

# Factors Associated with Opposition to a Vape-Free Campus Policy

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## Abstract

**Objective.** To assess the characteristics of campus populations who were opposed to a vape-free campus policy and examine factors associated with opposition to a vape-free campus policy among those who indicated support for a tobacco-free policy.

**Participants.** Faculty, staff, and students (N=2210) in a Midwestern university participated.

**Methods.** Individuals were invited to a campus-wide online survey about the tobacco-free policy on campus in spring 2018. Pearson's  $\chi^2$ , *t*-test, and binary logistic regression were used for analysis.

**Results.** Age, gender, current tobacco use, perceived harmfulness of e-cigarettes, and perceived harmfulness of secondhand smoke were significantly associated with opposition to the vape-free campus policy.

**Conclusions.** Our data highlight the importance of various demographic factors that are associated with opposition to the vape-free policy. The current field needs to use informative approaches to improve knowledge of overall tobacco in health campaigns and public health programs on campus and within community outreach programs.

**Keywords.** health policy, Electronic Nicotine Delivery Systems, tobacco, surveys and questionnaires, cross-sectional studies

## Factors associated with opposition to a vape-free campus policy

American young adults are rapidly becoming addicted to new tobacco products known as Electronic Nicotine Delivery Systems (ENDS), commonly called e-cigarettes. Researchers reported that ENDS prevalence among U.S. adults was 4.5%. Notably, among young adults aged 18 to 24, it was reported as high as 9.2% in 2016 (Mirbolouk et al., 2018). There are a variety of types of ENDS. Recently, a novel ENDS product named JUUL has swept the nation. Although it was first introduced in 2015 (Stahr, 2015), its market share was reported to hit over 75% in 2018 (Craver, 2018). Due to the tiny size and flashy USB flash drive-like shape with little to no scent, JUUL users can vape regardless of the location, including classrooms and buildings on college campuses (Reimer, 2019; Veitch, 2018).

Harmful effects of smoking and secondhand smoke (SHS) have been well documented in the literature. Both smoking and SHS are significantly associated with cardiovascular disease (e.g., stroke), respiratory disease (e.g., chronic obstructive pulmonary disease), cancer, and other serious health conditions, including stillbirth, low birth weight, bone diseases (U.S. Department of Health and Human Services, 2010; 2014). However, the detrimental health effects of ENDS are quite poorly understood compared to those of traditional combustible cigarettes (Dinakar & O'Connor, 2016). Although there is limited empirical data, multiple ingredients in ENDS, including nicotine, ultrafine particles, flavorants such as diacetyl, volatile organic compounds (e.g., benzene), toxic heavy metals (e.g., lead and cadmium), and carcinogens (e.g., formaldehyde) are suspected to produce negative health outcomes (U.S. Department of Health and Human Services, 2016). There is a concern that ENDS use may serve as a gateway to nicotine addiction and eventually traditional combustible tobacco smoking in the future (Etter, 2017; U.S. Department of Health and Human Services, 2016). Peer influence has been shown to be a significant facilitator leading to the use of ENDS. Evidence exist that young adults who smoke daily experienced increased desire to use ENDS when they observed a peer who use ENDS (King et al., 2015). Social learning theory (Bandura, 1977) and the ecological perspective of health (Sallis et al., 2006) explain the putative mechanism by which individuals learn smoking through exposure to that behavior (Bandura, 1977). Additionally, the ecological perspective stresses the importance of a healthy environment and policies for better health (McLeroy et al., 1988; Sallis et al., 2006).

In the United States, tobacco control policies are being adopted increasingly on campuses to protect college communities against the deadly health hazards caused by tobacco and promote the rights of those on campus to breathe clean air. As of April 1, 2019, 2,356 campuses had implemented 100% smoke-free policies. Although 84.2% restricted all tobacco, including non-combustible products, and 83.4% prohibited ENDS on campus (American Nonsmokers' Rights Foundation, 2019), many colleges are hesitant to adopt vape-free campus policies. Campus administrators and populations may be reluctant or disagree with pushing the adoption of vape-

free campus policies for various reasons. They may not know the exact constituents of secondhand vapor (Tan et al., 2017). They may also perceive ENDS not to be tobacco products, or there may be political issues at play involving campus groups who are in favor of vaping in colleges.

