Tobacco use among women firefighters

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Abstract

Objectives: Firefighters play a crucial role in protecting the lives and property of the communities they serve. Health and readiness for duty among women firefighters is of great concern because they are a significantly understudied group in this critical occupation. A tobacco-free fire service has been strongly promoted, but there are no published data on the extent and types of tobacco use among women firefighters.

Methods: Data were collected as part of a national online study of the health of women in the fire service.

Results: A total of 1,712 women firefighters completed questions regarding tobacco use. Unadjusted smoking and smokeless tobacco (SLT) rates were 5.1% and 1.2%, respectively. Age standardized smoking rates were lower than those of male firefighters and U.S. adult women. SLT use prevalence was very low compared to male firefighters, but comparable to US adult women. Tobacco users were more likely to have lower education and income and were younger when compared to those who did not use tobacco. There was a strong association between tobacco use and problem and binge drinking.

Conclusions: Current findings suggest that the rates of cigarette and SLT use are relatively low among women firefighters. Unhealthy lifestyle behaviors such as problem and binge drinking were strongly associated with tobacco use.

Introduction

Firefighters play a crucial role in protecting the lives and property of the communities they serve. Because they are the first to respond to emergencies of all types, serving as firefighters is a physically and mentally demanding profession. For instance, firefighters are exposed to a wide range of occupational hazards, dangerous environments, and strenuous

physical challenges. Thus, they are more prone to several medical and mental health conditions compared to general population (Haddock, Jitnarin, Poston, Tuley, & Jahnke, 2011; Jahnke, Poston, Jitnarin, & Haddock, 2012a; Jahnke, Poston, Haddock, & Murphy, 2016; Poston, Haddock, Jitnarin, & Jahnke, 2012; Poston, Haddock, Jahnke, Jitnarin, & Day, 2013; Soteriades, Smith, Tsismenakis, Baur, & Kales, 2011). For example, data from a large meta-analytic study on cancer risk found that more than 10 cancers were identified as probably or possibly associated with firefighting (LeMasters et al., 2006). In addition, it is estimated that 30% of firefighters develop behavioral health conditions including depression and post-traumatic stress disorder (PTSD), compared to 20% of the general population (Substance Abuse and Mental Health Services Administration (SAMHSA), 2018).

In the United States (U.S.), there are approximately 1.1 million firefighters working in more than 30,000 fire departments, but only a small proportion are women (Fox, Hornick, & Hardin, 2006; Hulett, Bendick, Thomas, & Moccio, 2008). Although the numbers of women firefighters have increased from 3–6% in 2008 to 7% in 2015 (Haynes & Stein, 2017), these numbers are substantially lower than in similar male-dominated occupations such as law enforcement (15%, Langton, 2010) and the military (16% enlisted forces; 18% officer corps; Office of the Under Secretary of Defense, Personnel and Readiness, 2016). Due to lower numbers of women firefighters, the published occupational epidemiology literature has been largely limited to male firefighters, with women firefighters typically excluded from analysis. For instance, one of the largest population-based studies of firefighters in the U.S. collected data from 24 departments in the central U.S. and had a sample size of more than 800 firefighters, but only 31 were women (Jahnke et al., 2012b; Poston et al., 2011). As a result, key health concerns of women firefighters have not been adequately studied nor addressed.

Similar to male firefighters, health and readiness for duty among women firefighters are great concerns and a tobacco-free fire service has been strongly promoted (Jahnke et al., 2012a; Poston et al., 2012). Smoking prevalence among male firefighters has declined over time and current prevalence is lower than in the general male population (13.2% vs. 21.5%; Jitnarin, Poston, Haddock, Jahnke, & Day, 2015). However, there are no published data on the extent and types of tobacco use among women firefighters. This study fills the gap in the literature on women firefighters' tobacco use by presenting data from the first national study of the health of women in the fire service.

