

Original Investigation

Differences between intermittent and light daily smokers in a population of U.S. military recruits

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Abstract

Introduction: Few studies have assessed differences between intermittent and light smokers, particularly among young adults. Exploring these differences promotes a systematic approach to research and treatment in low-level smokers. This study explored demographic, tobacco-related, and psychosocial predictors of intermittent nondaily smoking relative to light smoking among basic military training (BMT) recruits. The impact of smoking status on abstinence rates at follow-up was also assessed.

Methods: Participants were 5,603 U.S. Air Force BMT intermittent nondaily ($n = 3,134$) or light daily ($n = 2,469$) smoking recruits participating in a population-based group randomized trial targeting tobacco use prevention and cessation (Klesges et al., 2006, Efficacy of a tailored tobacco control program on long-term use in a population of U.S. military troops. *Journal of Consulting and Clinical Psychology*, 74, 295–306.). Participants completed baseline measures assessing demographics; tobacco use and history; and common social, attitudinal, and behavioral risk factors for tobacco use. Flights of recruits were randomly assigned to a tobacco use intervention or health education control intervention. At the 1-year follow-up, participants reported 7-day point prevalence and continuous abstinence.

Results: Intermittent nondaily smoking relative to light daily smoking was associated with lesser perceived addiction, intermittent and daily use of smokeless tobacco, nonsmoking male and female heads of household, lesser likelihood of smoking while stressed or while bored, and higher likelihood of intentions to quit smoking. Intermittent smokers were significantly more likely than light daily smokers to report abstinence at follow-up.

Discussion: Intermittent and daily light smokers differ on several tobacco-related and psychosocial variables. Attending to these factors in prevention and cessation programs may enhance abstinence in both groups.

Introduction

Smoking is the leading cause of preventable death in the United States (Centers for Disease Control and Prevention, 2004). Despite a decrease in smoking among middle-aged and older adults, young adult smoking prevalence declines are smaller, and reductions in moderate to heavy smoking have been accompanied by an increase in prevalence of light and intermittent smoking (Pierce, White, & Messer, 2009). One group of young adults who demonstrate high rates of smoking are individuals serving in the military (Bray et al., 2006; Nelson & Pederson, 2008).

Two subgroups of smokers who have received growing attention (Fiore et al., 2008) and have yet to be examined among military personnel are light and intermittent (i.e., nondaily) smokers. Both young adults (Substance Abuse and Mental Health Services Agency, 2004) and ethnic minorities (Ahluwalia et al., 2006; Rodriguez-Esquivel, Cooper, Blow, & Resor, 2009; Trinidad et al., 2009) are predominant in the military and evidence high rates of low-level smoking. Therefore, light and intermittent smoking are likely to be especially common in this group.

A pattern of maintaining low levels of smoking has multiple implications. First, relative to never smoking, even light smoking is deleterious to health such that light smokers are at increased

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risk for cancer (Bjartveit & Tverdal, 2005), myocardial infarction (Prescott, Scharling, Osler, & Schnohr, 2002), and cardiovascular mortality (Prescott et al.), and relative to current nonsmokers, respiratory symptoms (An et al., 2009). Second, the literature as to whether light smokers escalate their rates of smoking over time is inconsistent (Kenford et al., 2005; Levy, Biener, & Rigotti, 2009). Third, light smokers are less often advised than heavier smokers to quit smoking by their health care providers (Koontz et al., 2004; Owen, Kent, Wakefeld, & Roberts, 1995) and are less likely to receive treatment overall (Tong, Ong, Vittinghoff, & Pérez-Stable, 2006). Fourth, light smokers often do not exhibit the same levels of tolerance and withdrawal as do heavier smokers (Shiffman, Paty, Kassel, Gnys, & Zettler-Segal, 1994; Soresi, Catalano, Spatafora, Bonsignore, & Bellia, 2005), suggesting that physiological and behavioral factors that are targeted for intervention may need to be modified for this group. Finally, although in a recent trial, low-level smoking was not associated with abstinence at follow-up (Reitzel et al., 2009), one recent study targeting lighter smokers (defined as smoking 6–15 cigarettes/day [cpd]) observed higher abstinence rates for those without a history of heavier smoking at the Week 12 follow-up (Gariti et al., 2009), which suggests that interventions specifically targeting low-level smokers may increase efficacy.

