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Race/ethnicity and intention to quit cigarette smoking

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ABSTRACT

The study examined racial/ethnic differences in smokers' intentions to quit smoking within the next 6 months. The sample included 20,693 current non-occasional smokers in the U.S. who responded to the 2010–2011 Tobacco Use Supplement to the Current Population Survey. The rates of intention to quit within 1 month were significantly higher for non-Hispanic (NH) Black (21%; OR = 1.44, CI = 1.24–1.67) and Hispanic (21%; OR = 1.42, CI = 1.20–1.68) than for the NH Whites (NHW, 15%). The rates of intention to quit within 6 months were significantly higher for NH Blacks (46%; OR = 1.35, CI = 1.18–1.55) than for NH Whites (39%) and significantly lower for NH American Indians/Alaska Natives (38%; OR = 0.54, CI = 0.33–0.90) and NH Asians (39% OR = 0.55, CI = 0.35–0.86) than for NH multiracial (53%) smokers. Most disparities existed even after adjusting for smoking-related and sociodemographic factors. For most racial/ethnic groups, non-daily smoking and doctor's advice to quit were positively associated with the odds of intending to quit. For each racial/ethnic group, having a longer quit attempt in the past 12 months was positively associated with the odds of intending to quit. For NH Whites, NH Blacks, and Hispanics, the specific differences between racial/ethnic groups also depended on getting a doctor's advice, education, and survey mode. Although a smoker's intention to quit may not necessarily lead to immediate smoking cessation, the lack of intention may drastically delay smoking cessation. The study highlights the importance of accounting for racial/ethnic disparities when designing and implementing interventions to motivate smokers to quit and aid smoking cessation.

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1. Introduction¹

1.1. Intention to quit smoking and associated factors

Intention to quit smoking is an important step in the smoking cessation process, which precedes changes in smoking behaviors, e.g., quit attempts (Mathur and Singh, 2015; Feng et al., 2010; Hyland et al., 2006; Prochaska et al., 1992; Prochaska and Goldstein, 1991; DiClemente et al., 1991). Intention to quit has been assessed in a number of population-based and community-based studies (Mathur and Singh, 2015; Dhupal et al., 2014; Tsoh et al., 2011; Abdullah, 2005; Li et al., 2010; Hyland et al., 2006), where intention to quit was defined as seriously considering quitting smoking in the near future, e.g., the next 6 months (Dhupal et al., 2014; Tsoh et al., 2011; Feng et al., 2010; Fagan et al., 2007).

The intention to quit may depend on several factors including smoker's race/ethnicity. Among young U.S. adults who had at least one quit attempt in the past 12 months, NHB smokers had higher odds of intention to quit compared to NHW¹ smokers, while the odds for HISP¹, AIAN¹, ASIAN/HPI¹, and MULT¹ were comparable to the odds for NHW smokers (Fagan et al., 2007). The estimates were similar for these racial/ethnic groups when daily and nondaily smokers were analyzed separately, while controlling for other covariates such as age, gender, employment status, and nicotine dependence measures (Fagan et al., 2007). In a second study, NHW, NHB, and HISP smokers had considerably higher odds of intention to quit when compared to the other smokers (Mathur and Singh, 2015). However, the latter study used a different definition of intention to quit, i.e., intention to quit was assumed if the smoker had tried to find information regarding smoking cessation (Mathur and Singh, 2015). In light of the growing number of minority group individuals in the U.S., documenting racial/ethnic disparities in intentions to quit smoking and understanding the factors that contribute to these disparities is of high priority. A first step towards this goal is to determine if factors known to predict intentions to quit smoking are equally relevant for members of distinct racial/ethnic groups. In this study, we examine intentions to quit across multiple racial/ethnic groups in the U.S. using data from the 2010–2011

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¹ Abbreviations: NHW, non-Hispanic White; NHB, non-Hispanic Black; HISP, Hispanic; AIAN, non-Hispanic American Indian/Alaska Native; ASIAN, non-Hispanic Asian; HPI, non-Hispanic Hawaiian/Pacific Islander; MULT, non-Hispanic multiracial.

