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Phantom smoking among young adult bar patrons

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Abstract

Objective—To explore the prevalence and sociodemographic makeup of smokers who do not self-identify as smokers (ie, phantom smokers) compared with self-identifying smokers in a sample of bar-going young adults aged 18–30 years to more accurately assess young adult prevalence of smoking and inform cessation message targeting.

Methods—Cross-sectional surveys of smokers (n=3089) were conducted in randomly selected bars/nightclubs in seven US cities. Logistic regression models assessed associations between phantom smoking (past 30-day smoking and denial of being a smoker), tobacco and alcohol use behaviours (eg, social smoking, nicotine dependence, smoking while drinking, past 30-day alcohol use) and demographics.

Results—Compared with smokers, phantom smokers were more likely to be college graduates (OR=1.43, 95% CI 1.03 to 1.98) and to identify themselves as social smokers (OR=1.60, 95% CI 1.27 to 2.12). Phantom smokers had lower odds of smoking while drinking (OR=0.28, 95% CI 0.25 to 0.32), being nicotine dependent (OR=0.36, 95% CI 0.22 to 0.76) and having quit for at least 1 day in the last year (OR=0.46, 95% CI 0.36 to 0.69) compared with smokers.

Conclusions—This research extends phantom smoking literature on college students to provide a broader picture of phantom smoking among young adults in high-risk contexts and of varying levels of educational attainment. Phantom smokers may be particularly sensitive to social pressures against smoking, suggesting the importance of identifying smoking as a behaviour (rather than identity) in cessation messaging to ensure that phantom smokers are reached.

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Contributors
JG, YOL and PL contributed to hypothesis generation. PL contributed to study design and data collection. NL contributed to data analysis. NL and JG contributed to result interpretation. JG, NL, YOL and PL contributed to drafting and editing of the manuscript.

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None declared.

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INTRODUCTION

In aggregate, smoking rates have decreased substantially among adults in the USA.[1] Despite the steady decrease in smoking rates in recent years, young adults remain the only age group for which smoking rates are increasing.[2] Non-daily smoking (ie, smoking on 1–29 of the past 30 days) is becoming increasingly common among young adults.[3] Compared with daily smoking, non-daily smoking and light smoking carry a lower, but still substantial, risk for lung cancer and a similar risk for cardiovascular disease.[4–6] In addition, people who smoke occasionally have higher rates of smoking-related morbidity and mortality than those who have never smoked.[57–9]

Denormalisation of tobacco use has become an important component of tobacco control strategy. It involves the use of messaging and policy to reinforce that smoking is not typical or mainstream, such as passing clean indoor air acts.[1011] However, this strategy of reinforcing non-smoking social norms may have inadvertently stigmatised smokers.[12] Researchers have argued that another effect of the denormalisation of smoking is a phenomenon referred to as ‘phantom smoking’, when a person reports smoking cigarettes but does not self-identify as a smoker.[1013–16] The potential causes of phantom smoking are still unclear and the available studies are limited. The majority of research on phantom smokers has focused on college students or on all adults in California.[10131416] These studies either included a limited number of young adult smokers [10] or do not provide detailed data on phantom smoking outside of university settings,[131416] such as among straight-to-work young adults, who are at higher risk for smoking.[17]

Many young adult, non-daily smokers are phantom smokers.[13141618] This presents a public health issue because it underestimates the number of young adult smokers reported by public health surveillance systems and may reflect a decreased interest in quitting smoking among young adults.[1013–1619]

Rates of phantom smoking in previous studies are inconsistent, with studies reporting between 5.5% and 29.3% of all young adults and 56.5% of young adults who smoke being phantom smokers.[1416] Recent research exploring phantom smoking among adults in California suggests that about 12.3% of smokers (smoked 100+ cigarettes in lifetime and past 30-day smoking) were considered phantom smokers, and 64% of phantom smokers were between the ages of 18 and 44 (specific data on young adult smokers were not reported). The likelihood of phantom smoking was shown to be higher among non-daily smokers who previously smoked daily and who never smoked daily compared with daily smokers.[10] Phantom smoking likelihood was also higher among people who did not believe they were addicted to cigarettes,[10] which is often consistent with non-daily patterns of smoking.[16] Taken together, these findings suggest that phantom smokers smoke at lower levels than self-identified smokers.

