

## Attitudes and Perceptions of Tobacco-Related Products in College Students

Yen H. Dang, PharmD, CTTS-M

University of Maryland Eastern Shore, School of Pharmacy and Health Professions, Department of Pharmacy Practice

### Abstract

**Background** – Despite the highly publicized health consequences, some college students do not perceive tobacco consumption as harmful. Historically-Black College and Universities (HBCUs) have the lowest rates of tobacco-free policies compared to other colleges, universities, and minority-serving institutions, making their students at higher risk for tobacco abuse. A campus Alcohol, Tobacco, and Other Drug Prevention Committee (ATDP) was formed and led by a pharmacist to develop all tobacco cessation policies at the HBCU.

**Objectives** – (1) To determine the knowledge and attitudes of cigarettes, cigars, smokeless tobacco, electronic cigarettes, and hookah among college students in a rural area with high tobacco usage; (2) To assess perceptions on the effectiveness of smoking cessation resources on the college campus led by the ATDP committee.

**Methods** – A cross-sectional study was conducted on 99 students between 18 – 26 years attending a HBCU in Maryland. The online survey was disseminated to assess student's health behaviors and attitudes towards tobacco products and their successfulness in abstinence using campus resources with the Health Belief Model.

**Results** – Participants had more perceived harms with smoking tobacco (cigarettes and cigars) and smokeless tobacco, and greater perceived benefits with using electronic cigarettes and hookah ( $P < 0.001$ ). Most students had limited knowledge of the four tobacco categories ( $5.8 \pm 2.6$  on a 10-point Likert scale). Self-efficacy to quit was  $4.2 \pm 1.7$  on a 10-point Likert scale despite the current resources at the HBCU.

**Conclusion** – Students had a perceived benefits sequential rank order with hookah, e-cigarettes, smokeless tobacco, followed by smoking tobacco. Campuses should investigate barriers for abstinence, raise awareness about the dangers of tobacco, and create programs that enhance self-efficacy when quitting.

**Innovation and Practice Implication** – This is the first study of its kind that compares all major tobacco products head-to-head in a rural and underrepresented population. Additionally, the development of a campus-wide tobacco policy was novel as it was pharmacist-led. The results show this population has limited knowledge of tobacco products with more perceived benefits among newer nicotine delivery systems. Targeted education and public health programs should be implemented to prevent this susceptible group from initiating and continuing tobacco products.

**Keywords:** cigarettes; cigars; hookah; electronic cigarettes; smokeless tobacco; college students

### Introduction

According to the Centers for Disease Control and Prevention, approximately half a million people die each year due to a tobacco-related complication, making it the most preventable cause of death in the United States.<sup>1</sup> Cigarettes and cigars contains more than 60 known carcinogens and thousands of other harmful substances.<sup>2</sup> Cardiovascular disease, respiratory disease, cancer, and negative reproductive effects are among some of the leading consequences of tobacco usage.<sup>1,2</sup> Additionally, while smokeless tobacco is less commonly used than cigarettes, it is also associated with adverse events including oral cancer, gum disease, and tooth loss.<sup>1,2</sup> Inhaling or ingesting tobacco results in three-times higher mortality rates compared to the general population which results in billions of dollars in healthcare losses every year.<sup>1</sup>

Newer methods for introducing nicotine in the body have been developed with increasing popularity in youth. Electronic cigarettes (e-cigarettes) are battery-powered devices which aerolize nicotine, propylene glycol, and other flavorings through vaporized liquid. Hookahs are water pipes filled with tobacco and other flavorings. These products have been marketed as less harmful than their counterparts, contain numerous appealing flavor options, possess fewer regulations, and have been widely accepted in the social scene.<sup>3</sup> Despite conflicting reports, studies show that there are some differences between these products than traditional cigarettes and that the effects of these products are largely still unknown.<sup>3</sup>

One of the latest public health initiatives is to limit tobacco consumption in younger adults, especially those on college campuses. Approximately 90% of the population use their first tobacco product by age eighteen, and 98% of adults begin using a tobacco product by age 26.<sup>4</sup> Targeting college students becomes a critical population for tobacco education as this group is most susceptible for tobacco initiation. Despite the highly publicized health consequences, some college students do not perceive tobacco consumption having negative health consequences. In a study by Kong et al.<sup>5</sup>, 36.6% of students perceived harm among all tobacco products, 48.2% perceived