Tobacco Use Supplement (TUS) to the Current Population Survey (CPS; U.S. Department of Commerce, Census Bureau, 2012). We consider demographic factors, smoking history (e.g., previous quit attempts, nicotine dependence), and health care factors (doctor's advice to quit), which have been found to predict quit intentions in the general population, to elucidate whether and how these factors predict intentions differently depending on one's racial/ethnic group.

The impact of other demographic characteristics on intention to quit smoking has been widely studied, but the findings are somewhat inconsistent. Some studies concluded that age, gender, education, and family income were not associated with intention to quit (Tsoh et al., 2011; Feng et al., 2010; Solberg et al., 2007). However, other studies concluded that some of these factors were associated with intention to quit, e.g., employment and education (Mathur and Singh, 2015; Reid et al., 2010). The differences in conclusions are not surprising because the studies examined diverse target populations and used different analytical approaches that controlled or did not control for other covariates.

In addition, several smoking-related factors such as history of quit attempts, e.g., having at least one quit attempt in the past 12 months and duration of the longest quit attempt (Tsoh et al., 2011; Feng et al., 2010), nicotine dependence, e.g., daily smoking and number of cigarettes per day (Tsoh et al., 2011; Feng et al., 2010; Fagan et al., 2007), and doctor's advice to quit (Dhumal et al., 2014) strongly effect a smoker's intention to quit. While the exact estimates vary across studies, the common finding is that making quit attempts, being less nicotine dependent, and getting a doctor's advice to quit are positively associated with smokers' intentions to quit. Some specific dependencies have also been identified; for example, among 18- to 30-year-old smokers in the US, intention to quit among daily smokers can be explained by nicotine dependence, whereas for non-daily smokers, intention to quit is better explained by sociodemographic characteristics such as employment status and family income (Fagan et al., 2007). However, whether the effects of nicotine dependence, past quit attempts, and doctor's advice to quit on intentions to quit are similar for diverse racial/ethnic groups has not been adequately addressed in the literature.

Smoking-related factors also differ across racial/ethnic groups. AIAN show the highest rate of daily smoking (Fagan et al., 2007). Among patients who report smoking, the odds of being asked about their smoking habits and being advised to quit by a healthcare provider are lower for NHB and HISP patients than for NHW patients (Cokkinides et al., 2008). Receiving a doctor's advice to quit smoking became more prevalent from 1992 to 1993 and from 1998 to 1999 for the majority of racial/ethnic groups, but not for AIAN smokers (Reed and Burns, 2008). NHB smokers have higher odds of quitting for 1 or 7 days than do NHW smokers (Kumar et al., 2016; Kulak et al., 2016). Thus, when assessing the impact of smoking-related factors on intention to quit, studies should examine the significance of interaction effects between race/ethnicity and smoking-related factors to assure correct estimation for diverse subgroups of smokers.

1.2. Study goals

Because different social determinants and cultural practices may influence smokers' perceptions of use of tobacco and cigarettes (Espesey et al., 2014), we hypothesized that intention to quit might be associated with smoker's race/ethnicity. We also considered whether individuals have received smoking cessation recommendations from a health care professional in order to identify specific racial/ethnic groups who are more likely to be influenced by such a recommendation. Because smokers' intentions to quit might be explained, at least in part, by physical nicotine dependence (Tsoh et al., 2011; Feng et al., 2010) and prior quitting behaviors (Tsoh et al., 2011; Feng et al., 2010; Fagan et al., 2007), we also hypothesized that these factors may influence intentions to quit differently across diverse racial/ethnic groups of smokers.