In addition, recent research indicates that women experience risks from smoking and tobacco use that are unique to or higher in women, such as cervical cancer and coronary heart disease (Centers for Disease Control and Prevention (CDC), 2014; Samet & Yoon, 2010). Thus, given the roles of women firefighters in providing emergency services and the need for them to be healthy and fit to carry out their duties, it is essential to better understand what factors are contributing to their tobacco use in order to guide the development of appropriate prevention and treatment programs. The purpose of this study was to systematically examine tobacco use, including cigarette smoking and smokeless tobacco (SLT), and its relationship to health-related indicators in a national sample of women firefighters.

Methods

Sampling Procedures/Firefighters Recruitment

Data reported are from the web-based cross-sectional survey study entitled "A formative examination of the health and safety of women firefighters." The primary aim of this survey was to examine the health status, health beliefs, and perceived health challenges of women firefighters. The sampling methods and procedures have been described in detail elsewhere (Haddock, Poston, Jahnke, & Jitnarin, 2017; Jahnke, Poston, Jitnarin, & Haddock, 2018). Briefly, the study used snowball sampling techniques to solicit participants. We used several methods for primary recruitment, including contacting participants from previous studies (Jahnke et al., 2012b); communicating with the membership of *iWomen*, the only national organization representing women in the fire service (www.i-women.org); and posting on the "Secret List", a popular email listserv in the fire service that is distributed to firefighters worldwide. The secondary recruitment included requesting any women firefighters completing the survey to share the solicitation with their female colleagues. All women firefighters interested in participation were directed to a web-based survey.

The study protocol and consent procedures were approved by the Institutional Review Board (IRB) of the National Development & Research Institutes (NDRI). The initial page of the survey served as the informed consent document; it described the scope and purpose of the survey, provided contact information for the research team and the NDRI IRB, and assured participants of the survey's confidentiality. Next, participants were asked whether they currently serve in the career or volunteer fire service. Those indicating service as a volunteer firefighter were thanked for their interest and asked to share their contact information for future research, given that the focus of the current study was for career firefighters.

Women career firefighters were provided an opportunity to share their contact information if they wanted to receive a thank you gift (a portable cell phone charger) via the U.S. Postal Service. All qualified participants were then directed to the online survey. A total of 2,022 women career firefighters accessed the survey between June and August 2015, and 1,712 (84.7%) completed questions regarding their tobacco use. Table 1 provides the demographic and occupational characteristics.

Measures

Demographics (e.g., race/ethnicity) and occupational history (e.g., current rank and position, years in the fire service) were collected.

Assessment of tobacco use.—Items assessing tobacco use were modeled after the CDC Behavioral Risk Factor Surveillance System (BRFSS; CDC, 2018) and the Department of Defense Survey of Health Related Behaviors among Active Duty Personnel (Meadows et al., 2018). Three tobacco use questions were used to determine smoking status: a) Have you ever smoked a cigarette, or even a puff?; b) Have you smoked at least 100 cigarettes in your entire life?; and c) Have you smoked a cigarettes, even a puff, in the past 30 days? Participants who answered "no" to question a) were defined as never smokers. Those who answered "yes" to question a) but "no" to question b) were defined as experimental smokers.

Those who answered "yes" to questions a) and b) but "no" to question c) were designated as former smokers, while participants who answered "yes" to all three questions were classified as current smokers. Using items similar to the smoking assessment, participants were asked whether they had used chewing tobacco, snuff, or dip in the last 30 days, and if "yes" they were defined as current SLT users.

General and behavioral health.—Participants were asked to report their weight and height. Body mass index (BMI) was computed by divided weight in kilograms by height in meters squared to identify participants' obesity status using standard cut-points for BMI (BMI 30.0kg/m^2) (NHLBI, 1998).

The Self-Report of Physical Activity (SRPA) questionnaire (Jackson & Ross, 1997) was used to estimate participants' physical activity levels during the past 30 days. Vigorous activities were defined as participants engaged in heavy physical activity for any amount of time for up to 3 hours/week.

