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Emotion dysregulation and negative affect: Laboratory and EMA investigations in smokers

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ABSTRACT

Introduction: Difficulties in emotion regulation are associated with addictive behaviors, including smoking. Difficulties in emotion regulation may underlie large, rapid changes in negative affect that can increase likelihood of relapse. We investigated the association between emotion regulation ability and negative affect in smokers assessed both in the laboratory and in the field using Ecological Momentary Assessment.

Methods: Adult community smokers ($N = 44$) carried a personal digital assistant (PDA) for two weeks and were instructed to complete assessments of negative affect multiple times per day. Participants were instructed that they could smoke as much or as little as they liked. The Difficulties in Emotion Regulation Scale (DERS) and the Positive and Negative Affect Schedule (PANAS) were completed at three lab visits.

Results: Participants with higher average DERS scores reported greater negative affect at lab visits. When a participant reported a DERS score at a lab visit higher than their individual average, they also reported higher negative affect at that lab visit. Participants with higher baseline DERS scores reported more labile negative affect during EMA than those with lower baseline DERS scores, and they also reported a higher maximum level of negative affect during EMA.

Discussion and conclusions: Overall, the findings suggest that changes in emotion regulation are associated with negative affect and that emotion regulation ability is related to both the intensity and lability of negative affect. A better understanding of momentary changes in emotion regulation and negative affect may lead to improved interventions for preventing substance use relapse.

1. Introduction

Deficits in emotion regulation are associated with a variety of psychological difficulties, including addictive behaviors such as cocaine abuse, alcohol dependence, and smoking (Fox, Axelrod, Paliwal, Sleeper, & Sinha, 2007; Fox, Hong, & Sinha, 2008; Haaga & Allison, 1994; Magar, Phillips, & Hosie, 2008). For example, a study of patients in treatment for alcohol dependence found that poor emotion regulation was associated with relapse to drinking both during and after treatment. The ability to tolerate negative emotions was the emotion regulation skill most predictive of continued abstinence (Berking et al., 2011).

Affective lability can be defined as the extent to which an individual has frequent fluctuations in emotional valence and intensity (Anestis et al., 2010). Extremely labile or volatile emotions make it difficult to act in accordance with goals (Tice & Bratslavsky, 2000). Likewise, constant, strong, negative emotions can interfere with other objectives, such as desisting from substance use (Baker, Piper, McCarthy, Majeskie, & Fiore, 2004). Emotion regulation includes both the awareness and identification of emotions and the set of strategies and processes people use to redirect their emotions and modify their behaviors to accomplish their goals (Gratz & Roemer, 2004; Koole, 2009; Thompson, 1994). Emotion regulation skills allow an individual to respond more effectively to affect in order to act in accordance with his or her goals. Thus, emotion regulation skills may influence the initial presence or intensity of an emotion, and they may also change the individual's reaction to the emotion and the resulting trajectory of the emotion.

Although emotion regulation is usually conceptualized as a stable construct (Gross, 2015), emotion regulation may also vary over time. Little research has examined within-subject changes in emotion regulation. Overall, it is reasonable to expect that immediate situational factors may influence an individual's ability to regulate emotions at a particular time. For example, one study found that general emotion regulation abilities and situational factors influenced the use of emotion regulation strategies in a stressful situation (Egloff, Schmukle, Burns, & Schwerdtfeger, 2006).

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Ecological momentary assessment (EMA) is a method that may be useful for examining the association between emotion regulation and affect. EMA involves obtaining real-time assessments multiple times per day in the normal environment. The field of emotion dynamics has been proposed, consisting of the study of the trajectories of emotion and related components over time (Kuppens & Verduyn, 2011). Patterns of emotion such as variability, duration, and co-occurrence (i.e., the simultaneous experience of multiple emotions), assessed by EMA have been suggested as ways to investigate emotion regulation (Kuppens & Verduyn, 2011). Most studies have examined the use of specific emotion regulation strategies (e.g., reappraisal) and the effect of their use on symptoms of psychopathology or changes in affect (Heiy & Cheavens, 2014; Kashdan & Steger, 2006; O'Toole, Jensen, Fentz, Zachariae, & Hougaard, 2014). For example, Heiy and Cheavens (2014) examined emotion regulation strategy use and affect three times a day over a 10-day period. They reported associations between use of emotion regulation strategies and changes in positive and negative affect, but not within-subject emotion regulation change (Heiy & Cheavens, 2014). However, little research has examined the association between general emotion regulation ability and negative affect assessed in the field.

