



## Short Communication

## Differences in quit attempts between non-Hispanic Black and White daily smokers: The role of smoking motives

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## HIGHLIGHTS

- Non-Hispanic Black smokers fail to quit more often than non-Hispanic White smokers.
- The role of smoking motives in this racial difference in quit attempts was examined.
- Smoking motives mediated the relationship between race and failed quit attempts.
- Black smokers endorsed lower motives and more quit attempts than White smokers.
- Black smokers are vulnerable to failed quit attempts despite lower smoking motives.

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## ABSTRACT

**Introduction:** The prevalence of smoking across racial/ethnic groups has declined over the years, yet racial health disparities for smoking persist. Studies indicate that non-Hispanic Black smokers attempt to quit smoking more often compared to non-Hispanic White smokers but are less successful at doing so. Research suggests that motives to quit smoking differ by race, however, less is known about the role of motives to smoke in explaining racial differences in attempts to quit smoking.

**Methods:** This study examined whether smoking motives accounted for the differential rates in quit attempts between non-Hispanic Black ( $n = 155$ ) and non-Hispanic White ( $n = 159$ ) smokers. Data were culled from a larger study of heavy-drinking smokers. The Wisconsin Index of Smoking Dependence Motives (WISDM) assessed motives to smoke.

**Results:** As expected, Black and White smokers reported similar smoking patterns, yet Black smokers reported higher rates of failed attempts to quit smoking than White smokers. Findings indicated that Black, compared to White, smokers endorsed lower scores in the negative reinforcement, positive reinforcement, and taste WISDM subscales and scores in these subscales mediated the relationship between race and quit attempts.

**Conclusions:** In this study, Blacks, compared to Whites, endorsed lower motives to smoke, which are generally associated with successful quit attempts, yet they experienced more failed attempts to quit smoking. This study demonstrates racial health disparities at the level of smoking motives and suggests that Black smokers remain vulnerable to failed quit attempts despite reporting lower motives to smoke.

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## 1. Introduction

Cigarette smoking is the leading cause of preventable death in the United States (U.S.), accounting for approximately 480,000 deaths per year (U.S. Department of Health & Human Services, 2014). Population studies indicate that 26.7% of adults in the U.S. smoke cigarettes, with

nearly equal smoking rates between non-Hispanic Black (28.7%) and non-Hispanic White (28.9%) smoking adults (SAMHSA, 2012). Yet, Black smokers experience more tobacco-related health problems than their White counterparts. For example, Black smokers are more likely to develop and die from lung cancer than White smokers, despite the fact that Black smokers begin smoking later in their lifetime (American Cancer Society, 2011; Fagan, Moolchan, Lawrence, Fernander, & Paris, 2007; SAMHSA, 2012). Similarly, Black, compared to White, smokers are less successful at quitting even though Black smokers attempt to quit at higher rates than their White counterparts (Fagan et al., 2007; Kahende, Malarcher, Teplinskaya, & Asman, 2011).

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In efforts to understand racial health disparities related to tobacco use, studies have focused on examining differences in barriers as well as motives to successfully quit smoking between Black and White smokers. For instance, a study on barriers/obstacles to quit smoking found that White smokers identified enjoyment of smoking and stress relief equally as their main barriers, whereas Black smokers reported that stress relief was the most important barrier while endorsing enjoyment of smoking as a much less important obstacle (Theobald, Smith, & Fiore, 2005). Similarly, an examination of ethnic differences in reasons/motives for wanting to quit smoking among adolescents (Luther, Bagot, Franken, & Moolchan, 2006) found that White smokers endorsed current health concerns (e.g., “coughing up phlegm, throat irritation”) as their motivation to quit whereas Black smokers endorsed general health concerns (e.g., “it’s bad for me”) as their main motive for wanting to quit. Although there is some evidence that differences in barriers/obstacles to and motives/reasons for quitting smoking may help explain racial differences in tobacco use between White and Black smokers, less is known about whether racial differences in motives or reasons for smoking may also help explicate the differential rates of failed quit attempts between Black and White smokers.

