ORIGINAL INVESTIGATION

Reasons for Smoking Among Tri-Ethnic Daily and Nondaily Smokers

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ABSTRACT

Introduction: Nondaily smokers experience adverse effects from tobacco use, yet they have been understudied compared to daily smokers. Understanding how reasons for smoking (RS) differ by smoking level, gender, and race/ethnicity could inform tailored interventions.

Methods: A cross-sectional survey was administered through an online panel survey service to 2,376 current smokers who were at least 25 years of age. The sample was stratified to obtain equal numbers of 3 racial/ethnic groups (African American [AA], Latino, and White) across smoking level (native nondaily, converted nondaily, daily light, and daily moderate/heavy).

Results: A 7-factor structure of a 20-item Modified Reasons for Smoking Scale (MRSS) was confirmed (each subscale alpha > 0.80). Each factor of the MRSS varied by smoking level, with nondaily smokers endorsing all RS less frequently than daily smokers ($p < .0001$). The 4 smoker subgroups incrementally differed from one another ($p < .05$) with several exceptions between converted nondaily and daily light smokers. Males reported stronger RS on 5 out of 7 reasons ($p < .05$). Females had higher scores on tension reduction/relaxation ($p < .0001$). Latinos reported stronger RS than Whites and AAs on all reasons ($p < .05$) except for tension reduction/relaxation ($p > .05$). AAs and Whites were comparable on all RS ($p > .05$).

Conclusions: The present study highlights considerable variability across smoking level, gender, and race/ethnicity in strength of RS. Addressing subgroup differences in RS may contribute to more sensitive and effective prevention and treatment efforts.

INTRODUCTION

Tobacco research has traditionally focused on daily smokers, often excluding nondaily smokers from clinical trials (Kalman, Hoskinson, Sambamoorthi, & Garvey, 2010; King, Cao, Southard, & Matthews, 2011). Significant increases in nondaily smoking in the United States (Centers for Disease Control, 2012a) has brought this population to the forefront of research (Klein, Bernat, Lenk, & Forster, 2013). Nondaily smoking has been characterized as a stable pattern (Hassmiller, Warner, Mendez, Levy, & Romano, 2003) as well as a transitory behavior (Schane, Glantz, & Ling, 2009). Nondaily smokers experience increased risk of tobacco-related morbidity and mortality (Luoto, Uutela, & Puska, 2000; Pope et al., 2009; Schane, Ling, & Glantz, 2010; U.S. Department of Health and Human Services, 2010), yet they are less likely to identify as smokers (Berg et al., 2009; Pinsker et al., 2013), to view the behavior as risky (Murphy-Hoefer, Alder, & Higbee, 2004), or

to be asked or advised about quitting smoking by health care providers (Tong, Ong, Vittinghoff, & Perez-Stable, 2006). Therefore, there is a need to deepen our understanding of factors driving nondaily smoking and to determine how these motivations differ from daily smokers' to inform prevention and treatment approaches among this group.

Nondaily smoking has been defined as smoking on some days but not every day (Berg, Sutfin, Mendel, & Ahluwalia, 2012). Despite traditional models of nicotine dependence that would suggest maintenance of nicotine levels (Stolerman & Jarvis, 1995), studies have documented symptoms of physical dependence, such as cravings and withdrawal among nondaily smokers (DiFranza & Wellman, 2005; Schane et al., 2009). In addition, nondaily smokers are exposed to significant levels of cotinine and tobacco-specific carcinogens (Khariwala et al., 2013). Evidence suggests that nondaily smokers attempt to quit smoking more often than daily smokers (Tong et al., 2006) and that nondaily smokers experience difficulties while trying to

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quit smoking (Tindle & Shiffman, 2011). Nondaily smokers are more likely to be ethnic minority group members (Hassmiller et al., 2003; Tong et al., 2006; Wortley, Husten, Trosclair, Chrismon, & Pederson, 2003), making it important to aim for ethnically diverse samples in research on nondaily smoking.

Reasons for smoking (RS) are established determinants of smoking behavior (Chang, 2009; Harakeh & Vollebergh, 2012; Novak, Burgess, Clark, Zvolensky, & Brown, 2003; Piasecki, Piper, Baker, & Hunt-Carter, 2011). Affect-driven reasons were prominent in formative theories for explaining smoking behavior (Ikard, Green, & Horn, 1969; Tompkins, 1966) and have been empirically supported (Chang, 2009; Costa & McCrae, 1981). Recent models have been refined to differentiate between primary (i.e., clinical characteristics such as cravings which compel smoking) and secondary dependence motives (i.e., instrumental or situational characteristics influencing the choice to smoke) for smoking, which are also linked to smoking behavior (Piasecki et al., 2011). However, few studies have examined RS with a range of smoking levels or explored differences by demographic characteristics. Therefore, it is important to understand how RS vary by subgroups including smoking level (i.e., daily vs. nondaily), gender, and ethnicity. The primary goal of the study was to characterize RS by (a) smoking level (nondaily smokers who never smoked daily [native nondaily], nondaily who were formerly daily smokers [converted nondaily], daily light, and daily moderate/heavy), (b) gender, and (c) ethnicity (African American [AA], Latino, and White). We hypothesized that RS will be incrementally stronger by smoking level with greater endorsement of RS by moderate/heavy daily smokers. Analysis of RS by gender and ethnicity was exploratory.

