



Resilient but addicted: The impact of resilience on the relationship between smoking withdrawal and PTSD



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ABSTRACT

Nicotine use is common among people with posttraumatic stress disorder (PTSD). Resilience, which is reflected in one's ability to cope with stress, has been shown to be associated with lower cigarette smoking and posttraumatic stress symptoms, but relationships among these three variables have not been examined. This study investigates the relationships of resilience and nicotine withdrawal with each other and in relation to PTSD symptoms. Participants were 118 cigarette smokers with PTSD seeking treatment for PTSD and nicotine use. Data were randomly cross-sectionally sampled from three time points: week 0, week 12, and week 27 of the study. Hierarchical multiple regression analyses revealed main effects of both resilience and nicotine withdrawal symptoms on PTSD severity, controlling for the sampled time point, negative affect, and expired carbon monoxide concentration. Consistent with prior research, PTSD severity was higher among individuals who were less resilient and for those who had greater nicotine withdrawal. There was an interaction between resilience and nicotine withdrawal on self-reported PTSD severity, such that greater resilience was associated with lower PTSD severity only among participants with low nicotine withdrawal symptoms. Among individuals with high nicotine withdrawal, PTSD severity was high, regardless of resilience level. These results suggest that resilience is a protective factor for PTSD severity for those with low levels of nicotine withdrawal, but at high levels of nicotine withdrawal, the protective function of resilience is mitigated.

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Post-traumatic stress disorder (PTSD) is associated with significant burden, including greater days missed from work (Taylor et al., 2012), poorer health functioning (Asnaani et al., 2014), and greater healthcare utilization (Tuerk et al., 2013). Individuals with PTSD also have a significantly higher rate of smoking (approximately doubled) compared to those without PTSD (Feldner et al., 2007; Rasmussen et al., 2006). Further, higher rates of smoking and nicotine withdrawal have been identified as risk factors for the development of PTSD (Feldner et al., 2007; Hawkins and Cogle, 2013; van der Velden et al., 2007). That is, individuals who smoke are more likely to endorse clinically significant symptoms of PTSD (e.g. intrusions, avoidance behavior, and hostility) following a traumatic event than non-smokers (Beckham et al., 1996; van der Velden et al., 2007).

In addition, it has been found that smokers with PTSD are more likely to smoke heavily and report higher levels of nicotine

dependence than those without the disorder (Feldner et al., 2007; Hapke et al., 2005). An additional source of concern is evidence for a greater difficulty quitting from smoking in daily smokers with PTSD, as compared to non-psychiatric smokers, specifically, greater number of failed lifetime quit attempts, more severe withdrawal quit problems (Marshall et al., 2008), and poorer outcomes in smoking cessation programs (Beckham et al., 2013; Zvolensky et al., 2008). Given these findings and the increased focus on developing smoking cessation treatments tailored for psychiatric populations (Ziedonis et al., 2008), there remains a recognized need to better understand the factors that affect the smoking-PTSD relationship (see for example: Richards et al., 2013).

Contrary to the exacerbation associated with smoking on PTSD severity, resilience is often regarded as a protective factor against the development of PTSD in trauma-exposed individuals. Resilience is conceptualized as a trait-like ability to effectively cope with stress and thrive despite hardship (Connor & Davidson, 2003). A commonly used measure of resilience (the Connor-Davidson Resilience Scale, CD-RISC), assesses personal competence, tenacity, acceptance of change, ability to tolerate negative affect, finding strength in stress, and sense of purpose and control in life (Connor & Davidson, 2003). Higher resilience has been linked to

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lower risk of developing PTSD after experiencing trauma (Bensimon, 2012; Nishi et al., 2010), even after controlling for number of lifetime traumas (Wrenn et al., 2011). For example, in two matched cohorts of Austrian World War II survivors with and without PTSD, those with sub-threshold or threshold PTSD had significantly lower scores on the CD-RISC than those without PTSD (Tran et al., 2013).

Only a few studies, however, have examined how resilience may mitigate risk for PTSD. In a sample of adolescents, Fincham et al. (2009) found that resilience moderated the relationship between childhood abuse/neglect and PTSD such that, in individuals with higher resilience, the association between childhood abuse/neglect and PTSD symptoms was significantly reduced. Similarly, in a sample of military combat veterans, resilience interacted with combat exposure such that those with higher resilience experienced lower levels of PTSD symptoms, regardless of the extent of combat exposure (Green et al., 2010). In addition, this study found that resilience was a particularly strong buffer against PTSD symptoms for those with the highest levels of combat exposure.

Resilience appears to play a similarly protective role against substance use. Higher resilience has been associated with less frequent smoking and lower nicotine dependence (Goldstein et al., 2013). In addition, higher resilience scores were associated with more days smoke-free in the month following a smoking cessation program (Pergadia, 2002). In a large sample of inner-city adults ($n = 2024$), childhood abuse was associated with alcohol and illicit drug use in those with low resilience, but was unrelated to substance use in those high resilience (Wingo et al., 2014). Thus, resilience seems to function as a protective buffer between childhood trauma and both PTSD and substance use.

