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Tobacco use trajectories among a large cohort of treated smokers with posttraumatic stress disorder

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HIGHLIGHTS

- We identified four unique tobacco use trajectories among treated smokers with PTSD.
- Trajectory groups were early sustained reduction, late sustained reduction, temporary reduction and no reduction.
- Early sustained and temporary reduction groups received similar cessation treatment.
- Temporary reducers had greater mental health symptoms than sustained reducers.
- Findings can aid development of targeted interventions for smokers with PTSD.

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ABSTRACT

Introduction: This study identified distinct tobacco use trajectories across 18 months in 943 veteran smokers with posttraumatic stress disorder (PTSD) in order to describe quit and relapse patterns, examine associations between trajectory groups on baseline characteristics and cessation service utilization, and explore group differences in mental health outcomes.
Methods: Veterans who participated in a multisite, randomized trial of integrated smoking cessation care were grouped using k-means clustering based on reported daily tobacco use between baseline and 18 months. Four trajectory clusters were identified: no reduction (62%), temporary reduction (11%), late sustained reduction (9%) and early sustained reduction (18%).
Results: Median quit times in the early, late, temporary, and no reduction groups were 451, 141.5, 97, and 2 days, respectively. Compared to the early reduction group, the temporary reduction group exhibited higher baseline depression ($p < 0.01$) and anxiety ($p < 0.01$), but did not differ in treatment received, with both groups attending significantly more cessation visits ($p < 0.001$) and more likely to receive recommended pharmacotherapy ($p < 0.001$) than the no reduction group between baseline and 6 months. The early reduction group exhibited lower depression relative to the no reduction ($p < 0.01$) and temporary reduction ($p < 0.01$) groups across all assessments between baseline and 18 months. Differences were not observed between groups in depressive or PTSD symptom change over time between baseline and 18 months.
Conclusions: Tobacco use trajectories among treated smokers with PTSD vary distinctly. Characteristics of identified subgroups may lead to targeted interventions among smokers with PTSD and potentially other psychiatric disorders.

1. Introduction

Posttraumatic stress disorder (PTSD), one of the most commonly occurring mental health disorders (Kessler, Sonnega, Bromet, Hughes, &

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Nelson, 1995), is highly associated with smoking. An estimated one in ten current U.S. smokers have lifetime PTSD (Lasser et al., 2000). In addition to smoking at disproportionally high rates, individuals with PTSD are less likely to quit successfully (Hapke et al., 2005) and are more likely to relapse quickly (Beckham, Calhoun, Dennis, Wilson, & Dedert, 2013; Zvolensky et al., 2008) than those without PTSD. Treatments such as integrated smoking cessation care (IC), which integrates guideline-based cessation treatment into PTSD care, have been shown to double one-year prolonged abstinence rates in veterans with PTSD compared to specialized treatment in Veterans Affairs (VA) smoking cessation clinics in a multisite, randomized trial (McFall et al., 2010). Nevertheless, a large majority of trial participants who made a quit attempt relapsed prior to achieving long-term abstinence. Increased understanding of tobacco use patterns and the factors associated with those patterns in this high-risk population could allow for development of more targeted interventions to promote prolonged smoking cessation.

Prior longitudinal studies in the general population have identified smoking-related factors associated with relapse including severity of nicotine dependence (Hyland et al., 2006; Zhou et al., 2009), length of longest prior quit attempt (Hyland et al., 2006), and age of starting smoking (West, McEwen, Bolling, & Owen, 2001), as well as dynamic factors such as lack of cessation aids (Zhou et al., 2009). How such factors relate to lapse/relapse patterns over time in smokers with PTSD is not known, but may be particularly relevant given that individuals with PTSD are more likely to smoke heavily (Beckham et al., 1997) relative to those without PTSD.

Mental health factors associated with relapse include negative affect (Carmody, Vieten, & Astin, 2007) and low positive affect (Cook, Spring, McChargue, & Doran, 2010; Leventhal, Ramsey, Brown, LaChance, & Kahler, 2008). Among those with PTSD, positive and negative affect, PTSD symptoms, and trauma cues are strongly related to smoking (Beckham et al., 2005, 2007), and negative affect and trauma reminders are related to relapse (Beckham et al., 2013). Cook, McFall, Calhoun, and Beckham (2007) posit that the chronic nature of PTSD may promote vulnerability to relapse even after significant periods of abstinence. However, much of the data on affect- and PTSD-related factors associated with relapse in this population are derived from short-term diary-based studies; little information is available on the long-term impact of these factors on lapse/relapse.

