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Financial strain indirectly influences smoking cessation through withdrawal symptom severity

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ABSTRACT

Background: Financial strain has an adverse impact on smoking cessation. However, the mechanisms through which financial strain influences cessation remain unclear. The purpose of the current study was to determine whether financial strain indirectly influenced smoking cessation through withdrawal symptom severity.

Methods: Participants (N = 139) were primarily Black (63.3%) and female (57.6%) adults enrolled in a smoking cessation program at a safety-net hospital. A self-report financial strain questionnaire was completed one week prior to the scheduled quit date, and the Wisconsin Smoking Withdrawal Scale (WSWS) was completed on the day after the scheduled quit date. Biochemically-verified 7-day point prevalence abstinence was assessed four weeks after the scheduled quit date. Adjusted mediation analyses were conducted using the PROCESS macro for SPSS to evaluate the indirect effects of financial strain on smoking cessation via post-quit withdrawal symptom severity.

Results: Analyses indicated a significant indirect effect of financial strain on smoking cessation through total withdrawal symptom severity, B = 0.027; 95% CI (0.003, 0.066); and specifically anger, B = 0.035; 95% CI (0.008, 0.074), anxiety, B = 0.021; 95% CI (0.001, 0.051), and sleep symptoms, B = 0.015; 95% CI (0.005, 0.043). Greater pre-quit financial strain was associated with greater post-quit withdrawal symptom severity, which increased the likelihood of non-abstinence 4 weeks after the scheduled quit attempt. The direct effect of financial strain on smoking cessation was not significant in any of the mediation models.

Conclusions: Findings: suggest that withdrawal severity is an underlying mechanism through which financial strain influences smoking cessation.

1. Introduction

Smoking rates have declined to 13.9% among adults living at or above the poverty threshold in the U.S., though 26.1% of those living below the poverty threshold continue to smoke (Jamal et al., 2016). Notably, individuals of Black and/or Hispanic race/ethnicity are far more likely to be living below the poverty threshold than Non-Hispanic Whites, and women are more likely to experience poverty than men (Proctor et al., 2016). Numerous studies have shown that lower socioeconomic status (SES) is associated with a reduced likelihood of smoking cessation (e.g., Businelle et al., 2010; Fagan et al., 2007; Fernández et al., 2006; Kendzor et al., 2012; Kotz and West, 2009; Wetter et al., 2005), despite a similar number of cessation attempts between individuals of lower and higher SES (Kotz and West, 2009). Lower income is associated with greater financial strain (Dijkstra-Kersten et al., 2015) which occurs when people experience difficulty affording the basic necessities of life as well as other optional items or activities that make life more comfortable or enjoyable (Pearlin et al., 1981). Studies have demonstrated associations between financial strain and several aspects of tobacco use including smoking initiation, current smoking, smoking level, and tobacco dependence (Advani et al., 2014; Hernandez et al., 2017; McKenna et al., 2016; Siahpush et al., 2003; Widome et al., 2015). The expense of smoking may contribute to financial strain because it reduces the monetary resources available to expend on necessities (Busch et al., 2004; Guillaumier et al., 2015; Wang et al., 2006; Yao et al., 2015). Additionally, tobacco use has been shown to increase during times of financial stress (Shaw et al., 2011).

Notably, greater financial strain is associated with a reduced

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likelihood of smoking cessation (Kendzor et al., 2010; Reitzel et al., 2015; Siahpush and Carlin, 2006; Siahpush et al., 2009), and a greater likelihood of relapse after cessation (Grafova, 2011; McKenna et al., 2016; Siahpush and Carlin, 2006). Among those who are able to quit, smoking cessation is associated with a decrease in financial strain (Siahpush et al., 2007a,b). Importantly, the strong links between financial strain and smoking cessation have prompted the development of an intervention strategy that includes financial education as a key component of tobacco cessation treatment (Courtney et al., 2014).

Withdrawal symptoms are a plausible pathway through which financial strain may exert its influence on smoking cessation. Numerous studies have linked financial strain with negative affect (Dijkstra-Kersten et al., 2015; Gilman et al., 2013; Okechukwu et al., 2011; Pearlin et al., 1981; Richardson et al., 2017; Robles et al., 2017; Sweet et al., 2013; Szanton et al., 2010) and sleep problems (Hall et al., 2008; Hall et al., 2009; Walsemann et al., 2016), which are also components of the nicotine withdrawal syndrome (Hughes, 2007). In turn, withdrawal symptoms (Welsch et al., 1999), including negative affect (Cofta-Woerpel et al., 2011; Minami et al., 2014; Shiffman, 2005; Shiffman et al., 2007) and sleep disturbance (Peltier et al., 2017; Persico, 1992), have been linked with a reduced likelihood of smoking cessation. Conceivably, greater financial strain may increase the severity of perceived post-quit withdrawal symptoms, particularly negative affect and sleep disturbance, thereby making it more difficult to maintain abstinence after a quit attempt.