Participants were asked to rate their perception of future risk of serious disease on a 5-point scale with anchors of "Not at all likely" and "Very likely." Measures similar to this have been used in studies of self-rated health in related occupations (Haddock et al., 2006). The number of poor physical health days during the last 30 days was also assessed using a question from the CDC BRFSS (CDC, 2018; Moriarty, Zack, & Kobau, 2003). This question has established reliability and validity (Moriarty et al., 2003), is predictive of important longitudinal health care utilization (e.g., physician visits, hospitalizations) and mortality, and is used as part of an overall health rating system for the U.S. (Dominick, Ahern, Gold, & Heller, 2002; United Health Foundation, 2012).

Symptoms of trauma experienced in the line of duty were assessed with the Trauma Screening Questionnaire (TSQ). The TSQ is a brief screening instrument that consists of 10 symptom-based questions such as intrusive thoughts, upsetting dreams, physical responses (e.g., fast heartbeat, churning stomach), sleep disturbances, irritability or angry outburst, and feeling jumpy or easily startled. A score of six or more positive responses are considered in the range of concern for posttraumatic stress symptoms (Brewin et al., 2002).

The Center for Epidemiological Studies Short Depression Scale (CES-D10) was used to assess current depressive symptoms (Andresen, Malmgren, Carter, & Patrick, 1994). The survey include questions about the frequency of feelings and behaviors during the past week with the response options from none of the time (<1 day) to all of the times (5–7 days). A total score of four or more indicated possible depression. The 10-item version was found to have comparable reliability estimates to those reported for the original CESD scale, and is highly reliable in the general population (Spearman-Brown, split halves r=0.85; Irwin, Artin, & Oxman, 1999).

The Rand Mental Health Inventory (MHI) anxiety subscale was administered to assess participants' anxiety over the past 30 days (Stewart, Ware, Sherbourne, & Wells, 1992; Ware, Davies-Avery, & Brook, 1980). Scores range from 9 to 54, with higher scores

indicating greater anxiety. The scale has been previously tested on a representative populations sample, with good internal consistency; coefficients ranged from α = .83 to .92.

The Firefighter Coping Self-Efficacy (FFCSE) scale is a 20-item questionnaire measuring firefighters' perceived capability for managing stress and trauma exposure encounters on the job (Lambert, Benight, Harrison, & Cieslak, 2013). Total scores can range from 20 to 140, with higher scores representing greater coping self-efficacy perceptions during work situations. The FFCSE scale demonstrated good internal consistency (α = .84–.88) and internal reliability (α = .90).

Alcohol use was assessed by asking participants whether they had at least one drink of any alcoholic beverage in the past 30 days. Binge drinking was assessed by asking the participants to report the number of times during the past 30 days that they had four or more drinks of any alcoholic beverage on one occasion. Alcohol use items were modeled after established surveys used in the general population and the military (Vander Weg, DeBon, Sherrill-Mittleman, Klesges, & Relyea, 2006). Potential alcohol abuse was assessed with the four item CAGE questionnaire. The surveys assessed whether participants 1) felt the need to cut down their drinking; 2) felt annoyed by criticism of their drinking; 3) had guilty feelings about drinking; and 4) had taken a morning "eye opener" (i.e., a drink first thing in the morning). Each affirmative response contributes one point to an overall score range of 0–4. Scores equal to or greater than two are considered to indicate potential problem drinking (O'Brien, 2008).

Statistical Approach

Age-standardized prevalence rates of tobacco use categories (current smokers and SLT users) were computed to facilitate comparison with national and fire service estimates (Jamal et al., 2018; Jitnarin, Haddock, Poston, & Jahnke, 2013; Jitnarin et al., 2015; Lipari & Van Horn, 2017). The 2000 projected U.S. population (Klein & Schoenborn, 2001) was used for the standards for general U.S. populations. StatsDirect Statistical Software version 2.7.8 (StatsDirect Ltd, Cheshire, UK) was used to compute the age-standardized rates using the direct method (Hennekens, & Buring, 1987).