Strong constituent support is an important factor in adopting and implementing tobacco control policies (Satterlund et al., 2011). Nevertheless, research on characteristics of campus members associated with opposition to vape-free campus policies has been scarce. Braverman et al. (2017) reported the use of tobacco products (cigarettes, smokeless tobacco, and non-cigarette tobacco) as a predictor of opposition to tobacco-free policies, whereas predictors of support for these policies included smoke-free policy support, being female, international student status, exposure to SHS, and being over 55. A study by Brown et al. (2016) similarly found that non-users of ENDS were more likely to support vape-free campus policies than ENDS users. However, their study did not consider relevant demographic information (e.g., race/ethnicity, sexual preference, veteran status), environmental factors (noticing ashtrays or “no smoking” signs, etc.), awareness of the campus smoking policies, and perceived harmfulness of SHS and/or ENDS. There is a need for a more comprehensive assessment of individual characteristics or contextual factors that are associated with opposition to vape-free campus policies. Identification of such factors will provide essential information to develop effective strategies to establish and implement tobacco-free campus policies. Given the possibility of misconceptions of the definition of tobacco-free (whether it includes ENDS), the investigation of perceptions of ENDS-free (or vape-free) campus policies is valuable. Discerning the reasons why supporters of tobacco-free campuses would not support the policies for vape-free campuses is particularly important in initiating effective communications geared toward vape restrictions in colleges.

In this paper, we report results from a campus-wide survey open to all campus populations (students, staff, and faculty members) aimed at assessing levels and possible drivers of support and opposition for both vape and tobacco-free campus policies. Within the survey, we addressed a wide range of demographics, environmental factors, smoking policy awareness, and perceived harmfulness of ENDS and SHS. We aimed to assess the characteristics of individuals on campus who were opposed to a vape-free campus policy and examine factors associated with opposition to a vape-free campus policy among those who indicated support for a tobacco-free policy.

## **Methods**

### **Participants and Procedures**

In spring 2018, an email invitation from the Student Association with the link to the online survey about tobacco-free campus policies was distributed to all faculty, staff, and students at a university in Wisconsin. Only individuals who signed the online consent participated in the study survey. A total of 2,210 individuals participated in the survey, with an approximate response rate

of 8%. This study was approved by the University of Wisconsin-Milwaukee Institutional Review Board before data collection.

## Measures

### Opposition to Tobacco-Free and Vape-Free Campus Policies

The question, “Do you agree that campus needs to adopt a policy that would make the entire campus 100% tobacco-free?” was used to measure the level of support or opposition to the tobacco-free campus policy, and the question, “Do you agree that electronic cigarettes (vapes) need to be banned in the tobacco-free campus policy?” was used to measure the level of support or opposition to the vape-free campus policy. Response options included “strongly agree,” “somewhat agree,” “neither agree nor disagree,” “somewhat disagree,” and “strongly disagree.” “Strongly agree” and “somewhat agree” were considered support of the tobacco-free and vape-free policies and “somewhat disagree” and “strongly disagree” were considered opposition.

### Demographic Characteristics

Participants reported age, gender, sexual orientation, race and ethnicity, and veteran status.

### Tobacco Use and Exposure to Secondhand Smoke on Campus

Respondents reported their tobacco use status by responding to the question, “Do you currently use tobacco products?” Respondents were asked to report frequencies of exposure to SHS from cigarettes on campus; possible answers were “every day or most days,” “some days,” and “never.” Participants were also asked to document whether they had seen ashtrays, receptacles, or “no smoking” signs on campus.

### Awareness of Campus Smoking Policy

In the survey, we provided the current smoking campus policy statement (university prohibits smoking in all buildings, vehicles, parking structures, and within 25 feet of all buildings) and asked the participants whether they were aware of this policy before reading the statement.

### Perceived Harmfulness of SHS and ENDS

The participants were asked to report perceived harmfulness of SHS on a scale of 1 to 10, with 1 meaning “not at all harmful” and 10 meaning “extremely harmful.” Their perceived harmfulness of ENDS was evaluated with the question, “How harmful do you think electronic cigarettes (vapes) are compared to conventional cigarettes?” Responses included “less harmful,” “about the same,” and “more harmful.”

## Analytic Plan

We used descriptive statistics to examine frequencies and percentages for categorical variables and mean and standard deviation for continuous variables. We used Pearson's  $\chi^2$  statistics to examine bivariate associations between characteristics (categorical variables) of the participants and opposition/non-opposition to the vape-free policy on campus. A t-test was used to examine the mean difference in perceived harmfulness of SHS between groups who agreed with the vape-free policy and those who did not. We used binary logistic regression to investigate factors associated with opposition to the vape-free campus policy among individuals who were in favor of the tobacco-free campus policy. For categorical variables with more than 2 levels, we used the overall significance of the corresponding variable and Bonferroni adjustment to evaluate pairwise effects between the reference variable and the rest of the variables. All statistical assumptions for bivariate and multiple analyses were met. The significance level was set at  $< 0.05$ .

