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Gender Differences among Hardcore Smokers: An Analysis of the Tobacco Use Supplement of the Current Population Survey

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Abstract

Background: Despite significant declines in smoking rates in the United States, a substantial percentage of adults continue to smoke. Improved understanding of current smokers and their contact with sources of cessation support future tobacco control efforts. Recent evidence suggests that hardcore smokers, established smokers without a history of quit attempts, have less contact with cessation support. Although gender is among the major factors that influence smoking cessation, no research is available on gender differences among hardcore smokers.

Methods: Demographic, environmental, and smoking-related characteristics of female hardcore smokers and male hardcore smokers and other female smokers were examined. Data from 17,777smokers from the 2003 Current Population Survey Tobacco Use Supplement were analyzed.

Results: Compared with female hardcore smokers, male hardcore smokers were more likely to have contact with smoking restrictions at work (OR = 1.69) and at home (OR = 1.45). Compared with female hardcore smokers, female other smokers were more likely to have seen a healthcare provider during the past year who advised them to quit smoking (OR = 1.39) and more likely to have smoking restrictions at work (OR = 1.25) and at home (OR = 2.32)). Measures of nicotine dependence suggested that female hardcore smokers were less dependent than male hardcore smokers but more dependent than other female smokers.

Conclusions: The sociodemographic and healthcare access variations in tobacco use identified in our analyses have significant public health implications and underscore the vital need for clinical and scientific advances in tobacco use prevention and control efforts.

Introduction

Hardcore smokers are of significant public health concern because, by definition, they are individuals who are the most unlikely to quit smoking and, therefore, may be at the greatest risk to develop tobacco-related disease. Recent research has defined hardcore smokers as established, heavy smokers (15+ cigarettes per day) with no or limited history of making a quit attempt.[1–3] Although this definition likely captures only some of those individuals who may be conceptualized as hardcore smokers,[4] previous studies have consistently shown differences between hardcore smokers and other smoking populations on factors that may impact both initiating a quit attempt (e.g., contact with resources that encourage quit attempts) and subsequent success at quitting (e.g., markers of nicotine dependence).[1–3]

Prior work in this area has largely focused on efforts to characterize hardcore smokers and to distinguish them from other groups of smokers; the typical hardcore smoker is described as more likely to be male, unmarried, and not in the work force and to have lower education.[1–3] Hardcore smokers are also more likely to have started smoking at a younger age, smoke more, and are less likely to report contact with healthcare professionals who advise quitting and smoking restrictions, both factors that support cessation attempts. Recent analyses of national data from both the United States

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and England indicate that the prevalence of hardcore smokers may be substantial, comprising 14%–16% of current smokers.[1,3]

Despite the findings that approximately 60% of hardcore smokers are men,[1,2] a sizable minority of hardcore smokers are women. Gender differences among hardcore smokers have not been adequately examined. Such an analysis is important because of gender differences related to tobacco use, its impact on health, and the ability to effectively achieve cessation.[5] In the past 50 years, there have been substantial changes in the smoking patterns of women in the United States, such that early gender gaps have substantially diminished and have remained fairly constant since the mid-1980s.[6] Reflective of this, lung cancer, once rare among women, has surpassed breast cancer as the leading cause of female cancer death in the United States, now accounting for 25% of all cancer deaths among women.[7] Smoking in women has also been associated with an increased risk of cancer of the pharynx, kidney, bladder, esophagus, and pancreas.[5] In addition to cancer, smoking is believed to account for as much as 41% of cardiovascular deaths, with relative risks of approximately 3.0 for current women smokers between the ages of 35 and 64 in the United States, compared with nonsmoking women in the same age range.[8–10] Women also experience unique smoking-related disease risks related to pregnancy, perinatal outcomes, oral contraceptive use, reproduction, menstrual function, osteoporosis, and cervical cancer.[5]

Many smoking-related adverse effects and consequences are reversible upon smoking cessation. Women who quit smoking experience marked reduction in disease risk, including coronary heart disease and lung and other cancers; decreases in disease risk are evident even in smokers who have smoked for long period of time and quit in middle age.[11–15] In addition to the reductions in risk experienced by women who quit smoking, there is strong support for reduced risk to their children. For example, several studies have found that pregnant women who stop smoking within the first trimester have infants with weight and body measurements similar to those of infants born to nonsmoking women.[16–18] Thus, the risks associated with a wide variety of tobacco-related diseases can be effectively addressed through successful smoking cessation efforts.