A briefer measure than many existing measures of RS or smoking motives was used, as it can be incorporated into large studies to reduce participant burden and improve study feasibility. The Modified Reasons for Smoking Scale (MRSS; Berlin et al., 2003) been validated with several international samples (Berlin et al. 2003; Boudrez & De Bacquer, 2012; Souza, Crippa, Pasian, & Martinez, 2009), but has not yet been validated with a U.S. sample. Therefore, a secondary goal of the study was to evaluate the factor structure of the MRSS among a U.S. sample.

METHODS

Participants

Participants completed a cross-sectional survey administered through an online panel survey service, Survey Sampling International (SSI), between July 5, 2012 and August 15, 2012. SSI maintains access to an online panel of 1.5 million people in the United States, referred to as panelists, who have indicated that they are willing to participate in online surveys. Potential panelists are recruited through a variety of methods including websites, social media, and online communities. Participants eligible for this study self-identified as AA, White, or Latino (of any race), were at least 25 years old and were English speaking. These participants were current smokers (i.e., smoked at least one cigarette in the past 30 days), had smoked at least 100 cigarettes in their lifetime, smoked for at least 1 year, smoked at their current rate (i.e., daily or nondaily) for at least 6 months, and had not participated in any smoking cessation treatment in the past 30 days. Women who were currently pregnant or breast feeding were excluded from the study.

The sample was stratified to obtain equal samples of each of the three race/ethnicity groups across smoking level (nondaily and daily smoking). Nondaily smokers smoked at least one cigarette on 4–24 days in the past 30 days; persons who smoked on fewer than 4 days in the past 30 days were ineligible (Shiffman, Tindle et al., 2012). Daily smokers smoked 25–30 days in the past 30 days (Evans et al., 1992) and were further stratified into light daily smokers (≤ 10 cigarettes per day; [CPD]) and moderate to heavy daily smokers (> 10 CPD) (Businelle et al., 2009; Reitzel et al., 2009). Quotas for the number of participants by smoking level were 1,200 for nondaily smokers, 600 for light daily smokers, and 600 for moderate to heavy daily smokers. The final study sample consisted of 2,376 participants, which is described in detail in Pulvers et al. (2013).

Procedures

All procedures were approved by the University of Minnesota Institutional Review Board. SSI used preliminary questions (e.g., smoking frequency) and existing participant information (e.g., race/ethnicity, age) to direct smokers to this study. Potential participants directed to the study were presented with the informed consent page. Once they provided consent, they were asked screening questions to determine eligibility. Eligible participants were then presented with the survey questions. Participants who completed the survey received SSI's standard incentives, which included entry into a quarterly drawing and points that could be redeemed for cash.

Measures

Demographics

Demographic questions assessed participants' age, race/ethnicity, gender, highest level of education, and monthly household income (dichotomized to $< \$1,800$, and $\geq \$1,800$) to approximate the U.S. poverty guideline for the average household size of three persons (Cox et al., 2012; Department of Health and Human Services, 2013).

Cigarette Use

Participants reported the number of days they smoked in the past month and average number of cigarettes smoked per day on the days smoked in the past 7 days. Participants were asked to indicate the length of time they had been smoking cigarettes and whether they had ever smoked daily for at least 6 months. Nondaily smokers who indicated that they had smoked daily for at least 6 months were categorized as converted nondaily smokers and those who had never smoked daily for a 6-month period were categorized as native nondaily smokers (Shiffman, Tindle et al., 2012). Current daily smokers were also asked the length of time as a daily smoker and current nondaily smokers were asked the length of time as a nondaily smoker. Finally, participants were asked when they smoked their first cigarette of the day (TTFC) as a marker of nicotine dependence and this information was dichotomized as smoking ≤ 30 min after waking and smoking > 30 min (Baker et al., 2007; Heatherton, Kozlowski, Frecker, & Fagerstrom, 1991).

Reasons for Smoking

The MRSS (Berlin et al., 2003) was used to assess RS. The scale consists of 21 items rated on a five-point Likert scale with anchors of one (never) to five (always). Previous work

has shown seven factors: Addictive Smoking (need for cigarettes), Pleasure to Smoke (smoking for enjoyment), Tension Reduction/Relaxation (smoking to manage negative affect), Social Smoking (smoking to facilitate social interaction), Stimulation (smoking to re-energize), Habit/Automatism (smoking automatically with minimal awareness), and Handling (smoking for the satisfaction of cigarette handling).