The present study explores phantom smoking among a large sample of bar-going young adults aged 18–30 years. These data capture a wider range of educational backgrounds and ages of young adult smokers than previous studies. In addition, this study includes data from

seven US cities, allowing for the exploration of patterns of phantom smoking among a national sample of young adults.

METHOD

Participants and procedure

Young adult bar and club patrons completed questionnaires as part of a larger tobacco use study that took place from January 2012 through March 2014. Time-location sampling was used to generate a sample of young adults from bars in Albuquerque, Los Angeles, Nashville, Oklahoma City, San Diego, San Francisco and Tucson. Using a well-established methodology,[2021] venues, dates and times were randomly selected from a list of bars and clubs frequented by young adults in each city. The methodology was originally developed as a way to reach underserved populations in the locations they frequent and has been described in other published studies.[22–25] All participants answered a set of core questions, and two-thirds of participants answered a different group of questions; only answers to core questions were included in our analyses.[26] For the purpose of this study, we only included participants who were smokers (ie, smoked in the past 30 days) and between the ages of 18 and 30 years (n=3089). Among venue patrons approached for the study (16 281), 75% of people who met eligibility criteria for the larger study (being aged 18–30 years) completed surveys (8324/11 214).

Measures

Demographics—Demographic information assessed included date of birth (used to calculate age), education (in college, college graduate, college dropout/never attended college), race/ethnicity (non-Hispanic black, non-Hispanic white, non-Hispanic other, Hispanic), self-reported sexual orientation (heterosexual vs non-heterosexual) and sex (male vs female).

Outcome variables—The main outcome variable, phantom smoker (yes/no), was created using two items: ‘Do you consider yourself to be a smoker?’ and past 30-day smoking behaviour. Those who did not consider themselves smokers but reported any smoking in the past 30 days were considered to be phantom smokers, whereas those who described themselves as smokers and reported smoking days were considered regular smokers.

Predictor variables—Perceived prevalence of smoking was measured by asking the following question: ‘Based on what you have seen, how many people your age smoke tobacco?’. As part of this question, participants were further instructed to ‘Think about the most social, well-known people that hang out where you do. How many of them smoke?’ (with response categories in 10% point increments on a scale from 0% to 100%). Participants were also asked whether they considered themselves to be social smokers (yes/no), in addition to the following questions: ‘During the past 30 days, on how many days did you: Smoke at least one cigarette?’; ‘During the past 30 days, on how many days did you: Drink at least five alcoholic shots or drinks within a few hours?’ (number of days); and ‘When out at a bar, how frequently do you smoke cigarettes while drinking alcohol?’ (1=I never smoke when I drink alcohol in bars … 4=I always smoke when I drink in a bar).

Nicotine dependence was assessed by asking whether participants smoked a cigarette within 30 min of waking in the morning. We measured quitting using the item, 'During the past 12 months, have you stopped smoking tobacco for 1 day or longer because you were trying to quit?', which was dichotomised from a Likert-type scale (did not try vs tried to quit). Perceived smoking stigma was measured using two single items: 'I feel guilty when I smoke' and 'I keep my tobacco smoking secret from most people' (1=strongly disagree and 5=strongly agree).

Analytical plan—Table 1 presents descriptive information for the full sample and phantom smokers (yes/no). χ^2 and t tests were used for continuous and categorical variables, respectively, to determine which variables differed between phantom smokers and other smokers. Variables related to phantom smoker status ($p<0.10$) were included in subsequent analyses. This portion of the analysis was completed using SAS (SAS Institute Inc. SAS/STAT® 9.2 user's guide. Cary, NC: SAS Institute Inc. 2008). Next, logistic regression models were run using phantom smoker status as the outcome variable. Predictors included demographic and tobacco and alcohol variables related to phantom smoker status in the univariate analyses ($p<0.10$). Analysis was completed using M*plus*.[27] The data collection method for the present study used a planned missing data design, in which participants do not complete every item in the final survey. Core measures were administered to all participants, while additional measures were randomly assigned to two-thirds of the sample. Thus, the number of smokers and phantom smokers that we included in our final analyses does not include participants who did not receive the question asking whether they considered themselves to be a smoker. Missing data were handled using full information maximum likelihood (FIML), which allows all observations to be used.[28] The FIML method has been shown to produce more accurate estimates in model estimations by adjusting for the uncertainty caused by missing data.[2930] City was entered using the STRATIFICATION command, and venue (the unit of randomisation) was entered using the CLUSTER option with TYPE is COMPLEX in M*plus*. This technique allows us to account for intraclass correlation within clustered units (bar) nested within cities on computed significance levels and for generalisation of the findings to a larger sample.[31]