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**Corresponding author:** Yen H. Dang, PharmD, CTTS-M  
Associate Professor of Pharmacy Practice  
University of Maryland Eastern Shore  
School of Pharmacy and Health Professions  
One College Backbone Road, 210 Somerset Hall  
Princess Anne, MD 21853  
Phone: 410-651-8169; Fax: 410-651-8394  
E-mail: [ydang@umes.edu](mailto:ydang@umes.edu)

harm in newer tobacco products, and 8.6% of participants never heard of tobacco products at all. Those who were unaware of product harms were more likely to be younger, have a lower education level, and were minorities.<sup>5</sup> In an attempt to mitigate the damages associated with tobacco consumption, most colleges have enacted to ban tobacco consumption around campus. The American Nonsmokers' Rights Foundation (ANRF) states that there are currently 2,487 accredited universities nationwide that have established policies for smoke-free campuses.<sup>6, 7</sup> However, Historically Black College and Universities (HBCUs) have the lowest rates of tobacco-free policies compared to other colleges, universities, and minority-serving institutions. Among the 58 HBCUs with smoke-free policies, 42 (72.4%) are tobacco-free, 37 (63.8%) specifically ban e-cigarette use, and 28 (48.3%) specifically ban hookah smoking.<sup>6, 7</sup> Many students struggle to refrain from using tobacco and most campuses have difficulty enforcing the tobacco-free policy due to failures of raising awareness for the policy, a lack of policy enforcement, and limited resources for abstinence.<sup>8</sup>

This cross-sectional study was conducted at a HBCU in a county that had the highest rate of tobacco consumption in the State of Maryland. An estimated 22.0% of the youth in the area reported using some form of tobacco.<sup>9,10</sup> The incidence of lung, bronchus, and tracheal cancer were ranked as the number one risk of death in the county.<sup>9,10</sup> Youth were especially vulnerable in this area with 12.4% using cigarettes, 13% using cigars, 10.3% using smokeless tobacco, and 19.6% using e-cigarettes.<sup>11</sup> These rates were at least 5% higher than the state average.<sup>11</sup> Additionally, minorities reporting tobacco usage in this area had increased to 23.5%, compared to only 14.6% of minorities in State of Maryland.<sup>10,11</sup>

While the HBCU prohibited tobacco usage on university property, there were designated zones around the perimeter of the campus where tobacco was allowed. An Alcohol, Tobacco, and Other Drug Prevention Committee (ATDP) was created and chaired by a pharmacist with certifications in tobacco dependence. A public health faculty, rehabilitation faculty, law enforcement officer, counselor, building manager, and three full-time students were also assigned to the initiative. The committee was responsible for the development and enforcement of these tobacco-free policies, including fines for violators. The policy was available in printed and electronic formats in the Student Handbook. Additionally, the committee oversaw education and awareness campaigns on tobacco usage including pamphlets, signage, and workshops. The committee provided smoking cessation resources (e.g. counseling) and made smoking cessation materials available. The committee met monthly to review regulations and evaluate practices.

The Health Belief Model was used as the framework to develop survey questions and understand students' behavior towards tobacco products in this study (**Appendix I**). The theory has six main constructs that influence people's decisions to take

actions to prevent, screen for, and control illness.<sup>12</sup> Perceived susceptibility refers to the likelihood of getting the disease. Perceived severity is the seriousness of contracting illness. Perceived benefits are the efficacy of action to reduce the risk of impact. Perceived barriers refers to belief about the tangible and psychiatric costs of advised action. Cues to action are strategies to activate readiness. Self-efficacy is the confidence in one's ability to take action. The Health Belief Model theorizes that a person's belief in a threat of disease combined with a belief in the effectiveness of the health behavior will predict the likelihood of a person adopting the change in behavior.<sup>12</sup>

The objective of this study was to determine the knowledge, perceptions, and attitudes of different tobacco products among college students attending a HBCU in an underserved community with the highest prevalence of tobacco usage in the state. This was the first study of its kind that compared the perceptions and attitudes of five different tobacco products head-to-head in a rural and underrepresented population. Additionally, this study assessed student's perceptions of the effectiveness of campus smoking cessation policies that was spearheaded by a pharmacist.