Data Analysis

Participant characteristics were summarized using descriptive statistics. Exploratory factor analysis was chosen to examine the factor structure of the MRSS given differences in sample characteristics between the present study (nontreatment seeking daily and nondaily smokers) and previous studies (Berlin et al., 2003; Boudrez & De Bacquer, 2012) which may lead to different responses. Factor analysis was conducted using maximum likelihood estimation (MLE) on the 21 items of the MRSS with promax rotation. Factor loading with magnitudes greater than 0.35 were considered to be salient. Items were removed if their loadings were not salient on any factor. If a factor had one or no salient item loaded on it, it would be removed from the model and a model with fewer factors would be forced. Internal reliability of each factor with more than two items was assessed by performing Cronbach's alpha. The score of each reason of smoking was calculated by averaging the associated items determined by the factor analysis (possible range = 1–5). Obtained ranges were from 1 to 5 across reasons with the following exceptions in which the maximum score was lower among native nondaily smokers for the following RS: Stimulation (4.67 among AA, Latino, and female subgroups and 4.33 among men), Handling (4.67 among Latino and male subgroups and 4.33 among Whites), and Pleasure to Smoke (4.67 among Whites).

The hypothesis that scores on RS would vary by smoking level was tested using one-way analysis of variance (ANOVA) with smoking level (native nondaily, converted nondaily, light daily, and moderate/heavy daily) as the independent variable and each RS as the dependent variable, using Tukey's honest significant difference (HSD) for post-hoc comparisons. Exploratory analyses to evaluate gender and ethnic differences in RS followed a similar approach, using one-way ANOVA with gender and ethnicity as the independent variables in separate models, and each RS as the dependent variable, with Tukey's HSD for post-hoc comparisons. Interactions of smoking level with race and gender were evaluated for each of the factors by using general linear regression models. All statistical analyses were performed in SAS® 9.3 (SAS Institute Inc., Cary, NC).

RESULTS

Sample Characteristics

There was a roughly equal proportion of nondaily ($N = 1,201$) and daily smokers ($N = 1,175$) and similar proportion of ethnic groups (AA, Latino, White) within each smoking level (see [Supplementary Table 1](#)). Slightly more than half of the sample were female (58.2%) with an average age of 42.97 ($SD = 12.44$). Approximately a quarter had a high school education or less (26.6%) and 37.0% reported a household monthly income of less than \$1,800. On average, they smoked for 19.41

($SD = 13.17$) years, smoked 9.71 ($SD = 8.62$) CPD, and smoked 21.99 ($SD = 8.68$) days per month. Approximately half (56.8%) smoked within 30 min of waking. The majority (87.5%) reported ever (current or past) smoking daily for 6 months or more.

There were a number of significant differences in participant characteristics by smoking level. Compared to daily smokers, nondaily smokers tended to be younger, to have more education, higher income, fewer years of smoking, lower consumption of cigarettes, and less nicotine dependence (see [Supplementary Table 1](#)). Smoking characteristics (number of years smoked, number of CPD, number of days smoked per month, and time to first cigarette) increased incrementally by smoking level across all ethnic groups ($p < .0001$). There were also significant differences in participant characteristics by ethnicity and by ethnicity within smoking level. For example, Whites had the highest number of years smoked and number of CPD followed by AAs and then Latinos across all smoking levels ($p < .05$). However, nicotine dependence (TTFC) was highest among AAs followed by Latinos and Whites for all participants ($p < .05$) and there were different patterns by smoking level (see [Supplementary Table 1](#)).

Factor Structure

Exploratory factor analysis was performed using MLE with promax rotation. The preliminary eigenvalues of the 21 items, from the largest to the smallest, are 29.83, 5.22, 2.43, 1.28, 1.00, 0.64, 0.42, 0.20, 0.05, 0.01, -0.08 , -0.11 , -0.16 , -0.18 , -0.21 , -0.27 , -0.35 , -0.37 , -0.38 , -0.41 , and -0.45 . Ten factors were initially retained; the remaining 11 factors were not accepted due to their negative eigenvalues though a significance test of the sufficiency of the 10-factor model was rejected ($p < .0001$). Items were removed if their loadings were not salient on any factor (e.g., < 0.35). Based on our initial 10-factor model we found that one item ("I am very much aware of the fact when I am not smoking a cigarette") was not salient on any factor and three factors had only one or no salient item loaded on them, so they were removed and a model with seven factors without one item was forced. The final rotated factor pattern with standardized regression coefficients for the final 20 items appears in [Table 1](#). Correlations among the factors ranged from 0.32 to 0.65. Six out of the seven factors contained three items and all had a Cronbach's alpha over 0.80, indicating good internal consistency. One factor contained two items and had a between-item correlation of 0.77.