## Results

### Characteristics of All Participants

Table 1 presents the characteristics of the campus participants between opposition and non-opposition to the vape-free policy on campus. A total of 40.3% of the participants opposed the vape-free policy. Nearly half of participants aged 29 or younger opposed the vape-free policy, but only a small proportion of the participants aged 40 or older disagreed with the vape-free policy. The differences in these age categories, dependent on the vape-free policy opposition, were significant. There were also significant differences in gender and sexual orientation categories regarding opposition to the vape-free policy. Participants who answered with alternate gender self-identification opposed the vape-free policy to a greater degree (64.6%), compared to those who identified themselves as men (54.2%) or women (28.5%). Heterosexual participants reported significantly more to the vape-free policy opposition compared to their homosexual counterparts. Latinx participants (49.3%) opposed the vape-free policy the most whereas non-Latinx Asians (29.7%) did the least. Race and ethnicity were significantly related to opposition to the vape-free policy. Approximately, 80% of the participants who had never been exposed to SHS on campus opposed the vape-free policy compared to only 22% of those who were exposed to SHS every day or most days. This difference in opposition to the vape-free policy by frequency of exposure to SHS was significant. In addition, respondents who have never seen ashtrays or receptacles on campus reported significantly more opposition than those who had seen them.

**Table 1.** Characteristics of campus participants, stratified by opposition to a vape-free campus policy (N= 2210)

Categorical Variables	Bivariate association			
	Non-opposition (Support) N (%) or mean (SD)	Opposition N (%) or mean (SD)	$\chi^2$ or t	p
Frequencies of non-opposition and opposition	1320 (59.7)	890 (40.3)		
Age			166.132	<0.001
≥ 60 years	81 (83.5)	16 (16.5)		
50-59 years	127 (82.5)	27 (17.5)		
40-49 years	143 (83.1)	29 (16.9)		
30-39 years	197 (72.4)	75 (27.6)		
26-29 years	117 (57.6)	86 (42.4)		
18-25 years	655 (49.4)	657 (50.1)		
Gender			158.635	<0.001
Woman	871 (71.5)	347 (28.5)		
Man	432 (45.8)	512 (54.2)		
Alternate self-identification	17 (35.4)	31 (64.6)		
Sexual orientation			27.375	<0.001
Homosexuality	182 (47.8)	199 (52.2)		
Heterosexuality	1138 (62.2)	691 (37.8)		
Race/Ethnicity			12.439	0.014
Latinx	74 (50.7)	72 (49.3)		
Non-Latinx white	1090 (60.4)	714 (39.6)		
Non-Latinx black	35 (67.3)	17 (32.7)		
Non-Latinx Asian	45 (70.3)	19 (29.7)		
Non-Latinx others	76 (52.8)	68 (47.2)		
Veteran			3.178	0.075
No	1261 (60.2)	835 (39.8)		
Yes	59 (51.8)	55 (48.2)		
Frequencies of exposure to SHS			333.406	<0.001
Every day or most days	728 (78.0)	205 (22.0)		
Some days	512 (55.1)	417 (44.9)		
Never	80 (23.0)	268 (77.0)		
Ashtrays or receptacles			96.844	<0.001
Seen	762 (53.1)	673 (46.9)		
Not seen	29 (44.6)	36 (55.4)		
Not sure	529 (74.5)	181 (25.5)		
No smoking signs			2.751	0.097
Not seen	495 (62.0)	303 (38.0)		
Seen	825 (58.4)	587 (41.6)		

Current tobacco use			412.443	<0.001
No	1289 (68.6)	589 (31.4)		
Yes	31 (9.3)	301 (90.7)		
Awareness of campus smoking policy			32.285	<0.001
No	349 (70.8)	144 (29.2)		
Yes	971 (56.6)	746 (43.4)		
Perception of harmfulness of ENDS			381.414	<0.001
Less harmful	484 (40.8)	701 (59.2)		
About the same	652 (80.3)	160 (19.7)		
More harmful	184 (86.4)	29 (13.6)		
Perception of harmfulness of SHS	8.742 (1.694)	5.576 (2.787)	30.322	<0.001

Most current tobacco users (90.7%) disagreed with the vape-free policy, while only a third of the non-current tobacco users (31.4%) were opposed to the policy. A significantly greater percentage of the participants who reported awareness of the campus smoking policy opposed the vape-free policy (43.4%) than those who reported being unaware of the campus smoking policy (29.2%). Individuals who perceived ENDS as less harmful than cigarettes were significantly more opposed to the vape-free policy compared to those who perceived ENDS as more harmful, and those who perceived ENDS and cigarettes as equally harmful. Participants opposed to the vape-free policy reported significantly lower mean scores of perceived harmfulness of SHS than those who were not. There were no significant differences related to veteran status or noticing “no smoking” signs.