We hypothesized that college students would be more likely to use novel tobacco delivery devices such as e-cigarettes and hookah. We believed that these products would have less associated harms to target organs and disease states compared to conventional tobacco products such as cigarettes, cigars, and smokeless tobacco. We believed that the younger generation would understand the perceived benefits of abstinence and were offered cues to action by the ATDP committee. However, we predicted that they would retain an overall low self-efficacy level for tobacco cessation due to their perceived barriers.

## Methods

Undergraduate and graduate students at a HBCU were surveyed with a 21-item web-based questionnaire that was distributed via email listserve to all students in the university, regardless of prior tobacco use. Participants were enrolled full-time at the college and between 18 and 26 years old as initiation of tobacco is unlikely to occur after the age of 26.<sup>4</sup> Survey results were anonymously collected. After completion of the survey, participants were directed to information on the Centers for Disease Control and Prevention's website to learn more about the adverse effects of tobacco use. Definitions of tobacco product terminology used in this study is provided in **Appendix II**.<sup>15</sup> The four categories that were compared in this study included smoking tobacco (cigarettes and cigars), smokeless tobacco, e-cigarettes, and hookah. Cigarettes and cigars were grouped together under the "smoking tobacco" category due to their similar nicotine delivery system, ingredients, and side effect profiles. The study was granted approval through the investigational review board and expedited review was granted.

Survey questions were based on the Health Belief Model to assess students' health behaviors. Perceived susceptibility, severity, and benefits of the four tobacco-related categories were assessed by asking participants to compare and rank the four tobacco-related categories in relation to each other. Products were ranked in sequential order by their perceived likelihood to cause harm or benefit to the pulmonary system, cardiovascular system, pregnancy, potential to cause cancer, addictive potential, and production of second-hand smoke. Scoring was assigned to each rank, with the products perceived as the least likely to cause harm and most benefit scoring one point, increasing to a maximum of four points for products ranked as causing the most harm and least benefit (**Appendix III**).

Participants were asked to provide their perceived barriers for quitting the tobacco product, if applicable, through short answers in both tangible and psychological terms. Additionally, participants were asked to develop strategies for cues for action that could be initiated on college campuses to help them remain abstinent. Students rated their knowledge of tobacco products on a 10-point Likert scale of 1 (lowest knowledge level) to 10 (highest knowledge level) to measure their cues of action. Finally, students were asked to rank their self-efficacy to terminate tobacco products on a 10-point Likert scale (1 = least to 10 = most self-efficacy) with the current policies and resources at the HBCU.

All analyses were performed using SAS version 9.2. Descriptive statistics were used, and chi-square analysis was performed for categorical data. P-values were significant at an alpha level of less than 0.05.

## Results

Of the 980 students who received the survey, 99 students participated in the study with a 10.1% response rate. The majority of participants were female (64.6%) and African-American (66.7%). The survey took on average 15 minutes to complete. The demographics of the participants are shown in **Table 1**. The study population primarily consisted of undergraduate students (90.9%) who mostly were in the technology major. Half of all respondents stated that they used one of the five tobacco products at least once in their lifetime. In the subgroup that reported using a tobacco-related product periodically, hookah was the most popular (32.3%). Hookah was reported to be used a couple of times a year for a total duration of less than five years. This was followed by cigarettes (26.2%), e-cigarettes (15.1%), smokeless tobacco (3.0%), and cigars (2.0%). Many students reported using more than one tobacco product in their lifetime.

The results are shown in **Figure 1** and there were statistically significant differences in responses for perceived benefits and harms among all the four tobacco groups ( $P < 0.001$ ). Smoking tobacco was rated as the highest likelihood of toxicity on the pulmonary system, cardiovascular system, pregnancy, cancer,

addiction, and for second-hand smoke. Additionally, students predicted that smoking tobacco was the most expensive type of tobacco-related product and the most commonly used by college students. Smokeless tobacco was rated as the least detrimental to others who were exposed to it (second-hand smoke) and was the least expensive product. Hookah was ranked as having the lowest potential for harm during pregnancy, potential for causing cancer, and addiction risk. Students ranked electronic cigarettes as having the most benefit for the pulmonary and cardiovascular system. Participants ranked their overall knowledge of tobacco-related products to be  $5.8 \pm 2.6$  on a 10-point Likert scale.