RS by Smoking Level, Gender, and Race/Ethnicity

Each factor of the MRSS varied by smoking level, with nondaily smokers endorsing all RS less frequently than daily smokers ($p < .0001$). As shown in [Table 2](#), the four smoker subgroups incrementally differed from one another ($p < .05$) with several exceptions: converted nondaily and daily light smokers were comparable on Habit/Automatism, Handling, Stimulation, and Social Smoking ($p > .05$).

There were gender differences on six out of the seven RS (see [Table 2](#)). Men reported stronger RS on five out of seven reasons ($p < .05$), whereas women had higher scores on one reason, Tension Reduction/Relaxation ($p < .0001$). There were no gender differences on Addictive Smoking ($p > .05$).

Ethnic differences across all RS were observed ($p < .0001$). As shown in [Table 2](#), Latinos reported stronger RS than Whites and AAs on all reasons ($p < .05$) except for Tension Reduction/

Table 1. Factor Analysis

Item	Survey question	Factor 1, tension reduction; relaxation	Factor 2, habit; automatism	Factor 3, pleasure to smoke	Factor 4, handling	Factor 5, stimulation	Factor 6, addictive smoking	Factor 7, social smoking
Cronbach's α or Pearson r								
11	When I feel uncomfortable or upset about something, I light up a cigarette	.91 0.91	.77 0.00	.83 0.05	.83 -0.01	.88 0.00	.86 -0.01	.85 -0.02
4	I light up a cigarette when I feel angry about something	0.84	-0.03	-0.02	0.01	-0.05	0.07	0.04
18	When I feel "blue" or want to take my mind off cares and worries, I smoke cigarettes	0.75	0.04	0.03	0.03	0.09	0.01	-0.02
13	I light up a cigarette without realizing I still have one burning in the ashtray	0.01	0.88	0.04	-0.02	0.02	0.04	-0.02
20	I have found a cigarette in my mouth and did not remember putting it there	-0.05	0.79	-0.05	0.10	0.01	0.04	0.00
3	Smoking cigarettes is pleasant and relaxing	0.07	-0.04	0.83	-0.05	0.02	-0.01	0.06
10	I find cigarettes pleasurable	0.02	-0.01	0.81	0.04	0.06	-0.01	-0.06
17	I want a cigarette most when I am comfortable and relaxed	0.01	0.20	0.49	0.18	-0.05	0.08	-0.02
9	Part of the enjoyment of smoking a cigarette comes from the steps I take to light up	0.01	0.07	0.03	0.75	0.03	0.05	-0.01
16	When I smoke a cigarette, part of the enjoyment is watching the smoke as I exhale	0.02	0.15	0.06	0.66	0.00	-0.10	0.05
2	Handling a cigarette is part of the enjoyment of smoking it	-0.01	-0.06	0.32	0.50	0.00	0.08	0.06
15	I smoke cigarettes to give me a "lift."	0.03	0.10	0.09	-0.01	0.83	-0.04	-0.01
8	I smoke cigarettes to stimulate me, to perk myself up	0.02	0.00	0.06	0.05	0.72	0.06	0.07
1	I smoke cigarettes to keep myself from slowing down	0.04	0.20	-0.11	0.32	0.37	0.08	-0.01
5	When I have run out of cigarettes, I find it almost unbearable until I can get one	0.17	0.03	-0.03	0.02	0.01	0.76	0.01
19	I get a real gnawing hunger for a cigarette when I have not smoked in a while	0.20	0.03	0.12	0.01	0.08	0.56	-0.03
6	I smoke cigarettes automatically without even being aware of it	0.11	0.34	0.06	-0.06	-0.03	0.45	0.08
7	It is easier to talk and get along with other people when smoking	-0.03	0.06	0.00	0.03	0.04	0.14	0.73
14	While smoking I feel more confident with other people	0.00	0.33	0.01	0.09	0.21	-0.06	0.44
21	I smoke much more when I am with other people	0.13	0.29	0.03	0.10	-0.04	-0.13	0.42

Note. Salient loadings are highlighted in bold.

Table 2. Reasons for Smoking by Smoking Level, Gender, and Race/Ethnicity

Reason for smoking, <i>M</i> (<i>SD</i>)	Smoking level				<i>p</i> value
	Native nondaily	Converted nondaily	Light daily	Moderate/heavy daily	
Tension reduction/relaxation	2.65 (1.11)	3.18 (1.12)	3.56 (1.09)	4.02 (0.94)	<.0001
Habit/automatism	1.60 (0.89)	2.01 (1.27)	1.94 (1.16)	2.39 (1.33)	<.0001
Pleasure to smoke	2.80 (0.93)	3.16 (0.98)	3.49 (0.90)	3.85 (0.84)	<.0001
Handling	2.25 (1.02)	2.61 (1.13)	2.66 (1.11)	2.98 (1.13)	<.0001
Stimulation	2.18 (1.00)	2.49 (1.18)	2.59 (1.14)	3.10 (1.15)	<.0001
Addictive smoking	1.97 (0.92)	2.55 (1.17)	3.04 (1.11)	3.77 (0.98)	<.0001
Social smoking	2.23 (0.92)	2.54 (1.18)	2.51 (1.11)	2.98 (1.18)	<.0001