RESULTS

Sample characteristics

Overall, the sample included a large number of non-Hispanic, white (49.9%) and Hispanic participants (30.3%), with fewer African-American participants (5.5%) and participants in the 'Other' race/ethnicity category (14.4%) (compared with white participants). The sample included a range of educational backgrounds with 43.7% reporting that they were currently in college, 31.6% reporting that they were college graduates and 24.7% reporting no college. Mean age of participants was 23.7 (SD=1.8), and the sample was 41.5% females (detailed information in table 1). Although the majority of the sample was heterosexual (83.17%), the number of non-heterosexual participants (~17%) was higher than the 6.4% national prevalence of participants aged 18–29 years identifying as lesbian, gay, bisexual and transgender (LGBT).[32] About 75% of the sample identified themselves as social smokers. Mean days smoked across the entire sample was 14, and mean days binged on alcohol was

close to 9. Approximately 27% of the sample reported nicotine dependence (ie, smoking within 30 min of waking).

Univariate analyses

Univariate analyses determined that phantom smokers differed from other smokers on education and sex, with a higher proportion of college graduates and females ($p<0.10$), but not on other demographic variables. Compared with regular smokers, phantom smokers smoked fewer days on average, perceived that fewer of their peers smoked, had lower nicotine dependence and were more likely to identify as a social smoker (all $p<0.001$). Phantom smokers were also less likely to binge drink, smoke while drinking or have a past year quit attempt than regular smokers (all $p<0.001$). In addition, phantom smokers reported higher levels of perceived smoking stigma, reporting that they experienced greater guilt, and kept their smoking secret more often compared with regular smokers (all $p<0.001$).

Logistic regression analysis

Logistic regression analysis was used to explore the research questions (table 2). We included the variables in the model that were found to be significantly related ($p<0.10$) to phantom smoker status in univariate analyses. Compared with smokers, phantom smokers were more likely to be college graduates (OR=1.43, 95% CI 1.03 to 1.98) and to identify themselves as social smokers (OR=1.60, 95% CI 1.27 to 2.12). Alternatively, phantom smokers had lower odds of smoking while drinking at a bar (OR=0.28, 95% CI 0.25 to 0.32), being nicotine dependent (OR=0.36, 95% CI 0.22 to 0.76), having quit for at least 1 day in the last year (OR=0.46, 95% CI 0.36 to 0.69) and perceiving that their peers smoke (OR=0.99, 95% CI 0.98 to 0.99) compared with other smokers. Sex, binge alcohol use and smoking stigma were not significantly related to phantom smoker status in the multivariate model.

DISCUSSION

Phantom smokers accounted for 43% of the current smokers in our sample, suggesting that phantom smoking is common among bar-going young adults who come from straight-to-work, current college student and college-educated backgrounds. Prevalence of phantom smoking was slightly lower in this study than in previous studies assessing college students, which reported that more than half of the participants identified as phantom smokers.[14,16] College graduates and women in our sample had higher odds of being phantom smokers than smokers, which is not surprising given that smoking rates in the USA are lowest among individuals with an undergraduate or graduate degree (compared with other educational backgrounds) and among females (compared with males).[33]

Results suggest perceived prevalence of smoking may be a more influential factor on the reporting of phantom smoking than stigmatisation. Phantom smokers in the present study perceived lower levels of smoking among peers, suggesting that individuals who perceive smoking to be less common in their social group are more likely to be phantom smokers. These findings are consistent with claims from previous research that denormalisation of smoking is associated with phantom smoking.[10,13–16] Although we observed higher levels of

perceived smoking stigma (ie, feeling guilty about smoking) among phantom smokers than smokers in univariate analysis, this effect did not emerge in multivariate models. This finding does not necessarily suggest that stigmatisation of smoking is unrelated to lower perceived levels of smoking among phantom smokers, but rather that perceived stigma may influence these perceptions in a more nuanced manner than could be captured with the present data.

