The effects of a brief mindfulness exercise on state mindfulness and affective outcomes among adult daily smokers

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HIGHLIGHTS

- Brief mindfulness exercises reduce cravings and distress when nicotine deprived.
- This study explored effects when smokers were not nicotine-deprived.
- Results suggest increases in state mindfulness and decreases in distress levels.
- Brief mindfulness training did not affect the ability to tolerate distress.

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ABSTRACT

Brief, single session mindfulness training has been shown to reduce emotional distress, craving, and withdrawal symptoms among smokers when they are nicotine-deprived. However, no research has examined the efficacy of brief mindfulness training for non-nicotine-deprived smokers, or explored its effects on smokers' ability to tolerate emotional distress. Smokers progress differently through various stages as they attempt to change their smoking behavior and evidence-based strategies are needed for smokers at all levels of nicotine deprivation. Therefore, the purpose of the current study was to examine the effects of a brief mindfulness exercise on state mindfulness, distress, distress tolerance, and smoking urges following a distressing laboratory task among 86 non-nicotine-deprived adult daily smokers (\(M_\text{age} = 46\) years, 55\% male, 74\% African-American) who completed behavioral tasks and self-report measures before and after randomization to a 10-min mindfulness or control exercise. As hypothesized, the mindfulness exercise significantly increased state mindfulness \([F = 14.24, p = 0.00, \eta^2 = 0.15]\) and demonstrated a non-significant small to medium effect on decreased distress levels \([F = 3.22, p = 0.08, \eta^2 = 0.04]\). Contrary to prediction, it was not associated with improvements in self-reported \([F = 2.68, p = 0.11, \eta^2 = 0.03]\) or behavioral distress tolerance \([F(1) = 0.75, p = 0.39, \eta^2 = 0.01]\), or smoking urges following a stressor \([F = 0.22, p = 0.64, \eta^2 = 0.00]\). These findings suggest that brief mindfulness exercises successfully induce states of mindfulness in non-nicotine-deprived smokers. These exercises might also improve current moment levels of distress, but they do not appear to improve self-report or behavioral indices of distress tolerance.

1. Introduction

Smoking remains the leading preventable cause of death and disability in the United States (Center for Disease Control [CDC], 2008; U.S. Department of Health and Human Services [USDHHS], 2004). While nearly 70\% of smokers report a desire to quit smoking in any given year, most smokers who attempt to quit smoking are not successful and quickly relapse (Bränström, Penilla, Perez-Stable, & Munoz, 2010; CDC, 2011; Hughes, Keely, & Naud, 2004; West, McEwen, Bolling, & Owen, 2001). Mindfulness-based interventions, which teach present moment awareness and acceptance as a way of managing smoking triggers and cravings, have shown efficacy for promoting long-term smoking cessation (Brewer, Elwafi, & Davis, 2012; Davis et al., 2013; Davis et al., 2014; Davis, Fleming, Bonus, & Baker, 2007). Indeed, a recent systematic review of randomized controlled trials found that while quit rates were comparable between mindfulness-based interventions and standard care interventions (e.g., quit line, traditional cognitive-behavioral interventions) immediately post-intervention,
significantly more individuals who received mindfulness training re-
mained quit at four months post-intervention (25%) compared to in-
dividuals who received standard care (14%; Oikonomou, Arvanitis,
& Sokolove, 2016).

Mindfulness interventions are thought to promote smoking cessa-
tion by targeting emotional factors that underlie smoking behavior.
Smokers consistently report that one of the primary reasons they smoke is
to reduce negative affect, and increased negative affect is one of the
strongest predictors of smoking relapse (Brandon & Baker, 1991;
Copeland, Brandon, & Quinn, 1995; Fiore, 2008; Kenford et al., 2002;
Piper et al., 2004). Negative affect is also a common nicotine with-
drawal symptom, highlighting how important it is that smokers be
able to tolerate negative emotions without the use of cigarettes in order to
successfully quit smoking (Abrantes et al., 2008; Brown et al., 2008;
Brown, Lejuez, Kahler, Strong, & Zvolensky, 2005; Simons & Gaier,
2005). Mindfulness-based smoking cessation interventions have been
shown to reduce negative affect and increase mindfulness in smokers
(Davis et al., 2007; Davis, Manley, Goldberg, Smith, & Jorenby, 2014).
Mindfulness training has also been shown to increase distress tolerance
(i.e., the ability to withstand affective distress) in other populations
(Lotan, Tanay, & Bernstein, 2013; Sauer & Baer, 2012), and greater
levels of trait mindfulness have been associated with greater self-reported
distress tolerance in smokers (Luberto et al., 2013). However, no re-
search to date examined the effects of mindfulness training on distress
tolerance among smokers specifically.

Recently, research has focused on examining the acute effects of brief,
single-session mindfulness training. These training exercises are often
5–15 min in length and involve noticing internal and external events (e.g.,
body sensations, sounds in the room) with an attitude of openness and
curiosity, while also noticing when the mind wanders off and gently re-
directing attention back to the present moment. These exercises are taught
in the context of larger mindfulness-based interventions as a skill smokers
can use to ground themselves and choose adaptive behaviors in response to
cravings, rather than reacting to cravings by automatically smoking
(Brown, Chawla, & Marlatt, 2011). Given that mindfulness-based interven-
tions are often 8–weeks in duration with 2–weekly sessions and up to
45 min of daily home practice, understanding the immediate effects of
a single mindfulness exercise could help provide smokers with skills that are
efficient, easily accessible, and more feasible to learn. Extant research has
demonstrated significant reductions in distress, cravings, withdrawal
symptoms, and smoking behavior following single, brief mindfulness
practices (Bowen & Marlatt, 2009; Cropley, Ussher, & Charitou, 2007;
Rogojanski, Vettese, & Antony, 2011).

