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Race Differences in Factors Relating to Smoking-Initiation

Raphaela Finkenauer, Cynthia S. Pomerleau, Sandy M. Snedecor, and Ovide Pomerleau
Nicotine Research Laboratory, University of Michigan Department of Psychiatry

Abstract

To investigate race differences in retrospectively-reported early smoking experiences, we studied African-American (n=48) and Caucasian (n=155) current smokers who participated in a study designed to identify phenotypic and genotypic factors associated with smoking. Compared with Caucasian smokers, African-American smokers were less educated (mean \pm SEM: 13.3 ± 0.25 vs. 14.3 ± 0.16 ; $p < .01$), had higher BMI (28.9 ± 1.06 vs. 26.7 ± 0.52 ; $p < .05$), and smoked significantly fewer cigarettes/day (14.1 ± 1.00 vs. 18.4 ± 0.74 ; $p < .01$). Ninety percent of African American smokers consumed menthol cigarettes, as opposed to 25% of Caucasian smokers. African-American smokers were significantly older than Caucasian smokers upon initial smoking experimentation (17.4 ± 1.1 vs. 14.7 ± 0.3 ; $p < .05$) and onset of regular smoking (19.7 ± 0.9 vs. 17.4 ± 0.4 ; $p < .05$). African-American smokers were significantly more likely than Caucasian smokers to endorse global pleasurable sensations (48% vs. 30%; $p < .05$), “pleasurable rush or buzz” (62% vs. 43%; $p < .05$), and “relaxing” (45% vs. 27%; $p < .05$) as early experiences with smoking, whereas Caucasian smokers were marginally more likely to report dizziness and difficulty inhaling (61% vs. 45%; $p < .10$ and 48% vs. 31%; $p < .10$, respectively). Caucasian smokers were significantly more likely to endorse friends (6.9 ± 0.2 vs. 4.8 ± 0.4 ; $p < .0001$) and “perk me up” (4.2 ± 0.3 vs. 3.1 ± 0.4 ; $p < .05$) and marginally more likely to endorse buzz as (4.2 ± 0.2 vs. 3.4 ± 0.5 ; $p < .10$) as reasons for starting to smoke. Further research is needed to determine the relative contributions of genetic, developmental, and socio-cultural factors to these findings.

Keywords

early smoking experiences; race differences; smoking phenotypes

1. Introduction

Smoking remains the leading preventable cause of morbidity and mortality in the United States (CDC, 2005), making it imperative to improve our understanding of factors influencing smoking initiation and its trajectory. Racial differences exist in smoking behavior and have been well documented, with previous research showing that African Americans begin smoking at a later age, smoke fewer cigarettes per day, are more likely to smoke high nicotine and tar containing cigarettes, prefer mentholated cigarettes, inhale more deeply, and metabolize

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Corresponding author: Raphaela Finkenauer, 4250 Plymouth Rd. #2406, Ann Arbor, MI 48105, U.S.A.; e-mail rfinkena@med.umich.edu; telephone (734) 232-0546; fax (734) 615-8739.

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nicotine at a much slower rate than Caucasian smokers (Benowitz 1996; Clark, Gautam & Gerson, 1996; Fiore et al., 1989; Kabat, Morabia & Wynder, 1991; Okuyemi et al., 2006). African American smokers also have lower rates of successful quitting (Fiore et al., 1989; Giovino et al., 1994), and suffer a disproportionately high rate of deleterious health consequences due to smoking (Harris, Zang & Anderson, 1993). The reasons for these differences remain to be adequately explained.