Of the 52.5% of participants that reported using tobacco products, the majority (37.3%) reported that they did not attempt to quit. Top reasons in the 14 students that reported quit attempts included personal health benefits (36.5%), financial reasons (17.3%), and social pressures (15.3%). Of the respondents that used tobacco products in the past, ninety-two percent of respondents had never tried any tobacco cessation product during their tobacco use history. Perceived barriers to cessation include the loss of a way to handle stress (76.9%), withdrawal symptoms (7.7%), and weight gain (5.8%). Participants reported that their ability to abstain from tobacco use would be maintained if fines or other citations were enforced for tobacco products on campus regularly (3.8%), a stable social support system was created (7.7%), educational sessions on the harms of tobacco products were made electronic (19.2%), and smoking cessation aids were provided on campus free-of-charge (67.3%). Despite these factors, students ranked their self-efficacy to quit as a  $4.2 \pm 1.7$  on a 10-point Likert scale with the ATDP committee's current policies and resources.

Subgroup analyses performed showed that African Americans ( $P=0.023$ ), males ( $P=0.042$ ), those who have used tobacco products in the past ( $P=0.041$ ), and participants who have made no quit attempts ( $P=0.012$ ) were more likely to have lower self-efficacy for quitting. Additionally, males ( $P=0.028$ ), those without a college degree ( $P=0.034$ ), and those who have smoked for 5 years or less ( $P=0.028$ ) had lower rates of tobacco knowledge. Type of educational major ( $P=0.82$ ), type of past tobacco product usage ( $P=0.27$ ), and tobacco product usage frequency ( $P=0.38$ ) were not associated with self-efficacy or tobacco knowledge rates.

## Discussion

While government regulations and public health campaigns have lessened the usage of conventional cigarettes in the public domain by 33%, the usage of alternative tobacco products has grown in the younger population.<sup>13</sup> Increased availability, clever marketing, low cost, and perceptions of safety have spurred the rise of electronic cigarettes and hookah in young adults as alternatives to cigarettes, cigars, and smokeless tobacco.<sup>14</sup> In this current study, the most commonly used tobacco product was hookah, used in 32.3% of the study

population, which mirrors the prevalence rates in other studies, although the rates of cigar usage was lower.<sup>13,14</sup> This is an interesting finding as cigars are heavily marketed to the African American population, although the rural location of this study may make successful marketing campaigns difficult.<sup>15</sup> In our study, African American males who used tobacco products in the past were more likely to use newer tobacco delivery systems and have lower self-efficacy for abstinence. This confirms other findings where college users of alternative tobacco products were more likely to be younger, male, black, and concomitant cigarette users.<sup>16</sup>

The mixed results of perceived benefits and harms reported in this study reflect that there have been little head-to-head comparisons among the different tobacco products. Our study population perceived the sequential benefit rank order to be hookah (most benefit), e-cigarettes, smokeless tobacco, and smoking tobacco (least benefit). This is similar to other trials where alternative tobacco products were reported to be safer than conventional ones in young adults.<sup>17-20</sup> Like other studies, this trial shows that harmful perceptions were correlated among participants of male gender, younger adults, and those with more education.<sup>17</sup> However, while most people reported that e-cigarettes were safer than conventional cigarettes, many were concerned with the unfamiliar ingredients in the device, lack of product regulation, and addiction risk.<sup>21</sup> This may be attributed to the Food and Drug Administration (FDA)'s lack of regulation for the manufacturing, distribution, and sale of hookah and e-cigarettes.<sup>22</sup> This study was conducted when respiratory illnesses were associated with using vaping products. This prompted the FDA to restrict the production and sale of all flavored cartridge-based e-cigarettes to underage youth.<sup>22, 23</sup> Yet, in our study, students were unaware of lung damage claims and perceived e-cigarettes to have the most benefit on the respiratory system. Moreover, the long-term health effects of these products are still unknown and widely debated.<sup>22, 23</sup>

There is limited knowledge of tobacco-related products, particularly those that are novel in design, among young adults that leads them to a false sense of security. In a study among US students by Wang et al.,<sup>24</sup> product knowledge and awareness were present in only 50.3% of students using e-cigarettes and 41.2% using hookah. Blacks were less likely to have awareness of hookah products as a novel tobacco delivery device.<sup>24</sup> Our study showed that hookah usage had the least perceived harms in our predominantly African-American sample, and this can be attributed to the majority of the population using hookah at baseline. Moreover, a focus group of adolescents and young adults by Wiseman et al.<sup>25</sup> revealed that most did not know the components in novel tobacco products, although all respondents had negative views about the ingredients. All participants requested more information about the safety and toxicity profile of these products on the body.<sup>25</sup> Similarly, in our study, hookah followed by e-cigarettes was perceived as having the least harms on most target organs

compared to smoking tobacco, but participants reported an overall low understanding of all tobacco products. These results show the need for tobacco cessation interventions and education campaigns to reduce the usage of tobacco products among college students.

