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Comparisons of three nicotine dependence scales in a multiethnic sample of young adult menthol and non-menthol smokers

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ABSTRACT

Background: Few studies have compared nicotine dependence among menthol and non-menthol cigarette smokers in a multiethnic sample of young adult daily cigarette smokers. This study examines differences in nicotine dependence among menthol and non-menthol daily smokers and the associations of nicotine dependence with quitting behaviors among Native Hawaiian, Filipino, and White cigarette smokers aged 18–35.

Methods: Craigslist.org, newspaper advertisements, and peer-to-peer referrals were used to recruit daily smokers ($n = 186$) into a lab-based study. Nicotine dependence was assessed using the Fagerstrom Test of Nicotine Dependence (FTND), the Nicotine Dependence Syndrome Scale (NDSS), and the brief Wisconsin Inventory for Smoking Dependence Motives (WISDM). Multiple regression analyses were used to examine differences in nicotine dependence between menthol and non-menthol smokers and the relationship between each nicotine dependence scale with self-efficacy to quit, quit attempt in the past 12 months, and number of attempts.

Results: Menthol smokers were more likely to report difficulty refraining from smoking in places where forbidden ($p = .04$) and had higher scores on social/environmental goads subscale of the WISDM ($p = .0005$). Two-way interaction models of the FTND and menthol status showed that menthol smokers with higher levels of dependence were more likely to have tried to quit smoking in the past 12 months ($p = .02$), but were less likely to have had multiple quit attempts ($p = .01$).

Conclusions: Components of the FTND and WISDM distinguish levels of dependence between menthol and non-menthol smokers. Higher FTND scores were associated with having a quit attempt, but fewer quit attempts among menthol smokers.

1. Introduction

Significant progress has been made to reduce cigarette smoking in the U.S. (U.S. Department of Health and Human Services, 2014), but menthol cigarette smoking is a growing problem among young adult smokers (Substance Abuse and Mental Health Services (SAMHSA), 2009). Menthol cigarettes are the most commonly used flavored tobacco product among 18–34 year olds in the U.S. (Villanti et al., 2013), and from 2004 to 2008 menthol smoking increased from 34.1% to 40.8% among adults aged 18–25 (SAMHSA,

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2009). Although data are not reported at the national level for all young adult racial/ethnic groups, prevalence rates range from 24% among White to 94% among African American young adult smokers (Giovino et al., 2015). National data also show that 53% of Native Hawaiian and Pacific Islander smokers aged 12 and over smoke menthol cigarettes (SAMHSA, 2009). In Hawaii, 78% of Native Hawaiians/Pacific Islanders and 42% of White adult smokers consume menthol cigarettes (Smoking and Tobacco in Hawaii, 2010). Menthol cigarette use is high among Filipinos as well (Euromonitor, 2008). By 2050, conservative estimates suggest that over 300,000 deaths can be averted if it were not for menthol cigarette smoking (Levy et al., 2011).

In 2012, countries like Brazil banned menthol along with other characterizing and non-characterizing flavors (ANVISA, 2012), but in the U.S., menthol is the only characterizing flavor that was not banned by the 2009 Family Smoking Prevention and Tobacco Control Act. Menthol as a characterizing flavor has cooling, soothing, anesthetic, and analgesic effects that mask the bitter taste, smell, and pain sensation of nicotine (Brown and Williamson, n.d.; Bessac et al., 2008; Hummel et al., 1992). Several synthesis studies have concluded that menthol smoking is associated with increased dependence (Tobacco Products Scientific Advisory Committee, 2011; Food and Drug Administration, 2013). However, studies have not specifically focused on young adults or Native Hawaiians who have high rates of menthol cigarette smoking like African Americans (Giovino et al., 2015; Smoking and Tobacco in Hawaii, 2010).

Studies among youth have used the items: time to first cigarette of the day, number of cigarettes smoked per day, depth of inhalation, and the Fagerstrom Test for Nicotine Dependence (FTND) to measure nicotine dependence among menthol and non-menthol smokers, and the evidence suggests that youth menthol smokers show greater signs of nicotine dependence (Hersey et al., 2006; Collins and Moolchan, 2006; Wackowski and Delnevo, 2007; Tobacco Products Scientific Advisory Committee, 2011; Food and Drug Administration, 2013). Evidence varies in whether adult menthol smokers show greater signs of nicotine dependence than non-menthol smokers (Tobacco Products Scientific Advisory Committee, 2011; Hoffman and Simmons, 2011). Mixed findings may reflect variations in the measures used across studies. Studies among adults have primarily used the items: time to first cigarette of the day, number of cigarettes smoked per day, and the FTND total scale to examine differences in dependence among menthol and non-menthol smokers. Some studies that used time to first cigarette of the day as a measure have found higher levels of nicotine dependence among adult menthol compared to non-menthol smokers (Ahijevych and Parsley, 1999; Perez-Stable et al., 1998; Fagan et al., 2010; Muscat et al., 2010; Gandhi et al., 2009; Bover et al., 2008) and others have not (Ahijevych and Garrett, 2004; Hyland et al., 2002; Frost-Pineda et al., 2014). Several studies have not found higher rates of dependence among menthol smokers using the FTND total scale (Muscat et al., 2009; Okuyemi et al., 2004), but found higher rates of dependence on FTND items (Muscat et al., 2009). Other measures show higher rates of dependence among adult menthol smokers compared to non-menthol smokers (Gandhi et al., 2009; Bover et al., 2008).