We identified only one cessation intervention study between light and intermittent smokers. In this study, Blacks who smoked on at least 25 of the past 30 days and consumed 10 or fewer cpd were randomly assigned to the following: 2 mg nicotine gum plus health education, 2 mg nicotine gum plus motivational interviewing, placebo gum plus health education, or placebo gum plus motivational interviewing. Results indicated that nicotine gum was no better than placebo in increasing cessation; however, at all timepoints, health education outperformed motivational interviewing in increasing cessation (Ahluwalia et al., 2006). Although in this study, light smoking was an inclusion criterion, the study did not identify predictors of light smoking. Given the increasing number of (particularly young) adults who are light and intermittent smokers and the paucity of interventions targeting this group, additional assessment and subsequent treatment studies are clearly needed.

In order to advance the literature, efforts should assess characteristics relevant to intermittent and light smoking to determine how best to address low-level smoking. Many studies have noted factors associated with light smoking relative to heavier smoking such as the tendency to smoke more on weekend days (Colder et al., 2006) and in certain settings (e.g., bars) (Shiffman & Paty, 2006) as well as engaging in indulgent activities such as relaxation, eating, and consuming alcohol (Krukowski, Solomon, & Naud, 2005; Shiffman & Paty). In addition, although light smokers report levels of craving that are similar to those of heavier smokers, between cigarette urges tend to be less common (Shiffman & Paty). Recently, two studies assessed differences between intermittent and light smokers relative to moderate-heavy smokers in ethnic subgroups. First, Tong, Nguyen, Vittinghoff, and Pérez-Stable (2009) noted that Asian American intermittent and light smokers compared with moderate-heavy smokers were more likely to be women and highly educated. Relative to daily smokers, intermittent smokers were more likely to be women and to have lower household incomes. Second, Boulos et al. (2009) assessed differences between non-daily, light daily, and moderate-heavy male smokers

in Egypt. Results indicated that, relative to moderate-heavy daily smokers, non-daily smokers tended to be younger and unmarried, with higher levels of education. Compared with moderate-heavy daily smokers, non-daily and light daily smokers reported higher rates of planning to quit and self-efficacy for quitting. However, in both studies, daily smokers and/or moderate-heavy smokers were the referent groups, somewhat limiting interpretation of differences between non-daily and light daily smokers. In a recent population-based cohort study, Levy et al. (2009) assessed differences across four smoking categories: <5 cpd: nondaily, <5 cpd: daily, 6–10 cpd, and >10 cpd. Results indicated that across smoking categories, lighter smokers were generally younger, more highly educated, had higher incomes, were more likely to be women and non-White, initiated smoking at a later age, were less nicotine dependent, and were more likely to plan to quit in the next year. Furthermore, relative to very light daily smokers, very light non-daily smokers were younger, of higher socioeconomic status, demonstrated a social smoking pattern, initiated smoking later, were less nicotine dependent, and had more recent and planned cessation efforts. These studies contribute to a greater understanding of differences relative to smoking status; however, further studies assessing differences in light and intermittent smokers in large ethnically diverse young adult samples are warranted to bolster the ability to tailor cessation interventions to low-level smokers.

This study aimed to assess in basic military training (BMT) recruits the baseline characteristics associated with intermittent and light daily smoking, relevant between group differences, and the impact of intermittent versus light smoking on cessation at follow-up.

Method

Participants

Air Force active duty personnel, guardsmen, and reservists who entered the U.S. Air Force from October 1999 to October 2000 participated in the parent study (Klesges et al., 2006). The current study examined only individuals who engaged in intermittent or daily light smoking (<10 cpd) at baseline. A total of 5,604 (87% active duty, 10% Air National Guard, and 3% reserve) recruits were identified who met this criterion. Baseline analyses were conducted on all recruits in order to obtain a broader understanding of intermittent and light smoking. At follow-up, only active duty personnel were contacted (cf. Klesges et al., 2006). Of the 4,900 active duty intermittent and light smoking recruits available, a total of 3,828 recruits (78% response rate) completed the 12-month follow-up. Consistent with the parent study (Klesges et al., 2006), only these cases were analyzed. Available case-only analyses proceeded as a sizeable number of recruits may remain quit subsequent to BMT (Klesges, Haddock, Lando, & Talcott, 1999), and it is unlikely that only continuing smokers opted not to return follow-up surveys.