A growing body of literature suggests that initial experiences with nicotine, by activating a series of biochemical events in the reward and craving areas of the brain (Littleton, 2001; Quick & Lester, 2002) may be critical in determining whether or not an individual goes on to become a smoker (Chen et al., 2003; DiFranza et al., 2004; DiFranza, & Wellman, 2005; Friedman, Lichtenstein & Biglan, 1985; Gurling, Grant & Dangl, 1985; Poulos, & Cappell 1991; Pomerleau et al., 1999; Pomerleau, Pomerleau & Namenek, 1998; Pomerleau, Pomerleau, Mehringer, Snedecor & Cameron, 2005a). Although those who persist in smoking may experience unpleasant as well as pleasant sensations upon smoking their first cigarette, they may be constitutionally more sensitive to the reinforcing and/or rewarding effects of nicotine (Pomerleau, Collins, Shiffman & Pomerleau, 1993) and possibly more susceptible to the development of tolerance, leading to greater self-administration (Pomerleau, 1995).

To investigate possible race differences in early smoking experiences that might modulate the transition to smoking, we studied African-American and Caucasian current smokers who participated in a study designed to identify phenotypic and genotypic factors associated with smoking. Age of initial experimentation with smoking and transition to regular smoking, avidity of uptake, reactions to early experiences with nicotine, and reasons for initiation of regular smoking were compared.

2. Methods

2.1 Participants

Participants were 203 regular daily smokers (155 Caucasian, 48 African-American) recruited from the local community to participate in a study designed to identify phenotypic and genotypic factors associated with smoking. To be included in the study, candidates had to be between age 25 and 65 years old, to have smoked at least 5 cigarettes/day of ≥ 0.5 mg nicotine for ≥ 5 years, and to have smoked at their current rate for the past 6 months. They also had to meet the following exclusion criteria: currently pregnant or nursing; current or lifetime diagnosis of psychosis, bipolar disorder, mania or suicide attempts; current (<6 months) use of psychoactive medication; recent consumption of alcohol beyond specified limits (15 drinks/week for women; 21 drinks per week for men); or current diagnosis of alcohol abuse or current illegal drug use. The sample was stratified on nicotine dependence and sex and designed to over-include individuals with depressive symptomatology (see Pomerleau et al., 2005b); thus, the sample was not randomly distributed on these variables. Race was confirmed by genotyping ancestrally informative SNPs. (Sherva et al., 2008)

2.2. Study instruments

Smoking history and demographics were collected via standard assessments in use by the Nicotine Research Laboratory. Early smoking experiences were assessed via the Early Smoking Experiences Questionnaire (ESE; Pomerleau et al., 1998; Pomerleau et al., 2005a) asking participants to rate, retrospectively, pleasurable sensations and unpleasant sensations experienced when they smoked their first cigarette, on a scale of 1 (none) to 4 (intense), dichotomized into “none” or “slight” vs. “moderate” or “intense.” Reasons for starting to smoke regularly were assessed using a ten-point scale with 1= not at all important and 10= extremely important.

3. Results

3.1 Sample characteristics

African American smokers had fewer years of education and higher BMI than their Caucasian counterparts. They smoked significantly fewer cigarettes per day. Ninety percent of the African American sample smoked mentholated cigarettes as compared to 25% of the Caucasian sample population. No other significant differences in baseline or variables related to current smoking emerged. Sample characteristics are shown in Table 1.

3.2 Race differences in age of experimentation and transition to regular smoking

African American smokers were significantly older than Caucasian smokers when they first started experimenting with cigarettes (17.1 ± 1.0 years vs. 14.7 ± 0.3 ; $t=-2.91$ $p<.05$) and when they first started smoking regularly (19.5 ± 0.8 years vs. 17.4 ± 0.4 ; $t=-2.56$ $p<.05$). No differences were detected in avidity of uptake (latency from experimentation to regular smoking (2.5 ± 1.2 years vs. 2.9 ± 0.4 ; NS).

3.3 Race differences in early experiences with smoking

As shown in Table 2, significant differences were found between our sample populations in early experiences with smoking. African American smokers experienced higher levels of global pleasurable sensations, a pleasurable “rush or buzz”, and more relaxation compared to their Caucasian counterparts. African American smokers experienced marginally lower rates of dizziness, and tended to experience less difficulty inhaling than Caucasian smokers.