Nicotine dependence reflects multidimensional factors (Kleinjan et al., 2007), and none of the prior studies compared findings across measures that may capture different components of dependence. While there is no consensus on optimal measures of nicotine dependence, the FTND (Fagerstrom, 1978), the Nicotine Dependence Syndrome Scale (NDSS; Shiffman et al., 2004), and the Wisconsin Inventory of Smoking Dependence Motives (WISDM; Piper et al., 2004) have all been used to assess dependence among young adults. Using and comparing multiple measures of nicotine dependence may help to resolve prior contradictory findings and shed light on the different dimensions that each scale captures.

The Food and Drug Administration (FDA) has specifically called for more research on vulnerable populations (age, gender, race, ethnicity, and geographic location; NIH Office of Disease Prevention, n.d.). The purpose of this study is to compare findings of nicotine dependence among menthol and non-menthol smokers using the FTND, NDSS, and the brief WISDM. We compared behavioral measures of nicotine dependence among daily menthol and non-menthol smokers aged 18–35 years who are Native Hawaiian, Filipino, and White and examined the association of nicotine dependence with quitting behaviors. We hypothesized that nicotine dependence would be higher among daily menthol smokers as compared to non-menthol smokers. We focused on comparisons among groups with the highest lung cancer rates in Hawaii (Hawaii Cancer Facts and Figures, 2010). To date, no studies have compared nicotine dependence and quitting behaviors between Whites and these understudied ethnic groups. Findings from this study can provide additional data to inform FDA policy decisions related to flavored tobacco products.

2. Methods

2.1. Sample

Our study aimed to recruit 200 adult daily smokers aged 18–35 using www.craigslist.com, newspaper advertisements, and peer-to-peer referrals. Advertisements asked participants to contact study staff by email or telephone to determine eligibility. Interested persons were screened by telephone by trained research staff from May 2013 to December 2013. Participants were eligible if they were: (1) between the ages of 18 and 35; (2) self-identified as Native Hawaiian, Filipino, or White; (3) could read and speak English well; (4) had a working phone, email, and home address; (5) were willing to provide consent; (6) stated that they smoked menthol or non-menthol; and (7) smoked daily and at least 5 cigarettes per day. Persons were ineligible if they used tobacco products other than cigarettes, nicotine delivery devices, or pharmacotherapy; indicated that they smoked no usual brand type; or were pregnant. Ninety eight percent ($n = 336$) of eligible participants agreed to voluntarily participate in the study and were invited to come to the University of Hawaii Cancer Center to complete a survey in the translational research laboratory. Among the eligible participants, 59.5% completed the study, a consent rate higher than (Ramo et al., 2014; Ramo and Prochaska, 2012) and comparable to other studies that recruited young adult smokers (Ramo et al., 2010).

The research was reviewed and approved by the Western Internal Review Board and received a Certificate of Confidentiality from the National Institutes of Health.

2.2. Procedures

Study enrollees completed the consent form during the one-hour visit and prior to survey administration. Participants were asked to bring in the pack of cigarette that they usually smoke for brand verification. Trained research staff provided instructions to participants to complete the online survey. Upon completion of the study, participants were provided a $40 gift card and a one-page fact sheet on quitting smoking. The Western Institutional Review Board approved this study and a Certificate of Confidentiality was obtained through the National Institutes of Health.

2.3. Measures

2.3.1. Sociodemographic measures. Measures included gender, age, race/ethnicity, Hispanic origin, sexual orientation, country of origin, educational attainment/status, marital status, employment status, financial dependence on parents/guardians, overall personal financial situation, and household income. Measured height and weight were also collected from participants to calculate the body mass index (BMI (kg/m^2)). Age groups were categorized as 18–24 and 25–35. *Race/ethnic* categories included Native Hawaiians, Filipinos, and Whites. *Sexual orientation* items included heterosexual/straight, homosexual/gay/lesbian, bisexual, transgender, other, or not sure. *Educational attainment* was categorized as persons with no high school diploma, high school graduate, and college education or higher. *Marital status* included the categories now married, widowed, divorced, separated, never married and living with a partner. *Employment status* was categorized as full-time, part-time 15–34 h per week, part-time <15 h per week, or do not work for pay. *Financial dependence on parents/guardian* response categories included completely/almost completely dependent, partially dependent, and not dependent. *Personal financial situation* response categories included live comfortably, meet needs with a little left, just meet basic expenses, and do not meet basic needs. *Total household income* included the categories <$20,000, $20,000–$49,999, or ≥$50,000.