Procedure

The study and interventions were incorporated as an official part of Air Force BMT, and the smoking cessation intervention was delivered to all recruits in fights assigned to the treatment condition. However, completion of the baseline survey was voluntary, and informed consent was obtained. These surveys were administered during Week 2 of BMT, and interventions were delivered

during the sixth and final week. All recruits were required to stop smoking upon entering the Air Force base; therefore, all participants were involuntarily abstinent for nearly 2 weeks at baseline.

Air Force fights (similar to platoons), not individuals, were randomized to the treatment (75%) or control (25%) conditions. The study protocol was approved by the National Institutes of Health and the Institutional Review Boards of the University of Memphis, University of Missouri—Kansas City, and the U.S. Air Force at Wilford Hall Medical Center in San Antonio.

Treatment and control sessions were delivered in a group format during the last week of BMT and consisted of two 1-hr sessions. The intervention was largely cognitive behavioral and included components targeting beliefs about tobacco use, developing coping and relapse prevention skills, and motivational enhancement. Follow-up forms were mailed 1 year later to all active duty participants who reported being current or former tobacco users at baseline. Staff who conducted follow-ups were not blind to treatment assignment at follow-up.

Measures

The baseline questionnaire was developed for use with this population and measured demographics, tobacco use/history, tobacco-related variables thought to be associated with cessation/relapse based on the extant literature and our prior work with military recruits (e.g., Haddock, Klesges, Talcott, Lando & Stein, 1998; Klesges et al., 1999; Lando, Haddock, Klesges, Talcott, & Jensen, 1999), and other psychosocial and health risk factors. First, basic demographics were assessed, including height and weight, gender, ethnicity, age, education level, and total family income. Next, history of tobacco use was assessed, including the use of cigarettes, smokeless tobacco, cigars, pipes, clove cigarettes, and bidis. For the present study, however, we limited our focus to smokeless tobacco and cigars as these two products are the most commonly used among this population (Vander Weg et al., 2008). The smoking categories included never-smokers (never smoked, not even a puff), experimental smokers (smoked on only one to two occasions), former smokers (smoked at least 1 cpd regularly but had quit in the past 6 months, quit between 6 months and 1 year ago, and quit more than 1 year ago), and regular smokers (smoked regularly up to the beginning of BMT). Intermittent non-daily smokers were those who indicated that “they smoked but not every day.” Light smokers endorsed smoking every day and subsequently reported on a separate item consuming 10 or fewer cpd. Although there has been variability in categorizing low-level smokers (Okuyemi et al., 2002), many recent studies have categorized non-daily smokers as “intermittent” (Husten, 2009) and those smoking fewer than 10 cpd as “light” smokers (Boulos et al., 2009; Fagan, Brook, Rubenstone, Zhang, & Brook, 2009; Fiore et al., 2008). As such, we adopted these definitions. Nicotine dependence was measured by an abbreviated version (Haddock, Lando, Klesges, Talcott, & Renaud, 1999) of the Fagerström Test for Nicotine Dependence (Heatherton, Kozlowski, Frecker, & Fagerström, 1991). Age of a first puff of a cigarette was also assessed. Participants reported on the smoking status of the male and female heads of households, their estimate of how many of their friends smoke, and intake of alcohol (no intake, once a month, two to four times a month, at least once a week, and either almost every day or daily). Perceived

rebelliousness, willingness to take health risks, feelings of sadness, and a tendency to smoke when stressed or when bored were all assessed with the same response options. These variables were rated on a 5-point scale ranging from strongly disagree to strongly agree. For purposes of analysis, responses were subsequently condensed to three categories (disagree to strongly disagree, agree to strongly agree, and neutral).

Perceived likelihood of developing a smoking-related illness compared with others of their age was measured as a 5-point range from “definitely will not” to “definitely will.” These response options were subsequently reduced to “definitely not or unlikely,” “likely or definitely will,” or “neither” (the reference group in all subsequent analyses). Perceived health was measured in a 5-point range from “poor” to “excellent” and reduced to fair to poor, very good to excellent, or good (the reference category for analyses). Perceived level of addiction to cigarettes was originally assessed using a 5-point scale (definitely addicted to cigarettes, probably addicted to cigarettes, not very addicted to cigarettes, probably not addicted to cigarettes, and definitely not addicted to cigarettes) and subsequently condensed to “not very to probably not addicted,” “probably or definitely addicted,” and “not very addicted.” Finally, intention to quit was measured as “planning to stay quit,” “thinking about staying quit,” or “not planning to stay quit,” with “not planning to stay quit” as the referent group.

