

Tobacco Use in a National Sample of United States Service Member and Veteran Students

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Abstract

This study explored tobacco use in a national sample of service member and veteran students enrolled in postsecondary institutions with the purpose of informing the development of a tobacco cessation initiative by identifying factors associated with the use of cigarettes, water pipes, cigars and smokeless tobacco. Researchers conducted secondary analysis of data from the fall 2011 National College Health Assessment (NCHA) II, which surveyed 44 postsecondary institutions in the United States (n = 27,774). Three percent of the sample reported United States Armed Services active military or veteran status (n = 706). Of the service member and veteran respondents, 41% reported that they used some form of tobacco within the last 30 days. Tobacco use predicted problematic reactions to stressors and mental health symptoms, and correlated with suicidality in the study sample. Further research is recommended to inform culturally competent programming.

The great majority of veterans of Iraq and Afghanistan are eligible for the Post-9/11 GI Bill, which has increased the number of student veterans on campuses in all disciplines.¹ These funded students undertake studies with higher rates of physical injury, chronic pain, depression and stress injury than their classmates.² Related to these issues are problematic health behaviours such as the overuse of tobacco products.³ Tobacco use contributes to decreased quality of both mental and physical health.⁴

Tobacco use

In general, health behaviours among student veterans are understudied, particularly among those who smoke.⁵ The purpose of this study was to inform the development of a tobacco cessation initiative to reduce tobacco use among service member and veteran students in postsecondary institutions by identifying factors associated with the use of cigarettes, water pipes, cigars and smokeless tobacco.

Among veterans. Tobacco use is higher among veterans than the general population.⁶ In 2005, roughly one-third of military-connected personnel used tobacco (32%), which is not surprising given that many tend to use tobacco products prior to entering the service.⁷ Additionally, deployment has been associated with increased tobacco use, and deployed service members report smoking 50% more than those service members who are not deployed.⁸

Among college students. Among college students, experimentation with the everyday use of tobacco in multiple forms is commonly attributed to the experience of new challenges and potentially stressful situations in college.⁹⁻¹⁰

Effects over the life course. The health-related effects of tobacco use over one's life course in the United States are significant; cigarettes and obesity are the two tied leading causes of preventable death.¹¹ An estimated one-half of individuals who smoke cigarettes will eventually die or become disabled as a direct result of their cigarette use.¹²

Other tobacco products

Tobacco products—defined by the US Food and Drug Administration (FDA) as a product 'made or derived from tobacco that is intended for human consumption, including any component, part, or accessory of a tobacco product'—include various forms of nicotine delivery systems.¹³ Some forms have long been mainstream (e.g. cigarettes, smokeless tobacco that is chewed), while others have more recently either been introduced (e.g. electronic nicotine delivery systems such as e-cigarettes¹⁴) or become more popular (e.g. water pipes or hookahs,¹⁴ and cigars and electronic nicotine delivery systems¹⁴⁻¹⁵).

Information regarding prevalence and potential predictors of both traditional (e.g. cigarettes) and alternative (e.g. smokeless tobacco) forms of tobacco use among service member and veteran students is limited. However, some research suggests that

service member and veteran students more often report traditional tobacco use than non-veteran students.¹⁶

Electronic nicotine delivery systems. Electronic nicotine delivery systems—known also as ENDS—are battery-operated devices resembling cigarettes (with flavours and other chemicals) comprised of a cartridge (containing nicotine, flavours and other chemicals), heating device/vaporiser, and power source.¹⁷ Nicotine is delivered by way of vapour: puffing activates the e-cigarette, which ‘vaporizes the liquid in the cartridge’ whereby ‘the resulting aerosol is then inhaled (called ‘vaping’).¹⁷ The use of alternative products such as e-cigarettes is very common in the young adult population.¹⁸

Water pipes. Water pipes are a nicotine delivery system that originated in the Middle East and contain flavoured nicotine. They are popular with young adults and are often smoked socially in groups.¹⁹ One popular form of water tobacco smoking is the use of hookahs, which many people perceive to be less harmful than cigarettes,²⁰ though hookah smoking is associated with exposure to toxicants and carcinogens including tar, nicotine, carbon monoxide and heavy metals.²¹⁻²²

Cigars. Cigars contain fermented, aged and cured tobacco (primarily from a single source), and can be distinguished from roll-your-own cigarettes because they are wrapped in tobacco leaf. Cigars vary in size, level of nicotine content (e.g. some equivalent to what may be found in an entire pack of cigarettes) and duration needed for consumption.²³ It is commonly misconceived that cigars are safer than other forms of nicotine delivery systems because cigar smokers do not inhale, but cigar smoke contains high levels of tar, toxins and cancer-causing substances.²⁴

Smokeless tobacco. Smokeless tobacco, to include chewing tobacco and snuff, is the second most prevalently used form of tobacco in the United States.²⁵ An estimated 14.5% of service members use smokeless tobacco.⁷ Use has been implicated in a variety of different cancers including oropharyngeal, prostate and pancreatic²⁶ as well as other health problems (e.g. gingival recession, leukoplakia, dental caries, tooth abrasions and nicotine addiction²⁷).