Adding to the concern about female smokers in general and female hardcore smokers in particular is the potential for gender-based variation in ability to achieve cessation. Data about this issue are mixed, with some studies supporting a gender difference in cessation success[19–23] and others not supporting this finding.[24–26] Furthermore, the presence of hardcore smokers, those most likely to have substantial difficulty quitting, may have far-reaching impact on how to best allocate cessation resources.

To further our understanding of gender differences of continued smokers, especially those who might be classified as hardcore, and differences among groups of female smokers, we performed a series of analyses using a national database, the Tobacco Use Supplement (TUS) to the Current Population Survey (CPS) 2003. The goals of our analysis were to use a national sample to assess possible differences between male and female hardcore smokers and differences between female hardcore smokers and other female smokers in terms of demographics, environment, smoking behavior characteristics, and nicotine dependence. In addition, given the potential importance of contact with smoking cessation messages, we assessed variation in such contact among smoking groups.

Materials and Methods

Sample population

Data for this analysis were drawn from the 2003 Tobacco Use Supplement to the Current Population Survey. The CPS is a national, monthly, household, interviewer-administered, complex survey, which is administered in all 50 states. Conducted by the Bureau of the Census, the CPS primarily serves as the source of official government statistics on employment for the noninstitutionalized, civilian population, aged ≥15 years in the United States.[27] Every 3 years since 1992, the TUS has been sponsored by the National Cancer Institute (NCI) to measure a variety of smoking-related topics. The design of this survey allows for stable estimates of state and U.S. national population smoking rates.

The 2003 TUS CPS includes responses from approximately 250,000 people. Proxy responses are permitted in the CPS; however, the TUS specifically attempts to avoid proxy responses, and only self-report interviews were used for this analysis. All individuals included in this study were at least 26 years of age. This age restriction is identical to that used in previous research and was designed to avoid smokers who are currently in the smoking uptake process.[2] We chose to apply the age restriction to all our comparison groups to avoid a confounding effect by age when comparing groups of smokers.[1] Only data from individuals who reported that they had smoked at least 100 cigarettes in their life and that they currently smoke on at least some days were used. The final sample consisted of 2,090 male hardcore smokers (weighted population estimate = 2,491,879), 1,694 female hardcore smokers (weighted population estimate = 1,608,901), and 13,938 other female current smokers (weighted population estimate = 13,697,463).

Dependent variables (smoking category definitions)

Smoking status was assigned according to definitions created in prior research.[1,2] Hardcore smokers were defined according to the following criteria: (1) at least 26 years old, (2) daily smokers, (3) at least a 5-year smoking history, (4) smoke at least 15 cigarettes per day, (5) report never having made a quit attempt, and (6) report no intent to quit within the next 6 months. Current female smokers included all women who were current smokers and at least 26 years old but who did not meet the other defining criteria for hardcore smokers. This category included both daily and occasional smokers.

Independent variables

The following demographic variables available in the TUS CPS dataset were considered in the analyses: age (continuous), race, education level (categorical), and income (categorical). The following variables related to smoking behavior were also included: total years smoked (continuous), age of smoking onset (continuous), and cigarettes per day (CPD) (continuous). In addition, the 2003 TUS CPS includes a number of questions about nicotine dependence, including smok-

ing the first daily cigarette within 30 minutes of rising (categorical) and modified items of the Nicotine Dependence Syndrome Scale (NDSS) (categorical).[28,29] CPD and time to first cigarette were assessed only among daily smokers. Environmental variables used in the analysis were marital status, work status, restrictions on smoking behavior in work settings or home, and healthcare provider contact and advice to quit smoking.

Statistics

Analyses were performed using SAS-callable SUDAAN,[30] which corrects standard errors to account for the complex sampling design of the CPS survey.[27] National population estimates and corrected standard errors were calculated based on the CPS sample weight for self-report interviews and the appropriate CPS replicate weights.[27] We compared female hardcore smokers with the other smoking groups using standard contingency table analysis. Reported p values are based on either chi-square for categorical variables or t test for continuous variables using corrected standard errors derived from SUDAAN PROC CROSSTAB and PROC DESCRIPT procedures. Multivariate analyses comparing female hardcore smokers with male hardcore smokers and with other female current smokers to assess potential contact with smoking cessation messages were performed using logistic regression. Odds ratios (ORs) and 95% confidence intervals (CIs) were calculated using the SUDAAN procedure PROC RLOGIST.

Results

Demographics

The results of the analyses of demographic variables are presented in Table 1. Compared with both male hardcore smokers and female other smokers, female hardcore smokers tended to have less annual income, were older, and were more likely to be white. Female hardcore smokers did not differ from male hardcore smokers regarding education but were less educated than other female smokers.