The 1-year follow-up questionnaire assessed smoking status and any tobacco use during the past year. Continuous abstinence was assessed by asking, “Have you used any tobacco product since BMT?” (a “no” response was defined as quit). Seven-day point prevalence abstinence was assessed by asking, “Have you used any of the following tobacco products in the past 7 days?” Participants could not endorse any form of tobacco use during these periods in order to be classified as abstinent. The procedure at follow-up was to mail the questionnaire, and if participants did not respond to two mailings, they were then contacted by phone and the questionnaire was administered by telephone.

Approach to analyses

The association between relevant variables and intermittent (vs. daily light) smoking was examined via logistic regression. In addition, the influence of intermittent (vs. daily light) smoking on cessation after the BMT smoking ban was examined both after considering the impact of a cessation intervention provided during BMT and a possible interaction between smoking status and assignment to treatment group. Standard multivariate logistic regression was employed. All predictor variables were included in the multivariate model estimated as all univariate logistic models predicting intermittent smoking were significant.

Results

Descriptive characteristics for categorical (see Table 1) and continuous predictors (see Table 2) show the significant associations of all variables with intermittent versus light smoking. All demographic, tobacco use-related, and psychosocial variables were associated with smoking status at the univariate level ($p = .05$).

The multivariable model predicting smoking status fit the data, $\chi^2(46) = 3,059.63$, $p < .001$; Hosmer–Lemeshow

Table 1. Demographic characteristics of daily light and intermittent smoking Air Force recruits, N = 5,604 (daily light, n = 2,469, 44%, and intermittent, n = 3,134, 56%)