Methods

Source of data. Researchers conducted secondary analysis of data from the fall 2011 National College Health Assessment (NCHA) II. This survey is administered by the American College Health Association (ACHA) twice a year. The fall 2011 survey administration collected a sample of 27,774 students

from 44 postsecondary institutions across the United States. Three percent of the sample reported that they were currently or have been a member of the United States Armed Services ($n = 706$).

Study variables

Demographic. In the present study, the following demographic characteristics were considered: age (in years); gender; sexual orientation; race and ethnicity; marital status; level in school; membership in a fraternity/sorority; grade point average (GPA); participation in organised college athletics; and deployment to an area of hazardous duty.

Mental health. The ACHA survey measured mental health with 11 items asking, ‘Have you ever...’: felt things were hopeless; felt overwhelmed by all you had to do; felt exhausted (not from physical activity); felt very lonely; felt very sad; felt so depressed that it was difficult to function; felt overwhelming anxiety; felt overwhelming anger; intentionally cut, burned, bruised or otherwise injured yourself; seriously considered suicide; and attempted suicide. Each variable was measured at the ordinal level and was—for the purpose of analysis in the present study—recoded into a dummy variable.²⁸

Normative stressors. The ACHA survey measured stress with 11 items asking, ‘Within the last 12 months, have any of the following been traumatic or very difficult for you to handle’: academics; career-related issue; death of a family member/friend; family problems; intimate relationships; other social relationships; finances; health problem of a family member or partner; personal appearance; personal health issue; and sleep difficulties. These variables were measured with a dichotomous response option and were recoded into dummy variables.

Use of tobacco products. The ACHA survey measured the use of tobacco products with four items asking, ‘Within the last 30 days, on how many days did you use...’: cigarettes; tobacco from a water pipe (hookah); cigars, little cigars or clove cigarettes; and smokeless tobacco. Each variable was measured at the ordinal level and was recoded into a dummy variable.

Statistical analysis. We calculated frequencies and percentages for all study variables by use of tobacco products. We checked all assumptions for logistic regression including influential points²⁹ and the extent of multicollinearity.³⁰ We confirmed the linearity in the logit for the age variable with the Box-Tidwell transformation procedure.³¹ We used a clustered sandwich estimator for all logistic regression analyses.³⁰ Total variance explanation

in each model was specified with the Cox-Snell R^2 and the Nagelkerke R^2 .³²⁻³³ Fifty-six variables were individually regressed on the four tobacco products: cigarettes, water pipes, cigars and smokeless tobacco. Significant variables were then tested in multivariate models. Finally, we tested significant variables from these multivariate models in final models. We performed all statistical analyses with Stata 13 for Windows.³⁴ This study was approved by the university Institutional Review Board.

Results

Two hundred and eighty-six service member and veteran students (41% of the total service member and veteran student sample) reported that they used some form of tobacco within the last 30 days. Most tobacco users were white, heterosexual males in undergraduate programs who were not married and had some problematic reactions to stressors and mental health symptoms. Table 1 presents complete information on tobacco use by demographic, mental health and normative stressor variables.

Table 1 Use of tobacco products by demographic, mental health and stress variables