#### Characteristics of Participants Who Opposed the Vape Free Policy but Agreed with the Tobacco Free Policy

Table 2 presents the characteristics of the campus participants who favored the tobacco-free policy but opposed to the vape-free policy on campus. Out of 1458 tobacco-free policy supporters (66% out of the total sample), 219 participants (15.1%) opposed the vape-free policy. There were significant differences in the age and gender categories regarding vape-free policy opposition. More than 20% of the participants aged 25 or younger reported opposition to the vape-free policy compared to 10% or fewer of those aged 26 or older. And male participants were more often opposed to the vape-free policy compared to female and other than male and female participants. A significantly greater percentage of heterosexual participants were opposed to the vape-free policy than homosexual individuals. Participants who had not seen “no smoking” signs reported significantly more opposition to the vape-free policy than those who had seen the signs.

Current tobacco users reported four times more opposition to the vape-free policy than non-current tobacco users, representing significant differences regarding opposition. Respondents who perceived that ENDS were less harmful than traditional cigarettes reported significantly more opposition to the vape-free policy than those who perceived that ENDS were more harmful or that ENDS and cigarettes were similarly harmful. Participants who were not opposed to the vape-free policy reported perceiving SHS as more harmful than those who were opposed to the policy. The difference in this perception level was significant. There were no significant differences in race/ethnicity, veteran status, frequencies of exposure to SHS, noticing ashtrays or receptacles on campus the surroundings, or awareness of the campus smoking policy in this sample.

#### Factors Associated with Opposition to the Vape-Free Campus Policy but Agreement with the Tobacco Free Policy

Table 2 is a representation of a binary logistic regression model to find factors associated with opposition to the vape-free campus policy among those who agreed with the tobacco-free policy. Controlling for all other variables (sexual orientation, race/ethnicity, veteran status, frequencies of exposure to SHS, noticing ashtrays or receptacles, noticing no smoking signs, and awareness of the campus smoking policy), age, gender, current tobacco use, perceived harmfulness of ENDS, and perceived harmfulness of SHS were significantly associated with the vape-free policy opposition. We adjusted multiple comparisons using Tukey's test to look at differences between groups with more than two levels including age, gender, and perceived harmfulness of ENDS. As shown in Table 3, the 18-25 age group had significantly higher odds of opposition to the vape-free policy than all others. Moreover, males had significantly higher odds than females to the opposition of the vape-free policy. Participants who answered that ENDS is about the same as or more harmful than conventional cigarettes had significantly less odds of opposition to the vape-free policy than those with less harmful. Figure 1 presents bar charts regarding statistically significant variables in the multiple logistic regression model.



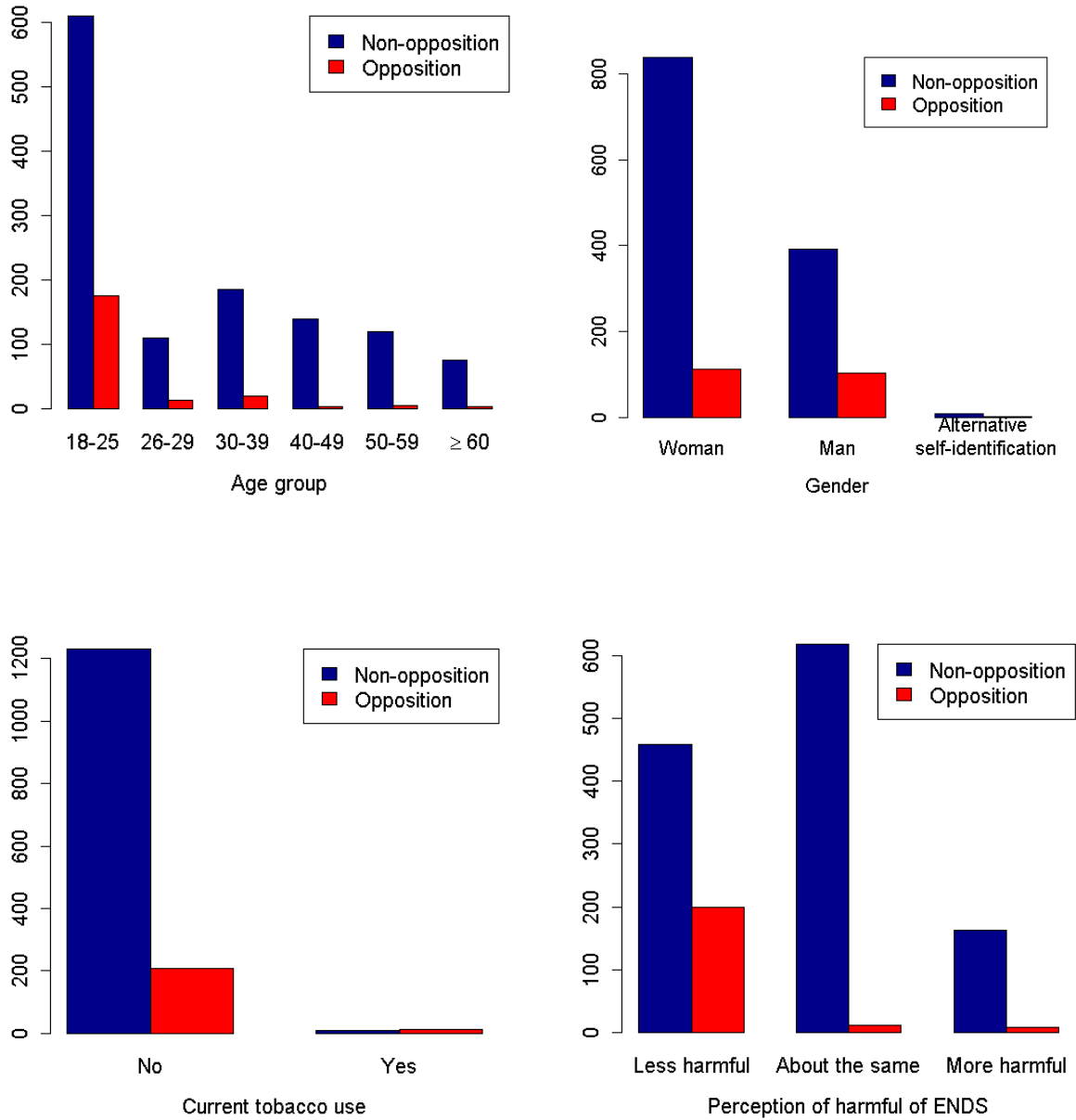
**Table 2.** Factors associated with opposition to the vape-free campus policy among individuals who supported a tobacco-free campus policy (N=1458)