The ATDP committee created at the HBCU was unique as it was led by a pharmacist to address needs related to tobacco policy, compliance, enforcement, and cessation. The interdisciplinary nature of the task-force formed with students, staff, and faculty, was diverse enough to capture different stakeholders for tobacco cessation. The success of the committee's monthly meetings allowed interventions to be implemented in a timely manner. Pharmacy organizations and universities have advocated for the role of pharmacists in policy development for tobacco control.<sup>26</sup> Pharmacists are well positioned to create public health policies to eliminate tobacco usage on college campuses. Many studies have shown the clinical and cost-effectiveness of pharmacist-led interventions for tobacco cessation.<sup>27</sup> The non-pharmacological and pharmacological interventions developed by pharmacists deliver sustainable health services and optimize patient care.<sup>27</sup>

Tobacco-free campus policies and those that include partial smoking restriction have been enforced with mixed results on college campuses. These policies have been paired with smoking cessation programs, especially those that offer complementary smoking cessation aids and education, to allow for more successful approaches. Difficulties of enacting comprehensive tobacco control programs include the lack of enforced policies and the variability of services.<sup>28,29</sup> Colleges should promote the distribution of educational material in non-conventional means to younger students, including electronic pathways and social media, about tobacco harms and perceived barriers to abstinence.<sup>30</sup> This should be done in conjunction with treatment referrals to an affiliated health center or health department for smoking cessation pharmacotherapy. The programs should be targeted to novel tobacco agents, if possible. Finally, support groups with student mentors and family members should be incorporated in the treatment approach.<sup>30</sup> College campuses should continue evaluating their programs routinely for the effectiveness of implementation.

This study was innovative in its approach to understand attitudes and perceptions of college students at a HBCU in an underserved area. Additionally, this study had a novel approach in which all tobacco products were analyzed for knowledge and compared against one another. The tobacco-free policies that the HBCU enforced were developed and reviewed by a pharmacy-led committee. Limitations included the cross-sectional nature of the study that prevented making causal inferences on the findings. The response rate was low so the generalizability of the study could be affected. Additionally, many of the participants who used tobacco products did not try any smoking cessation aids, which implied that this population had more addictive potential to tobacco products compared to



others. Moreover, less than half of the participants rated their literacy of tobacco products as adequate. The perceived harms and benefits may have been skewed with their limited knowledge as no information was provided in the survey about these products beforehand. Finally, the Health Belief Model does not consider habitual behaviors, environmental, or economic factors to accept a recommended action, and it has low predictive capability.<sup>12</sup>

### Conclusion

Out of the four tobacco categories, hookah had the highest prevalence among college students, followed cigarettes, e-cigarettes, smokeless tobacco, and cigars. While college students ranked smoking tobacco (cigarettes and cigars) and smokeless tobacco to have more perceived harms, hookah and e-cigarettes had greater perceived benefits on target organs. There remains limited knowledge of youth about tobacco products, particularly those that are novel in design. Campaigns on college campuses to raise awareness about the dangers of tobacco usage and programs that offer tobacco cessation management should be targeted to young students about novel tobacco products. Pharmacists are instrumental in the tobacco cessation process for policy development, evaluation, and enforcement. Finally, campuses should investigate barriers for abstinence among youth and create programs that enhance self-efficacy when quitting.

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**Treatment of Human Subjects:** Expedited IRB review/approval required and obtained