To that end, the aims of this brief report were to (1) examine whether non-Hispanic Black daily smokers reported more failed quit attempts than their non-Hispanic White counterparts and (2) test whether smoking motives mediate this difference. It was hypothesized that Black daily smokers would report more failed quit attempts than White smokers. Due to the limited data on racial differences in smoking motives, the proposed mediation analyses were exploratory.

## 2. Method

### 2.1. Participants and procedures

Participants were drawn from a community sample of non-treatment seeking daily smokers who drank heavily and responded to an ad for a medication study. The ad specified that it was not a treatment protocol for smoking or drinking problems. The medications utilized in the study were varenicline and naltrexone. While these medications can help in smoking cessation, they were only used 9–12 days, which is not enough to produce much clinical benefit (for further details see Ray et al., 2014). Interested participants were screened for eligibility through a phone interview. Eligible participants were non-treatment seeking daily smokers (smoked  $\geq 10$  cigarettes per day) who were also heavy drinkers, consistent with the National Institute on Alcohol Abuse and Alcoholism guidelines of  $\geq 14$  drinks/week for men and  $\geq 7$  for women. Individuals were excluded from participation in the study if they endorsed a serious medical condition in the past 6 months (e.g. hepatic or renal disease), regular drug use other than cannabis, current depression or suicidal ideation assessed with the Beck Depression Inventory (BDI-II), or other psychiatric problems such as bipolar disorder and schizophrenia.

Data for the present study were culled from the in-person intake assessment before eligible participants ( $N = 427$ ) were randomized to medication. A total of 74% participants identified as non-Hispanic Black and non-Hispanic White and were selected for analyses. Of this sample, approximately 49% of participants identified as non-Hispanic Black ( $n = 155$ ) and 51% identified as non-Hispanic White ( $n = 159$ ). Participants were, on average, 36.29 ( $SD = 10.7$ ) years old and 31% were female. Participants reported smoking approximately 14 ( $SD = 8.15$ ) cigarettes daily.

### 2.2. Measures

Participants reported the number of times they made an attempt to quit smoking lasting longer than 24 h in the past year. The distribution of this variable was positively skewed therefore responses were grouped into three categories: 0–3, 4–5, and 6 or more quit attempts.

Smoking motives were assessed with the Wisconsin Inventory of Smoking Dependence Motives (WISDM; Piper et al., 2004). The WISDM asks participants to rate 68 statements on a 7-point Likert scale ranging from “not true of me at all” to “extremely true of me” and yields 13 subscales of smoking motives (Table 1) including negative reinforcement, positive reinforcement, and taste/sensory processes. The negative reinforcement subscale assesses the desire to smoke to relieve negative internal states such as dysphoria and stress with statements such as “Smoking a cigarette improves my mood.” The positive reinforcement subscale measures the desire to smoke to experience a “buzz” or “high” with statements including “Smoking makes me feel good.” The taste/sensory subscale assesses the orosensory and/or gustatory effects of smoking with statements such as “The flavor of a cigarette is pleasing.”

### 2.3. Analytic strategy

A series of ordinary least squares and logistic regressions were conducted using PROC LOGIT in SAS Statistical Software V9.1. First, racial differences in smoking patterns were tested (a path). Second, racial differences in each WISDM subscale were tested to identify potential mediators (b path). Next, the WISDM subscales that were identified as potential mediators were examined in separate mediation models following the Preacher and Hayes (2008) recommendations for bootstrapping indirect effects. That is, the indirect effect ( $c'$ ) was calculated as the product of the coefficient representing the relationship between the predictor and the proposed mediator (a path) and the coefficient representing the relationship between the mediator and the outcome (b path). Bootstrapping yields a percentile-base confidence

**Table 1**

Results of mediation analyses steps testing whether smoking motives as measured by WISDM subscales explain the higher rates of failed quit attempts reported by Black compared to non-White regular smokers.

