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Life adversity is associated with smoking relapse after a quit attempt

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HIGHLIGHTS

- Females who relapse following a cessation attempt have higher adversity than men who relapse.
- Cigarette craving is independent of depressive affect.
- Cigarette craving is increased for those with low adversity during abstinence.

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ABSTRACT

Multiple cross-sectional studies have linked adverse childhood events and adult adversities to current smoking, lifetime smoking, and former smoking. To date, however, there have been no direct observational studies assessing the influence of adversities on smoking relapse. We prospectively followed 123 participants, 86 of whom were habitual smokers, from pre-quit ad libitum smoking to four weeks post-quit. Thirty-seven non-smokers were also tested in parallel as a comparison group. Subjects provided biological samples for confirmation of abstinence status and self-report history of adversities such as abuse, neglect, family dysfunction, incarceration, and child-parent separation. They also completed mood and smoking withdrawal symptom measures. The results indicated that within non-smokers and smokers who relapsed within the first month of a quit attempt, but not abstainers, females had significantly higher adversity scores than males. Cigarette craving, which was independent from depressive affect, increased for low adversity participants, but not those with no adversity nor high adversity. These results demonstrate that sex and relapse status interact to predict adversity and that craving for nicotine may be an important additional mediator of relapse. These results add further support to the previous cross-sectional evidence of an adversity and smoking relationship. Further studies to clarify how adversity complicates smoking cessation and impacts smoking behaviors are warranted.

1. Introduction

Despite significant strides in tobacco control policies over the past 20 years, approximately 18% of young persons will begin smoking (Aldrich et al., 2014). Depression and anxiety have been linked with the initiation and maintenance of smoking (Kassel et al., 2007; Killen et al., 1996). It is important to note that the relationship between depression, anxiety, and smoking is complex and, at times, bidirectional, and there is some evidence that smoking itself is a risk factor for subsequent development of depressive affect (Kassel, Stroud, & Paronis, 2003). In addition to depression, individual differences in anxiety also interact with environmental circumstances, including stress, in determining who will experience increases in anxiety with smoking (Evatt & Kassel, 2010). Research has consistently linked negative emotions and depression to other important smoking variables that complicate quit attempts. For example, negative emotions related to stress decrease an individual's ability to resist smoking and increase the number and velocity of puffs taken while smoking a cigarette (McKee et al., 2011).

For the chronic smoker who attempts to quit, depression, anxiety, craving, and anger have been linked to relapse following a quit attempt (al'Absi, Carr, & Bongard, 2007; al'Absi, Nakajima, Allen, Lemieux & Hatsukami, 2015; Nakajima & al'Absi, 2012; Roche et al., 2014; Tsaur, Strasser, Souprountchouk, Evans, & Ashare, 2015). Both trauma exposure and the experience of adverse childhood experiences, including loss, abuse, and neglect, are strong predictors of depression (Kendler, Kessler, Neale, Heath, & Eaves, 1993; Kim et al., 2013; Sen, Exworthy, & Forrester, 2014; Tang, Liu, Liu, Xue, & Zhang, 2014; Young, Harford, Kinder, & Savell, 2007). Interpersonal traumas or adult adversities contribute to increased depression and other mental health problems, including the adult adversities or trauma of intimate partner violence

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(Devries et al., 2013; Farris, Zvolensky, Beckham, Vujanovic, & Schmidt, 2014; Lagdon, Armour, & Stringer, 2014) and the chronic stress of caregiving for family members with mental illness or substance abuse problems (Jiang, Callinan, Laslett, & Room, 2015; Kate, Grover, Kulhara, & Nehra, 2013; Priestley & McPherson, 2015; Vella & Pai, 2013). There are complex and interdependent relationships between adversities and trauma across the developmental lifespan. Mental illness such as PTSD, depression, and comorbid substance use heightens the risk of further trauma, thereby perpetuating the cycle of trauma, poor mental health, and substance abuse (Ullman, Najdowski, & Filipas, 2009). Given this, it is important to consider how life adversity and trauma influence nicotine dependence and relapse.

Adverse childhood experiences and trauma have long been linked to substance use and related physical illnesses. Early work demonstrated that adversity, particularly at high levels, was capable of tripling an individual's risk of early smoking initiation (Anda et al., 1999; Felitti et al., 1998). As the burden of adversity increases, so does the likelihood of being a current heavy smoker (Anda et al., 1999). Likewise, a well-developed literature on interpersonal partner violence (IPV) during adulthood also shows that victims, as well as their perpetrators, are more likely to smoke than non-victims regardless of relationship type or socioeconomic status (Crane, Hawes, & Weinberger, 2013; Crane, Pilver, & Weinberger, 2014). Trauma exposure also has direct and indirect effects on nicotine dependence and smoking behaviors (Farris et al., 2014). Since the early work linking childhood adversity to smoking, there has continued to be strong support for the adversity, trauma, and smoking relationships from large epidemiological, cross-sectional studies, and, more recently, prospective studies (Bellis, Hughes, Leckenby, Perkins, & Lowey, 2014; Crane et al., 2013; Crane et al., 2014; Edwards, Anda, Gu, Dube, & Felitti, 2007; Elliott et al., 2014; Ford et al., 2011; Taha, Galea, Hien, & Goodwin, 2014; Xie et al., 2012). More specifically, depression and adversity independently predict smoking persistence in patients experiencing serious smoking-related illnesses and increased health risks directly mediated by smoking (Edwards et al., 2007). Some studies addressing adverse childhood experiences have further suggested that anxiety, especially in women, is a stronger predictor than depression of when someone classifies him or herself as a former smoker (Fuller-Thomson, Filippelli, & Lue-Crisostomo, 2013). It has also been suggested that the effect of adversity on smoking persistence is independent of either depression or anxiety (Taha et al., 2014). With IPV, however, other substance use (alcohol) severity and mental health, including PTSD-related symptoms, predict daily smoking (Jessup, Dibble, & Cooper, 2012; Sullivan et al., 2015).