Study variables	Cigarettes ¹ N (%)*		Water pipe ¹ N (%)*		Cigars ¹ N (%)*		Smokeless ¹ N (%)*	
	Yes	No	Yes	No	Yes	No	Yes	No
All participants (row %)	134 (19)	568 (81)	35 (5)	663 (95)	54 (8)	648 (92)	63 (9)	638 (91)
Demographic factors								
Age, in years (M, SD)	31.1 (12.5)	30.5 (10.2)	24.2 (13.4)	31 (10.4)	31.5 (17.5)	30.5 (9.9)	29.2 (12)	30.7 (10.5)
Gender								
Female	45 (34)	185 (33)	5 (15)	224 (34)	7 (14)	223 (35)	5 (8)	224 (35)
Male	87 (65)	373 (66)	27 (82)*	430 (65)	42 (81)*	418 (65)	56 (90)*	404 (64)
Transgender	2 (1)	4 (<1)	1 (3)	5 (<1)	6 (<1)*	3 (<1)	1 (2)	5 (<1)
Sexual orientation								
Heterosexual	119 (90)	530 (94)	28 (88)	616 (39)	46 (88)	602 (93)	57 (92)	590 (93)
Gay/lesbian	4 (3)	14 (3)	1 (3)	18 (3)	2 (4)	17 (3)	1 (2)	18 (3)
Bisexual	6 (5)	15 (3)	2 (6)	19 (3)	3 (6)	18 (3)	3 (4)	18 (3)
Unsure	3 (2)	5 (<1)	1 (3)	7 (1)	1 (2)	7 (1)	1 (2)	7 (1)
Race								
White	113 (84)	443 (78)	28 (80)	525 (79)	41 (76)	515 (80)	57 (91)*	499 (78)
Black	6 (5)	40 (7)	3 (9)	43 (7)	8 (15)*	38 (6)	3 (5)	42 (7)
Hispanic or Latino/a	12 (9)	66 (12)	4 (11)	74 (11)	10 (19)	68 (11)	3 (5)	75 (12)
Asian or Pacific Islander	7 (5)	28 (5)	3 (9)	32 (5)	5 (9)	30 (5)	2 (3)	33 (5)
American Indian, Alaskan Native, or Native Hawaiian	8 (6)*	13 (2)	3 (9)	18 (3)	3 (6)	18 (3)	4 (6)	17 (3)
Biracial or multiracial	8 (6)	15 (3)	2 (6)	20 (3)	3 (6)	20 (3)	2 (3)	21 (3)
Other	2 (2)	14 (3)	3 (9)*	13 (2)	3 (2)	13 (2)	2 (3)	14 (2)
Marital status								
Not married	92 (69)	321 (57)	29 (85)	382 (58)	31 (59)	382 (59)	35 (57)	378 (59)
Married	41 (31)*	246 (43)	5 (15)*	280 (42)	22 (42)	265 (41)	27 (44)	259 (41)
Level in school								
Undergraduate	116 (87)	451 (80)	29 (85)	534 (81)	45 (87)	522 (81)	55 (90)	512 (81)
Graduate/professional	18 (13)	110 (20)	5 (15)	123 (19)	7 (14)	121 (19)	6 (10)*	1212 (19)
Membership in a fraternity/sorority								
Yes	16 (12)*	37 (7)	6 (18)*	47 (7)	10 (19)*	43 (7)	8 (13)	45 (7)
No	114 (88)	523 (93)	28 (82)	605 (93)	43 (81)	594 (93)	52 (87)	584 (93)

Grade point average (GPA)								
A	40 (3)	219 (39)	8 (24)	249 (38)	19 (36)	239 (37)	14 (23)	244 (39)
B	62 (47)	258 (46)	16 (49)	302 (46)	21 (40)	300 (47)	32 (52)*	288 (46)
C	25 (19)*	60 (11)	6 (18)	79 (12)	8 (15)	77 (12)	12 (19)*	73 (12)
D/F	3 (2)	5 (<1)	2 (6)*	6 (<1)	3 (6)*	5 (<1)	2 (3)*	6 (<1)
N/A	3 (2)	21 (4)	1 (3)	23 (4)	2 (4)	22 (3)	2 (3)	22 (4)
Participation in organised college athletics ³								
Varsity	6 (5)	23 (4)	3 (9)	26 (4)	4 (8)	25 (4)	3 (5)	26 (4)
Club sports	10 (8)	34 (6)	6 (18)*	38 (6)	8 (15)*	35 (5)	5 (8)	39 (6)
Intramurals	21 (16)	83 (15)	14 (42)*	90 (14)	18 (34)*	86 (13)	11 (18)	93 (15)
Deployment to a hazardous area								
Yes	61 (46)	283 (50)	13 (37)	330 (50)	27 (50)	317 (49)	35 (56)	309 (48)
No	73 (55)	285 (50)	22 (63)	333 (50)	27 (50)	331 (51)	28 (44)	329 (52)
Mental health factors ²								
Felt hopeless	58 (44)*	176 (31)	14 (40)	220 (33)	18 (34)	216 (34)	26 (41)	208 (33)
Felt overwhelmed	98 (74)	393 (69)	28 (80)	460 (70)	37 (69)	454 (70)	41 (65)	449 (71)
Felt exhausted	106 (80)*	389 (69)	28 (80)	464 (70)	38 (70)	457 (71)	47 (75)	448 (71)
Felt lonely	73 (55)*	226 (40)	20 (59)	279 (42)	25 (46)	275 (43)	26 (41)	274 (43)
Felt sad	76 (57)*	244 (43)	18 (51)	303 (46)	24 (44)	297 (46)	30 (48)	291 (46)
Felt depressed	48 (36)*	140 (25)	13 (37)	175 (26)	17 (32)	171 (26)	22 (35)	166 (26)
Felt anxious	65 (49)*	195 (34)	14 (40)	244 (37)	21 (39)	239 (37)	28 (44)	232 (37)
Felt angry	60 (45)*	175 (31)	10 (29)	222 (34)	18 (33)	217 (34)	26 (41)	209 (33)
Intentionally injured self	9 (7)	24 (4)	4 (11)	29 (4)	6 (11)*	27 (4)	5 (8)	28 (4)
Suicidal ideation	12 (9)	35 (6)	6 (17)*	41 (6)	7 (13)	40 (6)	6 (10)	41 (7)
Attempted suicide	4 (3)	5 (<1)	3 (9)*	6 (<1)	4 (7)*	5 (<1)	3 (5)*	6 (<1)
Normative stressor factors ³								
Academics	57 (43)	199 (35)	15 (43)	239 (36)	22 (42)	234 (36)	23 (37)	233 (37)
Career-related issue	45 (34)*	127 (22)	14 (40)*	159 (24)	19 (36)	154 (24)	22 (36)*	151 (24)
Death of a family member or friend	29 (22)*	65 (11)	5 (14)	89 (13)	12 (22)*	82 (13)	10 (16)*	83 (13)
Family problems	49 (37)*	128 (23)	10 (29)	166 (25)	16 (30)	162 (25)	21 (33)	157 (25)
Intimate relationships	55 (42)*	132 (23)	13 (37)	174 (26)	16 (31)	171 (27)	22 (35)	165 (26)
Other social relationships	33 (25)*	76 (14)	10 (29)*	98 (15)	14 (26)*	95 (15)	13 (21)	96 (15)
Finances	75 (57)*	201 (36)	13 (37)	261 (40)	21 (40)	255 (40)	28 (44)	248 (39)
Health problem of a family member/partner	33 (25)*	80 (14)	9 (26)	103 (16)	14 (26)*	99 (15)	18 (29)*	95 (15)
Personal appearance	30 (23)*	81 (14)	7 (20)	103 (16)	12 (23)	99 (15)	13 (21)	98 (15)
Personal health issue	34 (26)*	75 (13)	6 (17)	102 (16)	13 (25)	96 (15)	13 (21)	96 (15)
Sleep difficulties	52 (39)*	149 (26)	8 (23)	192 (29)	19 (37)	182 (28)	23 (37)	178 (28)
Alcohol use ¹	105 (79)*	335 (59)	32 (91)*	405 (61)	48 (89)*	392 (61)	51 (82)*	388 (61)