There are, however, at least three notable gaps in the research on
brief mindfulness exercises and smoking-related outcomes. First, al-
though research has demonstrated effects on distress, no research has
examined the effects of a brief mindfulness exercise on distress tolerance.
There has been one study of a brief mindfulness exercise for smokers that addressed distress tolerance (Paz, Zvielli, Goldstein,
& Bernstein, 2017). Here, brief mindfulness training was shown to
decouple the relationship between self-reported distress tolerance and
anxious responding to a laboratory stressor among nicotine-deprived
smokers; that is, distress tolerance was less strongly predictive of an-
xious responding following a mindfulness exercise as compared to a
neutral control exercise (Paz et al., 2017). Thus, distress tolerance is
relevant to the effects of mindfulness training on emotional outcomes in
smokers, but no research has tested whether brief mindfulness training
actually impacts smokers’ levels of distress tolerance. Given that distress
tolerance is an important factor in substance use behavior above and
beyond levels of distress (Buckner, Keough, & Schmidt, 2007), and be-
because theorized to be a key mechanism by which mindfulness training
promotes smoking cessation (Abrantes et al., 2008; Bowen & Marlatt,
2009; Breslin, Zack, & McMain, 2002; Katz & Toner, 2013), this
knowledge would advance theoretical models of mindfulness and
smoking, and provide insight into the practical utility of these brief
exercises for helping smokers withstand distress in the moment.

Second, research has focused exclusively on smokers who have been
fully nicotine deprived for up to 12 h. However, smokers progress dif-
erently through various stages of change as they plan or prepare to
quit, and smokers at all levels of nicotine deprivation need evidence-
based strategies to cope with distress and cravings (i.e., DiClemente
et al., 1991; Lindson, Averyard, & Hughes, 2010). Strategies that are
useful for nicotine-deprived smokers may not be as useful for smokers
who are not nicotine-deprived given that smokers prefer different
coping strategies at different levels of nicotine deprivation (Araujo,
Oliveira, Pedroso, & Castro, 2009). Thus, it is important to identify
evidence-based strategies that are acceptable and useful for non-nico-
tine-deprived smokers. Also, methodologically, nicotine deprivation
impairs cognitive and attentional skills (Ernst, Heishman, Spurgeon,
& London, 2001; Gross, Jarvik, & Rosenblatt, 1993), which could
negatively impact smokers’ abilities to participate in mindfulness exercises
and distress tolerance tasks, and nicotine deprivation is considered a
state of elevated distress (Paz et al., 2017), which could make the
distress tolerance tasks more difficult than is relevant to the experience
of smokers who are not attempting to quit (Bernstein, Trafton, Ilgen,
& Zvolensky, 2008). Examining the effects of a brief mindfulness
exercise in non-nicotine-deprived smokers is therefore also important
for isolating the effects of mindfulness training and facilitating an ac-
curate assessment of mindfulness for distress tolerance.

Lastly, only one study, conducted in nicotine-deprived smokers, has
examined whether brief mindfulness exercises actually elicit a mindful
state in smokers. A mindful state is a state of being openly, non-judg-
mentally aware of internal or external experiences that are occurring in
a given moment (Bishop et al., 2004). Although mindfulness is often
considered a trait or set of skills, consensus definitions emphasize that
mindfulness may actually be best considered a state-like, context-de-
pendent, and dynamic mental behavior (Bishop et al., 2004;
Tanay & Bernstein, 2013). It is important to examine state mindfulness
in smokers because it is the ability to be in a mindful state that is
thought to help smokers reduce emotional and behavioral reactivity
(e.g., non-smoking in response to smoking urges). Understanding
whether mindfulness practices actually elicit a mindful state for smo-
kers would inform the delivery of evidence-based strategies for coping
with distress and smoking urges. In addition, this knowledge is neces-
sary to understand whether mindfulness itself is responsible for effects
on smoking and emotional outcomes at a conceptual level.

Therefore, the purpose of the present study was to examine the ef-
ects of a brief mindfulness exercise on state mindfulness and affective
outcomes among non-nicotine-deprived adult daily smokers. To re-
plicate previous work in nicotine-deprived smokers (e.g., Cropley et al.,
2007; Westbrook et al., 2011), distress levels and cravings following an
emotional stressor were assessed. To further replicate and extend pre-
vious work in smokers (e.g., Paz et al., 2017) and non-smokers (Lotan
et al., 2013), state mindfulness and two additional indices of distress
tolerance (i.e., self-reported and behavioral) were assessed. We used
both self-report and behavioral measures to assess a range of distress
tolerance outcomes, given that different measurement methods are
correlated with different emotional and behavioral substance use out-
comes (Magidson, Ali, Listhaus, & Daughters, 2013). It was hypothe-
sized that smokers who were randomized to participate in a brief
mindfulness exercise, as compared to a neutral control exercise, would
demonstrate a greater increase in self-reported distress tolerance, be-
havioral distress tolerance, and state mindfulness, and a greater de-
crease in distress and smoking urges following a stressful laboratory
task.

2. Methods

2.1. Participants

See Table 1 for a summary of the demographic characteristics of the
sample. Participants were 86 daily smokers recruited from the
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