What remains unclear is how resilience interacts with smoking withdrawal, and how this interaction may impact PTSD severity. As noted previously, there is considerable research showing that nicotine use exacerbates PTSD and vice versa (Beckham et al., 1996; Dedert et al., 2012; Feldner et al., 2008), and that resilience lowers risk for PTSD (Fincham et al., 2009; Green et al., 2010). However, no study to date has examined how these three variables intersect with one another. Due to the high prevalence of comorbidity between PTSD and nicotine use observed in clinical practice, the current study aimed to elucidate the relationships among PTSD, nicotine withdrawal, and resilience. We examined the main and interactive effects of resilience and nicotine withdrawal on total PTSD severity and PTSD symptom cluster severity (re-experiencing, avoidance, and hyperarousal) in a treatment-seeking sample of smokers with PTSD. We hypothesized that, consistent with prior research, resilience would have an inverse relationship with PTSD severity (Fincham et al., 2009), and that nicotine withdrawal would have a direct, proportionate relationship with PTSD (van der Velden et al., 2007). Similarly, given the evidence for a consistent positive influence of resilience on PTSD even with comorbid substance use (Pergadia, 2002; Wingo et al., 2014), we further hypothesized that individuals with high resilience would exhibit a weaker relationship between nicotine withdrawal and PTSD severity than those with low resilience, with resilience moderating the association between withdrawal and PTSD symptoms. Finally, we examined the effects of resilience and withdrawal on specific PTSD symptom clusters. Given the scarcity of data looking at this, the hypotheses for this last set of analyses was exploratory.

1. Material and methods

1.1. Participants

Participants were 118 adult cigarette smokers with PTSD who were enrolled in an ongoing randomized clinical trial comparing

the efficacy of varenicline and smoking cessation counseling with or without integrated prolonged exposure (PE) therapy for PTSD. Inclusion criteria for participants in the study included male and females (age ≥ 18) who were heavy cigarette smokers (≥ 10 cigarettes per day) and had a primary DSM-IV diagnosis of PTSD and a total score ≥ 20 on the PTSD Symptom Scale Interview (PSS-I; Foa et al., 1993). The exclusion criteria, designed to ensure safety, focused primarily on suicidal ideation or past suicide attempts, certain health conditions (specifically significant cardiovascular disease or uncontrolled hypertension in the past 6 months, and currently pregnant or nursing women), past or current psychosis, and continuing intimate relationship with a violent domestic partner. Individuals with a history of drug or alcohol abuse/dependence in the past 3 months or any unwillingness to not smoke marijuana during the first 13 weeks of the study were also excluded.

Participants were recruited through public advertising (e.g., ads in a free city newspaper and flyers) and direct referrals from health care providers. Of the 118 participants, 70 (59.3%) were men and 48 (40.7%) were women. Participants had a mean age of 41.9 years ($SD = 10.3$ years). The majority of participants (76.3%) were Black/African American, with the rest of the participants identifying as White (22.9%) or American Indian/Alaskan Native (.9%). Eight participants (6.8%) identified as Hispanic or Latino. This study was conducted in compliance with the Declaration of Helsinki as revised in 2008 and received approval from the ethics boards at both sites at which the study was conducted. All participants received a full description of the study and then provided written informed consent.

1.2. Procedure

Data were collected from three time points over the course of the 27-week trial: week 0, week 12, and week 27. At each assessment, a masters- or doctoral-level clinician conducted an independent (blinded) evaluation of PTSD symptom severity. In addition, participants completed self-report questionnaires including measures of PTSD symptoms and resilience. Participants also met with a study nurse at each assessment point to complete a checklist of nicotine withdrawal symptoms.

1.3. Measures

1.3.1. Connor-Davidson Resilience Scale

The Connor-Davidson Resilience Scale (CD-RISC; Connor and Davidson, 2003) is a 25-item self-report questionnaire measuring resilience. Participants are asked to indicate how much they agree with items such as “I can deal with whatever comes my way” and “Even when things look hopeless, I don’t give up.” Each item is rated on a 5-point Likert scale from 0 (*not true at all*) to 4 (*true nearly all the time*), with total scores ranging from 0 to 100. The CD-RISC was found by Connor and Davidson (2003) to have good internal consistency (Cronbach’s $\alpha = .89$), high test-retest reliability (intraclass correlation coefficient = .87), and good convergent validity. In the current sample, internal consistency for the CD-RISC was excellent (Cronbach’s $\alpha = .97$).

1.3.2. Posttraumatic stress diagnostic scale

The Posttraumatic Stress Diagnostic Scale (PDS; Foa et al., 1997) is a self-report questionnaire assessing the severity of PTSD symptoms according to the DSM-IV. Participants are asked to rate their experience of 17 symptoms over the previous two weeks on 4-point Likert scales from 0 (*not at all*) to 3 (*5 or more times a week/ almost always*), with total scores ranging from 0 to 51. The PDS includes three subscales: re-experiencing (five items, range 0–15),

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