The study considered seven racial/ethnic groups of non-occasional smokers in the U.S., i.e., NHW, NHB, HISP, AIAN, ASIAN, HPI, and

MULT. For larger (NHW, NHB, HISP) and smaller (AIAN, ASIAN, HPI, and MULT) racial/ethnic groups, the study had the following aims: to determine whether smokers' intention to quit differs across racial/ethnic groups and, if so, to identify groups that have lower rates of intention to quit (Abdullah, 2005); to determine whether non-daily (versus daily) smoking, prior quitting behaviors, and getting a doctor's advice to quit are associated with higher rate of intention to quit in the overall population (after adjusting for sociodemographic characteristics of smokers and survey mode) (Calnan and Sanford, 2004); and to determine whether the importance of these factors is consistent across racial/ethnic groups (Cohen and Conway, 2007).

While a smoker's intention to quit may not necessarily lead to immediate smoking cessation, addressing the above aims is important because the lack of intention to quit may drastically delay smoking cessation. Moreover, identifying racial/ethnic groups that have lower rates of intention to quit smoking could be highly beneficial when designing and implementing tailored community-based smoking cessation interventions.

2. Methods

2.1. Data

The data came from the 2010–2011 TUS. The TUS is a survey of tobacco use sponsored by the National Cancer Institute and co-sponsored by the Centers for Disease Control and Prevention (since 2001–2002). The TUS has been administered as a supplement to the CPS, sponsored jointly by the U.S. Census Bureau and the U.S. Bureau of Labor Statistics, since 1992–1993. The CPS is a continuing monthly assessment of labor force and demographic information for the U.S. population. In selected months, CPS respondents are invited to participate in the TUS, which is targeted at assessing smoking-related behaviors. There are three TUS monthly samples per survey period, where each sample is nationally representative of the civilian non-institutionalized adult (18 years old and older) population of the U.S.

Our study used self-reports of current non-occasional smokers. Subsamples corresponding to larger and smaller racial/ethnic groups were analyzed separately due to incomparable sample sizes. Indeed, the three larger racial/ethnic groups accounted for almost 95% of the overall sample, i.e., there were 16,084 (74.2%) NHW, 1978 (11.3%) NHB, and 1411 (9.3%) HISP. The smaller racial/ethnic groups accounted for only 5% and there were 333 (1.0%) AIAN, 405 (2.3%) ASIAN, 59 (0.2%) HPI, and 423 (1.8%) MULT. Table 1 presents descriptive statistics for subsamples corresponding to larger and smaller racial/ethnic. The first subsample was 78.3% NHW, 11.9% NHB, and 9.8% HISP. The second subsample was 19.1% AIAN, 43.5% ASIAN, 3.5% HPI, and 33.9% MULT.

2.2. Measures

The primary measure was intention to quit smoking within the next 6 months. This binary measure (yes/no) was constructed using responses to the survey question "Are you seriously considering quitting smoking within the next 6 months?" Those respondents who answered "Yes" to the question were also asked "Are you planning to quit within the next 30 days?" Responses to both questions were used to define an additional categorical measure with 3 categories, i.e., smokers who plan to quit within the next month, i.e., 30 days, smokers who consider quitting sometime in 1 to 6 months, and smokers who do not consider quitting smoking in the next 6 months.

The smoking-related measures included daily smoking, duration of the longest quit attempt in the past 12 months, and doctor's advice to quit smoking during the past 12 months. Table 1 presents sample descriptive statistics for the smoking-related measures. Daily smoking status was used to distinguish between daily smokers and non-daily smokers (those who reported being someday smokers and smoking on at least 12 days in the past month). The duration of the longest

Table 1

Sample characteristics of the smokers, percentages are based on the population count; 2010–2011 Tobacco Use Supplement to the Current Population Survey, U.S.