Smoking

The results for analyses of the smoking variables are also shown in Table 1. Compared with male hardcore smokers, female hardcore smokers started smoking at a later age and smoked fewer CPD, with no significant difference in total years of daily smoking. Compared with other female smokers, however, female hardcore smokers started smoking earlier and smoked for more total years. Compared with male hardcore smokers, female hardcore smokers demonstrated evidence of lower levels of nicotine dependence: female hardcore smokers were less likely to report smoking their first daily cigarette within 30 minutes of rising and less likely to endorse items from the NDSS. Conversely, compared with other female smokers, female hardcore smokers appeared to have more evidence of nicotine dependence: they were more likely to report smoking their first cigarette within 30 minutes of rising and endorsed more NDSS items.

Table 1. Demographic and Smoking Variable Percentages and Means by Smoking Group Computed Using Sample and Replicate Weights[a]

Variables	*Female hardcore smokers* %	*Male hardcore smokers* %	*Female other smokers* %
Demographic variables			
Education			
>13 years	32.4	31.3 ($p = 0.13$)	45.2 ($p < 0.0001$)
Income			
<$30,000	51.5	45.9 ($p < 0.005$)	43.9 ($p < 0.0001$)
Race			
White, non-Hispanic	86.9	81.2 ($p < 0.002$)	78.7 ($p < 0.0001$)
White, Hispanic	3.6	6.5	7.0
Black	7.2	9.6	12.1
Asian	1.2	2.1	1.3
American Indian	1.1	0.7	0.9
Age (mean)	47.9	46.1 ($p < 0.005$)	46.1 ($p < 0.003$)
Smoking variables			
Age started regular smoking (mean)	17.5	16.6 ($p < 0.0001$)	18.6 ($p < 0.0001$)
Cigarettes per day (mean)	22.8	25.4 ($p < 0.0001$)	15.1 ($p < 0.0001$)
Daily; total years smoked every day (mean)	28.4	28.1 ($p = 0.49$)	24.6 ($p < 0.0001$)
Time to first cigarette ≤30 minutes[b] (Yes)	79.0	82.4 ($p < 0.005$)	69.6 ($p < 0.001$)
Delay (Yes)	55.8	61.4 ($p < 0.003$)	38.2 ($p < 0.001$)
Rain (Yes)	58.9	65.5 ($p < 0.0006$)	48.6 ($p < 0.001$)
Craving (Yes)	67.5	69.4 ($p = 0.27$)	59.5 ($p < 0.001$)
Out to smoke (Yes)	70.0	75.4 ($p < 0.002$)	58.6 ($p < 0.001$)
Total Shiffman score (mean)	5.48	5.28 ($p < 0.0003$)	6.0 ($p < 0.001$)

[a]All p values reflect comparisons with hardcore female smokers.
[b]Only for daily smokers.

Environmental

The results of analyses of the environmental variables are summarized in Table 2. Female and male hardcore smokers were equally likely to be currently married, but female hardcore smokers were more likely to be widowed, and male hardcore smokers were more likely to have never been married. No differences in marital status were noted between female hardcore smokers and other female smokers. Only 54.1% of female hardcore smokers were currently in the workforce compared with 67.1% and 60.6% of male hardcore smokers and other female smokers, respectively. Among those who were working, no difference in the presence of work smoking restrictions was noted between male and female hardcore smokers. Compared with other female smokers, a significant difference in the presence of smoking work restrictions was noted, with other female smokers being more likely to work in settings where smoking was restricted. Regarding restrictions within the home, 19.9% of hardcore male smokers and 30.7% of female other smokers reported complete smoking bans compared with only 13.8% of female hardcore smokers.

Compared with male hardcore smokers, female hardcore smokers were more likely to have seen a healthcare provider in the last year and, if a provider was seen, were more likely to have received advice to quit. Female other smokers were more likely to have seen a healthcare provider within the last year than female hardcore smokers but were equally as likely to have received advice to quit if a provider was seen.

Multiple regression

The results of the multiple regression analysis are presented in Table 3. After controlling for age, education, income, race/ethnicity, age of smoking onset, and length of smoking history, compared with female hardcore smokers, male hardcore smokers were more likely to have contact with work-based smoking restrictions (OR = 1.69) and to have smoking restrictions in their home (OR = 1.45) but were less likely to have had contact with a healthcare provider who advised quitting smoking (OR = 0.50).