Note: M = mean; SD = standard deviation; * ≤ 0.05 in univariate logistic regression; ¹Within the last 30 days; ²Lifetime; ³Within the last 12 months, have any of the following been traumatic or very difficult for you to handle

Factors associated with the use of cigarettes. One hundred and thirty-four service member or veteran students (19% of the sample) indicated that they had used cigarettes within the last 30 days. Twenty-two initial factors were significantly associated with cigarette use (see Table 1). Three factors were significantly associated with cigarette use (when controlling for other factors): alcohol use, financial stress and being married/partnered. These were tested in a final model that generated statistically significant results [$\chi^2(6, N = 693) = 43.35, p \leq 0.001$]. The number of positive cases of cigarette use was appropriate for the model given that there were at least 10 positive cases per variable.³⁵ The model explained between 13% (Cox-Snell R^2) and 21% (Nagelkerke R^2) of the variance in cigarette use and correctly classified 81.2% of cases. Table 2 presents complete information on factors associated with cigarette use.

Factors associated with the use of tobacco from a water pipe. Thirty-five service member or veteran students (5% of the sample) indicated that they used a water pipe within the last 30 days. Twelve initial factors were significantly associated with water pipe use (see Table 1). Five factors were significantly associated with water pipe use (when controlling for other factors): attempted suicide, alcohol use, other (race), being married/partnered and participation in intramural sports. These were tested in a final model that was statistically significant [$\chi^2(6, N = 658) = 39.11, p \leq 0.001$]. The number of positive cases of water pipe use was problematic given that there were not at least 10 positive cases per variable;³⁵ thus, the results should be interpreted with caution. The model explained between 14% (Cox-Snell R^2) and 44% (Nagelkerke R^2) of the variance in water pipe use and correctly classified 95.3% of cases. Table 2 presents complete information on factors associated with water pipe use.

Factors associated with the use of cigars, little cigars and clove cigarettes. Fifty-four service member or veteran students (8% of the sample) indicated that they used cigars within the last 30 days. Thirteen initial factors were significantly associated with cigar use (see Table 1). Four factors were significantly associated with cigar use (when controlling for other factors): alcohol use, male, transgender and participation in intramural sports. The aforementioned statistically significant predictors were tested in a final model [$\chi^2(4, N = 689) = 36.22, p \leq 0.001$]. The number of positive cases of cigar use was appropriate for the model given that there are at least 10 positive cases per variable.³⁵ The model explained between 12% (Cox-Snell R^2) and 28% (Nagelkerke R^2) of the variance in cigar

use and correctly classified 92.7% of cases. Table 2 presents complete information on factors associated with cigar use.

