clinical Psychiatry*. 1996; 57(11):534–538. [PubMed: 8968303]
- Bowen S, Marlatt A. Surfing the urge: brief mindfulness-based intervention for college student smokers. *Psychology of Addictive Behaviors*. 2009; 23(4):666–671. [PubMed: 20025372]
- Brewer JA, Mallik S, Babuscio TA, Nich C, Johnson HE, Deleone CM, et al. Mindfulness training for smoking cessation: Results from a randomized controlled trial. *Drug and Alcohol Dependence*. 2011; 119(1-2):72–80.
- Brown KW, Ryan RM. The benefits of being present: mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology*. 2003; 84(4):822–848. [PubMed: 12703651]

- Carlson LE, Ursuliak Z, Goodey E, Angen M, Specia M. The effects of a mindfulness meditation-based stress reduction program on mood and symptoms of stress in cancer outpatients: 6-month follow-up. *Supportive Care in Cancer*. 2001; 9(2):112–123. [PubMed: 11305069]
- CDC. Cigarette Smoking Among Adults and Trends in Smoking Cessation --- United States, 2008. *Morbidity and Mortality Weekly Report*. 2009; 58(44):1227–1232. [PubMed: 19910909]
- Cinciripini PM, Wetter DW, Fouladi RT, Blalock JA, Carter BL, Cinciripini LG, et al. The effects of depressed mood on smoking cessation: mediation by postcessation self-efficacy. *Journal of Consulting and Clinical Psychology*. 2003; 71(2):292–301. [PubMed: 12699023]
- Conger AJ. A revised definition for suppressor variables: A guide to their identification and interpretation. *Educational and Psychological Measurement*. 1974; 34:35–46.
- Davidson RJ, Kabat-Zinn J, Schumacher J, Rosenkranz M, Muller D, Santorelli SF, et al. Alterations in brain and immune function produced by mindfulness meditation. *Psychosomatic Medicine*. 2003; 65(4):564–570. [PubMed: 12883106]
- Davis JM, Fleming MF, Bonus KA, Baker TB. A pilot study on mindfulness based stress reduction for smokers. *BMC Complementary and Alternative Medicine*. 2007; 7:2. [PubMed: 17254362]
- Davis JR, Glaros AG. Relapse prevention and smoking cessation. *Addictive Behaviors*. 1986; 11(2): 105–114. [PubMed: 3739795]
- Elwafi HM, Witkiewitz K, Mallik S, Thornhill TAt, Brewer JA. Mindfulness training for smoking cessation: moderation of the relationship between craving and cigarette use. *Drug and Alcohol Dependence*. 2013; 130(1-3):222–229. [PubMed: 23265088]
- Etter JF. A comparison of the content-, construct- and predictive validity of the cigarette dependence scale and the Fagerstrom test for nicotine dependence. *Drug and Alcohol Dependence*. 2005; 77(3):259–268. [PubMed: 15734226]
- Fiore, MC., Jaen, CR., Baker, TB., Bailey, WC., Benowitz, NJ., Curry, SJ., et al. *Treating Tobacco Use and Dependence: 2008 Update*. Rockville, MD: U.S. Department of Health and Human Services (USDHHS), Public Health Service (PHS); 2008.
- Garland EL, Gaylord SA, Boettiger CA, Howard MO. Mindfulness training modifies cognitive, affective, and physiological mechanisms implicated in alcohol dependence: results of a randomized controlled pilot trial. *Journal of Psychoactive Drugs*. 2010; 42(2):177–192. [PubMed: 20648913]
- Gilbert DG, McClernon FJ, Rabinovich NE, Dibb WD, Plath LC, Hiyane S, et al. EEG, physiology, and task-related mood fail to resolve across 31 days of smoking abstinence: relations to depressive traits, nicotine exposure, and dependence. *Experimental and Clinical Psychopharmacology*. 1999; 7(4):427–443. [PubMed: 10609977]
- Gilbert DG, McClernon FJ, Rabinovich NE, Plath LC, Masson CL, Anderson AE, et al. Mood disturbance fails to resolve across 31 days of cigarette abstinence in women. *Journal of Consulting and Clinical Psychology*. 2002; 70(1):142–152. [PubMed: 11860040]
- Glassman AH, Helzer JE, Covey LS, Cottler LB, Stetner F, Tipp JE, et al. Smoking, smoking cessation, and major depression. *Journal of the American Medical Association*. 1990; 264(12): 1546–1549. [PubMed: 2395194]
- Hall SM, Rugg D, Tunstall C, Jones RT. Preventing relapse to cigarette smoking by behavioral skill training. *Journal of Consulting and Clinical Psychology*. 1984; 52(3):372–382. [PubMed: 6379002]
- Heatherton TF, Kozlowski LT, Frecker RC, Fagerstrom KO. The Fagerstrom Test for Nicotine Dependence: a revision of the Fagerstrom Tolerance Questionnaire. *British Journal of Addiction*. 1991; 86(9):1119–1127. [PubMed: 1932883]
- Hughes JR, Hatsukami D. Signs and symptoms of tobacco withdrawal. *Archives of General Psychiatry*. 1986; 43(3):289–294. [PubMed: 3954551]
- Hughes JR, Keely J, Naud S. Shape of the relapse curve and long-term abstinence among untreated smokers. *Addiction*. 2004; 99(1):29–38. [PubMed: 14678060]
- Kabat-Zinn J. An outpatient program in behavioral medicine for chronic pain patients based on the practice of mindfulness meditation: theoretical considerations and preliminary results. *General Hospital Psychiatry*. 1982; 4(1):33–47. [PubMed: 7042457]