All statistical models examining correlates of different categories of tobacco use were performed in SAS 9.4 (SAS Institute, Cary, NC). In order to explore potential differences between different tobacco use groups, models were developed examining demographic, occupational, and health status differences based on previous studies (Haddock et al., 2011; Jitnarin et al., 2013; 2015; 2018). A backward elimination approach was used to evaluate confounders, and the change in estimate of 10% was applied to determine model efficiency. A multivariable mixed-effect logistic regression model, with the age and rank as confounders, was created to examine tobacco use patterns (i.e., all tobacco users, current smokers and SLT users compared to non-users) and correlates. Odds Ratios (ORs), 95% confidence intervals (CI), and P-values ($p < 0.05$) were used to evaluate results for significance.

Results

Overall Tobacco Use

Among 1,712 women firefighters, 352 (18.5%) were tobacco users, of which 85 exclusively smoked cigarettes, 21 used SLT, and 3 used both (see Table 2). In general, tobacco users were significantly younger, more likely to be single and less educated, and had less income compared to their nontobacco using counterparts. With respect to health/health behavior characteristics, tobacco users had higher BMIs (OR = 1.1, 95% CI = 1.1–1.2) and were more likely to report problem drinking on the CAGE (OR = 1.9, 95% CI = 1.1–3.2) and engage in binge drinking (OR = 1.8, 95% CI = 1.1–2.9) than nontobacco users (Table 3).

Cigarette and SLT use

There was a relatively small percentage of participants who were current cigarette smokers (5.1%) compared to never (42.8%), experimental (32.5%), and former smokers (19.6%) (Table 4). Overall age-standardized current smoking prevalence among women firefighters (1.9%) was substantially lower than the rates for U.S. adult women (13.5%; Jamal et al., 2018) and male firefighters (13.2%; Jitnarin et al., 2015). Current smokers had significantly less income and less education than never-smoker. They also were more likely to be younger, serve in firefighter (vs. officer) positions, and be racial/ethnic minorities, when compared to their nonsmoking counterparts s (Table 4).

After adjustment for demographic differences, there were no significant differences among smoking status categories on most of the health characteristics/health behaviors. However, experimental smokers were less likely to rate themselves as healthy compared to never-smokers (OR = 0.8, 95% CI = 0.7–0.9). In addition, current smokers were more than twice as likely to have drinking problem (OR = 2.3, 95% CI = 1.2–4.6) and almost three times as likely to binge drink (OR = 2.6, 95% CI = 1.5–4.8) compared to never smokers (Table 5).

Table 6 provides demographic and health/health behaviors characteristics stratified by SLT use status. The overall unadjusted prevalence of current SLT use among women firefighters was 1.2%. The age-standardized rate (0.5%) was very low when compared to that for men in the fire service (10.5%; Jitnarin et al., 2015) but comparable to U.S. adult women (0.3%; Lipari & Van Horn, 2017). SLT users were significantly younger and had less income than firefighters who never used SLT. Adjusted analyses by SLT use categories did not show significant differences between non- and current SLT users regarding health and health behavior characteristics.

Discussion

This study represents the first detailed examination of tobacco use patterns and factors associated with its use in women firefighters. Main findings included that: a) the prevalence of smoking among women firefighters was low compared to adult women in the general U.S. population; b) SLT use rates were comparable to U.S. adult women; and c) there was a strong and consistent association between drinking behaviors and tobacco use.

The age-standardized rate of current smoking among women firefighters was very low compared to male firefighters (1.9% vs. 13.2%; Jitnarin et al., 2015). This rate also was lower than that of U.S. adult women and remains far lower than the U.S. state that had the lowest smoking prevalence in the nation (Utah, 8.2%; Nguyen, Marshall, & Brown, 2016). In addition, the difference for cigarette smoking prevalence between women firefighters vs. women military personnel was very pronounced. Female military personnel smoked cigarettes at more than double the prevalence found among women firefighters (11.4% vs. 5.1%; Meadows et al, 2018).

SLT use was uncommon among women firefighters, with an age-standardized prevalence of 0.5%. This rate was very low compared to men in the fire service (10.5%; Jitnarin et al., 2015). Women firefighters demonstrated similarly low SLT rates compared to U.S. adult women (0.3%; Lipari & Van Horn, 2017). The unadjusted rate of SLT use found in this study also was lower than that found in women military members (1.2% vs. 2.0%; Meadows et al., 2018). These tobacco use patterns are mostly consistent with the women in U.S general population, who are more likely to smoke cigarettes than use SLT (Nguyen et al., 2016).