3.3 Race differences in reasons for transition to regular smoking

Reasons for starting to smoke regularly are shown in Table 3. African Americans were significantly less likely to endorse “smoking with friends” and “smoking perked me up” and marginally less likely to endorse “enjoyed the buzz” compared to their Caucasian counterparts.

4. Discussion

African-American smokers were less educated than their Caucasian counterparts and had a higher BMI. Consistent with previous reports (Kabat et al., 1991), they currently smoked fewer cigarettes per day and were more likely to smoke mentholated cigarettes.

African-American smokers were significantly older than Caucasian smokers when they first experimented and when they transitioned to regular smoking, in accord with previously reported findings (Trinidad, Gilpin, Lee, & Pierce, 2004). No differences were found in avidity of uptake (latency from first cigarette to regular smoking). In response to early experimentation with smoking, African-American smokers were more likely to report pleasant sensations, “buzz,” and relaxation, and marginally less likely to report dizziness and difficulty inhaling. Caucasian smokers endorsed social reasons and “it perked me up” significantly more strongly, and getting a buzz marginally more strongly, than African-American smokers as reasons for starting to smoke. It is interesting to note that although the African American smokers were more likely to endorse experiencing a pleasurable rush or buzz, they tended to rate it *lower* as a reason for transitioning to regular smoking.

These findings may be due to genetic differences based on race. Although analyses by our group (Sherva et al., 2008) were inconclusive because of the small sample size of African-Americans and the low allelic frequency of the polymorphism (rs16969968) related to elevated risk in the Caucasian smokers, it is possible that genetic differences yet to be identified will help to explain these findings.

An alternative, though not mutually exclusive, explanation is that the observed differences are attributable at least in part to a combination of socio-economic and developmental factors. For example, the greater age at which African-Americans began experimenting and smoking regularly may be due to differences in economic resources. The greater neurological, psychological, and/or physiological immaturity of the Caucasian smokers based on more than two years' difference in age at the time of experimentation and regular smoking could in turn lead to greater peer influence in the initiation of smoking. It could also have profound consequences for pharmacological response to nicotine. Animal studies have shown, for example, that the adolescent brain is receptive to nicotine effects that may reinforce potential for addiction and highly sensitive to nicotine neurotoxicity (Levin et al., 2007). The younger age of onset could explain the Caucasians' greater endorsement of "it perked me up" as a reason for starting to smoke.

The possibility of increased sensitivity among Caucasian youth due to their younger age of onset, however, is at odds with the African-Americans' greater intensity of self-reported pleasurable experiences, "buzz," and relaxation upon early experimentation. Bearing in mind the higher prevalence and amount of smoking in Caucasians at least through young adulthood (White, Nagin, Replogle, & Stouthamer-Loeber, 2004), it may be that a more pronounced pharmacological effect is required to overcome as yet unidentified protective factors among African-Americans and induce them to become smokers. Unfortunately, our sample was not randomly selected with respect to several relevant variables and therefore does not permit a direct test of this possibility.

Some limitations of our study should be noted. Retrospective reports of early smoking experiences have been well supported in the literature, although theoretically they remain as a source of bias (see Riedel, Blitstein, Robinson, Murray, & Klesges, 2003). Previous research shows repeated demonstrations of enhanced sensitivity in young smokers in the U.S. and elsewhere and suggests that the reports of early smoking experiences are not simply a reflection of selective recall of positive experiences by current smokers (Chen et al., 2003; DiFranza et al., 2004; Pomerleau et al., 1999). Research on smoking behavior, including early smoking experiences, have suggested that self-report measures about tobacco use are generally reliable (Brigham et al. 2008; Hudmon, Pomerleau, Brigham, Javitz, & Swan, 2005). Our previous research provides additional support by demonstrating that a period of abstinence, long enough to allow for the dissipation of tolerance, followed by retrospective reports of "buzz" during early experimentation with smoking, significantly predicted which individuals rated re-exposure to nicotine administered via nasal spray as more pleasurable (Pomerleau, et al., 2005a). Furthermore, a study by Perkins et al. (2008) demonstrated that "dizzy" and "buzzed" predicted prospectively assessed responses to nicotine via nasal spray in adult never smokers.