- Kabat-Zinn, J. *Full Catastrophe Living: Using the Wisdom of Your Body and Mind to Face Stress, Pain, and Illness*. New York: Dell; 1990.
- Kabat-Zinn, J. *Wherever you go there you are: Mindfulness meditation in everyday life*. New York: Hyperion; 1994.
- Kabat-Zinn J, Wheeler E, Light T, Skillings A, Scharf MJ, Cropley TG, et al. Influence of a mindfulness meditation-based stress reduction intervention on rates of skin clearing in patients with moderate to severe psoriasis undergoing phototherapy (UVB) and photochemotherapy (PUVA). *Psychosomatic Medicine*. 1998; 60(5):625–632. [PubMed: 9773769]
- Kenford SL, Smith SS, Wetter DW, Jorenby DE, Fiore MC, Baker TB. Predicting relapse back to smoking: contrasting affective and physical models of dependence. *Journal of Consulting and Clinical Psychology*. 2002; 70(1):216–227. [PubMed: 11860048]
- Kozlowski LT, Porter CQ, Orleans CT, Pope MA, Heatherton T. Predicting smoking cessation with self-reported measures of nicotine dependence: FTQ, FTND, and HSI. *Drug and Alcohol Dependence*. 1994; 34(3):211–216. [PubMed: 8033758]
- Linehan, MM. *Cognitive-Behavioral Treatment of Borderline Personality Disorder*. New York: Guilford Press; 1993.
- Ma HS, Teasdale JD. Mindfulness-based cognitive therapy for depression: Replication and exploration of differential relapse prevention effects. *Journal of Consulting and Clinical Psychology*. 2004; 72:31–40. [PubMed: 14756612]
- MacKinnon DP, Krull JL, Lockwood CM. Equivalence of the mediation, confounding and suppression effect. *Prevention Science*. 2000; 1(4):173–181. [PubMed: 11523746]
- Michalsen A, Altner N, Richarz B, Reichardt H, Konietzko N, Spahn G, et al. Impact of mindfulness-based stress reduction in supporting smoking cessation: results of a non-randomised, controlled trial. *Focus on Alternative and Complementary Therapies*. 2003; 8:521.
- Niaura R, Abrams DB, Shadel WG, Rohsenow DJ, Monti PM, Sirota AD. Cue exposure treatment for smoking relapse prevention: a controlled clinical trial. *Addiction*. 1999; 94(5):685–695. [PubMed: 10563033]
- Niaura R, Britt DM, Borrelli B, Shadel WG, Abrams DB, Goldstein MG. History and symptoms of depression among smokers during a self-initiated quit attempt. *Nicotine and Tobacco Research*. 1999; 1(3):251–257. [PubMed: 11072422]
- Piasecki TM, Fiore MC, Baker TB. Profiles in discouragement: two studies of variability in the time course of smoking withdrawal symptoms. *Journal of Abnormal Psychology*. 1998; 107(2):238–251. [PubMed: 9604553]
- Preacher KJ, Hayes AF. Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavioral Research Methods*. 2008; 40(3):879–891.
- Radloff L. The CES-D Scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement*. 1977; 1:385–401.
- Roemer L, Orsillo SM. Mindfulness: A promising intervention strategy in need of further study. *Clinical Psychology: Science and Practice*. 2003; 10:172–178.
- Schroevers MJ, Brandsma R. Is learning mindfulness associated with improved affect after mindfulness-based cognitive therapy? *British Journal of Psychology*. 2010; 101(Pt 1):95–107. [PubMed: 19327220]
- Shiffman S. Coping with temptations to smoke. *Journal of Consulting and Clinical Psychology*. 1984; 52(2):261–267. [PubMed: 6715652]
- Shiffman S, Paty JA, Gnys M, Kassel JA, Hickcox M. First lapses to smoking: within-subjects analysis of real-time reports. *Journal of Consulting and Clinical Psychology*. 1996; 64(2):366–379. [PubMed: 8871421]
- Specia M, Carlson LE, Goodey E, Angen M. A randomized, wait-list controlled clinical trial: the effect of a mindfulness meditation-based stress reduction program on mood and symptoms of stress in cancer outpatients. *Psychosomatic Medicine*. 2000; 62(5):613–622. [PubMed: 11020090]
- Stone AA, Kennedy-Moore E, Neale JM. Association between daily coping and end-of-day mood. *Health Psychology*. 1995; 14:341–349. [PubMed: 7556038]