	Daily light n (%)	Intermittent n (%)		Daily light n (%)	Intermittent n (%)	
Gender						
Male	1,702 (69)	2,379 (76)	$\chi^2(1) = 33.95, p < .01$			
Female	767 (31)	755 (24)				
Ethnicity						
Non-Hispanic White	1,716 (70)	2,058 (66)	$\chi^2(4) = 28.28, p < .01$			
Black	346 (14)	442 (14)				
Hispanic	183 (7)	359 (12)				
Asian American/Pacific Islander	125 (5)	137 (4)				
Other ethnicity	99 (4)	138 (4)				
Education						
12 or fewer years	1,996 (81)	2,332 (74)	$\chi^2(1) = 32.28, p < .01$			
13 or more years	473 (19)	801 (26)				
Annual household income						
<\$21,000	486 (20)	545 (18)	$\chi^2(3) = 10.21, p < .01$			
\$21,000–\$50,000	958 (39)	1,163 (37)				
\$50,001–\$80,000	583 (23)	824 (26)				
\$80,001 and above	442 (18)	602 (19)				
Female head of household						
Does smoke	831 (34)	692 (22)	$\chi^2(2) = 93.97, p < .01$			
Does not smoke	1,489 (60)	2,235 (71)				
No female head of household	149 (6)	207 (7)				
Male head of household						
Does smoke	882 (36)	832 (27)	$\chi^2(2) = 68.94, p < .01$			
Does not smoke	1,270 (51)	1,950 (62)				
No male head of household	317 (13)	352 (11)				
% Friends who smoke						
Almost all, 80% and above	1,052 (43)	859 (27)	$\chi^2(3) = 183.95, p < .01$			
Many, 50%–79%	851 (34)	1,113 (36)				
Some, 20%–40%	415 (17)	837 (27)				
Hardly any, 0%–20%	151 (6)	325 (10)				
Alcohol consumption						
Do not drink	758 (31)	841 (27)	$\chi^2(4) = 20.22, p < .01$			
Once a month	456 (18)	559 (18)				
Two to four times a month	708 (29)	913 (29)				
At least once a week	424 (17)	670 (21)				
Almost daily or daily	123 (5)	151 (5)				
Smokeless tobacco use						
Never used	1,616 (65)	1,883 (60)	$\chi^2(4) = 114.42, p < .01$			
Experimental use	596 (24)	692 (22)				
Former	92 (4)	108 (4)				
Intermittent use	128 (5)	224 (7)				
Daily use	37 (2)	227 (7)				
Cigar use						
Never used	613 (25)	758 (24)	$\chi^2(4) = 26.63, p < .01$			
Experimental use	1,274 (51)	1,528 (49)				
Former	49 (2)	43 (1)				
Intermittent use	488 (20)	772 (25)				
Daily use	45 (2)	32 (1)				
Rebelliousness						
Neutral	696 (28)	943 (30)	$\chi^2(2) = 7.74, p < .05$			
Disagree	1,315 (53)	1,694 (54)				
Agree	458 (19)	497 (16)				
Willingness to take health risks						
Neutral	319 (13)	344 (11)	$\chi^2(2) = 5.92, p = .05$			
Disagree	2,054 (83)	2,649 (85)				
Agree	96 (4)	141 (4)				
Feel sad and blue most of the time						
Neutral	378 (15)	453 (14)	$\chi^2(2) = 8.97, p < .01$			
Disagree	1,931 (78)	2,531 (81)				
Agree	160 (7)	151 (5)				
Perceived health status						
Good	1,274 (52)	1,479 (47)	$\chi^2(2) = 67.42, p < .01$			
Poor to fair	435 (17)	388 (12)				
Very good to excellent	758 (31)	1,267 (41)				
Perceived likelihood of getting a smoking-related illness relative to same-aged peers						
Neither	1,237 (50)	998 (32)	$\chi^2(2) = 440.31, p < .01$			
Unlikely or not at all	846 (34)	1,937 (62)				
Likely or definitely	386 (16)	199 (6)				
Plan to quit after BMT						
Do not plan to quit	438 (18)	353 (11)	$\chi^2(2) = 183.97, p < .01$			
Thinking about staying quit	1,451 (59)	1,526 (49)				
Plan to stay quit	576 (23)	1,251 (40)				
Tendency to smoke when stressed						
Neutral	308 (13)	645 (21)	$\chi^2(2) = 413.88, p < .01$			
Disagree	204 (8)	795 (25)				
Agree	1,953 (79)	1,692 (54)				
Tendency to smoke when bored						
Neutral	442 (18)	747 (24)	$\chi^2(2) = 485.16, p < .01$			
Disagree	279 (11)	1,029 (33)				
Agree	1,748 (71)	1,358 (43)				
Perceived addiction						
Not very addicted	736 (30)	848 (27)	$\chi^2(2) = 1,600, p < .01$			
Unlikely or not at all	380 (15)	1,950 (62)				
Likely or definitely	1,350 (55)	333 (11)				

Note. BMT = basic military training.

Table 2. Continuous demographic variables

	Daily light		Intermittent		Range	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Age	19.86	1.85	20.07	2.13	17.08–36.50	$t(5,601) = -3.78, p < .01$
Cigarettes per day	8.02	2.40	3.86	2.86	1.00–10.00	$t(5,342) = 57.12, p < .01$
Age of first puff	14.11	2.77	14.81	2.84	2.00–27.00	$t(5,595) = -9.21, p < .01$

$\chi^2(5,277) = 4,943.80, p > .99$; Cox and Snell pseudo $R^2 = .44$ (see Table 3). Relative to never use, the use of smokeless tobacco products either intermittently, odds ratio (*OR*) = 1.98, $p < .001$, or daily, $OR = 5.39, p < .001$, increased the odds of being an intermittent smoker. For every unit increase in age of the first puff of a cigarette, recruits were 1.03 times more likely to be intermittent smokers ($p = .05$). Those with lesser perceived likelihood of developing a smoking-related illness were 1.40 times more likely to be an intermittent smoker ($p < .001$), while those with lesser perceived addiction to cigarettes were 2.03 times more likely to be an intermittent smoker ($p < .001$). For every unit increase in cpd, recruits were 0.67 times as likely to be intermittent smokers ($p < .001$), and those who endorsed that he/she is likely or definitely addicted to cigarettes were 0.36 times as likely to be an intermittent smoker ($p < .001$). Thinking about quitting, $OR = 1.70, p < .001$, and planning to quit, $OR = 1.85, p < .001$, were also associated with smoking status, indicating higher intention to quit among intermittent smokers.