Path	Variable	Beta	SE
c Path: Differences in quit attempts by race			
	Race (Black vs. White)	.49*	.21
a Paths: Relationship between race and each WISDM subscale tested in separate models			
	Affiliative attachment	-.15	.20
	Automaticity	-.14	.17
	Behavioral choice/melioration/alternative reinforcement	-.37*	.18
	Cognitive enhancement	-.62*	.19
	Craving	-.37*	.17
	Cue exposure/associative processes	-.64*	.15
	Loss of control	-.49*	.18
	Negative reinforcement	-.55**	.16
	Positive reinforcement	-.58**	.17
	Social and environmental goals	.02	.20
	Taste and sensory properties	-.49**	.17
	Tolerance	-.09	.17
	Weight control	-.23	.19
b Paths: Relationship between WISDM subscales and quit attempts tested in separate models			
	Behavioral choice/melioration/alternative reinforcement	-.09*	.03
	Cognitive enhancement	-.04	.03
	Craving	-.09*	.03
	Cue exposure/associative processes	-.07	.04
	Loss of control	-.02	.03
	Negative reinforcement	-.09**	.03
	Positive reinforcement	-.09**	.03
	Taste and sensory properties	-.12**	.03
c' Paths: Indirect effect of race on quit attempt through each significant WISDM subscale			
	Behavioral choice/melioration/alternative reinforcement	.04	.02
	Craving	.03	.02
	Negative reinforcement	.05*	.02
	Positive reinforcement	.05*	.02
	Taste and sensory properties	.06*	.02

\*  $p < .05$ .

\*\*  $p < .01$ .

interval where the null hypothesis of no indirect effect is tested by determining whether the confidence interval includes zero (Preacher & Hayes, 2008). Bootstrapping the indirect effects is superior to other procedures as this approach does not assume that the distribution of indirect effects is normal (Preacher & Hayes, 2008).

### 3. Results

Non-Hispanic Black and White smokers did not differ in the number of drinks, total number of drinks, number of cigarettes smoked, average number of cigarettes per smoking day, and total number of cigarettes in the past month ( $ps > .05$ ). Consistent with the hypothesis, Black daily smokers reported more failed quit attempts than their White counterparts ( $\beta = .48, SE = 0.21, \chi^2 = 5.2, p < 0.05$ ).

Table 1 illustrates the results of each step in the mediation analyses. Motivation to smoke due to the negative reinforcement ( $\beta = -.55, SE = 0.16, t = -3.34, p < 0.001$ ), positive reinforcement ( $\beta = -.58, SE = 0.17, t = -3.4, p < 0.001$ ), taste/sensory processes ( $\beta = -.49, SE = 0.17, t = -2.9, p < 0.01$ ), behavioral choice/melioration ( $\beta = -.37, SE = 0.18, t = -2.1, p < 0.05$ ), cognitive enhancement ( $\beta = -.62, SE = 0.19, t = -3.21, p < 0.01$ ), craving ( $\beta = -.37, SE = 0.17, t = -2.1, p < 0.05$ ), cue exposure ( $\beta = -.64, SE = 0.15, t = -4.4, p < 0.001$ ), and loss of control ( $\beta = -.49, SE = 0.18, t = -2.78, p < 0.05$ ) were endorsed lower among Black, compared to White, smokers. These 8 subscales were further tested as potential mediators of the differences in failed quit attempts between smokers by race. Black and White daily smokers did not differ significantly on the affiliative attachment, automaticity, social and environmental goals, tolerance, and weight control WISDM subscales ( $ps > .10$ ) and were not tested further as potential mediators.

In turn, being less motivated to smoke due to the negative smoking reinforcement ( $\beta = -.09, SE = 0.03, t = -2.77, p < 0.01$ ), positive reinforcement ( $\beta = -.09, SE = 0.03, t = -3.3, p < 0.01$ ), taste/sensory smoking processes ( $\beta = -.12, SE = 0.03, t = 3.73, p < 0.001$ ), behavioral choice ( $\beta = -.09, SE = 0.03, t = -2.77, p < 0.01$ ), and craving ( $\beta = -.09, SE = 0.03, t = -2.84, p < 0.01$ ) were respectively associated with failed quit attempts. The cognitive enhancement, cue exposure, and loss of control WISDM subscales were not associated with failed quit attempts and, consequently, were not mediators of the differences in failed quit attempts between Black and White daily smokers.