Reason for smoking, <i>M</i> (<i>SD</i>)	Gender		<i>p</i> value
	Male	Female	
Tension reduction/relaxation	3.24 (1.12)	3.55 (1.16)	<.0001
Habit/automatism	2.30 (1.31)	1.85 (1.16)	<.0001
Pleasure to smoke	3.41 (0.92)	3.33 (1.02)	.0482
Handling	2.83 (1.11)	2.56 (1.13)	<.0001
Stimulation	2.81 (1.16)	2.50 (1.18)	<.0001
Addictive smoking	2.92 (1.18)	2.89 (1.26)	.4990
Social smoking	2.79 (1.16)	2.47 (1.14)	<.0001

Reason for smoking, <i>M</i> (<i>SD</i>)	Ethnicity			<i>p</i> value
	African American	Latino	White	
Tension reduction/relaxation	3.41 (1.19)	3.53 (1.11)	3.32 (1.15)	.0021 ^a
Habit/automatism	1.96 (1.17)	2.32 (1.35)	1.83 (1.14)	<.0001 ^{a,b}
Pleasure to smoke	3.32 (1.04)	3.46 (0.98)	3.32 (0.91)	.0072 ^{a,b}
Handling	2.53 (1.16)	2.95 (1.16)	2.54 (1.03)	<.0001 ^{a,b}
Stimulation	2.49 (1.19)	2.87 (1.22)	2.54 (1.09)	<.0001 ^{a,b}
Addictive smoking	2.87 (1.22)	3.03 (1.24)	2.81 (1.22)	.0012 ^{a,b}
Social smoking	2.48 (1.14)	2.84 (1.21)	2.49 (1.09)	<.0001 ^{a,b}

Note. The four smoker subgroups incrementally differed from one another ($p < .05$) with the following exceptions: converted nondaily versus daily light smokers were comparable on habit/automatism, handling, stimulation, and social smoking ($p > .05$).

^aSignificant difference between Latinos and Whites ($p < .05$).

^bSignificant difference between Latinos and African Americans ($p < .05$).

Relaxation, in which AA and Latino scores were comparable ($p > .05$). AAs and Whites were comparable on all RS ($p > .05$).

Interactions

General linear model was applied to each of the seven factors with covariates including smoking level, gender, ethnicity, age, education, years of smoking, and the interactions of smoking level with gender and with ethnicity in simultaneous models. Nonsignificant interactions were then removed from the model and a final regression model was analyzed including only significant interactions simultaneously. There were statistically significant interactions between smoking level and gender on Tension Reduction/Relaxation ($F_{3,2349} = 5.66, p < .001$), Pleasure to Smoke ($F_{3,2343} = 4.00, p < .01$), Stimulation ($F_{3,2349} = 2.84, p < .05$), and Addictive Smoking ($F_{3,2343} = 12.14, p < .0001$). Descriptive scores for each strata (e.g., smoking level by gender) are provided in Table 3. Consistent with the main effect, women displayed higher Tension Reduction/Relaxation scores than men, and this difference was especially pronounced among light and heavier daily smokers. Also consistent with the main effect, men had higher scores on Stimulation, but this was less pronounced among daily moderate/heavy smokers.

The main effect of men scoring higher on Pleasure to Smoke was pronounced among native and converted nondaily smokers, whereas the gender difference was reversed among light and heavier daily smokers, with women having higher pleasure to smoke scores. Finally, there was an opposite gender effect for Addictive Smoking, with men scoring higher among native and converted nondaily smokers and women scoring higher among daily, especially daily moderate/heavy, smokers.

There were also interactions between ethnicity and smoking level on Pleasure to Smoke ($F_{6,2343} = 4.04, p < .001$), Handling ($F_{6,2346} = 2.34, p < .05$), Addictive Smoking ($F_{6,2343} = 2.87, p < .01$), and Social Smoking ($F_{6,2346} = 3.17, p < .01$). Descriptive scores for each strata (e.g., smoking level by ethnicity) are provided in Table 4. On Pleasure to Smoke, Whites scored highest among native nondaily smokers, Latinos scored highest among converted nondaily smokers, and AAs scored highest among daily light and heavier smokers. For Handling, Latinos scored highest across smoking levels but Whites scored higher than AA among native and converted nondaily smokers, whereas AAs scored higher than Whites among light and heavier daily smokers. On Addictive Smoking, the main effect for Latinos scoring highest was present among converted nondaily smokers but AA's scored highest among other smoking levels. Finally,