EMA has also been used to examine the association between negative affect and smoking behavior (Shiffman, Stone, & Hufford, 2008). EMA research has revealed that large, rapid increases in negative affect (e.g. more than one standard deviation in about 5 h) may precede some smoking temptations and lapses (Shiffman, Paty, Gnys, Kassel, & Hickcox, 1996; Shiffman & Waters, 2004). Other data suggest a link between emotion regulation and smoking behavior. For example, maladaptive regulation strategies such as suppression have consistently been associated with early smoking initiation, greater smoking urges, and higher rates of cessation relapse (Haaga & Allison, 1994; Magar et al., 2008). Further, individuals instructed to reappraise their emotions about smoking showed less negative affect, reduced craving for cigarettes, and diminished attentional biases to smoking-related cues than individuals who were instructed to suppress or accept their smoking-related emotions (Szasz, Szentagotai, & Hofmann, 2012). Thus, smoking is an appropriate domain to study emotion regulation because there is a large EMA literature in this population (Shiffman et al., 2008), because affect and affective lability is associated with smoking behavior (Baker et al., 2004), and because emotion regulation has been associated with smoking behavior outcomes (Szasz et al., 2012).

In sum, little research has investigated within-subject changes in emotion regulation, or the relationship of general emotion regulation (vs. specific strategies) to momentary ratings of negative affect. This study utilized repeated laboratory assessments and EMA to investigate the relationship between emotion regulation and negative affect in smokers not attempting to quit. It was hypothesized that difficulties in emotion regulation would be associated with higher and more labile negative affect in smokers. In addition, it was expected that within-subject changes in difficulties in emotion regulation would be observed from assessment to assessment, and that such changes would themselves be associated with negative affect.

2. Methods

2.1. Participants

Participants were adult, community-based smokers in the greater Washington, D.C. metropolitan area recruited using advertisements seeking smokers interested in meditation. Advertisements were displayed on local mass transit, a free local newspaper, Craigslist.com, and on flyers throughout the community. Participants were eligible if they were a current smoker, aged 18 to 65, and had been smoking at least 10 cigarettes a day for the past two years. Exclusion criteria were current participation in smoking cessation treatment or the current use of tobacco products other than cigarettes including e-cigarettes. Self-reported smoking was biochemically verified, and participants were also excluded if their expired breath carbon monoxide (CO) was lower than 10 ppm.

The current study was a secondary analysis of data collected for a study examining mindfulness meditation training (Ruscio, Muench, Brede, & Waters, 2016), conducted at the Uniformed Services University of the Health Sciences (USUHS) in Bethesda, Maryland. The USUHS Institutional Review Board approved all study procedures. Data were collected between June 2012 and September 2012.

2.2. Procedures

Participants were first screened via telephone. Eligible participants were invited to attend the initial laboratory visit (visit 1), which began with informed consent procedures, followed by assessment of expired CO in breath. If individuals were ineligible (based on CO level) or declined to participate, they were offered self-help materials and references to local smoking cessation programs. If eligible individuals agreed to participate, they were randomly assigned to either a Brief Mindfulness Practice (BMP) or Control training condition (see Ruscio et al., 2016, for further detail). The parent study examined the effect of BMP on affect, craving, and smoking. Participants were told that they could smoke “as much or as little as they like” during the study including the days of laboratory visits.

Participants then completed a number of self-report assessments, including assessments of emotion regulation and negative affect (described below). Finally, research staff trained participants on the use of a personal digital assistant (PDA; HP iPAQ Pocket PC model 1940/1945; Microsoft Windows Mobile 6.5 OS). Programming was completed by Terminal C, a Houston-based company, using C#.NET.

2.3. EMA procedures

After visit 1, participants carried the PDA with them throughout each day. The PDAs were programmed to alert participants to complete an assessment at four randomly selected times per day (termed “random assessments”; RAs). As reported elsewhere (Ruscio et al., 2016), participants completed a mean of 66.4% of presented RAs (Median Compliance = 75.5%). Participants were also instructed to practice meditating once a day at a time of their choosing by listening to a Brief Mindfulness Practice and then to complete an assessment as soon as possible after the end of the recording. Controls listened to sham-meditation tracks on their PDA, and the instructions did not promote mindfulness (Ruscio et al., 2016). Controls were also instructed to complete an assessment as soon as possible after the end of the recording. BMP and Control participants completed an average of 32.8 (SD = 14.9) and 25.8 (SD = 17.7) RAs, $F(1, 35) = 1.70$, $p = 0.20$, and 24.0 (SD = 25.4) and 17.8 (SD = 10.6) post-training assessments, $F(1, 35) = 0.88$, $p = 0.36$., respectively.

After one week, participants returned to the laboratory for a second visit, followed by a second week of PDA assessments and mindfulness/control practice. They returned to the laboratory for a third and final visit, where they were debriefed and given referrals to smoking cessation programs. At the second and third laboratory visits, participants again completed an assessment of expired breath CO, as well as assessments for emotion regulation and negative affect (described below). Participants received compensation up to $215 for completing lab visits, mindfulness/control practices, and random assessments.

2.4. Laboratory assessments

The following assessments were administered at all laboratory visits.