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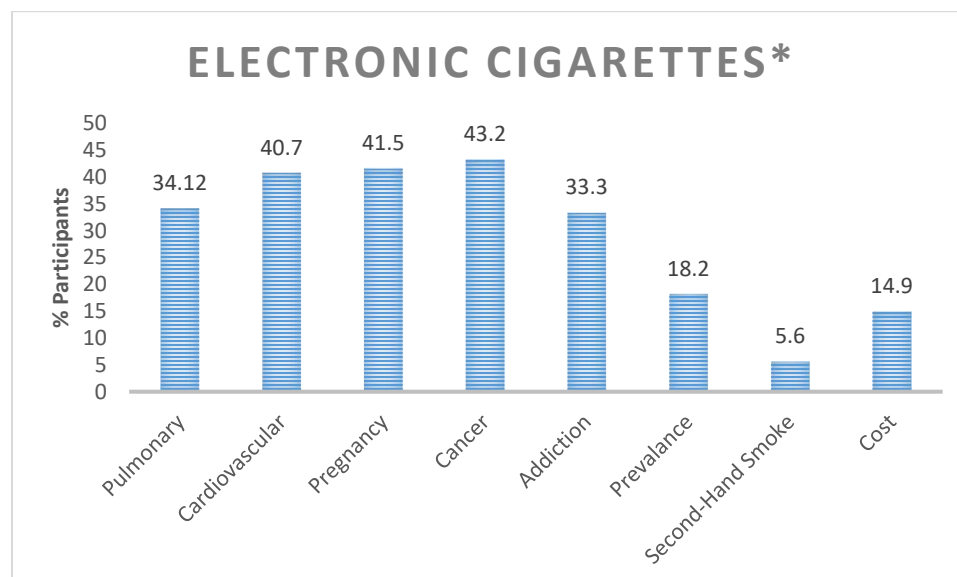
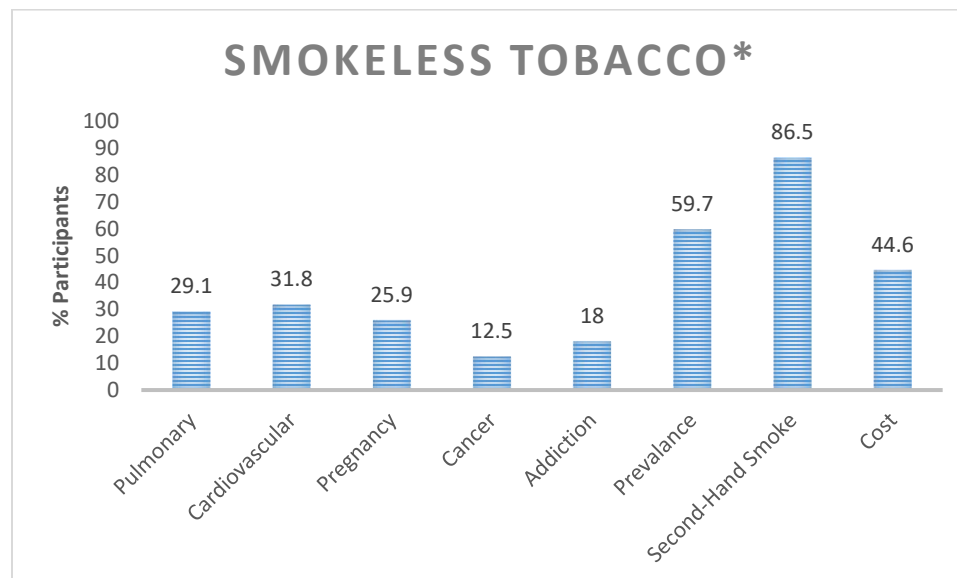
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**Table 1. Participant Demographics**