Characteristic	NHW, NHB, and HISP smokers		AIAN, ASIAN, HPI, and MULT smokers	
	Sample size	Percent (%)	Sample size	Percent (%)
Age				
18–24	1664	13.6	133	15.2
25–44	7665	39.2	571	48.5
45–64	8295	39.5	425	30.7
65+	1849	7.8	91	5.6
Gender				
Male	9497	53.6	664	59.3
Female	9976	46.4	556	40.7
Highest level of education				
Less than high school	3118	17.3	191	13.8
High school (or equivalent)	7886	40.0	410	32.0
Some college or a bachelor's degree	7875	39.9	555	47.6
Graduate degree	594	2.7	64	6.5
Region				
Northeast	3804	17.0	145	14.1
Midwest	5414	26.2	267	17.3
South	6762	40.6	254	27.8
West	3493	16.2	554	40.8
Metropolitan status				
Metropolitan	14,463	80.5	863	83.3
Non-metropolitan	5010	19.5	357	16.7
Survey mode				
Phone	11,403	56.2	665	52.1
In-person	8070	43.8	555	47.9
Daily smoking				
Daily smoker	15,816	80.5	958	74.7
Non-daily smoker	3657	19.5	262	25.3
Duration of the longest quit attempt (past 12 months)				
No quit attempt	12,235	63.6	456	59.2
From 1 to 7 days	3827	18.9	151	21.1
Longer than 7 days	3411	17.5	149	19.7
Doctor's advice to quit smoking (past 12 months)				
Got an advice	10,981	53.5	625	50.4
Did not get an advice	8492	46.5	595	49.6
Sample size and population count	19,473	26,127,882	1220	1,425,421

quit attempt in the past 12 months (in days), a prior quitting behavior, was used to distinguish three groups of smokers: those who did not try to quit smoking during the past 12 months, those who attempted to quit and stayed abstinent for 1 to 7 days, and those who attempted to quit and stayed abstinent longer than 7 days. Doctor's advice to quit smoking was a binary measure, which corresponded to receiving advice to quit smoking from a doctor or dentist during the past 12 months or not getting such advice. The latter category identified smokers who reported that they either did not visit a doctor/dentist in the past 12 months or were not advised to quit smoking when they visited.

2.3. Statistical analyses

Analyses for the two subsamples were performed separately, each at the 5% significance level. The Rao–Scott chi-square tests (Rao and Scott, 1981, 1987) were used to detect significant associations between intention to quit and other measures. Survey logistic regressions (simple and multiple) for the logit of intention to quit within the next 6 months with the reference category “no intention to quit within the next 6 months” were used. The simple regressions were fitted for each racial/ethnic group separately with one factor at a time to identify important predictors. The multiple regression model for the larger racial/ethnic groups was built using backward elimination (with elimination at 5% significance level) where all two-way interactions between race/ethnicity

and the other factors were considered. The multiple regression model for the smaller racial/ethnic groups contained only the main effects due to insufficient sample sizes for some specific cross-groups. The model-based odds ratios (OR) and the corresponding 95% confidence intervals (CI) are reported. Bonferroni corrections were used for multiple comparisons; the adjusted *p*-values and simultaneous confidence intervals (SCI) are reported for these cases.

Because the TUS is a population-based survey that incorporates mixed survey modes (i.e., some interviews are conducted in person while some interviews conducted by phone), it is important to adjust for the survey mode when analyzing TUS data (Kolenikov and Kennedy, 2014; Soulakova et al., 2009). Moreover, the accuracy of respondents' reports may differ between the survey modes (Soulakova et al., 2009; Simile et al., 2006). Also, adjusting for metropolitan status and region are commonly used when assessing smoking-related and other health-risk information to better account for possible differences in smoking patterns across metropolitan and non-metropolitan areas and U.S. geographical regions (Jemal et al., 2011; Soulakova et al., 2009; Kaplan et al., 2007). Therefore, we controlled for these factors in our analyses.

All computing incorporated the standard adjustments for the complex design of the TUS, i.e., the weights were used to correctly adjust for differential selection probabilities, non-response, and non-coverage (U.S. Department of Commerce, Census Bureau, 2012). Computing was done using SAS/STAT@9.4 (SAS Institute Inc., 2014).