The socioeconomic correlates of tobacco use identified in the current study were consistent with those found in general population studies (CDC, 2001; Jamal et al., 2018). Younger women and those with lower education and income consistently had a higher prevalence of tobacco use. Several studies have shown that low socioeconomic status places women at higher risk for smoking (Huang & Ren, 2011; Kim & Clark, 2006). For example, women with less than a high school education were less likely to quit smoking compared to those with a college education or higher (Martin et al., 2008). In addition, Reitzel et al. (2007) documented that women with lower household incomes were more likely to smoke and less likely to quit smoking compared to women with higher household incomes.

However, in terms of health/health behaviors factors, there were some inconsistences with previous studies. For instance, tobacco users (i.e., smokers and SLT users) in this study had higher weights and BMIs than their non-users counterparts, while the other studies reported that current tobacco users generally have lower BMIs than never smokers or non-SLT users (Dare, Mackay, & Pell, 2015; Plurphanswat & Rodu, 2014). Lifestyle choices such as physical activity and alcohol consumptions may play a role in explaining the higher BMI of current tobacco users in this study. In our sample, tobacco users reported having lower physical activity levels and higher alcohol consumption than those who did not use tobacco, which may affect their weight and BMI through energy intake and/or energy expenditure (Lahti-Koski, Pietinen, Heliovaara, & Vartiainen, 2002; Traversy & Chaput, 2015).

The data from this study also were in line with the results from a national male firefighter cohort with respect to tobacco users' characteristics (Jitnarin et al., 2015). Regardless of gender, those who currently used tobacco (either cigarette or SLT) were younger and had served fewer years in fire service than their nontobacco using counterparts. With respect to health/health behavior characteristics, tobacco users were more likely to engage in patterns of problem drinking and binge drinking, and more likely to show signs of depression and anxiety compared to non-tobacco users. Future research is needed to examine health and

occupational factors that support tobacco use and evaluate occupationally-tailored interventions to help firefighter quit using tobacco successfully.

Limited studies have been conducted regarding factors associated with SLT use among women. One study by Vander Weg and colleagues (2005) demonstrated that income and education level were positively associated with SLT use among female military recruits. The results from this study demonstrated that age and income were related to SLT use, suggesting that SLT users tended to be younger and had less income than those who were not using SLT, which is in line with data from the 2016 National Survey on Drug Use and Health (NSDUH; SAMHSA, 2017). However, the use of SLT among women in general, and particularly in fire service, is poorly understood and no studies have been reported on SLT use in this population. In addition, SLT use among women tends to be overlooked despite the fact that women face increased morbidity and mortality risk from SLT compared to men (Sinha et al., 2018). Nearly 85% of all SLT-attributable cancer mortality and disability adjusted life years (DALYs) were found in women. Thus, more research should examine SLT use patterns among women firefighters and strategies for SLT use cessation.

Unhealthy lifestyle behaviors such as problematic alcohol consumption and binge drinking were strongly associated with tobacco use in this sample, which is similar to existing data (Falk, Yi, & Hiller-Sturmhofel, 2008; Piasecki et al., 2011). For example, cigarette smokers reported having potential problem and binge drinking compared to non-tobacco users or nonsmokers, which is consistent with findings of previous research among women (Burgard, Cochran, & Mays, 2005; Steele, Ross, Dobinson, Ba, & Tinmouth, 2009). Smokers are more likely than nonsmokers to become alcohol dependent and to report alcohol consumption and binge drinking. Co-occurrence of alcohol and tobacco use demonstrates significantly elevated risk for cancer-related morbidity and mortality (Hart, Davey Smith, Gruer, & Watt, 2010; Lubin et al., 2009; Purdue et al., 2009). Thus, the fire service should emphasize and focus efforts on the co-occurrence of alcohol and tobacco use when designing prevention and treatment programs for this population.