Controlling for the same variables, compared with female hardcore smokers, female other smokers were more likely to be married (OR = 1.19), more likely to have seen a healthcare provider who advised quitting (OR = 1.39), and more likely to have smoking restrictions at work (OR = 1.25) and home (OR = 2.32).

Discussion

Using a previously established conceptualization of hardcore smokers,[1–3] we compared female hardcore smokers with both male hardcore smokers and other female smokers over the age of 25 based on a sample drawn from the 2003 TUS CPS. Approximately 45% of smokers meeting our definition of hardcore smoker were women, which translates to a population estimate within the United States of roughly 1,600,000 individuals and approximately 11% of all female smokers over the age of 25.

A number of potentially important differences in demographic, environmental, and smoking variables were identified. When compared with male hardcore smokers, female hardcore smokers were more likely to be unemployed, non-Hispanic whites with lower incomes who were slightly older. No differences in education level or currently being married were observed between male and female hardcore smokers, although male hardcore smokers were more likely to have never been married and female hardcore smokers were more likely to be widowed. Although no differences in total years

Table 2. SUDAAN-Adjusted Environmental Variable Percentages and Means by Smoking Group Computed Using Sample and Replicate Weights[a]

Environmental variables	*Female hardcore smokers* %	*Male hardcore smokers* %	*Female other smokers* %
Employment			
Employed	54.1	67.1 ($p < 0.0001$)	60.6 ($p < 0.0001$)
Unemployed	4.8	6.6	5.7
Retired, disabled, other	41.0	26.2	33.8
Marital status			
Married	46.4	46.7 ($p < 0.0001$)	47.7 ($p = 0.036$)
Widowed	10.0	6.6	8.6
Divorced/separated	28.1	28.2	27.9
Never	15.6	22.4	15.8
Saw healthcare provider in last year (Yes)	71.0	50.0 ($p < 0.0001$)	81.0 ($p < 0.0001$)
Healthcare provider advised quit in last year (Yes)[b]	62.0	56.7 ($p < 0.05$)	61.7 ($p = 0.86$)
Work smoking policy (Yes)[c]	84.2	84.4 ($p = 0.95$)	88.5 ($p < 0.02$)
Smoking rules in your home			
Not allowed	13.8	19.9 ($p < 0.001$)	30.7 ($p < 0.0001$)
Allowed in some areas	20.6	19.6	27.4
Allowed in all areas	65.6	60.5	41.9

[a]All p values reflect comparisons with hardcore female smokers.
[b]Only among those who had seen a healthcare provider.
[c]Only among those who were employed.

Table 3. ORs and 95% CI Based on Two Separate Multiple Logistic Regression Models Comparing Female Hardcore Smokers with Male Hardcore Smokers (Model 1) and with Other Female Smokers (Model 2) on Contact with Sources Supporting Smoking Cessation[a,b]

Variable	*Model 1 Female hardcore smokers vs. male hardcore smokers OR (95% CI)*	*Model 2 Female hardcore smokers vs. female other smokers OR (95% CI)*
Currently married (Yes)	1.06 (0.89–1.26)	1.19 (1.00–1.41)
Contact with work smoking restrictions (Yes)[c]	1.69 (1.39–2.07)	1.25 (1.08–1.45)
Contact with healthcare provider, advice to quit in last year[d] (Yes)	0.50 (0.42–0.60)	1.39 (1.20–1.61)
Smoking not allowed in home (Yes)	1.45 (1.14–1.86)	2.32 (1.88–2.88)

[a]Both models control for current age, education, income, race/ethnicity, age of smoking onset, and total years smoked.
[b]Female hardcore group is referent group for the analyses.
[c]For these models, individuals not currently employed were included and considered to not have contact with work restrictions.
[d]For these models, individuals who had not seen a healthcare provider during the last 12 months were included and considered to not have received provider advice to quit in that time frame.

reported as a regular smoker were observed, female hardcore smokers appear to have started smoking at a later age and to smoke fewer cigarettes than male hardcore smokers. In addition, based on time to first cigarette in the morning and items from the NDSS, female hardcore smokers appear to have fewer signs of nicotine dependence.

Similar results were found when comparing female hardcore smokers with other female smokers. Female hardcore smokers were more likely to be unemployed, unmarried, non-Hispanic whites with lower incomes. A significant difference in education level was found, with female hardcore smokers being less likely to have gone beyond high school compared with other female smokers. When compared with other female smokers, female hardcore smokers started smoking at an earlier age and reported being a regular smoker for longer. Female hardcore smokers demonstrated more signs of nicotine dependence than did other female smokers based on time to first cigarette in the morning among daily smokers and items from the NDSS.