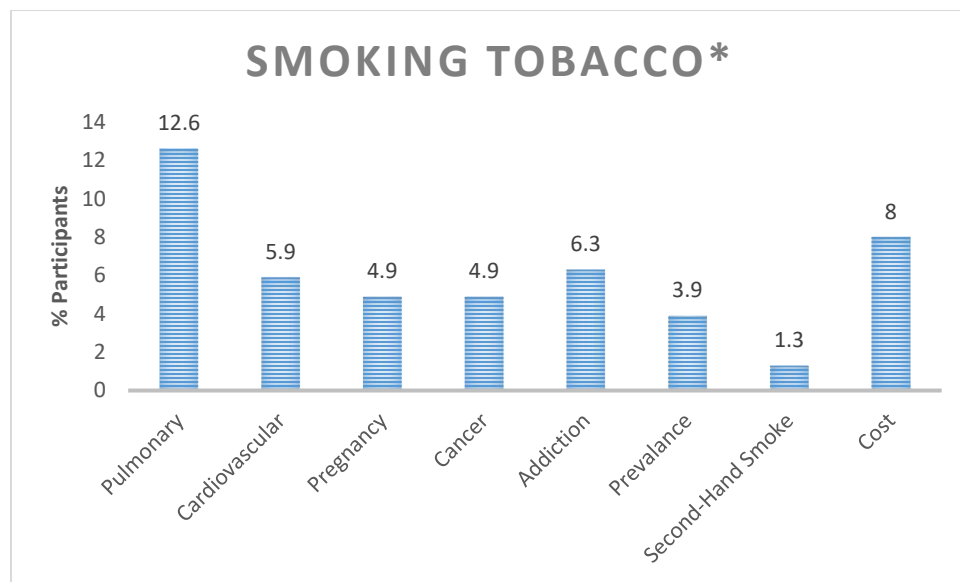
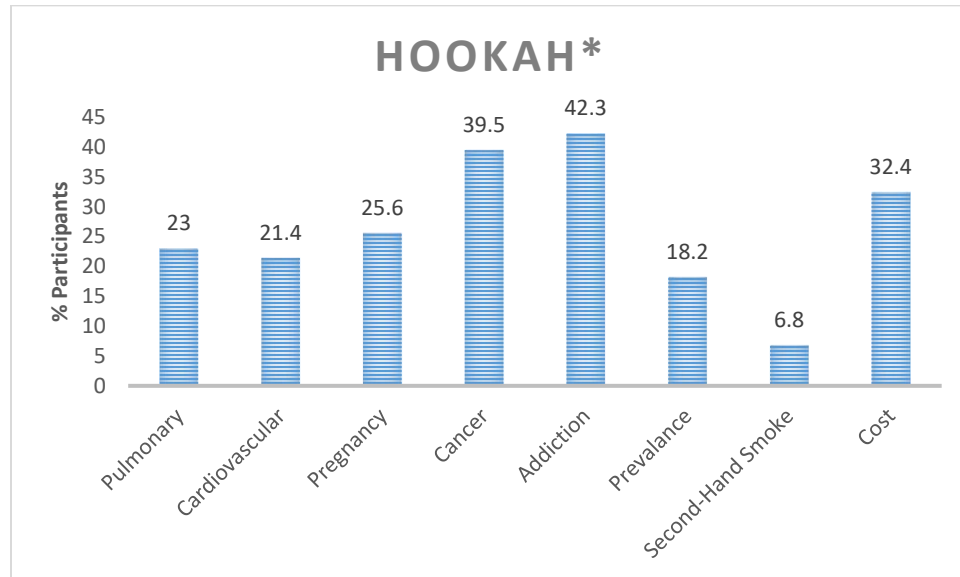
Factor		(N = 99)*
Gender	Female	64 (64.6)
	Male	35 (35.3)
Race	African-American/Black	66 (66.7)
	Asian or Pacific Islander	5 (5.1)
	Caucasian	21 (21.2)
	Hispanic	3 (3.0)
	Other	4 (4.0)
Highest education level	High school graduate	61 (61.6)
	Associate's degree	13 (13.1)
	Bachelor's degree	16 (16.2)
	Master's degree	7 (7.1)
	Doctorate degree	2 (2.0)
Academic Major	Business	11 (11.1)
	Technology	45 (45.4)
	Natural sciences	20 (20.2)
	Liberal arts	14 (14.1)
	Other	9 (9.1)
Prior tobacco usage	No	47 (47.4)
	Yes	52 (52.5)
Tobacco product usage	Chewing tobacco	3 (3.0)
	Electronic cigarettes	15 (15.1)
	Hookah	32 (32.3)
	Cigarettes	26 (26.2)
	Cigars	2 (2.0)
Duration of tobacco usage	Less than 5 years	45 (45.5)
	Over 5 years	6 (6.1)
Tobacco usage frequency	Once a day	9 (9.1)
	Once a week	2 (3.9)
	Once a month	1 (2.0)
	A couple of times a year	39 (39.4)
Number of quit attempts	0 attempt	37 (37.3)
	1 attempt	7 (7.1)
	2 attempts	1 (1.0)
	3 attempts	1 (1.0)
	4 or more attempts	5 (5.1)

\* All values are expressed as n (%)

Figure 1. Comparison of Least Harm and Most Benefit between Tobacco Products Reported Among College Students\*