- Teasdale, JD. The relationship between cognition and emotion: the mind-in-place in mood disorders. In: Clark, DM., Fairburn, CG., editors. *Science and Practice of Cognitive Behaviour Therapy*. Oxford: Oxford University Press; 1997. p. 67-93.
- Teasdale JD, Segal Z, Williams JM. How does cognitive therapy prevent depressive relapse and why should attentional control (mindfulness) training help? *Behavioral Research and Therapy*. 1995; 33(1):25–39.
- Teasdale JD, Segal ZV, Williams JM, Ridgeway VA, Soulsby JM, Lau MA. Prevention of relapse/recurrence in major depression by mindfulness-based cognitive therapy. *Journal of Consulting and Clinical Psychology*. 2000; 68(4):615–623. [PubMed: 10965637]
- Vidrine JI, Businelle MS, Cinciripini P, Li Y, Marcus MT, Waters AJ, et al. Associations of mindfulness with nicotine dependence, withdrawal, and agency. *Substance Abuse*. 2009; 30(4): 318–327. [PubMed: 19904667]
- Watson D, Clark LA, Tellegen A. Development and validation of brief measures of positive and negative affect: the PANAS scales. *Journal of Personality and Social Psychology*. 1988; 54(6): 1063–1070. [PubMed: 3397865]
- Welsch SK, Smith SS, Wetter DW, Jorenby DE, Fiore MC, Baker TB. Development and validation of the Wisconsin Smoking Withdrawal Scale. *Experimental and Clinical Psychopharmacology*. 1999; 7(4):354–361. [PubMed: 10609970]
- Wetter DW, Fiore MC, Baker TB, Young TB. Tobacco withdrawal and nicotine replacement influence objective measures of sleep. *Journal of Consulting and Clinical Psychology*. 1995; 63(4):658–667. [PubMed: 7673544]
- Wetter DW, Kenford SL, Smith SS, Fiore MC, Jorenby DE, Baker TB. Gender differences in smoking cessation. *Journal of Consulting and Clinical Psychology*. 1999; 67(4):555–562. [PubMed: 10450626]
- Wetter DW, Smith SS, Kenford SL, Jorenby DE, Fiore MC, Hurt RD, et al. Smoking outcome expectancies: factor structure, predictive validity, and discriminant validity. *Journal of Abnormal Psychology*. 1994; 103(4):801–811. [PubMed: 7822583]
- Zelman DC, Brandon TH, Jorenby DE, Baker TB. Measures of affect and nicotine dependence predict differential response to smoking cessation treatments. *Journal of Consulting and Clinical Psychology*. 1992; 60(6):943–952. [PubMed: 1460156]