Recruits reporting nonsmoking female heads of household were 1.24 times more likely to be intermittent smokers ($p < .05$), as were those reporting nonsmoking male heads of household ($p < .05$). Relative to 80% and above friends smoking, those who reported some friends smoking (i.e., 20%–40%) were 1.46 times more likely to be intermittent smokers ($p < .001$), and relative to not drinking, those who reported drinking approximately once a week were 1.37 times more likely to be intermittent smokers ($p < .01$). Those who reported a likelihood of developing a smoking-related illness were 0.70 times as likely to be intermittent smokers ($p < .01$), those who reported smoking while stressed were 0.62 times as likely to be intermittent smokers ($p < .001$), and those who reported smoking while bored were 0.73 times as likely to be intermittent smokers ($p < .001$).

Finally, cessation rates differed between intermittent and daily light smokers both in terms of 7-day point prevalence abstinence, $\chi^2(1) = 206.79, p < .001$, Cox and Snell pseudo $R^2 = .05$, and continuous abstinence, $\chi^2(1) = 170.45, p < .001$, Cox and Snell pseudo $R^2 = .04$. Multivariable logistic regression adjusting for the potential influence of treatment group assignment and the interaction of smoking status with treatment group assignment (see Table 4) did not change the relationship between smoking status and cessation. At follow-up, 45% of intermittent and 23% of daily light smokers reported 7-day abstinence from smoking. Moreover, 41% of intermittent and 22% of daily light smokers reported continuous abstinence.

Discussion

Multiple predictors of intermittent smoking relative to light smoking were observed; however, no demographics were noted

as significant predictors of smoking status. Recent studies have demonstrated low-level smokers relative to moderate-heavy smokers (Boulos et al., 2009; Tong et al., 2009) and relative to heavier light smokers (Levy et al., 2009) were more often women, more highly educated, and younger (among other inconsistent demographic findings). That none of the demographic predictors distinguished intermittent and light daily smokers in this study may be a result of different smoking status comparisons or the uniqueness of this military cohort relative to other studies. For example, Boulos et al. assessed low-level smoking relative to moderate-heavy smoking in an Egyptian sample, and Tong et al. (2009) assessed differences in California-based Asian Americans. It may be that demographic predictors of lower level smoking are more readily observable with greater breadth of smoking status representation. Moreover, those studies (Boulos et al.; Tong et al., 2009) and the Levy et al. study (which did assess differences between non-daily and daily light smokers) all included a larger age distribution relative to the current study. It may be that in a young adult sample, demographic differences between intermittent and light daily smokers are less salient as a result of reduced age variance, limited time since age of initiation, or a generational effect, indicating that smoking status differences are narrowing in current young adults.

With regard to tobacco-related predictors, intermittent and daily use of smokeless tobacco demonstrated among the strongest relationships to intermittent smoking relative to daily light smoking. Previous studies have suggested nontrivial rates of combined smoking and smokeless tobacco use in youth (Severson, Forrester, & Biglan, 2007) and young adults in the military (Vander Weg et al., 2008), and one study has indicated that among military personnel, high rates of smokeless tobacco use were observed particularly among those smoking fewer than 10 cpd (Peterson et al., 2007). The current results indicate that more smokeless tobacco use is associated with less smoking. Although the reasons for this are unclear, it could be that for some, intermittent use of one tobacco product serves as a substitute for the other. Despite the ongoing debate regarding smokeless tobacco use as a potential smoking harm-reduction strategy (e.g., Timberlake, Huh, & Lakon, 2009), strong evidence is lacking to support such interventions. As such, both prevention and intermittent and light smoking cessation efforts should continue to assess alternative tobacco use and include components designed to educate youth and young adults to the hazards of all forms of tobacco use when used alone and in combination.