Variables	Bivariate association				Logistic regression model		
	Non-opposition (Support) N (%) or mean (SD)	Opposition N (%) or mean (SD)	$\chi^2$ or t	p	OR	95% CI	p
Frequencies of non-opposition and opposition	1239 (84.9)	219 (15.1)					
Age			78.709	<0.001			<0.001
≥ 60 years	76 (96.2)	3 (3.8)			Ref.		
50-59 years	120 (96.0)	5 (4.0)			1.023	0.214-4.883	0.977
40-49 years	139 (97.9)	3 (2.1)			0.742	0.133-4.146	0.734
30-39 years	185 (90.7)	19 (9.3)			2.149	0.554-8.331	0.269
26-29 years	109 (89.3)	13 (10.7)			2.639	0.643-10.883	0.178
18-25 years	610 (77.6)	176 (22.4)			5.240	1.454-18.888	0.011
Gender			21.168	<0.001			0.007
Woman	838 (88.1)	113 (11.9)			Ref.		
Man	392 (79.0)	104 (21.0)			1.750	1.234-2.481	0.002
Alternate self-identification	9 (81.8)	2 (18.2)			1.238	0.222-6.912	0.808
Sexual orientation			5.282	0.022			
Homosexuality	160 (79.6)	41 (20.4)			Ref.		
Heterosexuality	1079 (85.8)	178 (14.2)			0.771	0.494-1.204	0.254
Race/Ethnicity			2.842	0.585			0.328
Latinx	62 (82.7)	13 (17.3)			Ref.		
Non-Latinx White	1030 (85.1)	180 (14.9)			0.819	0.393-1.707	0.593
Non-Latinx Black	33 (80.5)	8 (19.5)			2.228	0.684-7.255	0.184
Non-Latinx Asian	44 (91.7)	4 (8.3)			0.562	0.148-2.136	0.398
Non-Latinx Others	70 (83.3)	14 (16.7)			0.884	0.332-2.349	0.804

Veteran			2.546	0.111			
No	1189 (84.7)	215 (15.3)			Ref.		
Yes	50 (92.6)	4 (7.4)			0.623	0.182-2.132	0.451
Frequencies of exposure to SHS			0.595	0.743			0.177
Every day or most days	719 (85.6)	121 (14.4)			Ref.		
Some days	463 (84.2)	87 (15.8)			1.226	0.852-1.763	0.273
Never	57 (83.8)	11 (16.2)			2.092	0.912-4.801	0.082
Ashtrays or receptacles			2.602	0.272			0.305
Seen	699 (84.4)	129 (15.6)			Ref.		
Not seen	27 (77.1)	8 (22.9)			1.476	0.553-3.940	0.437
Not sure	513 (86.2)	82 (13.8)			0.804	0.562-1.151	0.234
No smoking signs			5.389	0.02			
Not seen	474 (82.3)	102 (17.7)			Ref.		
Seen	765 (86.7)	117 (13.3)			0.797	0.551-1.152	0.228
Current tobacco use			29.617	<0.001			
No	1230 (85.6)	207 (14.4)			Ref.		
Yes	9 (42.9)	12 (57.1)			4.304	1.501-12.341	0.007
Awareness of campus smoking policy			0.896	0.344			
No	335 (83.5)	66 (16.5)			Ref.		
Yes	904 (85.5)	153 (14.5)			1.094	0.736-1.625	0.658
Perception of harmfulness of ENDS			222.978	<0.001			<0.001
Less harmful	458 (69.6)	200 (30.4)			Ref.		
About the same	618 (98.3)	11 (1.7)			0.059	0.031-0.110	<0.001
More harmful	163 (95.3)	8 (4.7)			0.172	0.081-0.367	<0.001
Perception of harmfulness of SHS	8.948 (1.367)	8.1 (1.787)	6.686	<0.001	0.853	0.767-0.948	0.003