**Table 1**

Descriptive statistics for key study variables examined (N=158)

	Mean (SD) or Percentage	Range
<b>Demographics</b>		
Age	43.8 (11.76)	18 – 71
Gender (% female)	44.9%	---
<b>Race (%)</b>		
Caucasian	50.0%	---
African American	33.6%	---
Latino	10.1%	---
Other	6.3%	---
<b>Partner Status (%)</b>		
No Partner	62.0%	---
<b>Total Household Income (%)</b>		
<\$30,000/year	47.4%	
\$30,000/year	52.6%	
<b>Education</b>		
Years completed	13.4 (2.5)	7 – 20
<b>Nicotine Dependence</b>		
Cigarettes per day	20.8 (9.23)	5 – 50
1 <sup>st</sup> cig. within 5 minutes of waking	46.2%	---
<b>Mindfulness</b>		
KIMS Total Score	31.4 (3.8)	22 – 45
<b>Coping</b>		
Situation Redefinition	3.6 (1.0)	1 – 5
Direct Action	3.8 (0.8)	1 – 5
Catharsis	3.7 (1.0)	1 – 5
Acceptance	3.08 (1.1)	1 – 5
Seeking Social Support	3.4 (1.1)	1 – 5
Distraction	3.3 (1.1)	1 – 5
Religion	3.3 (1.2)	1 – 5
Relaxation	3.7 (0.9)	1 – 5
<b>Stress and Affective Variables</b>		
Perceived Stress (PSS)	6.6 (3.1)	0 – 15
Positive Affect	32.4 (9.0)	11 – 49
Negative Affect	20.9 (9.8)	10 – 50
Depression (CES-D)	17.1 (12.9)	0 – 51



Pearson correlation coefficients depicting associations among coping, mindfulness, and stress and affective variables

**Table 2**

	<b>KIMS Total</b>	<b>Perceived Stress (PSS)</b>	<b>Positive Affect</b>	<b>Negative Affect</b>	<b>Depression (CES-D)</b>
<b>Coping</b>					
Situation Redefinition	r=-.04 p=.6195	r=-.09 p=.2474	r=-.02 p=.8161	r=-.04 p=.6608	r=-.02 p=.8421
Direct Action	r=.15 p=.0639	r=-.25* p=.0014	r=.26* p=.0012*	r=-.20* p=.0117	r=-.13 p=.1176
Catharsis	r=.28* p=.0004	r=-.10 p=.2307	r=.21* p=.0069	r=.03 p=.7239	r=-.03 p=.7371
Acceptance	r=-.18* p=.0259	r=.13 p=.1121	r=-.14 p=.0800	r=.16* p=.0487	r=.02 p=.7929
Seeking Social Support	r=.16 p=.0545	r=-.19* p=.0195	r=.32* p<.0001	r=-.17* p=.0350	r=-.13 p=.0951
Distraction	r=-.04 p=.6186	r=.08 p=.3158	r=.01 p=.9475	r=.11 p=.1691	r=.08 p=.3463
Religion	r=.19* p=.0188	r=-.16* p=.0456	r=.20* p=.0103	r=-.10 p=.2139	r=.03 p=.6651
Relaxation	r=.29* p=.0002	r=-.39* p<.0001	r=.37* p<.0001	r=-.24* p=.0020	r=-.23* p=.0031