Consistent with past studies, fewer cigarettes smoked per day, lesser perceived addiction to cigarettes, later age of initiation (Levy et al., 2009), and lesser perceived likelihood of developing a smoking-related illness were associated with intermittent smoking relative to

Table 3. Multivariate logistic regression predicting intermittent versus daily smoking

	OR	p	95% CI
Female	0.99	.95	0.82–1.21
13+ years of education	1.14	.21	0.93–1.41
Annual household income (ref. <\$21,000)			
\$21,000–\$50,000	1.07	.57	0.85–1.33
\$50,001–\$80,000	1.14	.30	0.89–1.46
\$80,001 and above	1.11	.44	0.85–1.45
Ethnicity (ref. is Non-Hispanic Whites)			
Black	0.80	.06	0.63–1.01
Hispanic	0.99	.92	0.75–1.29
Asian American/Pacific Islander	0.83	.29	0.58–1.18
Other ethnicity	1.15	.46	0.79–1.67
Female head of household (ref. is “does smoke”)			
Does not smoke	1.24	.02	1.04–1.49
No female head of household	1.37	.08	0.97–1.93
Male head of household (ref. is “does smoke”)			
Does not smoke	1.24	.02	1.04–1.48
No male head of household	0.98	.86	0.75–1.27
% Friends who smoke (ref. is 80% and above)			
Many, 50%–79%	1.10	.29	0.92–1.32
Some, 20%–40%	1.46	.00	1.18–1.80
Hardly any, 0%–20%	1.14	.39	0.84–1.54
Alcohol consumption (ref. is “does not drink”)			
Once a month	1.00	.97	0.80–1.26
Two to four times a month	1.22	.06	1.00–1.50
At least once a week	1.37	.01	1.08–1.74
Almost daily or daily	1.09	.67	0.74–1.59
Smokeless tobacco use (ref. is never used)			
Experimental use	1.12	.28	0.91–1.36
Quit	1.20	.40	0.79–1.81
Intermittent use	1.98	.00	1.41–2.79
Daily use	5.39	.00	3.36–8.63
Cigar use (ref. is never used)			
Experimental use	1.00	.97	0.82–1.23
Quit	0.83	.55	0.45–1.52
Intermittent use	1.02	.89	0.79–1.30
Daily use	0.55	.08	0.28–1.08
Rebelliousness (ref. is neutral)			
Disagree	0.88	.17	0.73–1.06
Agree	0.90	.39	0.71–1.14
Willingness to take health risks (ref. is neutral)			
Disagree	1.02	.89	0.79–1.31
Agree	1.29	.26	0.83–2.02
Low mood (ref. is neutral)			
Disagree	0.85	.15	0.68–1.06
Agree	0.78	.20	0.54–1.14
Perceived health status (ref. is good health)			
Poor to fair	1.02	.90	0.81–1.27
Very good to excellent	1.11	.25	0.93–1.31
Likelihood of getting sick (ref. is neutral)			
Unlikely or not at all	1.40	.00	1.19–1.65
Likely or definitely	0.70	.01	0.54–0.91
Plan to quit after BMT (ref. is “do not plan to quit”)			
Thinking about staying quit	1.70	.00	1.35–2.14
Plan to stay quit	1.85	.00	1.43–2.39

Table 3. Continued

Table 3. Continued

	OR	p	95% CI
Smoking when stressed (ref. is neutral)			
Disagree	0.75	.06	0.56–1.01
Agree	0.62	.00	0.50–0.77
Smoking when bored (ref. is neutral)			
Disagree	1.14	.30	0.89–1.46
Agree	0.73	.00	0.61–0.89
Perceived addiction (ref. is “not very addicted”)			
Unlikely or not at all	2.03	.00	1.68–2.45
Likely or definitely	0.36	.00	0.30–0.43
Age	1.03	.17	0.99–1.08
Cigarettes per day	0.67	.00	0.66–0.69
Age of first puff	1.03	.05	1.00–1.06

Note. BMT = basic military training; OR = odds ratio.

light daily smoking. Later age of first cigarette, lower number of smoking days, and fewer cigarettes smoked on smoking days also distinguished never-daily intermittent smokers from former daily intermittent smokers in a recent study (Nguyen & Zhu, 2009). These findings suggest a pattern of smoking, smoking history, and addiction-related differences relative to smoking status.

Both thinking about and planning to quit smoking were associated with intermittent nondaily smoking relative to light daily smoking. These findings are consistent with previous studies, indicating greater intention to quit associations with lower levels of smoking (Boulos et al., 2009; Levy et al., 2009). Although the link between intention and future behavior may be modest (Rise, Kovac, Kraft, & Moan, 2008), studies demonstrate this relationship exists (Manfredi, Cho, Crittenden, & Doloczek, 2007; Pai & Edington, 2008). Evidence supports a focus on both the motivational and the volitional processes associated with intention to promote cessation (Armitage & Arden, 2008); thus, adding volitional elements to intermittent and light smoking interventions may capitalize on observed intention rates in intermittent smokers and enhance intention rates in light daily smokers to promote cessation in both groups.