SD, Standard deviation; CI, Confidence interval

**Figure 1.** Bar charts of statistically significant variables in the logistic regression model



**Table 3.** Multiple comparisons

		OR	Adjusted p-value
Age	50-59 years vs $\geq$ 60 years	1.023	1
	40-49 years vs $\geq$ 60 years	0.742	0.999
	30-39 years vs $\geq$ 60 years	2.149	0.862
	26-29 years vs $\geq$ 60 years	2.639	0.732
	18-25 years vs $\geq$ 60 years	5.240	0.101
	40-49 years vs 50-59 years	0.725	0.998
	30-39 years vs 50-59 years	2.100	0.737
	26-29 years vs 50-59 years	2.579	0.566
	18-25 years vs 50-59 years	5.121	<b>0.014</b>
	30-39 years vs 40-49 years	2.895	0.562
	26-29 years vs 40-49 years	3.555	0.415
	18-25 years vs 40-49 years	7.061	<b>0.018</b>
	26-29 years vs 30-39 years	1.228	0.996
	18-25 years vs 30-39 years	2.439	<b>0.023</b>
18-25 years vs 26-29 years	1.986	0.333	
Gender	Man vs Woman	1.750	<b>0.004</b>
	Alternate self-identification vs Woman	1.238	0.965
	Alternate self-identification vs Man	0.707	0.911
Perception of harmfulness of ENDS	About the same vs Less harmful	0.059	<b>&lt;0.001</b>
	More harmful vs Less harmful	0.172	<b>&lt;0.001</b>
	More harmful vs About the same	2.945	0.061

More specifically, the odds of being in the opposition group to the vape-free policy among participants aged 18-25 were 5.2 times higher than those 60 or older. The odds of being in the opposition group among male participants were 1.7 times higher than those in female participants. The odds of being in the opposition group among current tobacco users were 4.3 times higher than those in non-users. The odds of opposing the vape-free policy among those who answered, “about the same” and “more harmful” for the perceived harmfulness of ENDS compared to those who answered “less harmful” were 0.059 and 0.172, respectively. As the participants perceived ENDS more harmful, the odds of opposition to the vape-free policy decreased. The odds ratio of perceived harmfulness of SHS predicting opposition to the vape-free policy was 0.853, which indicates that the odds of opposing the vape-free policy decreased as they perceived SHS more harmful.

## Discussion

The Surgeon General definitively concluded that any kind of tobacco use or exposure to tobacco is significantly hazardous to health (U.S. Department of Health and Human Services, 2014). Recently, ENDS have become the most popular form of tobacco products among youths and young adults in America. As ENDS deliver nicotine derived from tobacco, they are considered a tobacco product by the U.S. Food & Drug Administration (2019). Although evidence about the long-term health effects of ENDS is limited compared to that of traditional combustible tobacco products, researchers have confirmed that ENDS pose significant health risks (U.S. Department of Health and Human Services, 2016). Therefore, vape-free policies should be considered in efforts to control tobacco use on campus.

The multiple analysis model (Table 2) indicated that age, gender, current tobacco use, perceived harmfulness of ENDS, and perceived harmfulness of SHS were significantly associated with opposition to the vape-free campus policy among those who otherwise supported a tobacco-free campus policy. Because ENDS are categorized as tobacco products, the “comprehensive tobacco-free policy” in our survey was meant to include the restriction of ENDS. Surprisingly, a considerable proportion (15.1%) of the study participants reported being opposed to the vape-free campus policy even though they reported supporting the comprehensive tobacco-free campus policy in the survey. This finding suggests that many people do not consider ENDS to be tobacco products. This misconception may come from misinformed beliefs and norms around ENDS. For example, adolescents and young adults who use JUULs often fail to recognize that they contain nicotine and many refer to their devices specifically as JUULs rather than e-cigarettes (Willett et al., 2019). Moreover, a belief that vaporization from ENDS is pure and unharmed may contribute to misconceptions about ENDS (Harding, 2014). These beliefs may in part be driven by exposure to social media promotions for e-cigarettes, which have often portrayed ENDS as safer and as healthier than conventional cigarettes (McCausland et al., 2019). Exposure to ENDS materials on social media has also been shown to be associated with greater ENDS use (Pokhrel et al., 2018). Given the prevalence of misinformation about ENDS, the participants may have failed to recognize how ENDS use would be affected by the enforcement of a comprehensive tobacco-free policy. Beliefs may also have been shaped by prior exposure to tobacco-free policies in other locations, as a variety of dimensions exist in campus tobacco control policies. For example, policies depend on the definition of tobacco products (e.g., smokeless tobacco, ENDS, hookah), the affected areas (e.g., indoors, outdoors, inside vehicles, a certain distance from buildings), and situations (e.g., religious ceremonies, research purposes) (American Nonsmokers’ Rights Foundation, n.d.; Heath et al., 2016).