Factors associated with the use of smokeless tobacco. Sixty-three service member or veteran students (9% of the sample) indicated that they used smokeless tobacco within the last 30 days. Eleven initial factors were significantly associated with smokeless tobacco use (see Table 1). Six factors were significantly associated with smokeless tobacco use (when controlling for other factors): attempted suicide, alcohol use, health problem of a family member/friend, male, white and a 'C' grade point average (GPA). The aforementioned statistically significant predictor variables were tested in a final model [$\chi^2(16, N = 671) = 69.21, p \leq 0.001$]. The number of positive cases of smokeless tobacco use was appropriate for the model given that there are at least 10 positive cases per variable.³⁵ The model explained between 20% (Cox-Snell R^2) and 43% (Nagelkerke R^2) of the variance in smokeless tobacco use and correctly classified 91.1% of cases. Table 2 presents complete information on factors associated with cigar use.

Discussion

This study explored tobacco use in a national sample of service member and veteran students enrolled in postsecondary institutions. The prevalence of alternative forms of tobacco use was high. We discuss five findings from our study.

First, and perhaps most surprisingly, deployment and negative mental health or most normative stressor factors were not predictive of tobacco use. This finding is different from that of Bondurant and Wedge⁸ who found that deployment was a significant factor in tobacco use. Researchers have also found statistical and practical significance in the relationship between smoking and depressive conditions in veterans, both diagnosed and undiagnosed.³⁶ We recommend additional investigation to explore this apparent discrepancy.

Second, results suggest that there is an association between alcohol use and increased tobacco use across all four categories (cigarette, water pipe, cigar and smokeless tobacco). This finding is consistent with the current literature in that it suggests that problematic alcohol use likely co-occurs with tobacco use,³⁷ and supports the Gulliver et al. study that argues that smoking cessation may support sobriety.³⁸

A third finding from our study was that attempted suicide was associated with increased water pipe

Table 2 Significant factors associated with the use of tobacco

Cigarettes ¹							
Factors	B	SE	OR	95% CI	p	HL ²	Prob > ²
Alcohol use ¹	0.93	0.24	2.54	1.59 to 4.04	≤0.001	5.35	0.62
Finances ²	0.91	0.21	2.49	1.66 to 3.73	≤0.001		
Married/partnered	-0.50	0.22	0.61	0.39 to 0.93	0.02		
Constant	-3.26	0.37	0.04	0.02 to 0.08	0.00		
Water pipe ¹							
Factors	B	SE	OR	95% CI	p	HL ² (df)	Prob > ²
Attempted suicide ³	2.50	0.79	12.19	2.62 to 56.81	≤0.001	5.25	0.39
Alcohol use ¹	1.91	0.67	6.76	1.80 to 25.37	0.01		
Other (race)	1.84	0.76	6.27	1.42 to 27.64	0.02		
Married/partnered	-1.38	0.53	0.25	0.09 to 0.71	0.01		
Intramurals ²	1.25	0.40	3.48	1.59 to 7.64	≤0.005		
Constant	-4.56	0.75	0.01	0.002 to 0.05	0.00		
Cigars ¹							
Factors	B	SE	OR	95% CI	p	HL ² (df)	Prob > ²
Alcohol use ¹	1.56	0.47	4.76	1.91 to 11.87	≤0.001	0.86	0.97
Male	0.98	0.43	2.66	1.15 to 6.14	0.02		
Transgender	2.66	0.86	14.30	2.63 to 77.67	0.01		
Intramurals ²	0.98	0.35	2.67	1.36 to 5.27	≤0.005		
Constant	-4.71	0.51	0.01	0.003 to 0.02	0.00		
Smokeless ¹							
Factors	B	SE	OR	95% CI	p	HL ² (df)	Prob > ²
Attempted suicide ³	2.30	1.08	9.98	1.19 to 83.35	0.03	3.94	0.79
Alcohol use ¹	0.91	0.36	2.47	1.23 to 4.97	0.01		
Health problem of a family member/friend ²	0.78	0.33	2.19	1.15 to 4.17	0.02		
Male	1.84	0.48	6.30	2.44 to 16.27	≤0.001		
White	1.19	0.50	3.29	1.24 to 8.71	0.02		
C (GPA)	1.00	0.45	2.72	1.13 to 6.52	0.03		
Constant	-7.00	0.85	0.0009	0.0002 to 0.005	0.00		

Note: ¹Within the last 30 days; ²Within the last 12 months; ³Lifetime

and smokeless tobacco use. We did not find a study focusing specifically on the association between attempted suicide and increased water pipe and smokeless tobacco use. However, there are studies on the broader subject of tobacco use and the relationship with suicide attempts. A longitudinal analysis was conducted in 2015 and found a positive relationship between attempted suicide and initial tobacco use, persistent tobacco use and relapse tobacco use.³⁹ These findings suggest an opportunity for further research.

