



Obsessive-compulsive symptoms and negative affect during tobacco withdrawal in a non-clinical sample of African American smokers



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ABSTRACT

The association between obsessive-compulsive (OC) symptomatology and smoking is poorly understood, particularly in African Americans—a group subject to smoking- and OC-related health disparities. In a non-clinical sample of 253 African American smokers, we tested the negative reinforcement model of OC-smoking comorbidity, purporting that smokers with higher OC symptoms experience greater negative affect (NA) and urge to smoke for NA suppression upon acute tobacco abstinence. Following a baseline visit involving OC assessment, participants completed two counterbalanced experimental visits (non-abstinent vs. 16-h tobacco abstinence) involving affect, smoking urge, and nicotine withdrawal assessment. OC symptom severity predicted larger abstinence-provoked increases in overall NA, anger, anxiety, depression, fatigue, urge to smoke to suppress NA, and composite nicotine withdrawal symptom index. African American smokers with elevated OC symptoms appear to be vulnerable to negative reinforcement-mediated smoking motivation and may benefit from cessation treatments that diminish NA or the urge to quell NA via smoking.

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1. Introduction

Obsessive-Compulsive (OC) symptoms—a collection of psychopathological features involving repetitive behaviors or mental acts (i.e., compulsions) that serve to alleviate anxiety or distress caused by persistent, recurrent, and intrusive thoughts, images, or urges (i.e., obsessions; American Psychiatric Association, 2013)—is understudied in the African American population. While prevalence of the Diagnostic and Statistical Manual of Mental Disorders (DSM) obsessive-compulsive disorder (OCD) diagnosis appears to be similar among African Americans and other racial groups (African Americans 2.3% vs. Whites 2.6%, Zhang & Snowden, 1999; African Americans 1.6% vs. Whites 1.6%, Himle et al., 2008; Kessler et al., 2005), African Americans have been demonstrated to experience higher levels of certain OC symptom subtypes (e.g., cleaning, checking, fears of contamination; Wheaton, Berman, Fabricant,

& Abramowitz, 2013; Thomas, Turkheimer, & Oltmanns, 2000; Williams & Turkheimer, 2007; Williams, Turkheimer, Magee, & Guterbock, 2008) than other racial groups. Possible racial differences in symptom-level variance by race is important, as OC symptoms have been shown to lie on a continuum in the general population (Mataix-Cols, Rosario-Campos, & Leckman, 2005; Murphy, Timpano, Wheaton, Greenberg, & Miguel, 2010), with a sizeable proportion of the general population endorsing some OC symptoms (without surpassing diagnostic thresholds) and experiencing distress and impairment from subclinical OC symptoms (Apter et al., 1996; Spinella, 2005). On top of differences in symptom expression, African Americans are less likely to receive quality mental healthcare than Whites for OC symptoms (National Survey of American Life; Himle et al., 2008). Hence, understanding the correlates and consequences of variation across the OC symptom continuum in non-clinical samples of African Americans is an important target for health disparities research agendas.

African Americans are also subject to tobacco-related health disparities. Although cigarette consumption rates were consistently found to be much higher among non-Hispanic Whites and other racial/ethnic groups (vs. African Americans; Trinidad et al., 2015; Evans-Polce, Vasilenko, & Lanza, 2015; Herzog & Pokhrel, 2012;

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Jamal et al., 2014), African American smokers are more susceptible to the effects of smoking on tobacco-related disease morbidity and mortality (American Cancer Society, 2016; DeLancey, Thun, Jemal, & Ward, 2008; Haiman et al., 2006; Irvin Vidrine, Reitzel, & Wetter, 2009), are less likely than other racial groups to initiate a quit attempt (Bacio, Guzman, Shapiro, & Ray, 2014; Fu et al., 2008; Hahn, Folsom, Sprafka, & Norsted, 1990; Trinidad, Perez-Stable, White, Emery, & Messer, 2011), appear to be at greater risk of relapse following a cessation attempt (Choi, Okuyemi, Kaur, & Ahluwalia, 2004), and may experience more extensive affective disturbances during acute abstinence (Bello et al., 2016). Moreover, recent literature has illustrated disproportionately higher rates of menthol cigarette smoking among African Americans, with African American menthol smokers being more likely to initiate smoking and less likely to successfully quit smoking than non-Hispanic White non-menthol smokers, despite showing more motivation to quit smoking (Alexander et al., 2016; Keeler et al., 2016; Stahre, Okuyemi, Joseph, & Fu, 2010).

Given that African Americans may be subject to disparities related to both OC symptom expression and tobacco use, understanding the intersection between OC symptoms and smoking could address a cross-cutting problem that disproportionately burdens the mental and physical health of African Americans. Yet, to our knowledge, we are unaware of any studies that have focused on the intersection between OC symptoms and smoking among African Americans. A few studies have demonstrated lower smoking prevalence rates among populations with OC symptomatology (Bejerot & Humble, 1999; Himle, Thyer, & Fischer, 1988; McCabe et al., 2004) and studies utilizing mixed-ethnic samples have shown some evidence of an inverse association between the two conditions (Abramovitch, Pizzagalli, Geller, Reuman, & Wilhelm, 2015; Sharma, Gale, & Fineberg, 2012). This has been hypothesized to be due to a lack of positive reinforcement experienced from nicotine in patients with OCD (Bejerot & Humble, 1999), which may prevent the continuation of smoking behavior following initial experimentation. Yet, amongst individuals for which smoking is already established—the target group for the current study—OC symptoms may play a different role in causing smoking to persist, which has yet to be examined in the African American smoker population.