The American College Health Association (2012) has endorsed comprehensive tobacco-free policies, stating that building tobacco-free environments on campus can result in significant decreases in the number of tobacco users, the quantity of tobacco products used, and the

exposure of non-tobacco users to passive tobacco use. To enact comprehensive tobacco-free campus policies that include ENDS restrictions, college administrators, health professionals, and policy makers need to understand the key factors related to opposition to new policies found in this study.

The logistic regression model (Table 2) showed that participants who perceived ENDS as less harmful than traditional cigarettes were more likely to oppose the vape-free policy compared to those who perceived ENDS as more harmful and those who perceived ENDS and cigarettes as equally harmful. The model also confirmed that respondents who perceived SHS less harmful were more likely to oppose the vape-free policy. Thus, opponents of the policy may have had lower sensitivity to the dangers of ENDS, SHS, and cigarettes. Perception and knowledge of general tobacco use in campus populations are closely associated with support for or opposition to vape-free policies. This aligns with the recent literature reporting that today's younger generations tend to consider ENDS less harmful and more acceptable than traditional tobacco products (Jongenelis et al., 2019; Leavens et al., 2019; Nicksic, et al., 2019). These widely prevalent beliefs about ENDS necessitate raising awareness in regards to ENDS through public health education and campaigns.

Our final analytic model showed that current tobacco use status was a strong predictive factor for the vape-free policy opposition on campus. Participants who used any tobacco products were not in favor of the vape-free policy. As we did not specify the kinds of products used, we were not able to examine differences related to the effects of each tobacco product. However, it is reasonable to think that current tobacco users do not think favorably about tobacco restriction policies. Previous research also supports this finding (Braverman et al., 2017; Cooper et al., 2016).

In our sample, 18-25-year-olds were nearly five times more likely to oppose the vape-free policy than respondents aged 60 or older. This odds ratio was even higher than that of current tobacco use in the model. The finding that younger adults were not in favor of the comprehensive tobacco-free policy (including vape restrictions) is consistent with findings from Braverman et al.'s study (2017). As mentioned above, ENDS use has become socially acceptable among young adults. In addition to perceptions of whether ENDS are tobacco and/or harmful, there is a possibility that young people do not believe the damaging consequences of vaping and exposure to vaporization will happen to them (Passanisi et al., 2017). Young adults and adolescents are prone to make poor decisions in terms of health behavior (Gwon & Jeong, 2018), and engage in risky or impulsive behaviors (Defoe et al., 2015; Scott-Parker et al., 2017). In this study, male campus participants reported more opposition to the vape-free policy than female and other than male and female counterparts. This difference in gender effect was in accordance with prior research (Braverman et al., 2017; Cooper et al., 2016; Thomson et al., 2016).

The variables of sexual orientation (heterosexuality vs. homosexuality) and “no smoking” signs (not seen vs. seen) were significant in bivariate association but not in logistic regression (Table 2) due to the controlling effect of other variables in the regression analysis. In other words, sexual orientation and “no smoking” signs correlated with other characteristics of the sample, and these two variables were explained by other variables instead. Numerous studies have documented disparities (higher prevalence) in tobacco use rates among LGBTQ groups compared to non-LGBTQ populations (Kann et al., 2016; Lee et al., 2009). The effect of heterosexual orientation may have been hidden by current tobacco use status in the model. Individuals who had not seen “no smoking” signs were more open to vaping on campus in bivariate analysis, possibly because opponents paid less attention to these enforcement signs. However, this variable was not significant in logistic regression because of the controlling effect of other variables.