A fourth finding from our study was that marriage/partnership was predictive of decreased cigarette and water pipe use. This finding agrees with the literature that indicates high levels of social support lower tobacco use and improve tobacco cessation rates.⁴⁰ Social relationships play an important role in promoting better health and alleviating diseases.⁴¹ While not all kinds of social interactions produce similar health consequences, intimate partnerships are considered a reliable indicator of social support.⁴² The ways in which individuals seek and cultivate social support vary widely, but this established, track-able metric has proven useful; both the presence of and supportive behaviour within intimate partnerships lead to better physical and mental health outcomes.⁴³ Attention to partner support in tobacco prevention and cessation programming is indicated both by the literature and the results of the present study.

A fifth finding from our study was that men demonstrated increased cigar and smokeless tobacco use, and for men, intramural participation increased water pipe and cigar use. These findings agree with the literature that indicates that men use more tobacco in general.⁴⁴⁻⁴⁵ In groups where it is socially normative to do so, such as college-based Greek organisations or recreational sporting leagues, male smoking rates increase significantly.⁴⁶ Such examples of community-level influences on health behaviour indicate postsecondary administrators and programs should implement an ecological approach to programming for college men.⁴⁷ The results of the present study, specifically, and the research literature in general indicate a need to offer tobacco prevention and cessation programs that work within communities to change social norms, perhaps embracing peer leadership models that typically appeal to veterans.⁴⁸ Prior work also suggests that service member and veteran students use college-based mental health services at very high rates,⁴⁹ which might afford an opportunity to scaffold additional support and motivation for tobacco cessation and related health behaviours.

Limitations

When considering the findings of this report, we acknowledge several limitations, including its overall exploratory nature. The study is limited by the cross-sectional nature of the design, the use of non-standardised measures, and selection bias due to low response rates and self-reporting, and our results are also limited in generalisability to postsecondary settings. Despite these limitations, our study provides a foundation from which administrators and programs at postsecondary institutions can begin to develop or further tailor tobacco cessation programs for service member and veteran students.

Implications for practice and research

Institutions have both ethical and financial incentives to support the well-being of veteran students, many of whom attend school because of funding by GI Bill benefits earned during post-9/11 service.³ Now, health educators have a tremendous opportunity to offer well-informed interventions that may improve academic success and life trajectories potentially relying heavily on student veteran associations to recruit members for participation in interventions and services.⁵⁰ Cultural competence when attempting this work is vital,⁵¹ and peer outreach is important to veterans.⁴³

Analyses of student veteran demographics indicate that of the 2 million veterans returning to civilian life each year, approximately 500,000 immediately use their veteran education benefits.⁵² These numbers make service delivery salient for college campuses and positions postsecondary institutions to deliver important smoking prevention and cessation services tailored to the unique needs of veterans. It is important for educators and providers to understand, assess and support decreased tobacco use among this population, cognisant of factors that contribute to use as compared to students who are not service members or veterans. In addition to having different supportive needs in general than non-service member/veteran students,⁵³ it is helpful for educators and providers to understand how school-related stressors may contribute to the use of tobacco products and examine effective programs in other vulnerable subpopulations for success exemplars.⁵⁴⁻⁵⁵

The findings of this research provide an impetus for cessation and prevention intervention development to work with service member and veteran students who use tobacco and alternative forms of tobacco. Existing social work frameworks such as the Social Ecological Model⁴⁷ that consider factors associated with tobacco

use might be helpful. At the individual level, gender identity and relationship or marital status can be considered in addition to general influences on tobacco use (e.g. genetics, addiction, demographics, other concerns).^{8(p.82)} At the interpersonal level, suicidal ideation can be considered in addition to general influences on tobacco use (e.g. family, peers, stress and boredom).^{8(p.82)} At the community level, intramural participation can be considered in addition to general influences on tobacco use (e.g. lack of tobacco cessation or control programs, culture of smoking, lack of restrictions or restricted use areas, access, lack of provider trainings).^{8(p.82)} At the societal level, membership as a service member/veteran can be considered in addition to general influences (e.g. military-smoking association, policy, taxes/prices).^{8(p.82)}

Additional research is warranted to understand how tobacco use among service member and veteran students might be used to cope with reintegration or avoid thoughts or emotions associated with traumatic experiences.