Contact with healthcare providers has been found to be associated with increased probability of making a cessation attempt and achieving successful cessation.[31–33] In our sample, compared with male hardcore smokers, female hardcore smokers were more likely to have seen a healthcare provider in the last year and to have received cessation advice from a provider. In contrast, compared with other female smokers, female hardcore smokers were less likely to have seen a healthcare provider in the last year. If a provider was seen in the last year, no differences in receiving advice to quit were noted. After controlling for key demographic and smoking variables, the overall effect was that female hardcore smokers were less likely to have had contact with cessation support by a healthcare provider than other female smokers but more likely than male hardcore smokers.

Contact with smoking bans and restrictions is another key factor associated with cessation attempts and success.[31–36] We found that female hardcore smokers were less likely to live in homes with smoking restrictions compared with both male hardcore smokers and other female smokers. No difference was found between male and female hardcore smokers in terms of contact with work restrictions if the person was employed. It should also be noted, however, that female hardcore smokers were less likely to be employed; thus, extensive smoking bans at work have less impact on them. Compared with other female smokers, female hardcore smokers were less likely report tobacco restrictions at work and were also less likely to be employed. Based on the multivariate models, it appears that female hardcore smokers are less impacted by work-based smoking restrictions.

The observation that female hardcore smokers represent even more economically disadvantaged groups among hardcore smokers, who generally have lower incomes, suggests that female hardcore smokers may be facing a number of significant economic stressors that may impede willingness to attempt to quit smoking. Unfortunately, the TUS CPS data do not capture additional features of the specific contexts that may be affecting willingness to attempt smoking cessation, such as severe medical conditions, depression, and comorbid substance abuse. It may also be that elevated nicotine dependence compared with other female smokers plays a role in female hardcore smokers' lack of quit history. Both information related to comorbid conditions and the function of smoking in these women's lives would be useful in clarifying how to best intervene with this population. This area of further research should be aggressively pursued to identify contextual factors to better explain the specific contexts in which smoking is occurring.

Our results point to a number of potentially important differences both between female and male hardcore smokers and between female hardcore smokers and other female smokers that may be useful in identifying means to more effectively target interventions aimed at hardcore smokers. In

particular, there are differences regarding the extent and nature of contact with resources that could encourage and assist in cessation attempts. This suggests that gender may be an important factor to consider in the development of specific programs aimed at reaching hardcore populations.

It appears that female hardcore smokers are less likely to have contact with work-related smoking restrictions or cessation programs. Thus, this may not be the most useful avenue to try to reach this group. Although they have less contact with health providers than other female smokers, approximately 70% of female hardcore smokers reported seeing a healthcare provider during the last 12 months. This would seem to be a potentially important access point to reach female hardcore smokers. Of note, we did not find differences between female hardcore smokers and other female smokers in terms of receiving advice to quit from a healthcare provider if one was seen. Despite receiving this advice as frequently as other female smokers, hardcore female smokers did not initiate a quit attempt. This suggest that healthcare providers may need to take additional steps to effectively intervene with female hardcore smokers, for example, exploring the possible presence of comorbid conditions and potential obstacles to engaging in treatment. Given that female hardcore smokers also demonstrated evidence of being more likely to have higher levels of nicotine dependence compared with other female smokers, this is an issue that should be looked further into, exploring concerns about withdrawal and ability to quit, as well as problem-solving effective treatments.

Although these results suggest possible means to improve cessation attempts in this population, there continue to be gaps that, if addressed, could identify strategies that would further efforts in this area. As noted, our current analyses are limited by a lack of data about comorbid physical and psychological conditions. In addition, no data are available about other obstacles to engaging in cessation treatment (e.g., limited child care, access to treatment). TUS CPS is a cross-sectional study, and although important population-level analyses can be performed, longitudinal data about transitions toward long-term cessation are not available. Finally, as we restricted our sample to only those aged ≥26 years in order to be consistent with previous literature and assess the smoking behavior of those smokers who were not likely to be in the uptake phase of smoking, our results may not be generalizable to young adult smokers 18–25 years old.

Many population groups disproportionately shoulder the cancer burden. Gender is among the major factors that influence disparities in cancer incidence, morbidity, and mortality.[37,38] The sociodemographic and healthcare variations in tobacco use identified in our analyses have significant tobacco-related and public health implications, underscoring the vital need for clinical and scientific advances in tobacco use prevention and control.

Disclosure Statement

No competing financial interests exist.

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