3. Results

3.1. Larger racial/ethnic groups

Among NHW, NHB, and HISP smokers, 16.5% (3283) of smokers intended to quit within one month, 23.4% (4700) of smokers intended to quit within next 2 to 6 months, and 60% (11,490) of smokers did not intend to quit within the next 6 months. The intention to quit is significantly associated with race/ethnicity ($p < 0.001$). Table 2 shows the sample percentages for these racial/ethnic groups. The rates of intention to quit within 1 month (adjusted $p < 0.001$) and the rates of intending to quit within the next 6 months (adjusted $p < 0.001$) differed significantly across racial/ethnic groups. The rates of intention to quit within 1 month were significantly higher for NHB and HISP than for the NHW. The rates of intention to quit within 6 months were significantly higher for NHB than for NHW, but not significantly different for HISP and NHW groups.

For all three racial/ethnic groups, daily smoking, duration of the longest quit attempt, and doctor's advice were the most important predictors of the logit of intention to quit within the next 6 months (all $p \leq 0.001$). Table 3 presents the odds ratios and corresponding confidence limits. Other important predictors were as follows. For NHW smokers, they included age ($p < 0.001$), education ($p < 0.001$), region ($p < 0.001$), and survey mode ($p = 0.008$). For NHB smokers, education ($p = 0.001$) was the only important predictor. For HISP smokers, education ($p = 0.025$) and survey mode ($p = 0.004$) were identified as significant.

The final model for the logit of intention to quit within the next 6 months (likelihood ratio = 6.327,784, $df = 28$, $p < 0.001$) contained significant interactions between race/ethnicity and doctor's advice ($p = 0.005$), education ($p = 0.024$), and survey mode ($p = 0.044$). Among smokers who received advice to quit, NHB had larger odds of intending to quit than NHW had (OR = 2.01; SCI = 1.42–2.85; adjusted $p < 0.001$), but the odds were similar for HISP and NHW smokers. Similarly, among smokers who did not receive advice to quit, NHB had larger odds of intending to quit than NHW had (OR = 1.57; SCI = 1.15–2.14; adjusted $p = 0.004$), while the odds were similar for HISP and NHW smokers. The post hoc tests for the other two interaction effects are not discussed here.

Table 2
Intention to quit for diverse racial/ethnic groups; 2010–2011 Tobacco Use Supplement to the Current Population Survey, U.S.

Intention to quit	NHW	NHB	HISP	AIAN	ASIAN	HPI	MULT
Percentage (the column percent, i.e., the percentages sum up to 100% within each race/ethnicity)							
Within 1 month	15.4%	20.7%	20.5%	13.8%	20.9%	18.9%	17.6%
In 1 to 6 months	23.5%	25.5%	20.0%	24.3%	17.7%	23.5%	35.6%
No intention to quit within the next 6 months	61.1%	53.7%	59.5%	61.9%	61.4%	57.6%	46.8%
Odds ratios (adjusted <i>p</i> -value for significant results; * denotes <i>p</i> < 0.001, significant results are bold) and simultaneous confidence intervals (versus no intention to quit within the next 6 months)							
Within 1 month	1.00	1.44*	1.42*	0.75	1.24	1.10	1.00
		1.24–1.67	1.20–1.68	0.34–1.67	0.70–2.19	0.29–4.15	
In 1 to 6 months	1.00	1.35* 1.18–1.55	1.07	0.54 (0.011) 0.33–0.90	0.55 (0.005) 0.35–0.86	0.65	1.00
			0.92–1.24			0.25–1.71	