In the current sample, sociodemographic and health/health behavioral characteristics among women firefighters were not found to be strongly associated with tobacco use. Due to the cross-sectional design of the current study, future longitudinal studies should be conducted in order to explore the relationships between sociodemographic and health/health behavioral characteristics with tobacco use.

This study has a number of strengths, including being the first national survey to explore tobacco use and its correlates among women firefighters with a large and diverse sample of participants. Given the sample size and the assumed proportion of the U.S. women firefighters (i.e., between 3–6%; Fox et al., 2006; Hulett et al, 2008) of all career firefighters in the U.S. (N=350,000; U.S. Fire Administration, 2012), participants in this study represent 15–17% of U.S. women firefighters. Thus, we are confident that the study reached significant numbers of participants who represent an underserved and underrepresented occupational group and the data collected likely can be generalized to women fire service personnel. Future research is needed to explore health and occupational factors that encourage tobacco use in this sub-population.

There are several limitations to the current study. First, this study's cross-sectional design prevented us from examining tobacco use and its impacts longitudinally. Second, due to the number of questions within each health domain, questions regarding other forms of tobacco, such as e-cigarettes or hookah, were excluded from the survey. Future research should examine the prevalence for these products to better determine the extent of use and characteristics of the users. Although biochemical verification of tobacco use status was not used in this study, there is a strong evidence regarding validity of using self-reported tobacco use in population-based surveys (Connor Gorber, Schofield-Hurwitz, Hardt, Levasseur, & Tremblay, 2009; Wong, Shields, Leatherdale, Malaison, & Hammond, 2012) and among firefighters (Haddock et al., 2011; Jitnarin et al., 2013; 2015; 2018). Next, because we limited this study to career women firefighters, results may not be generalizable to volunteer women firefighters. In this study, the population being considered was limited to only career women firefighters since the focus of this study was on firefighter-related occupational exposures. Also, the survey instrument and FFCSE scale have been validated and assessed mostly in the general population and male firefighters. Nonetheless, it is by far the largest population-based study of women in fire service in terms of health and wellness. This study can help establish an ongoing surveillance program of the women in fire service and may lead to studies focusing on other concerns such as reproductive and maternal health.

Current findings suggested that the rate of cigarette and SLT use is relatively low among women in the U.S. fire service. However, a focused research program on tobacco use is still essential given the negative effects of tobacco use in fire service in general and on women's health. Thus, tobacco cessation programs is needed and should be tailored to fit women firefighters and fire service culture.

Implications for Practice and/or Policy

The U.S. fire service has been proactive in health promotion with respect to encouraging firefighters to be tobacco free and providing tobacco cessation programs (International Association of Firefighters, 2010; National Fallen Firefighters Foundation, 2006). Given the growing numbers of women firefighters and the negative health effects of using cigarettes and SLT, tobacco cessation treatment should be tailored to fit fire service cultures as well as exploring the role of occupational factors in these users. In addition, interventions to reduce tobacco use and address the culture/norms that encourage tobacco use among women firefighters should be developed with an emphasis on addressing problematic alcohol use patterns.

Funding statement:

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Table 1.

Firefighter and department characteristics

Firefighter demographics	(N=1,712)
Age (years; M[SD])	40.2(9.0)
Race (% White, non-Hispanic)	76.3
Marital status (% married or living with a partner)	55.3
Education (% some college or higher)	96.2
Years in the fire service (M[SD]) Rank (%)	13.6 (7.9)
Any firefighter	69.3
Any officer	30.7

Table 2.