Psychosocial smoking-related variables were related to intermittent smoking relative to light daily smoking such that intermittent smoking was associated with nonsmoking female and male heads of household and lesser reports of smoking when stressed or bored. Studies have shown that smoking in adolescents is related to a social context more permissive of smoking (Buller et al., 2003) and living with smokers (Robinson et al., 2006). In one recent study (Pierce et al., 2009), a smoke-free home significantly increased the odds of being a light or intermittent smoker. Additionally, smoke-free environments (e.g., home, workplace) increase the likelihood of abstinence (Fiore et al., 2008).

Studies of intermittent and light smoking differences associated with a tendency to smoke when stressed or bored appear to be nonexistent. Although self-reported stress seems to be clearly related to reduced smoking abstinence (Fiore et al., 2008), the relationship between boredom relief and relapse to smoking has been inconsistent (McEwen, West, & McRobbie, 2008; Richmond et al., 2006), and no studies of the impact of boredom-related smoking and cessation are noted. Future studies of intermittent and light smokers should consider these situations as

Table 4. Predicting 7-day point prevalence and long-term abstinence

	OR	p	95% CI	OR	p	95% CI	OR	p	95% CI	OR	p	95% CI
7-day point prevalence abstinence												
Treatment group	1.02	.81	0.87–1.19				1.06	.49	0.90–1.24	1.03	.82	0.79–1.35
Intermittent vs. daily				2.78	.00	2.41–3.20	2.78	.00	2.41–3.20	2.70	.00	2.02–3.61
Treatment × Smoking Status										1.04	.82	0.74–1.45
Likelihood of cessation												
Treatment group	0.96	.57	0.82–1.12				0.99	.87	0.84–1.16	0.93	.60	0.71–1.22
Intermittent vs. daily				2.58	.00	2.23–2.98	2.58	.00	2.23–2.98	2.41	.00	1.80–3.23
Treatment × Smoking Status										1.09	.60	0.78–1.53

Note. OR = odds ratio.

contexts in which smoking may be more likely to occur and use valid measures to assess smoking in response to stress and boredom as well as the impact on subsequent cessation.

Regardless of treatment condition, intermittent smokers quit smoking at significantly higher rates than daily light smokers. Two considerations are noteworthy. First, it may be that 6 weeks of forced abstinence promotes cessation to a greater degree than other cessation paradigms. This is consistent with results of the larger study in all smokers (Klesges et al., 2006) and the original large-scale study in BMT recruits (Klesges et al., 1999). Although studies of forced smoking bans are emerging, for example from psychiatric wards (e.g., Etter, Khan, & Etter, 2008), cessation after discharge or exiting the banned environment are not yet frequently considered. Future studies should evaluate bans and subsequent cessation rates when appropriate, perhaps even more so in intermittent smokers, as the current results suggest high abstinence rates in this group. Second, consistent with the typical finding that heavier smoking is related to reduced abstinence (Fiore et al., 2008), light daily smokers may require more intensive intervention relative to intermittent smokers (in this case, above and beyond the smoking ban).

Strengths, limitations, and future directions

Despite clear study strengths to include a large sample size, sociodemographic diversity, and the use of a young adult cohort, three limitations are noteworthy. First, the study was performed within a large sample of BMT recruits; thus, generalizability to other young adults is unknown. Second, self-reports of smoking and smoking status were used; in a sample of this size whose follow-ups were conducted across the country, biochemical verification of smoking status was not feasible. Finally, detailed information was not collected regarding the frequency (e.g., number of days per week) of intermittent smoking and the contexts in which it occurred, thereby limiting what we know about the smoking patterns of this group.

In summary, intermittent smokers achieved smoking abstinence at higher rates than daily light smokers after a 6-week smoking ban. Multiple tobacco-related and psychosocial predictors of intermittent smoking relative to light daily smoking were observed. Tailoring intermittent and light smoking interventions to characteristics that distinguish the two groups by targeting the heavier daily light smokers may bolster cessation rates in both groups.

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Declaration of Interests

None declared.

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