Unfortunately, we did not collect information about the extent to which the African American smokers experimented with mentholated cigarettes. If the current high prevalence of menthol smoking is an indication, as seems likely, however, it likely accounts for the greater difficulty inhaling experienced by Caucasians. Their greater immaturity could also contribute to this difference.

Further research in population-based samples, including queries about the type and strength of cigarettes tried, is clearly warranted to refine our understanding of the observed race differences and to partition the contribution of genetic and environmental risk and protective factors.

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Table 1

Sample characteristics.

	Caucasian Smokers (n=155)	African-American Smokers (n=48)	Statistics, p-values
Age (mean \pm s.e.m.)	38.4 \pm 0.9	37.2 \pm 1.1	t=0.83 NS
Education (mean \pm s.e.m.)	14.3 \pm 0.2	13.3 \pm 0.3	t=2.86 p<.01
Body Mass Index (mean \pm s.e.m.)	26.7 \pm 0.5	28.9 \pm 1.1	t=-2.01 p<.05
Sex (% female)	48%	35%	ChiSq=2.49 NS
Depression (% high-depressed)	44%	44%	ChiSq=0.00 NS
Nicotine dependence (% high-dependent)	64%	65%	ChiSq=0.00 NS
Cigarettes/day (mean \pm s.e.m.)	18.4 \pm 0.7	14.1 \pm 1.0	t=2.92 p<.01
Menthol cigarettes (% menthol smokers)	25%	90%	ChiSq=62.58 p<.0001

Table 2

Race differences in early experiences with smoking (proportion endorsing 3 or 4 on the Early Smoking Experiences questionnaire).

	Caucasian Smokers (n=155)	African-American Smokers (n=48)	Statistics, p-values
global pleasurable	30%	48%	ChiSq=4.20, p<.05
global displeasurable	38%	30%	NS
ratio of global pleasurable to global displeasurable sensations	1.3 ± 0.1	1.5 ± 0.2	NS
“pleasurable rush or buzz”	43%	62%	ChiSq=4.21, p<.05
dizziness	61%	45%	ChiSq=3.22, p<.10
nausea	28%	20%	NS
relaxation	27%	45%	ChiSq=4.50, p<.05
coughing	46%	33%	NS
difficulty inhaling	48%	31%	ChiSq=3.47, p<.10

Table 3Race differences in reasons for starting to smoke regularly ((mean \pm s.e.m.).

	Caucasian Smokers (n=155)	African-American Smokers (n=48)	Statistics, p-values
REASON... Weight	1.9 \pm 0.2	1.5 \pm 0.2	NS
REASON... Friends	6.9 \pm 0.2	4.8 \pm 0.4	t=4.59, p<.0001
REASON... Physical addiction	4.5 \pm 0.3	3.778 \pm 0.5	NS
REASON... Buzz	4.2 \pm 0.2	3.35 \pm 0.5	t=1.75, p<.10
REASON... Taste	4.1 \pm 0.2	3.7 \pm 0.5	NS
REASON... Coping with Stress	5.1 \pm 0.3	4.8 \pm 0.5	NS
REASON... Sad or blue	4.1 \pm 0.3	3.4 \pm 0.4	NS
REASON... Help concentration	3.4 \pm 0.2	3.1 \pm 0.4	NS
REASON... Perk me up	4.2 \pm 0.3	3.1 \pm 0.4	t=2.43, p<.05
REASON... When drank alcohol	6.2 \pm 0.3	7.1 \pm 0.4	NS