**Table 3**

Relationships between mindfulness and hypothesized coping mediators

	Independent Variable Mindfulness			
	B	SE	t	p
<b>Proposed Mediator Variables (a paths)</b>				
Situation Redefinition	-.0143	.0237	-.6026	.548
Direct Action	.0326	.0174	1.8774	.063
Catharsis	.0723	.0218	3.3125	.001
Acceptance	-.0299	.0243	-1.2300	.221
Seeking Social Support	.0601	.0262	2.2994	.023
Distraction	-.0027	.0238	-.1127	.910
Religion	.0661	.0258	2.5647	.011
Relaxation	.0773	.0200	3.8701	<.001

*Note:* *p*-values were based on linear regressions. Unstandardized coefficients are for the independent variable of mindfulness. All analyses controlled for age, gender, race/ethnicity, educational attainment, household income, and marital status. “*a* path” refers to the path between the independent variable and mediators in mediation model

**Table 4**

Relationships between proposed coping mediators, mindfulness, and stress/affect variables

Proposed Mediator Variables ( <i>b</i> path)	Perceived Stress			Positive Affect			Negative Affect			Depression						
	B	SE	t	p	B	SE	t	p	B	SE	t	p				
Situation Redefinition	-.3523	.2242	-1.5712	.118	-.1436	.6348	-.2262	.821	-.5071	.6776	-.7484	.456	-.2565	.9603	-.2671	.790
Direct Action	-.7796	.3017	-2.5842	.011	2.1757	.8471	2.5683	.011	-1.5223	.9180	-1.6583	.099	-.2534	1.3111	-.1933	.847
Catharsis	.0765	.2459	.3110	.756	.6011	.6888	.8727	.384	1.4652	.7282	2.0120	.046	.7490	1.0430	.7181	.474
Acceptance	.1194	.2203	.5418	.589	-.6690	.6166	-1.0851	.280	.6291	.6600	.9533	.342	-.7232	.9347	-.7737	.440
Seeking Social Support	-.4522	.2061	-2.1941	.030	1.9846	.5632	3.5235	.001	-1.0001	.6227	-1.6061	.111	-1.2924	.8834	-1.4630	.146
Distraction	.0404	.2252	.1794	.858	.1849	.6321	.2926	.770	.7549	.6731	1.1215	.264	.1484	.9565	.1551	.877
Religion	-.4093	.2056	-1.9911	.048	1.2742	.5752	2.2152	.028	-.2117	.6255	-.3384	.736	.2302	.8851	.2601	.795
Relaxation	-1.0831	.2530	-4.2813	<.01	2.3432	.7288	3.2153	.002	-1.5522	.7968	-1.9481	.053	-2.6960	1.1195	-2.4083	.017
<b>Independent Variable (<i>c</i> path)</b>																
Mindfulness	-.3740	.0637	-5.8677	<.01	1.3485	.1790	7.5354	<.01	-.9087	.1914	-4.7479	<.01	-1.0587	.2708	-3.9103	<.01

*Note:* *p*-values were based on linear regressions. Unstandardized coefficients are for the hypothesized coping mediators or the independent variable of mindfulness. All analyses controlled for age, gender, race/ethnicity, educational attainment, household income, and marital status. “*b* path” refers to the path between the hypothesized mediators and stress/affective variables in mediation models. “*c* path” refers to the path between mindfulness and stress/affective variables in mediation models.