The purpose of the current study was to evaluate perceptions of withdrawal symptom severity as a potential mediator of the relationship between financial strain and smoking cessation. Additional analyses were conducted to determine whether financial strain indirectly influenced cessation through its impact on several specific dimensions of the withdrawal syndrome. It was hypothesized that anxiety, anger, sadness, and sleep disturbance in particular, would be adversely influenced by financial strain and have a negative impact on cessation. Findings will provide insight into the mechanisms through which greater financial strain reduces the likelihood of smoking cessation, and will contribute to our understanding of tobacco-related health disparities in socioeconomically disadvantaged populations.

2. Method

2.1. Participants

Adults from the Tobacco Cessation Clinic at the Dallas County safety-net hospital were recruited to participate in a smoking cessation intervention study (see Kendzor et al., 2015). Eligible participants were randomly assigned via random number generator to either usual care (UC), which included pharmacotherapy and counseling sessions, or UC plus small financial incentives for smoking abstinence. Treatment group assignments were not concealed from participants. Informed consent was obtained from all individuals prior to screening for eligibility. Individuals were eligible to participate in the study if they: 1) demonstrated > 6th grade English literacy level, 2) were willing to quit smoking 7 days from their first visit, 3) were ≥18 years of age, 4) had an expired carbon monoxide (CO) level ≥8 ppm, 5) were smoking ≥5 cigarettes per day, and 6) were able to attend study visits.

2.2. Procedure

This research was approved by the Institutional Review Boards of the University of Texas Southwestern Medical Center and the University of Texas Houston Health Science Center. A total of 146 individuals participated in the parent study. Of those, seven participants were excluded from the analyses because they did not complete the WSWS on the quit date, leaving an analytic sample of 139 adults. Participants reported sociodemographic information and completed a measure of financial strain one week prior to the quit date. Withdrawal symptoms were assessed on the first day after the scheduled quit attempt (i.e., participants were instructed to quit by 10 p.m. the evening prior). Smoking abstinence was assessed on the first day after the quit attempt, and again four weeks after the scheduled quit date. Complete smoking status data (i.e., self-reported smoking with or without biochemical verification or self-reported abstinence with biochemical verification) were available for 100% of participants (N = 139) on the quit date and 87.8% (n = 122) of participants four weeks after the scheduled quit date. Participants with incomplete or missing smoking status data were considered to be smoking in the analyses.

2.3. Measures

2.3.1. Sociodemographic information

Demographic and socioeconomic characteristics were measured at the baseline visit (1 week pre-quit), including race/ethnicity, gender, age, income, and educational attainment.

2.3.2. Financial strain

The 9-item Economic Strain questionnaire (Pearlin et al., 1981) assessed difficulty affording basic necessities such as housing, food, medical care, and clothing. Eight of the items were rated on a 0–3 scale to indicate the degree of difficulty affording each type of goods or service. A single item inquired about financial status as the end of the month, and was rated on a 0–2 scale indicating “some money left over,” “just enough to make ends meet,” or “not enough to make ends meet” respectively. Total scores ranged from 0 to 26, with higher scores indicating greater financial strain.

2.3.3. Withdrawal symptoms

The Wisconsin Smoking Withdrawal Scale (WSWS; Welsch et al., 1999) is a 28-item self-report questionnaire that measures seven dimensions of smoking withdrawal. The questionnaire assessed symptoms during the past 24 h. Items are rated on a scale from 0 to 4, with higher scores indicating greater withdrawal severity. The WSWS subscales were computed by summing the items that comprise each subscale including Anger, Anxiety, Concentration, Craving, Hunger, Sadness, and Sleep. The total score was computed by summing all study items.

2.3.4. Smoking status

Carbon monoxide (CO) levels ≥8–10 ppm suggest recent cigarette smoking with a sensitivity and specificity of approximately 90% (Benowitz et al., 2002). Thus, abstinence on the first day after quitting was defined as a self-report of smoking abstinence since 10 p.m. the prior evening, in combination with an expired CO level of ≤10 ppm. This higher threshold was utilized due to the recency of quitting (≈12 h prior). Point prevalence abstinence four weeks after the scheduled quit date (primary outcome) was defined as a self-report of abstinence from smoking over the past seven days in combination with an expired carbon monoxide (CO) level of < 8 parts per million (ppm). Participants with incomplete or missing smoking status data were considered to be smoking. Participants who met abstinence criteria were coded as abstinent (abstinent = 0) and participants who did not meet these criteria were coded as smoking (smoking = 1).

2.4. Statistical analyses

Unadjusted and adjusted logistic regression analyses were conducted to evaluate the simple associations between financial strain and smoking cessation 4 weeks after a scheduled quit attempt. The adjusted models included treatment group assignment in the parent study (UC vs. UC + financial incentives), as well as key sociodemographic variables including gender (male vs. female), age (years), race/ethnicity (Non-Hispanic White vs. Non-White and/or Hispanic), and education (years). Average pre-quit cigarettes smoked per day was included as a proxy for nicotine dependence. Smoking status (abstinent vs. smoking)

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