The overall model-based pair-wise comparisons between racial/ethnic groups indicated that the odds of intention to quit within the next 6 months were significantly larger for NHB than they were for NHW (OR = 1.78; SCI = 1.31–2.40; *p* < 0.001), but there was no significant difference when HISP smokers were compared to NHW smokers. Among main effects not included in the interactions, daily smoking (*p* < 0.001), duration of the longest quit attempt (*p* < 0.001), age (*p* < 0.001), and region (*p* < 0.001) were significant. The overall comparisons indicated that the odds of intending to quit within the next 6 months were significantly smaller for daily smokers than they were for nondaily smokers (OR = 0.58, CI = 0.52–0.64; *p* < 0.001) and significantly larger for smokers who had quit for 1 to 7 days (OR = 6.52, SCI = 5.82–7.29; adjusted *p* < 0.002) and for >7 days (OR = 7.17, SCI = 6.32–8.15; adjusted *p* < 0.002) than they were for smokers who did not attempt to quit.

3.2. Smaller racial/ethnic groups

Among AIAN, ASIAN, HPI, and MULT smokers, 18.4% (205) of smokers intended to quit within one month, 25.2% (291) intended to quit in 1 to 6 months, and 56.4% (724) did not intend to quit within the next 6 months, and the rates were significantly associated with racial/ethnic group (*p* < 0.001). Table 2 presents the corresponding percentages. The rates of intention to quit within 6 months differed significantly across the racial/ethnic groups (*p* = 0.002). These rates were significantly lower for AIAN and ASIAN than for MULT smokers. The rates of intention to quit within one month were not significantly different among the four racial/ethnic groups.

For each racial/ethnic group, the duration of the longest quit attempt was an important predictor of the odds of intention to quit (*p*'s < 0.0001 for AIAN, ASIAN, and MULT; *p* = 0.020 for HPI), see Table 3. The other important factors were age (*p* = 0.006) and doctor's advice (*p* = 0.043) for AIAN smokers, daily smoking (*p* < 0.001) and metropolitan status (*p* = 0.017) for ASIAN smokers, and daily smoking (*p* = 0.041) and education (*p* = 0.040) for MULT smokers.

The final model (likelihood ratio = 340.509, df = 19, *p* < 0.001) contained significant effects of race/ethnicity (*p* = 0.006), daily smoking (*p* < 0.001), duration of the longest quit attempt (*p* < 0.001), doctor's advice (*p* = 0.007), and metropolitan status (*p* = 0.046). Post hoc comparisons indicated that ASIAN smokers had lower odds of intending to quit than did MULT (OR = 0.48; SCI = 0.28–0.82; adjusted *p* = 0.003), while AIAN and HPI had similar odds when compared to MULT smokers. Furthermore, daily smokers had lower odds of intending to quit than did non-daily smokers (OR = 0.43, CI = 0.28–0.66), smokers who got a doctor's advice to quit had higher odds than those who did not (OR = 1.60, CI = 1.14–2.26), and those who quit for 1 to 7 days and for >7 days had higher odds than those smokers who did not attempt to quit (adjusted *p*'s < 0.001): the respective odds ratios were 4.77 (SCI = 2.78:8.16) and 6.72 (SCI = 3.73–12.13). Also, those smokers who resided in metropolitan areas had higher odds of intending to quit than those who resided in nonmetropolitan areas (OR = 1.50, CI = 1.01–2.23; *p* = 0.046;).

4. Discussion

4.1. Overall effect of race/ethnicity on smoker's intention to quit smoking

The results indicated that the racial/ethnic identity of a smoker is associated with the smoker's intention to quit smoking. The highest rates of intending to quit within 1 month were found for NHB, HISP, ASIAN, HPI, and MULT smokers (rates varied from 17.6% to 20.9%), while the lowest rate corresponded to AIAN smokers. However, the differences in the rates (after adjusting for multiplicity) were significant only for NHB and HISP when compared to NHW: the rates were lower for NHW compared to the other two groups. The highest rates of intending to quit within the next 6 months were found for MULT smokers (53.2%); rates for other groups ranged from 38.1% to 46.3% with the lowest rates for NHW, AIAN, and ASIAN smokers. The ethnic/racial differences in these rates were significant overall for larger and smaller racial/ethnic groups. After multiplicity adjustments, the rates differed for NHB and NHW, AIAN and MULT, and ASIAN and MULT.