The above review suggests that adversity and trauma predict a variety of smoking behaviors including early smoking initiation, habitual smoking, and persistence in smoking despite increased health risks, highlighting the role of life adversity as a potential mediator of smoking addiction. Although readiness to quit has been investigated relative to IPV perpetration (Stuart et al., 2006), to the authors' knowledge, no study to date has explored by direct observation prospectively the role of adversity in smoking relapse following a quit attempt. We therefore examined the association of adversity with smoking relapse by assessing whether a group of smokers who relapsed within the first month of a quit attempt reported higher lifetime adversity than those who remained abstinent. Although a variety of adult trauma exposures such as natural disasters, war, and terrorism may impact various aspects of smoking (Calhoun, Levin, Dedert, Johnson, & Beckham, 2011; Dorahy et al., 2015; Geiling, Rosen, & Edwards, 2012; Harville, Xiong, & Buekens, 2009), in this study we focus only on childhood adverse experiences and interpersonal adult adversities or trauma such as abuse, neglect, IPV, and substance abuse or mental illness in the family. As both the adversity and smoking literatures point to important sex differences, the potential for a sex by relapse status interaction on adversity scores will also be examined. Furthermore, we examined whether characteristics of the withdrawal experience, baseline mood, or biological smoking indicators were related to adversity. We hypothesized that smokers with early smoking relapse would report higher adversity in comparison to those who were able to successfully abstain from smoking; and female relapsers would have higher adversity scores than any other subgroup. We also hypothesized that negative affect, craving, and higher level of nicotine exposure would be related to higher adverse life experiences.

2. Methods

2.1. Participants

This study was a secondary analysis of a larger scale project which investigated predictors of smoking relapse (al'Absi et al., 2015). Participants were recruited through advertisements and flyers posted in the local community. Interested participants called the laboratory and completed a telephone screening. They were then invited to an on-site medical screening during which eligibility was determined. Participants must have had: (a) no current major physical or psychiatric conditions; (b) two or fewer alcoholic drinks per day; and (c) no routine prescribed medication use, except for contraceptives. Smokers must have smoked 10 or more cigarettes per day. Although it is well known that both childhood and adult adversities predict increased risk of physical and psychiatric dysfunction, the parent study protocol required the exclusion of current major physical or psychiatric conditions as potential confounds of neuroendocrine and psychophysiological function. The participants also needed to claim a strong motivation to quit smoking. Qualified candidates read and signed a consent form approved by the University of Minnesota IRB and were monetarily compensated for their participation. A total of 123 individuals (37 non-smokers and 86 smokers) were included in the current report.

2.2. Measures

2.2.1. Psychological

Participants completed an adversity questionnaire based on the Adverse Childhood Experiences (ACE) questionnaire (Felitti et al., 1998; Ford et al., 2011). Adversity was queried through questions about psychological abuse, physical abuse, sexual abuse, household member substance abuse, household member mental illness, household member suicide attempt, mother treated violently, and household member incarceration. The adversity questionnaire had 14 items. Due to an error in printing, the instructions did not explicitly state “prior to age 18” as in the original ACE questionnaire; therefore, this version should more broadly be considered to be a lifetime adversity questionnaire due to the potential for reporting events in both childhood or adulthood (see Supplemental Table S1). Baseline mood differences were assessed using the Patient Health Questionnaire-9 (PHQ-9) (Kroenke, Spitzer, & Williams, 2001) and State-Trait Anxiety Inventory (STAI) (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983). The STAI is a 40-item inventory that includes state anxiety and trait anxiety subscales. The trait anxiety subscale was used in this analysis (STAI-T). Possible STAI scores for the trait anxiety measure range from 20 to 80. The PHQ-9 is a 9-item scale (0 *not at all* to 3 *nearly every day*) with an overall score range of 0 to 27.

2.2.2. Demographic & smoking measures

Demographic variables (e.g., age, years of education), smoking history (e.g., average cigarettes per day), and nicotine dependence levels using the Fagerström Test of Nicotine Dependence (FTND) (Heatherton, Kozlowski, Frecker, & Fagerstrom, 1991) were collected at baseline. In addition to quantifying tobacco use with the FTND, alcohol use was quantified as self-report of never, rarely, approximately two drinks per day, or greater than two drinks per day. A modified version of the Minnesota Nicotine Withdrawal Scale (MNWS) was used to measure the severity of withdrawal symptoms (Hughes & Hatsukami, 1998; Hughes & Hatsukami, 1986). The item “desire to smoke” was analyzed separately to examine craving because studies have reported