The current study applied k-means clustering to data from a large multisite trial of IC (McFall et al., 2010) to identify distinct tobacco use trajectories across an 18-month period among smokers with PTSD randomized to IC or smoking cessation clinic (SCC). Trajectory groups were compared in order to: 1) describe unique patterns of quitting and relapse, as well as cessation treatment utilization; 2) examine prospective associations between baseline factors, including nicotine dependence, smoking behavior, and mental health, and group membership; and 3) explore differences between groups in PTSD and depressive symptom change over the study course. We hypothesized that trajectory groups with sustained reductions in tobacco use would demonstrate less severity with respect to both smoking-related and mental health factors and higher treatment utilization relative to those groups with no or minimal sustained reductions in use.

2. Methods

2.1. Study participants

Between November 2004 and December 2007, veterans ($N = 943$) engaged in outpatient PTSD treatment at 10 VA medical centers enrolled in a randomized, controlled trial comparing IC to SCC. Eligibility criteria included: 1) military-related PTSD; 2) smoking >10 cigarettes on at least 15 of 30 days before screening; and 3) consent to receive cessation interventions. Veterans who used non-cigarette tobacco, met DSM-IV criteria for current psychotic, bipolar, or substance dependence disorder other than nicotine, or exhibited severe psychiatric instability or cognitive impairment were excluded. Following baseline assessment, eligible veterans were randomized in a 1:1 ratio to IC or SCC and reassessed every 3 months for 18 months on tobacco use, cessation medication use, PTSD and depressive symptoms, and smoking cessation treatment utilization.

Veterans in both conditions typically completed the initial cessation treatment course within 3 months of randomization. Those randomized to IC received 8 weekly individual sessions followed by monthly booster sessions delivered by their PTSD provider. Use of FDA-approved cessation medications was recommended but not required. Veterans randomized to SCC received care in accordance with local SCC policies. Veterans across conditions received ongoing mental health care through the PTSD clinic.

The Human Rights Committee of the Palo Alto Cooperative Studies Program Coordinating Center and the Institutional Review Boards at participating sites approved the study. Veterans gave written informed consent prior to enrollment. Please see McFall et al. (2007, 2010) for a detailed description of procedures, interventions, and primary outcomes.

2.2. Outcome measures

Self-reported demographics and tobacco use history were obtained at baseline. Nicotine dependence severity was measured by the Fagerström Test for Nicotine Dependence (FTND) (Heatherton, Kozlowski, Frecker, & Fagerstrom, 1991). Baseline health status was measured by the Smoking Cessation Quality of Life Questionnaire (SCQoL), which combines the veterans SF-36 (SF-36V) (Kazis et al., 1999) with 15 additional questions comprising five smoking cessation-targeted scales (Olufade et al., 1999). Baseline PTSD severity was measured by the Clinician Administered PTSD Scale (CAPS) (Weathers, Keane, & Davidson, 2001), with scores between 60 and 79 indicating severe PTSD symptomatology. Additional psychiatric diagnoses were determined using the Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I/P), a structured interview schedule used for diagnosing DSM-IV Axis I mental disorders (First, Spitzer, Gibbon, & Williams, 2001). To assess fidelity, assessors submitted audio recordings of CAPS and SCID-I/P interviews for outside review. The majority of SCID diagnoses from one participating site were excluded from analyses due to fidelity concerns.

Daily self-reported tobacco use data, obtained via timeline follow-back interview method (Collins, Eck, Torchalla, Schroter, & Batra, 2009), were used to determine number of quit attempts, length of longest quit and days from baseline to longest quit. These outcomes, rather than categorical measures of point prevalence and prolonged abstinence (McFall et al., 2010), were selected to capture the full variation in quit and relapse patterns by cluster. The first 24-hour period after baseline with no tobacco use was considered the initial quit attempt. To avoid attributing multiple quit attempts to consistent non-daily smokers (e.g. using tobacco every other day), subsequent quit attempts were defined as a 24-hour period with no tobacco use following daily use for two weeks or more.

Treatment process variables included total cessation treatment visits and type and amount of smoking cessation medications used. Data pertaining to treatment visits were extracted from Veterans Health Administration (VHA) electronic medical records. Participants' use of cessation medications was obtained using the timeline follow-back method.

Change in PTSD severity over time was measured by the PTSD Checklist (PCL; range 17–85) (Weathers, Litz, Herman, Huska, & Keane, 1993). The Patient Health Questionnaire 9 (PHQ-9; range 0–27) (Kroenke, Spitzer, & Williams, 2001) measured depression over time. Veterans were determined to have probable major depressive disorder if they endorsed either anhedonia (item 1) or depressed mood (item 2) and endorsed ≥5 items per the algorithm in Kroenke et al. (2001).