Reasons for smoking among daily and nondaily smokers

Table 3. Reasons for Smoking by Smoking Level and Gender Reason for Smoking, *M (SD)*

Reason	Native nondaily		Converted nondaily		Light daily		Moderate/heavy daily	
	Male	Female	Male	Female	Male	Female	Male	Female
**1	2.56 (1.04)	2.72 (1.16)	3.12 (1.10)	3.23 (1.14)	3.19 (1.03)	3.77 (1.07)	3.80 (0.99)	4.19 (0.86)
2	1.80 (1.00)	1.43 (0.75)	2.38 (1.36)	1.72 (1.12)	2.21 (1.23)	1.79 (1.09)	2.50 (1.37)	2.31 (1.30)
**3	2.88 (0.91)	2.74 (0.95)	3.31 (0.87)	3.04 (1.04)	3.48 (0.85)	3.50 (0.93)	3.80 (0.89)	3.88 (0.80)
4	2.39 (1.04)	2.13 (1.00)	2.85 (1.11)	2.42 (1.11)	2.79 (1.04)	2.60 (1.14)	3.06 (1.15)	2.93 (1.12)
*5	2.34 (1.00)	2.04 (0.98)	2.79 (1.19)	2.25 (1.12)	2.75 (1.08)	2.51 (1.17)	3.15 (1.16)	3.07 (1.13)
***6	2.11 (0.94)	1.85 (0.88)	2.76 (1.18)	2.39 (1.14)	2.92 (1.07)	3.10 (1.12)	3.60 (1.02)	3.89 (0.93)
7	2.33 (0.92)	2.15 (0.92)	2.82 (1.20)	2.32 (1.11)	2.71 (1.10)	2.40 (1.10)	3.05 (1.19)	2.93 (1.17)

Note. Numbers represent the following reasons for smoking: (1) tension reduction/relaxation, (2) habit/automatism, (3) pleasure to smoke, (4) handling, (5) stimulation, (6) addictive smoking, and (7) social smoking. *Significant interaction $p < .05$, ** $p < .01$, *** $p < .001$. The p values of the interactions are based on the multivariable general linear regression described in the Interactions subsection.

Table 4. Reasons for Smoking by Smoking Level and Ethnicity Reason for Smoking, *M (SD)*

Reason	Native nondaily			Converted nondaily			Light daily			Moderate/heavy daily		
	AA	L	W	AA	L	W	AA	L	W	AA	L	W
1	2.64 (1.19)	2.81 (1.13)	2.48 (0.95)	3.14 (1.14)	3.36 (1.08)	3.05 (1.13)	3.55 (1.11)	3.64 (1.08)	3.50 (1.08)	4.08 (0.95)	4.03 (0.93)	3.95 (0.93)
2	1.55 (0.81)	1.83 (1.09)	1.41 (0.67)	1.85 (1.18)	2.44 (1.40)	1.73 (1.11)	1.89 (1.06)	2.10 (1.27)	1.84 (1.12)	2.42 (1.29)	2.59 (1.40)	2.17 (1.28)
**3	2.66 (0.98)	2.83 (0.98)	2.93 (0.81)	2.98 (1.02)	3.37 (0.98)	3.13 (0.89)	3.60 (0.86)	3.51 (0.95)	3.37 (0.89)	3.92 (0.87)	3.86 (0.83)	3.76 (0.82)
*4	2.07 (0.94)	2.43 (1.12)	2.26 (0.97)	2.33 (1.13)	3.01 (1.14)	2.49 (1.00)	2.56 (1.10)	2.87 (1.16)	2.56 (1.04)	3.03 (1.19)	3.19 (1.11)	2.73 (1.05)
5	2.02 (0.96)	2.40 (1.08)	2.12 (0.91)	2.22 (1.12)	2.88 (1.27)	2.37 (1.06)	2.51 (1.12)	2.75 (1.20)	2.53 (1.10)	3.10 (1.22)	3.21 (1.14)	3.00 (1.07)
**6	2.02 (0.90)	2.00 (0.99)	1.87 (0.85)	2.45 (1.12)	2.88 (1.24)	2.34 (1.09)	3.02 (1.03)	3.04 (1.17)	3.05 (1.11)	3.81 (1.00)	3.77 (0.95)	3.71 (0.98)
**7	2.07 (0.89)	2.32 (1.04)	2.32 (0.80)	2.29 (1.10)	2.97 (1.24)	2.34 (1.06)	2.40 (1.06)	2.69 (1.15)	2.45 (1.10)	3.05 (1.17)	3.06 (1.22)	2.85 (1.15)

Note. Numbers represent the following reasons for smoking: (1) tension reduction/relaxation, (2) habit/automatism, (3) pleasure to smoke, (4) handling, (5) stimulation, (6) addictive smoking, and (7) social smoking. *Significant interaction $p < .05$, ** $p < .01$. The p values of the interactions are based on the multivariable general linear regression described in the Interactions subsection. AA = African American; L = Latino; W = White.

the main effect of Latinos scoring highest on Social Smoking was upheld among converted nondaily and daily light smokers, but Whites scored higher among native nondaily smokers and AA scored higher among daily moderate/heavy smokers.