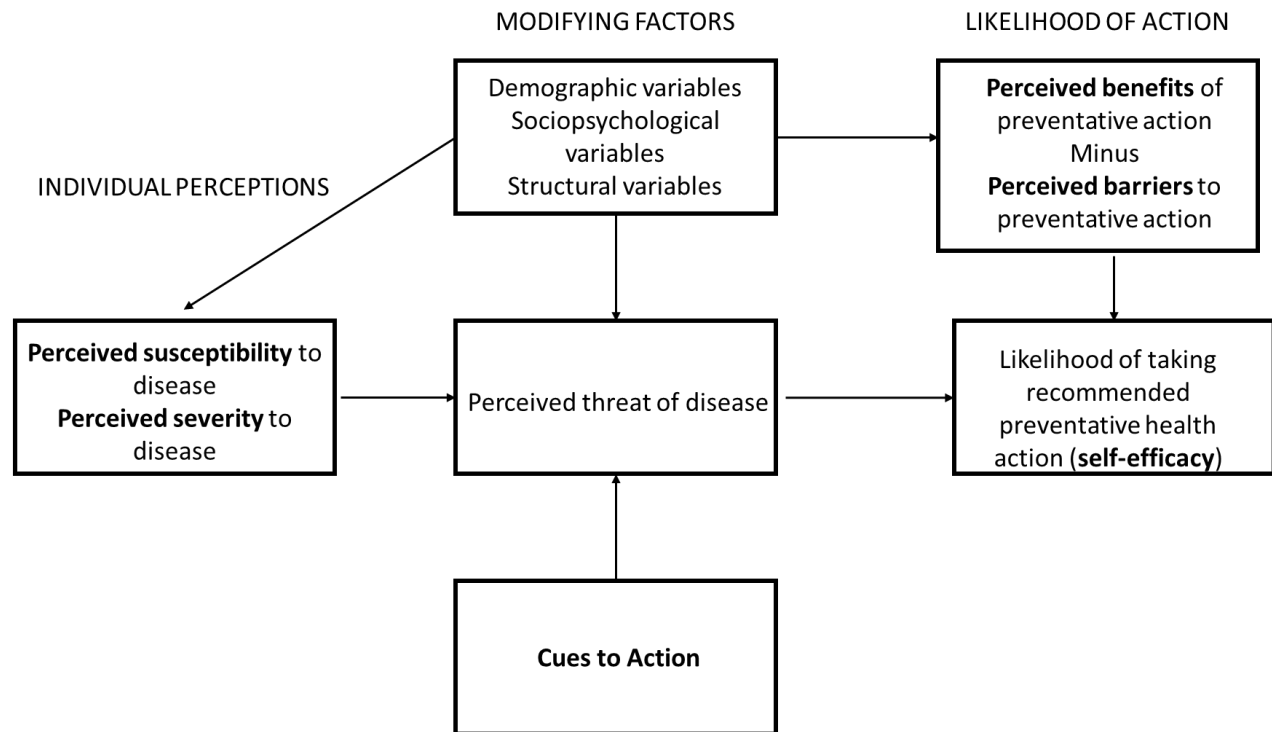






\* $P < 0.001$

Appendix I: The Health Belief Model as a Predictor of Preventative Health Behavior



Appendix II: Definitions and Examples of Common Tobacco Products

Tobacco Product	Definition	Examples
Cigarettes	Small rolls of porous paper containing tobacco	Marlboro, Camel, Newport
Cigars	Rolled tobacco wrapped in a tobacco leaf	Macanudo, Romeo y Julieta, Black & Mild
Smokeless tobacco	Products that are placed in the mouth for chewing, sucking, or spitting	Redman, Levi Garrett, Beechnut, Skoal, Grizzly
E-cigarettes	Battery-powered devices that produce vapor instead of smoke	Blu, JUUL
Hookah	Smoking tobacco in a water pipe	Starbuzz Carbine, Regal Queen Redwood, Shika Legend

Appendix III. Scoring System for Tobacco Attitudes and Perceptions Survey

On a scale of 1 – 4, rank the four products (smoking tobacco, smokeless tobacco, e-cigarettes, and hookah) in relation to each other where:

- 1 = least harm and most benefit for health
- 2 = more harm and less benefit for health
- 3 = severe harm and limited benefit for health
- 4 = most harm and least benefit for health

*Sample: Rank the four tobacco categories in relation to its effects on the cardiovascular system*

Respondents could give e-cigarettes a 1 ranking if they thought it caused the least harm and most benefit to the cardiovascular system, followed by a 2 for hookah for higher levels of harm and less benefit, a 3 score for smokeless tobacco for more negative health connotations, and a 4 for smoking tobacco as the most harm and least benefit.