Formal tests of mediation indicated that race had a significant indirect effect on failed quit attempts through the negative reinforcement (Indirect Effect = .05,  $SE = 0.02$ ; 95% CI [0.02, 0.11]), positive reinforcement (Indirect Effect = .05,  $SE = 0.02$ ; 95% CI [0.17, 0.12]), and taste/sensory processes (Indirect Effect = .06,  $SE = 0.3$ ; 95% CI [0.02, 0.12]) motives. Mediation tests indicated that behavioral choice and craving were not significant mediators of the relationship between race and failed quit attempts. These results suggest that a subset of smoking motives mediate the relationship between race and failed quit attempts among Black and White smokers.

### 4. Discussion

The aims of this brief report were to examine whether daily non-Hispanic Black smokers reported a higher number of failed quit attempts compared to their non-Hispanic White counterparts and to explore the role of smoking motives in explaining this difference. Consistent with previous findings (Kahende et al., 2011), no differences were found in smoking behaviors between Black and White daily smokers. However, non-Hispanic Black daily smokers made more failed quit attempts in the past year than non-Hispanic White smokers. A subset of smoking motives helped explain this difference. Specifically, Black, compared to White, daily smokers were less motivated to smoke to experience the positive reinforcement, negative reinforcement, and taste/sensory processes related to smoking, which in turn were associated with failed attempts to quit smoking.

These results are consistent with a racial health disparities model where similar levels of cigarette smoking are associated with worse health consequences in Black smokers (American Cancer Society, 2011; Fagan et al., 2007; SAMHSA, 2012). The present study found that the overall assertion that lower endorsement of smoking motives generally indicates a lower severity of nicotine dependence (Piper et al., 2004) and in turn a greater capability to quit smoking successfully, may not true for Black daily smokers. That is, Black daily smokers, compared to their White counterparts, endorsed being less motivated to smoke to experience the positive reinforcement, negative reinforcement, and taste/sensory processes related to smoking. However, endorsing lower motivation to smoke did not appear to be sufficient to help Black daily smokers successfully quit smoking. These results may inform clinical interventions. By identifying tractable mediators of racial health disparities between Black and White smokers on quit attempts, treatment programs can be tailored to address these mechanisms. In this case, results suggest that smoking cessation interventions may help reduce tobacco-related health disparities by recognizing that lower endorsement of some smoking motives are less consistently linked to quit attempts in Black, compared to White, smokers.

Results from this study should be interpreted within its strengths and limitations. Results may not be generalizable to a broader population of cigarette smokers as the present sample is comprised of heavy drinking smokers only, a sizeable, yet somewhat distinct subset of smokers (Littleton, Barron, Prendergast, & Nixon, 2007). The study was limited to non-treatment seeking participants and the measure of quit attempts was retrospective. Nevertheless, this study included a large sample of non-treatment-seeking daily smokers from the community most of whom were nicotine dependent.

On balance, the current study provides much needed data on racial differences in motivations to smoke as well as its relationship to failed quit attempts and offers a step toward understanding the mechanisms underlying differential health outcomes between Black and White smokers. Specifically, Black daily smokers endorsed lower motives to smoke, which are associated with successful quit attempts in the general population, yet they experienced more failed attempts to quit smoking. This suggests that Black daily smokers remain vulnerable to failed quit attempts despite endorsing lower motivation to smoke. While these findings help understand the higher rates of failed attempts among Black smokers, they do not fully explain why the continued efforts of Black smokers to quit smoking failed more frequently than their White counterparts. As such, continued investigation of mechanisms underlying racial health disparities in nicotine dependence outcomes is warranted, particularly, studies that can more fully integrate biological and psychosocial explanatory variables.

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#### Contributors

Guadalupe A. Bacio conducted data analysis and wrote the first draft of the manuscript. Iris Y. Guzman conducted literature searches, summarized previous studies, and helped to conduct data analysis. Jenessa Shapiro supervised interpretation and integration of results with existing literature. Lara A. Ray designed the study, directed data collection, and supervised data analysis. All authors contributed to and have approved the final manuscript.

#### Conflict of interest

LAR is a paid consultant for GSK. None of the authors have any other conflicts of interest to disclose.

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