DISCUSSION

This study contributes to the existing literature by distinguishing between RS by daily and nondaily subgroups, providing empirical evidence needed to inform prevention and treatment approaches. This is particularly important as nondaily and light daily smokers represent an increasing proportion of smokers (Centers for Disease Control, 2012b). Furthermore, variations in smoking-related behavior and characteristics by smoking level, nicotine dependence, and quit rates by gender and ethnicity suggest that a more detailed understanding of RS by these demographics is critical (Branstetter, Blosnich, Dino, Nolan, & Horn, 2012; Ellickson, Orlando, Tucker, & Klein, 2004; Piper et al.,

2004). In addition, this study is the first to examine the MRSS with a U.S. sample of tri-ethnic daily and nondaily smokers.

Similar to research by others (Berlin et al., 2003; Souza et al., 2009), we confirmed a seven-factor model for the MRSS and the scale demonstrated good reliability. However, our seven-factor model contained a slightly different configuration of items than in Berlin's (2003) work. We retained 20 items in our final model, dropping the same item as Berlin (2003) ("I am very much aware of the fact when I am not smoking a cigarette"). Diverging from Berlin, the item "I smoke much more when I am with other people" was retained in our model and loaded highly on the Social Smoking factor. This difference may reflect the presence of nondaily smokers in our sample, compared to Berlin's study sample which was composed of daily smokers. Finally, one item loaded on a different factor in our study: "I smoke cigarettes automatically without even being aware of it" was salient on the Addictive Smoking instead of the Habit/Automatism factor in our study. Whereas the alphas in Berlin's (2003) study ranged from 0.56 to 0.75, those in our

study were 0.80 or higher, suggesting the reliability of the items in measuring each respective RS with a diverse U.S. sample.

Our hypothesis that daily smokers would have stronger RS than nondaily smokers was supported. Furthermore, we were able to make finer distinctions within daily and nondaily smoker subgroups. Native nondaily smokers scored lower than both daily light and daily moderate/heavy smokers across all RS, as did daily light versus daily moderate/heavy smokers. In contrast, converted nondaily smokers and daily light smokers were more similar. Specifically, daily light smokers more strongly endorsed smoking for reasons of Tension Reduction/Relaxation, Pleasure to Smoke, and Addictive Smoking than converted nondaily smokers, but they showed comparable levels of Habit/Automatism, Handling, Stimulation, and Social Smoking.

It is noteworthy that “Social Smoking” was not a leading RS among nondaily smokers, despite the classification of nondaily smokers as “social smokers” in some studies (Moran, Wechsler, & Rigotti, 2004; Oksuz, Mutlu, & Malhanb, 2007). This is consistent with research which has found that while there are subsets of nondaily smokers who exhibit social smoking patterns (Schane et al., 2009), many nondaily smokers are not social smokers (Shiffman, Kirchner, Ferguson, & Scharf, 2009). These divergent results may be due to sampling differences related to years of smoking experience. Whereas many studies on the subset of nondaily smokers who are primarily social smokers often focus on young adults, our study was restricted to participants 25 years of age or older. This explanation is consistent with another study which found differences in smoking-related characteristics between a college sample and a sample of older, more established smokers (Pulvers et al., 2013).

When considering tailored interventions based on smoking level, it is important to note the relative importance of each reason compared to one another. Light and moderate/heavy daily smokers had the same top three RS: tension reduction, pleasure, and addictive smoking. Converted nondaily smokers had a similar list, with tension reduction and pleasure in the top two, but the third highest RS was handling. Native nondaily smokers reasons were more similar to converted nondaily smokers, although the order of their top two was switched, with pleasure first and tension reduction second. Our finding that nondaily smokers, and particularly native nondaily smokers, display stronger RS stemming from secondary reinforcement (such as pleasure and handling) relative to other more primary reasons (such as addictive smoking) is consistent with previous research (Klitzke, Irwin, Lombardo, & Christoff, 1990; Piasecki et al., 2011; Shiffman, Dunbar, Scholl, & Tindle, 2012). In addition to considering the top three RS for any subgroup, smoking cessation counseling should address all salient RS with individual smokers given small effect sizes in between group differences.