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References

1. Borsari B, Yurasek A, Miller MB, et al.: Student service members/veterans on campus: challenges for reintegration. *Am J Orthopsychiatry*. 2017; 87(2): 166-75.
2. Pelts MD, Albright, DL: An exploratory study of student service members and veterans' mental health characteristics by sexual orientation. *J Am Coll Health*. 2015; 63(7): 508-12.
3. Thomas KH, Albright DA, Phillips D, Roosevelt K, Crawley R, Plummer Taylor S: (In press). Mental health status in service member and veteran students at four-year postsecondary institutions: a pilot needs assessment. *Best Pract Ment Health*. In press.
4. McLaughlin JK, Hrubsec Z, Blot WJ, Fraumeni JF: Smoking and cancer mortality among US veterans: a 26-year follow-up. *Int J Cancer*. 1995; 60(2): 190-93.
5. Barry AE, Whiteman SD, Wadsworth SM: Student service members/veterans in higher education: a systematic review. *J Stud Aff Res Pract*. 2014; 51(1): 30-42.
6. US Department of Health and Human Services. *The Health Consequences of Smoking—50 Years of Progress: A Report of the Surgeon General*. Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2014.
7. Bray RM, Hourani LL, Rae KL, et al.: 2002 Department of Defense Survey of Health Related Behaviors Among Military Personnel (prepared for the Assistant Secretary of Defense [Health Affairs]). Cooperative Agreement No. DAMD17-00-2-0057. Raleigh, NC: RTI International; 2003.
8. Bondurant S, Wedge R, editors: Institute of Medicine of the National Academies. *Combating Tobacco Use in Military and Veteran Populations*. Washington, DC: National Academies Press; 2009.
9. Pelletier JE, Lytle LA, Laska MN: Stress, health risk behaviors, and weight status among community college students. *Health Promot Pract*. 2016; 43(2): 139-144.
10. Staats S, Cosmar D, Kaffenberger J: Sources of happiness and stress for college students: a replication and comparison over 20 years. *Psychol Rep*. 2007; 101(3): 685-96.
11. Centers for Disease Control and Prevention (CDC). Smoking-attributable mortality, years of potential life lost, and productivity losses: United States, 2000–2004. *MMWR Morb Mortal Wkly Rep*. 2008; 57: 1226-8.
12. Centers for Disease Control and Prevention: Targeting Tobacco Use: The Nation's Leading Cause of Death at a Glance 2008. Available at www.cdc.gov/nccdphp/publications/aag/osh.htm; accessed August 1, 2017.
13. Fagerström, K. "Measuring degree of physical dependence to tobacco smoking with reference to individualization of treatment." *Addictive behaviors* 3.3 (1978): 235-241.

14. Baker, TB., et al. "New methods for tobacco dependence treatment research." *Annals of Behavioral Medicine* 41.2 (2011): 192-207.
15. Connolly GN, Alpert HR: Trends in the use of cigarettes and other tobacco products, 2000-2007. *JAMA*. 2008; 299(22): 2629-30.
16. Widome R, Laska MN, Gulden A, Fu SS, Lust K: Health risk behaviors of Afghanistan and Iraq war veterans attending college. *Am J Health Promot*. 2011; 26(2): 101-8.
17. National Institute on Drug Abuse: DrugFacts: Electronic cigarettes. Bethesda, MD: National Institute on Drug Abuse; 2016. Available at <https://www.drugabuse.gov/publications/drugfacts/electronic-cigarettes-e-cigarettes>; accessed August 1, 2017.
18. Pardon AA, Maloney EK, Cappella JN: Youth targeted e-cigarette marketing in the US. *Tob Regul Sci*. 2017; 3(1): 95-101.
19. Sidani JE, Shensa A, Shiffman S, Switzer GE, Primack BA: Behavioral associations with waterpipe tobacco smoking dependence among US adults. *Addiction*. 2016; 111(2): 351-9.
20. Nuzzo E, Shensa A, Kim KH, et al.: Associations between tobacco smoking knowledge and hookah smoking behavior among U.S. college students. *Health Educ Res*. 2013; 28(1): 91-100.
21. Maziak W: The waterpipe: an emerging global risk for cancer. *Cancer Epidemiol*. 2013; 37(1): 1-4.
22. Shihadeh A, Saleh R: Polycyclic aromatic hydrocarbons, carbon monoxide, "tar", and nicotine in the mainstream smoke aerosol of the narghile water pipe. *Food Chem Toxicol*. 2005; 43(5): 655-61.
23. Wald, NJ. Prospective study of effect of switching from cigarettes to pipes or cigars on mortality from three smoking related diseases. *BMJ* 314.7098 (1997): 1860.
24. Vander Weg MW, DeBon M, Peterson AL, Sherrill-Mittleman D, Kelsges RC, Relyea GE: Prevalence and correlates of lifetime smokeless tobacco use in female military recruits. *Nicotine Tob Res*. 2005; 7(3): 431-41.
25. Hermes ED, Wells TS, Smith B, et al.: Smokeless tobacco use related to military deployment, cigarettes and mental health symptoms in a large prospective cohort study among US service members. *Addiction*. 2012; 107(5): 983-94.
26. Lee PN, Hamling J: Systematic review of the relation between smokeless tobacco and cancer in Europe and North America. *BMC Med*. 2009; 7:36.
27. U.S. Department of Health and Human Services: The health consequences of using smokeless tobacco: a report of the advisory committee to the Surgeon General. NIH Publication No. 86-2874. Bethesda, MD: Public Health Service, National Institutes of Health, 1986.
28. Suits DB: Use of dummy variables in regression equations. *J Am Stat Assoc*. 1957; 52(280): 548-51.
29. Pregibon D: Logistic regression diagnostics. *Ann Stat*. 1981; 9(4): 705-24.
30. Bagley SC, White H, Golomb BA: Logistic regression in the medical literature: Standards for use and reporting, with particular attention to one medical domain. *J Clin Epidemiol*. 2001; 54(10): 979-85.
31. Box GEP, Tidwell PW: Transformations of the independent variables. *Technometrics*. 1962; 4(4): 531-50.
32. Cox DR, Snell EJ: *Analysis of Binary Data*. New York, Chapman and Hall, CRC, 1970.
33. Nagelkerke NJD: A note on the general definition of the coefficient of determination. *Biometrika*. 1991; 78(3): 691-692.
34. STATA (for Windows) [computer program]. Version 13.0. College Station, TX: StataCorp; 2000.
35. Hosmer D, Lemeshow S: *Applied Logistic Regression*, Ed. 3, Hoboken, NJ, John Wiley and Sons, 2013.
36. Thomas KH, Turner LW, Kaufman E, et al.: Predictors of depression diagnoses and symptoms in veterans: results from a national survey. *Military Behavioral Health*. 2015; 3(4): 255-65.
37. Sobell LC, Sobell MB, Agrawal S: Self-change and dual recoveries among individuals with alcohol and tobacco problems: current knowledge and future directions. *Alcohol Clin Exp Res*. 2002; 26(12): 1936-1938.
38. Gulliver SB, Kamholz BW, Helstrom AW: Smoking cessation and alcohol abstinence: what do the data tell us? *Alcohol Res Health*. 2006; 29(3): 208-13.
39. Berlin I, Hakes JK, Mei-Chen H, Covey LS: Tobacco use and suicide attempt: longitudinal analysis with retrospective reports. *PLoS One*. 2015; 10(4): 1-13.