Table 3
Odds ratios (top entry) and Wald confidence limits for the odds ratios of intention to quit within 6 months; significant results are bold; 2010–2011 Tobacco Use Supplement to the Current Population Survey, U.S.

Comparison	NHW	NHB	HISP	AIAN	ASIAN	HPI	MULT
95% confidence limits							
Daily smoking: daily versus nondaily	0.45	0.45	0.63	0.50	0.31	0.50	0.49
	0.40–0.50	0.36–0.58	0.50–0.80	0.22–1.15	0.17–0.57	0.10–2.41	0.25–0.97
Doctor's advice to quit: yes versus no	1.84	2.46	2.37	1.82	1.13	1.64	1.22
	1.70–1.99	2.017–3.01	1.88–2.97	1.02–3.26	0.72–1.77	0.36–7.48	0.80–1.87
97.5% confidence limits							
Duration of the longest quit attempt	6.55	8.43 5.91–12.01	6.72	4.05	3.99	13.34 1.52– >100	5.66
From 1 to 7 days versus no attempt	5.85–7.34		4.65–9.72	1.45–11.30	1.86–8.55		2.50–12.82
Longer than 7 days versus no attempt	7.93	9.83	9.21	9.94	9.39	4.61 0.50–42.89	5.79
	6.98–9.01	7.28–13.28	5.95–14.27	3.17–31.18	3.89–22.65		2.63–12.76

Model-based comparisons (controlling for the other factors) confirmed specific differences in the intention rates for NHB and NHW smokers, and ASIAN and MULT smokers.

These results are consistent with a prior study of quit attempts and intention to quit among 18–30-year-old smokers in the U.S. using 2003 TUS data (Fagan et al., 2007). The study showed that (after controlling for age, gender, employment status, family income, and smoking-related information) NHB smokers had higher odds of intending to quit within the next 6 months than did NHW smokers while the comparisons to NHW were not significant for HISP, AIAN, ASIAN/HPI, and MULT. While many other studies assessed intentions to quit smoking (Dhumal et al., 2014; Tsoh et al., 2011; Reid et al., 2010; Feng et al., 2010; Solberg et al., 2007), we could not identify any relevant studies that addressed racial/ethnic differences in smokers' intentions to quit.

It is interesting that the difference between NHW and HISP in intention to quit within 1 month was not maintained when intention to quit in the next 6 months was examined. One possible reason for this discrepancy is that different analytic techniques were used for the two time frames. Because only a small proportion of smokers intended to quit within the next month, those results were based on unadjusted analyses and should be regarded as exploratory. In contrast, results for intent to quit in the next 6 months accounted for other important factors (e.g., nicotine dependence). Another potential reason is that the intention to quit right away (within 1 month) is indeed different from the intention to quit within the next 6 months. If so, the proportion of smokers who intend to quit within 1 month could be higher for HISP than NHW while the proportion of smokers who intend to quit within the next 2 to 6 months is higher for NHW than for HISP, resulting in a non-significant overall ethnic difference in intention to quit within 6 months.

4.2. Quitting behaviors, nicotine dependence, and intention to quit

Evaluating the significance of individual predictors indicated that for each racial/ethnic group, the duration of the longest quit attempt was positively associated with the odds of intending to quit. Daily smoking was also associated with the odds of intending to quit for the majority of racial/ethnic groups. The results were consistent for each race/ethnicity: non-daily smokers and those who had a quit attempt in the past 12 months had higher odds of intending to quit than the corresponding comparison groups. Multiple-logistic regression also indicated that the smoker's intention to quit depended on daily smoking and duration of the longest quit attempt. These results are consistent with those of prior studies (Tsoh et al., 2011; Feng et al., 2010; Fagan et al., 2007). While we hypothesized that these factors might influence intentions to quit differently across diverse racial/ethnic groups of smokers, we did not detect any interaction effects with race/ethnicity (for the larger racial/ethnic groups), indicating that perhaps these factors influence intentions to quit across all racial/ethnic groups in a similar way.