Examination of RS by gender revealed that men reported stronger RS on five out of seven reasons. Women had higher scores on Tension Reduction/Relaxation and there were no gender differences on Addictive Smoking. This is consistent with previous research that women tend to be more likely to report smoking as a coping strategy including stress or negative affect reduction (Fidler & West, 2009; Gregor, Zvolensky, Bernstein, Marshall, & Yartz, 2007; Johnson, Stewart, Zvolensky, & Steeves, 2009; McEwen, West, & McRobbie, 2008; Sanchez-Johnsen, Ahluwalia, Fitzgibbon, & Spring, 2006). However, our finding that men scored higher than women in other RS contrasts with previous research. In previous work with the MRSS in a French sample (Berlin et al., 2003), women tended to endorse

stronger RS than men, with three reasons reaching significance: Tension Reduction/Relaxation which was consistent with our study, and Social Smoking and Stimulation which differed from ours. Similar to Berlin's findings, a study conducted in Belgium found that women scored higher than men on Social Smoking and Stimulation (Boudrez & De Bacquer, 2012). The general pattern of contrasting results may reflect sampling differences such as heavier smoking and that these studies were conducted in a smoking cessation treatment context (Berlin et al.; Boudrez & De Bacquer, 2012). Among heavier daily smokers in the present study, women scored higher on Pleasure to Smoke and Addictive Smoking than men, and the gender difference on Stimulation was less pronounced than for other smoking levels. Therefore, when considering gender differences in RS, it is important to also consider cigarette consumption level.

The limited research which has examined ethnic differences in RS has compared AAs and Whites. Our results are consistent with previous research, in that AAs and Whites were generally comparable on RS (Ma, Li, & Payne, 2012; Sanchez-Johnsen et al., 2006). There have been no previous investigations of Latinos' RS, or tri-ethnic comparisons of RS. We found that Latinos reported stronger RS than Whites on all reasons. Latinos also had stronger RS than AAs on all reasons except for Tension Reduction/Relaxation, in which scores were comparable. There were some interactions between ethnicity and smoking level that reveal that level of cigarette consumption makes a difference in how ethnic differences in RS are expressed. The combination of being Latino and a converted nondaily smoker yielded the strongest RS on Pleasure to Smoke, Addictive Smoking, and Social Smoking. AA's scored highest among native nondaily and daily smokers on Addictive Smoking. There was a general pattern of Whites scoring higher on Pleasure to Smoke, Handling, and Social Smoking when they were native nondaily or nondaily smokers, and AA scoring higher on these reasons when they were daily moderate/heavy or daily smokers.

The present results have implications for culturally tailored smoking cessation interventions. All RS would be important to address with Latino smokers and Pleasure to Smoke, Addictive Smoking, and Social Smoking are especially important to address among converted nondaily Latino smokers. At a population level, Latinos tend to be low frequency smokers (Perez-Stable et al., 2001; Zhu, Pulvers, Zhuang, & Baezconde-Garbanati, 2007), therefore discovering possible targets for discussion in counseling this group is important. For the most sensitive interventions, it would be advised to assess smoking history to distinguish between native and converted nondaily smoking status. In addition, for AA who are daily smokers, Addictive Smoking, Pleasure to Smoke, Handling, and Social Smoking would be important to address in treatment. AA tend to have difficulty quitting smoking (Stahre, Okuyemi, Joseph, & Fu, 2010; Trinidad, Pérez-Stable, White, Emery, & Messer, 2011) underscoring the value of gaining insight into their RS. Finally, among Whites who are nondaily smokers, clinicians should particularly attend to Pleasure to Smoke, Handling, and Social Smoking RS.

The present study validates the MRSS with a diverse, U.S.-based sample of adults. This is a brief measure which can provide insight into factors associated with smoking behaviors (Chang, 2009; Harakeh & Vollebergh, 2012; Novak et al., 2003; Piasecki et al., 2011). The inclusion of a tri-ethnic sample in this study is an important addition to the literature; however,

future studies should examine RS with other ethnic groups who possess disproportionate rates of nondaily smoking such as Asian Americans (Tong, Nguyen, Vittinghoff, & Pérez-Stable, 2009; Trinidad et al., 2009). In addition, while our study specified that participants be English speaking given that the questionnaire was in English, and the majority of the sample reported speaking English well or very well (99.6%), scale metric equivalence across ethnic groups was not evaluated.

Recruitment from an online panel provided a sample drawn from geographic regions throughout the United States; however, this limited participation to individuals who had access to the Internet and were willing to complete online surveys. It must also be acknowledged that we used a voluntary enrollment strategy rather than random sampling and that the present sample may not be representative of U.S. smokers at the population level. Finally, since being in smoking cessation treatment was an exclusion criteria for the present study, investigators should be aware that the results may differ in a sample of treatment-seeking smokers. For example, those who are actively trying to quit smoking may vary in their RS compared to those who are committed smokers. Despite these limitations, the present study highlights considerable variability across smoking level, gender, and ethnicity in strength of RS. Although between group differences were relatively small in magnitude, addressing subgroup differences in RS may contribute to more sensitive and effective prevention and treatment efforts.

SUPPLEMENTARY MATERIAL

Supplementary Table 1 can be found online at <http://www.ntr.oxfordjournals.org>

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DECLARATION OF INTERESTS

None declared.

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