Demographic and health/health behaviors characteristics stratified by tobacco use status (M±SD, %)

	Tobacco use status		
	Non-tobacco user (n=1603)	Tobacco user (n=109)	p-values
Demographic variables			
Age (years)	40.5±9.1	38.5±9.1	0.035
Race (% White, non-Hispanic)	80.7	74.1	0.097
Marital status (% married or living with a partner)	55.8	44.4	0.028
Education (% some college or higher)	96.9	86.7	<0.0001
Income (% >$75,000)	66.0	49.5	<0.001
Years in the fire service (years)	13.8±7.9	12.7±8.1	0.224
Rank (% firefighter)	68.8	76.4	0.130
Health/health behaviors			
Weight (kg)	160.3±27.3	165.7±30.4	0.049
BMI (kg/m^2)	25.7±4.1	27.1±5.4	0.013
Obesity prevalence (%)	13.2	18.4	0.131
Engaged in vigorous physical activity (%)	62.8	56.9	0.231
Self-rated health (range 1–5)	3.3±1.2	3.3±1.2	0.774
Number of poor physical health days (range 0–30)	3.3±7.0	3.2±7.0	0.877
TSQ trauma (% potential PTSD)	9.6	12.1	0.412
CESD depression (% potential depression)	27.3	33.3	0.208
MHI anxiety scores (range 9–54)	18.3±6.8	20.0±9.6	0.380
Firefighter coping self-efficacy (range 20–140)	116.1±13.3	113.0±20.2	0.696
Binge drinking (%)	45.5	63.8	<0.001
Potential problem drinking (%)	15.3	29.8	<0.001

Table 3.

Multivariate logistic regression models of association between demographic and health/health behaviors characteristics and tobacco use status

	OR (95% CI)[*]
Demographic variables	
Age (years)	0.97 (0.95–1.00)
Marital status	
Married or living with a partner	Ref
Single (never married, widowed)	1.06 (0.64–1.74)
Education (some college or higher)	
Some college or higher	Ref
Less than high school	**4.68 (2.23–9.81)**
Income	
>$75,000	Ref
$75,000	**1.81 (1.07–3.05)**
Health/health behaviors	
BMI (kg/m^2)	**1.05 (1.00–1.12)**
Binge drinking	**1.79 (1.09–2.92)**
Potential problem drinking	**1.89 (1.11–3.23)**

Note:

[*] ORs >1.0 indicate increased odds for those who used tobacco to fall into a lower category of each variable (i.e., not married, less income, no binge drinking).

Table 4.

Demographic and health/health behaviors characteristics stratified by smoking status (M±SD, %)

	Smoking status[*]				p-values[*]
	Never (n=732)	Current (n=88)	Experimental (n=556)	Former (n=336)	
Demographic variables					
Age (years)	39.4±9.4[b]	39.1±9.0	40.7±8.9[a]	42.3±8.5	<0.0001
Race (% White, non-Hispanic)	78.8[ab]	70.1[a]	81.2[ab]	84.3[b]	0.016
Marital status (% married or living with a partner)	55.8	43.0	54.9	56.9	0.157
Education (% some college or higher)	97.0[a]	84.6	97.5[a]	95.5[a]	<0.0001
Income (% >$75,000)	65.2[a]	48.9	66.7[a]	65.8[a]	0.012
Years in the fire service (years)	13.4±8.0	13.1±8.2	13.8±7.9	14.3±7.8	0.326
Rank (% firefighter)	72.1[b]	77.5[ab]	68.2[ab]	62.5[a]	0.014
Health/health behaviors					
Weight (kg)	159.6±27.1	165.3±27.0	160.3±28.3	162.5±27.0	0.137
BMI (kg/m^2)	25.7±4.2[a]	27.2±5.4	25.7±4.3[a]	25.9±3.7[a]	0.017
Obesity prevalence (%)	13.3	19.3	13.7	12.5	0.411
Engaged in vigorous physical activity (%)	63.2	51.9	64.7	59.7	0.101
Self-rated health (range 1–5)	3.3±1.1[ab]	3.2±1.2[ab]	3.2±1.1[a]	3.4±1.2[b]	0.050
Number of poor physical health days (range 0–30)	3.1±6.6	3.0±6.7	3.5±7.2	3.7±7.7	0.552
TSQ trauma (% Potential PTSD)	9.8	11.3	8.6	11.1	0.637
CESD depression (% Potential depression)	25.2	33.8	27.7	31.6	0.120
MHI anxiety scores (range 9–54)	18.0±7.0	20.4±9.9	18.1±6.0	19.2±7.7	0.057
Firefighter coping self-efficacy scores (range 20–140)	116.3±13.2	111.4±21.5	116.2±13.5	115.7±12.9	0.547
Binge drinking (%)	37.6	64.9[a]	49.0[a]	56.4[a]	<0.0001
Potential problem drinking (%)	10.0	28.6[a]	19.1[a]	20.7[a]	<0.0001

Note:

[*] Different subscript letter denotes differences among cigarette use categories at p < .05. P-values indicate the differences among smoking status in the overall ANOVA model.