Our study also resulted in some additional results regarding sociodemographic predictors of intentions to quit. For example, educational attainment was an important predictor for the majority of racial/ethnic groups, while age, region, metropolitan status, and survey mode were important predictors for particular racial/ethnic groups. These results are consistent with prior literature addressing impact of sociodemographic characteristics (Mathur and Singh, 2015; Reid et al., 2010).

4.3. Doctor's advice, race/ethnicity, and intention to quit

Our result of a significant interaction between race/ethnicity and receiving a doctor's advice to quit suggests that receiving a doctor's advice might be especially beneficial for NHB smokers (in comparison to NHW smokers): among smokers who received such advice the odds of intending to quit for NHB were twice the odds for NHW, whereas

among smokers who did not receive such advice, the odds of intending to quit for NHB were only 1.5 times the odds for NHW. This suggests that a doctor's recommendation to quit might have a greater impact for NHB smokers than NHW smokers. The racial/ethnic disparities could be due to different levels of trust in medical personnel, different levels of healthcare, different types of medical insurance, and/or other health-care related factors (Jorm, 2016; Calnan and Sanford, 2004). Potential interactions between the doctor's advice and race/ethnicity for smaller racial/ethnic groups, while adjusting for the other factors were not investigated.

Turning to the role of a doctor's advice as an individual predictor of intention to quit, receiving a doctor's advice to quit was significantly associated with higher odds of intending to quit for the majority of racial/ethnic groups, which is consistent with prior results (Dhumal et al., 2014). The association was positive for each race/ethnicity: smokers who were advised by a doctor to quit smoking had higher odds of intending to quit than those who were not advised; however, some odds ratios were not significant (this is also consistent with results based on the multiple-logistic regressions). This finding points to the importance of health care professionals in discussing smoking cessation with the patients as well as motivating and encouraging them to be open regarding their smoking habits so these discussions can take place.

4.4. Study limitations and future goals

The study had several limitations. First, all information was self-reported and thus is potentially subject to response bias (Soulakova et al., 2015; Soulakova et al., 2012; Cohen and Conway, 2007; Johnson and Schultz, 2005; Tourangeau et al., 2000). Second, only non-occasional smokers were included in the study, because occasional smokers, i.e., smokers who reported smoking on <12 days in the past month, did not report duration of their past quit attempts. Third, while the study attempted to detect differences among the 7 racial/ethnic groups, some of these groups were not well represented in the sample (e.g., HPI), raising a concern that there was a lack of power.

Future studies of smokers' intentions and plans to quit and associated racial/ethnic disparities should be performed, especially for racial/ethnic groups that are less represented in the population. These studies may greatly benefit if they use surveys targeted on these smaller racial/ethnic groups. In addition, there is a lack of information concerning the impact of other smoking-related measures on intentions and plans to quit (e.g., a detailed history of quit attempts) and other potentially important factors that were not included in this study.

5. Conclusion

To the best of our knowledge, this study is the first comprehensive study of intention to quit smoking that included teenage, young adult, and adult smokers from 7 racial/ethnic groups in the U.S. The results indicated that racial/ethnic disparities exist in smokers' intentions to quit, even after adjusting for smoking-related factors and smokers' sociodemographic characteristics. While intending to quit may not necessarily lead to immediate smoking cessation, the lack of intention may drastically delay smoking cessation and contribute to smoking-related diseases and conditions. Racial/ethnic disparities in the intention to quit cigarette smoking should be considered when seeking to motivate smokers to quit and when developing and implementing smoking cessation interventions.

Conflicts of interest

The authors have no conflicts to declare.

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