40. Allgöwer A, Wardle J, Steptoe A: Depressive symptoms, social support, and personal health behaviors in young men and women. *Health Psychol.* 2001; 20(3): 223.
41. Thomas KH, Haring E, McDaniel J, Fletcher K, Albright DL: Belonging and support: women veterans' perceptions of veteran service organizations. *Journal of Veterans Studies.* 2017; 2(2): 1-12.
42. Cohen S, Underwood L, Gottlieb BH: *Social Support Measurement and Intervention: A Guide for Health and Social Scientists*, Cary, NC, Oxford University Press, 2000.
43. Thomas KH, Plummer Taylor S: Bulletproofing the psyche: mindfulness interventions in the training environment to improve resilience in the military and veteran communities. *Adv Soc Work.* 2015; 16(2): 312-22.
44. Ramo DE, Young-Wolff KC, Prochaska JJ: Prevalence and correlates of electronic-cigarette use in young adults: findings from three studies over five years. *Addict Behav.* 2015; 41: 142-47.
45. Rigotti NA, Lee JE, Wechsler H: US college students' use of tobacco products: results from a national survey. *JAMA.* 2000; 284(6): 699-705.
46. Sutfin EL, McCoy TP, Morrell HE, Hoepfner BB, Wolfson M: Electronic cigarette use by college students. *Drug Alcohol Depend.* 2013; 131(3): 214-21.
47. Hayden JA: *Introduction to Health Behavior Theory*. New York, NY, Jones & Bartlett Publishers, 2013.
48. Thomas KH, Plummer Taylor S, Hamner K, Glazer J, Kaufman E: Multi-site programming offered to promote resilience in military veterans: a process evaluation of the Just Roll With it bootcamps. *Calif J Health Promot.* 2015; 13(2): 15-24.
49. Albright DL, Fletcher KL, Pelts MD, Taliaferro LA: Use of college mental health services among student veterans. *Best Pract Ment Health.* 2017; 13(1): 66-80.
50. DiRamio D, Ackerman R, Mitchell RL: From combat to campus: voices of student-veterans. *NASPA Journal.* 2008; 45(1): 73-102.
51. Torrens Armstrong A: Serving those that serve: a practitioner commentary on health promotion in the military. *Health Promot Pract.* 2017; 18(2): 169-74.
52. Romero DH, Riggs SA, Ruggiero C: Coping, family social support, and psychological symptoms among student veterans. *J Couns Psychol.* 2015; 62(2): 242-52.
53. McBain, L, Kim YM, Cook BJ, Snead KM: *From soldier to student II: assessing campus programs for veterans and service members*. Washington, DC, American Council on Education; 2012. Available at <http://www.acenet.edu/news-room/Documents/From-Soldier-to-Student-II-Assessing-Campus-Programs.pdf>; accessed August 1, 2017.
54. Richey R, Garver-Apgar C, Martin L, Morris C, Morris C: Tobacco-free policy outcomes for an inpatient substance abuse treatment center. *Health Promot Pract.* 2017; 18(4): 554-60.
55. Sung H, Apollonio DE: Evaluation of tobacco control policies in San Francisco homeless housing programs. *Health Promot Pract.* 2017; 18(4): 571-80.