Table 5.

Multivariate logistic regression models of association between demographic and health/health behaviors characteristics and smoking status

	Current vs. Never OR (95% CI)[†]	Experimental vs. Never OR (95% CI)[†]	Former vs. Never OR (95% CI)[†]
Demographic variables			
Age (years)	1.00 (0.97–1.04)	**1.02 (1.00–1.04)**	**1.04 (1.01–1.06)**
Race			
White, non-Hispanic	Ref	Ref	Ref
Racial/ethnic minorities	1.92 (0.95–3.87)	1.03 (0.67–1.60)	0.90 (0.52–1.55)
Education			
Some college or higher	Ref	Ref	Ref
Less than high school	**5.25 (2.01–13.70)**	0.67 (0.27–1.71)	1.30 (0.51–3.31)
Income (>$75,000)			
>$75,000	Ref	Ref	Ref
$75,000	1.59 (0.87–2.88)	0.90 (0.64–1.25)	1.18 (0.80–1.75)
Rank			
Any officer or chief	Ref	Ref	Ref
Any firefighter	1.54 (0.75–3.16)	1.06 (0.76–1.49)	0.85 (0.57–1.25)
Health/health behaviors			
BMI (kg/m^2)	1.06 (1.00–1.13)	1.00 (0.97–1.04)	1.00 (0.96–1.04)
Obesity prevalence			
Self-rated health	1.04 (0.82–1.33)	**0.84 (0.74–0.95)**	1.04 (0.90–1.21)
Binge drinking	**2.64 (1.45–4.80)**	**1.50 (1.11–2.03)**	**2.14 (1.51–3.04)**
Potential problem drinking	**2.30 (1.15–4.59)**	**1.73 (1.14–2.64)**	**1.49 (0.92–2.40)**

Note:

[†] ORs >1.0 indicate increased odds for those who were current smokers compared to non-smokers to fall into a lower category of each variable (i.e., not married, less income, no binge drinking). Health/health behaviors variables are controlled for age, ethnicity, income, and education.

Table 6.

Demographic and health/health behaviors characteristics among SLT user status (M±SD, %)

	SLT use status		
	Never (n=1639)	**Current (n=270)**	**p-values**
Demographic variables			
Age (years)	40.4±9.1	35.5±9.7	0.011
Race (% White, non-Hispanic)	80.1	91.7	0.156
Marital status (% married or living with a partner)	55.1	52.2	0.777
Education (% some college or higher)	96.3	91.3	0.206
Income (% >$75,000)	65.2	45.8	0.048
Years in the fire service (years)	13.7±7.9	11.1±8.0	0.109
Rank (% firefighter)	69.2	75.0	0.574
Health/health behaviors			
Weight (kg)	160.6±27.3	166.3±40.4	0.493
BMI (kg/m^2)	25.8±4.2	26.5±5.1	0.362
Obesity prevalence (%)	13.6	12.5	0.879
Engaged in vigorous physical activity (%)	62.2	75.0	0.200
Self-rated health (range 1–5)	3.3±1.2	3.5±1.0	0.296
Number of poor physical health days (range 0–30)	3.3±7.0	3.7±8.0	0.813
TSQ trauma (% Potential PTSD)	9.7	13.6	0.536
CESD depression (% Potential depression)	27.6	31.8	0.660
MHI anxiety scores (range 9–54)	18.4±7.0	18.7±8.0	0.967
Firefighter coping self-efficacy scores (range 20–140)	115.9±13.8	119.4±11.6	0.222
Binge drinking (%)	46.7	55.0	0.458
Potential problem drinking (%)	16.1	30.0	0.093