Compared with smokers, phantom smokers also had lower odds of having made a quit attempt in the past year. These findings are consistent with previous studies showing phantom smoking was associated with fewer quit attempts[131516] and lower levels of motivation or desire to quit.[13161834]

One important contribution of this research is the exploration of phantom smoking behaviour among a broad population of young adults that included straight-to-work young adults, college students and college graduates, compared with previous studies focusing mainly on young adults in college settings.[131416] The finding that college graduates and current college students were more likely to be phantom smokers warranted further exploration. We conducted additional analyses to determine whether there was also a relationship between being a college graduate and nicotine dependence and found a high correlation between education and nicotine dependence (having a cigarette <30 min after waking) ($r=0.118$, $p<0.0001$), such that being in college or being a college graduate is related to having a lower percentage of nicotine dependence. This finding is important because it further confirms that straight-to-work young adults are at a higher risk for heavier smoking[17] and makes an important argument for the need to use innovative sampling approaches for recruiting hard-to-reach populations of young adults, such as the ones used in the present research. These findings also suggest the larger need for tobacco control interventions for young adults in the USA and potentially other countries that have large populations of young adults who smoke, to extend beyond college campuses to reach straight-to-work young adults who are heavier smokers and the most heavily addicted to nicotine.

Our findings have important implications for public health campaign targeting and messaging. Substantial numbers of young adult smokers may be missed in public health campaign messaging that overtly targets smokers. Results provide further support for more nuanced clinical surveillance measures that more specifically capture smoking behaviour (ie, using past 30-day smoking) rather than simply asking patients to identify themselves as current, former or never tobacco users in clinical screening.[1635]

Findings from this study and others suggest that specific campaigns and targeting strategies are needed to target individuals who smoke at lower levels,[36] rather than only targeting messaging and content towards heavier, daily smokers, for example. Public health campaigns for young adults need to be particularly cautious in designing cessation messaging, as references to quitting may trigger the perception that to quit one needs to identify as a smoker. Special efforts may be needed to reach female, college-educated young adults, who are more likely to be phantom smokers.

In terms of recommendations for messaging for these public health campaigns, researchers studying non-daily smoking have suggested that campaign messages should address health consequences specific to non-daily smoking,[14] such as the risk of cardiovascular disease,[4–6] and that non-daily smokers still have higher rates of smoking-related morbidity and mortality than non-smokers.[57–9] In addition, campaign messaging should focus more on social and environmental motivations for smoking, which are more relevant to non-daily smokers, and less on addiction, as phantom smokers are less nicotine dependent. Longitudinal studies of young adult smokers are also needed to better describe the natural history of phantom smoking to determine whether reluctance to identify oneself as a smoker is part of a smoking cessation process or a way to mitigate smoking stigma while maintaining the behaviour.

Findings from this study also provide a reminder of the importance of smoke-free environments in bars and nightclubs. More than one-third of the participants aged 18–30 years who completed surveys in the present study were smokers, and research has demonstrated a clear relationship between binge drinking and smoking frequency.[24] Evidence suggests that passing clean indoor air acts has been closely related to reduced smoking rates in the USA.[1011] Phantom smokers had lower rates of binge drinking and smoking while drinking at a bar,[24] suggesting that smoke-free bars and nightclubs would have the greatest impact on heavier smokers.

Limitations

Findings are cross-sectional and do not provide evidence for causality or changes in phantom smoking among young adults over time. In addition, the conclusions of this study may not generalise to geographic locations beyond the seven cities represented here, to other age groups (eg, youth, older adults with more established smoking patterns) or to young adults who do not frequent bars.

Conclusion

It is important to capture smoking behaviour patterns among young adults accurately to estimate smoking rates more precisely and to target smoking cessation messages appropriately. This research extends the phantom smoking literature on college students in limited geographic locations to provide a broader picture of phantom smoking among young adults in high-risk contexts and of varying levels of educational attainment. Our findings suggest that phantom smokers make up a substantial proportion of young adult smokers, are less likely to perceive smoking to be common among their peers and are more likely to be in demographic groups with lower levels of smoking, including those who are females and college educated. Phantom smokers may be particularly sensitive to social pressures against smoking, but unwillingness to identify as smokers poses a particular challenge to developing relevant smoking cessation messages.