We propose a negative reinforcement model of the mechanisms whereby OC symptoms contribute to motivation to smoke. By nature, OCD is a disorder of negative reinforcement such that compulsions or mental rituals are performed to reduce acute anxiety and stress caused when obsessions are manifested (Fontenelle, Oostermeijer, Harrison, Pantelis, & Yücel, 2011). Smoking also has been shown to have anxiety and stress-alleviating properties, which negatively reinforces and maintains smoking behavior among nicotine-dependent individuals (Brown, Kahler, Zvolensky, Lejuez, & Ramsey, 2001; Choi, Ota, & Watanuki, 2015; Kassel, Stroud, & Paronis, 2003; Watkins, Koob, & Markou, 2000). In chronic smokers, acute abstinence can be a prominent source of negative affect (NA), as abstinence from smoking produces the expression of neuroadaptations that lead to NA-related nicotine withdrawal symptoms and also is a source of stress triggered by the removal of a key coping mechanism for quelling distress (i.e., smoking; Baker et al., 2013; Parrott, 1999). Given that individuals with elevated OC symptoms are well-practiced in engaging in negatively reinforcing behaviors, it is plausible that smokers with higher (vs. lower) OC symptoms are more vulnerable to developing behavioral cycles of smoking-induced negative reinforcement (Raines, Unruh, Zvolensky, & Schmidt, 2014). Hence, when regular smokers are in a state of acute abstinence from tobacco either as part of a quit attempt or temporary deprivation (e.g., waking after abstaining overnight, restrictions against smoking at work), those with higher levels of OC symptoms may experience stronger abstinence-

induced exacerbations in acute NA states and urges to smoke to quell NA. If this were the case, the interactions between OC symptoms, negatively reinforcing (escape) behaviors, and tobacco abstinence effects could prolong and increase smoking levels for smokers with OC symptom elevations. Validation of the aforementioned model of mechanisms linking OC and smoking would have benefits for advancing theories of comorbidity and identifying NA-related withdrawal as a promising cessation treatment target for smokers with OC symptoms. This model may be pertinent across several different ethnic/racial populations, including African American smokers who cite smoking for NA reduction as a motive for smoking at levels equivalent to Whites (Aguirre et al., 2016).

In this laboratory study utilizing experimental manipulation of acute tobacco abstinence (vs. ad libitum smoking), we tested the aforementioned negative reinforcement model of OC-smoking comorbidity in a non-clinical sample of African American smokers. We hypothesized that OC symptom level would be positively associated with the degree of abstinence-provoked exacerbations in NA states, the urge to smoke to suppress NA, and a composite nicotine withdrawal scale which includes numerous NA states and other aversive symptoms (e.g., headaches). We also examined the discriminant validity (i.e., specificity) of this model in two ways. We examined whether OC symptoms were associated with abstinence-induced changes in two states that putatively underlie positive reinforcement-mediated smoking motivation—diminished positive affect and urge to smoke for pleasure. Based on our model, OC symptoms are presumed to play a role in amplifying negative (but not positive) reinforcement smoking motivation; hence, we did not expect OC symptoms to be related with these outcomes. Second, we tested whether associations of OC symptoms with NA and urge to smoke to suppress NA persisted after statistically controlling for severity of tobacco dependence and non-OC emotional symptomatology (i.e., depressive and anxiety symptoms). We expected associations to be robust upon statistical control of these variables, given the expectation that OC is implicated in negative reinforcement smoking not solely because it is a proxy for non-specific psychiatric distress or mere dependency on nicotine.

2. Methods

2.1. Participants

This study is the first report using data from an ongoing study of individual differences in the expression of tobacco withdrawal among African American smokers. Participants were non-treatment seeking daily cigarette smokers ($N = 253$; $M = 48.2$ years old) recruited from the metropolitan Los Angeles area via word of mouth and paper and online advertisements. Inclusion criteria for the study were: (1) 18 years of age or older; (2) self-reported non-Hispanic African American ancestry in both biological parents (3) daily cigarette smoking for at least the past 2 years; (4) typically smokes ≥ 10 cigarettes per day; and (5) and fluent in English. The exclusion criteria were: (1) current DSM-IV non-nicotine substance dependence; (2) breath carbon monoxide (CO) levels < 10 ppm at intake; (3) desire to substantially cut down or quit smoking in the next 30 days; (4) current use of anti-depressant, psychostimulant, or anti-psychotic medications; (5) use of anxiolytic medications more than once per week; (6) report being pregnant or breastfeeding; and (7) daily use of other non-cigarette tobacco products or nicotine replacement therapy. Participants were compensated \$200, and the University of Southern California Internal Review Board reviewed and approved all study procedures.

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