Findings from this paper can be useful for informing policy makers and community partners of effective practices to reduce the use of ENDS among college students who may be influenced by perception and social and environmental factors (Cheney et al., 2018). The inadequate level of knowledge about ENDS products and their health effects may cloud the decision-making process, which leads to experimental and, eventually, regular use of ENDS on campuses. A study in North Dakota showed that four in ten college students did not know whether ENDS use was prohibited on campus (Braverman et al., 2016). Given the dramatically increased availability of ENDS products and rise of ENDS advertisements in college communities (Wagoner et al., 2014), initiating anti-ENDS campaigns to promote tobacco-free campus policies is crucial. In 2017, Arkansas and Illinois mandated a smoke-free campus policy (including ENDS) for public institutions; Iowa has even extended this to private institutions (Wang et al., 2018). Although Wisconsin, where this study was conducted, enacted a smoke-free law prohibiting smoking in workplaces, restaurants, and bars in 2010 (Centers for Disease Control and Prevention, 2020), there have been no state-wide smoking and vaping restrictions on campuses. Further, state preemption has prevented localities from regulating advertising, licensure, or youth access for tobacco products (Centers for Disease Control and Prevention, 2018), and the state does not consider e-cigarettes as “tobacco products” in its statutes (Public Health Law Center, 2020). Thus, state policy may have influenced the opposition to the adoption of the vape-free campuses in the state. In addition, while Wisconsin’s smoking rate is close to national average and the state is not a major tobacco producer, its adult vaping rate is among the top ten in the U.S. (Hu et al., 2019) and the percentage of Wisconsin high school students had increased from 8% in 2014 to 20% in 2018 (Wisconsin Department of Health Services, 2019). As a result, participants may view vaping as more normative than in other Midwestern states with lower vaping rates.

Future research is warranted to investigate the impact of this policy on the prevention of ENDS use and exposure to ENDS products among college students. Developing tailored communication strategies that target groups opposing vape restriction, including males, who

predominantly use ENDS products more than females, and current tobacco users who use ENDS as a substitute, is also important in gaining their support for a comprehensive tobacco-free campus policy, coupled with a potential educational role for parents (Cheney, et al., 2018). This will gradually shape social norms and, in the long run, decrease ENDS use and exposure to secondhand vape among young adults in higher education.

### **Limitations and Strengths**

Although this study provided important findings for successful adaptation of vape-free policies on college campuses, it includes several limitations. First, the survey results were subject to response bias because this campus-wide online survey was self-reported with a possibility that participants answered untruthfully or misleadingly on the survey questionnaire. For example, they may have felt pressure to give answers that were more socially acceptable, but the anonymity of the survey may have decreased this concern. Second, this survey was conducted on one university campus in Wisconsin, and the results may not be widely generalizable. Third, we were not able to include more questions and answers that may have been useful for analysis. For example, types of tobacco products used may have affected opposition to the vape-free policy. Additional answers such as lesbian, gay, asexual, bisexual, queer, polysexual, and pansexual for sexual orientation (American Psychological Association, 2019) would provide more detailed information about association with opposition to the policy. We did not consider different answer options for gender other than man, woman, and alternate self-identification, such as cisgender man, cisgender woman, transgender man, transgender woman, gender-nonconforming, genderqueer, gender-nonbinary, gender-creative, agender, and two-spirit (American Psychological Association, 2019). Lastly, the survey was implemented cross-sectionally, not allowing the examination of trajectories.

Multiple strengths of the current study should also be noted. First, the sample size was significantly large. Second, this survey included a set of comprehensive variables in the analytic models that prior research did not, including sexual orientation, veteran status, frequency of SHS, environmental scan factors, awareness of existing smoking policy, and perception of the harmfulness of ENDS and SHS. Third, we included various confounding factors, such as demographics, environmental factors, awareness, and perception in the analytic models to examine the factors associated with opposition to vape-free campus policy which previous researchers did not consider. Fourth, our findings are novel in that comprehensive tobacco-free campus policy supporters can be opposed to the adoption of vape-free campus policy probably due to their misconception and misbelief about ENDS.



## Conclusion

In this study, we investigated factors associated with opposition to vape-free campus policies among those who supported a tobacco-free policy based on a campus-wide survey of a university in Wisconsin. College administrators, health professionals, tobacco-free campus taskforce teams, and policymakers need to consider the significant demographic factors that prompt opposition to these policies (younger age, male, and current tobacco user), targeting populations in campus health campaigns and community outreach programs for more support. Notably, altering perceptions of the harmfulness of ENDS and SHS can be important steps toward vape-free campuses. There is a need to use informative approaches to improve knowledge of overall tobacco use, ENDS, and the harmful effects of ENDS in public health programs on campus. Because this study was conducted in only one campus, surveying a larger sample from multiple institutions (similar in size and demographics to the university the survey was administered) in the future will be helpful to compare the factors associated with opposition to vape-free campus policies and learn what, if anything, has been effective in making campuses more smoke and vape free. Additional research is required to examine the effect of campus campaigns and programs for a better understanding of ENDS and the support for or opposition to comprehensive tobacco-free and vape-free campus policies.

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