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What this paper adds

- We explored the prevalence and sociodemographic makeup of phantom smokers among young adults from a broad array of educational backgrounds and geographic regions, which to date had only been explored among college student samples or in limited geographic regions of the USA.
- College graduates and women in our sample had higher odds of being phantom smokers than smokers. US smoking rates are lower in these groups, suggesting that current clinical surveillance systems may not be capturing these populations as current smokers.
- Findings suggest that smoking cessation messages should be designed to target smoking behaviour of phantom smokers (particularly women and college graduates), who are not being reached by traditional cessation messaging.

Table 1

Sample characteristics and tobacco-related variables among bar patrons aged 18–30 years: 2013

Characteristics	Total sample n (%) 3089 (100)	Phantom smokers n (%) 966 (43.30)	Smokers n (%) 1265 (56.70)	p Value*
Demographics				
Age, M (SD)	23.70 (1.80)	23.63 (1.80)	23.67 (1.80)	0.5809
Education				
No college	760 (24.68)	155 (17.00)	354 (29.26)	<0.0001
In college	1347 (43.73)	404 (44.30)	540 (44.63)	
College graduate	973 (31.59)	353 (38.71)	316 (26.12)	
Race/ethnicity				
White	1535 (49.90)	469 (51.54)	602 (49.75)	0.457
African-American	168 (5.46)	41 (4.51)	73 (6.03)	
Other	442 (14.37)	133 (14.62)	176 (14.55)	
Hispanic	931 (30.27)	267 (29.34)	359 (29.67)	
Sexual orientation				
Heterosexual	2559 (83.17)	764 (83.86)	1007 (83.36)	0.757
Sex				
Female	1277 (41.50)	405 (44.36)	448 (37.18)	0.0008
Tobacco and alcohol use				
Past 30 days, days smoked, M (SD)	14.39 (12.00)	7.00 (8.30)	20.28 (11.30)	<0.0001
Based on what you have seen, how many people your age smoke? M (SD)	52.14 (22.50)	47.87 (22.10)	57.26 (21.80)	<0.0001
Self-identified social smoker	1552 (-74.29)	701 (79.21)	828 (70.59)	<0.0001
Past 30 days, days binged on alcohol, M (SD)	8.71 (8.70)	7.73 (8.10)	9.54 (9.20)	<0.0001
When out at a bar, how frequently do you smoke cigarettes while drinking alcohol? M (SD)	3.07 (1.00)	2.49 (0.90)	3.55 (0.70)	<0.0001
I feel guilty when I smoke, M (SD)	2.38 (1.30)	2.72 (1.30)	2.12 (1.20)	<0.0001
I keep my tobacco smoking secret from most people, M (SD)	2.59 (1.60)	2.70 (1.30)	2.11 (1.20)	<0.0001
Nicotine dependent	614 (26.40)	35 (7.45)	374 (32.52)	<0.0001
During the past 12 months, have you stopped smoking tobacco for 1 day or longer because you were trying to quit?	1161 (41.84)	261 (34.34)	549 (46.64)	<0.0001

*p Value for pairwise comparisons of phantom smokers and smokers using t tests and χ^2.

Table 2

Logistic regression results of phantom smokers (vs regular smokers): 2013

Independent variables	OR	95% CI	p Value
Education (ref=no college)			
In college	1.22	0.88 to 1.68	0.225
College grad	1.43	1.03 to 1.98	0.030
Sex (ref=male)	0.84	0.67 to 1.04	0.114
How many people your age smoke?*	0.99	0.98 to 0.99	0.002
Self-identified social smoker (ref=social smoker)	1.60	1.27 to 2.12	0.001
Past 30 days, days binged on alcohol (ref=yes)	1.00	0.99 to 1.02	0.617
When out at a bar, how frequently do you smoke cigarettes while drinking alcohol?†	0.28	0.25 to 0.32	0.000
I feel guilty when I smoke‡	1.21	0.99 to 1.64	0.118
I keep my tobacco smoking secret from most people‡	1.17	0.98 to 1.54	0.145
Nicotine dependence (ref=dependent)	0.36	0.22 to 0.76	0.000
Past 12 months, quit for at least 1 day (ref=yes)	0.46	0.36 to 0.69	0.000

*Answer choices (0–100%).

†Answer choices (1=I never smoke when I drink alcohol in bars … 4=I always smoke when I drink in a bar).

‡Answer choices (1=strongly disagree, 5=strongly agree).