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## A Review of American College Campus Tobacco or Smoke free Policies: A Case Study of a Large Urban University

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A Review of American College Campus Tobacco or Smoke free Policies: A Case Study of a  
Large Urban University

by

Sarah E. Powell

A thesis submitted in partial fulfillment  
of the requirements for the degree of  
Masters of Science in Public Health  
Department of Epidemiology  
College of Public Health  
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## **ABSTRACT**

Objective: A year after a tobacco free policy was passed, the University of South Florida (USF) was interested in the overall policy opinions and efficacy. To assess this a project was completed that included a survey and geospatial data. The survey measured tobacco policy enforcement behavior and a geographic information system (GIS) mapped tobacco policy violation. This project introduces an evaluation process that can efficiently assess an institutions tobacco-free policy. Methods: Using a cross-sectional survey sent to students, faculty, and staff, understanding of policy and resources, tobacco use observations, stage of change regarding policy enforcement, self-efficacy to enforce, and perceived policy impact on campus tobacco use (n = 5242) was evaluated. Additionally, using a GIS phone application volunteers gathered geospatial data on tobacco use seen on campus after policy enactment. Results: There was modest understanding of the current policy and low beliefs regarding policy enforcement. Most respondents answered that they do not approach violators to remind them of the policy and did not plan to do so in the future. There were statistically significant variations between smokers and non-smokers as well as between students and faculty and staff. The final map of witnessed tobacco use uncovered continued use on campus with 158 data points. Conclusions: Together, the violations map and survey results, illustrate the ineffectiveness of the current tobacco-free policy. The rise in tobacco-free policy enactment calls for inventive evaluation practices so institutions can efficiently assess their implementation. This ensures tobacco-free policies can achieve reduced tobacco use and exposure.

## INTRODUCTION

Despite decreasing rates (Razani, Boone, Lesser & Weiss, 2004; Centers for Disease Control and Prevention, 2018), smoking is the leading cause of preventable death in the United States causing approximately 16 million Americans to suffer from a disease directly related to it (Centers for Disease Control and Prevention, 2018; Halperin and Rigotti, 2003). While smoking rates overall appear to be decreasing, rates among college students increased in the 1990's by almost 10% from 1990 to 1999 (American College Health Association, 2017a). As reported by the National College Health Assessment in 2017, 9.6% of college students used cigarettes at least once within 30 days, 4.3% used e-cigarettes, and 3.2% used a hookah (American College Health Association, 2017a; Bennett, Deiner & Pokhrel, 2017). Among cigarette smokers, 98% smoked before the age of 26 (Centers for Disease Control, 2018b)

As of 2011, 42% of young adults were enrolled in a two or four year academic program (National Center for Education Statistics). Deterring young adults, ages 18-24 from starting or continuing tobacco use is important because light or daily smoking is associated with increased risks of cardiovascular conditions, cancers, respiratory symptoms, and an overall lower self-reported quality of life (Centers for Disease Control, 2018b; Schane, Ling & Glantz, 2010). Of the current cigarette smokers 98% smoked before the age of 26, and those people are most at risks for the above conditions and others (Schane, Ling & Glantz, 2010). College and university campuses can play a significant role in deterring tobacco use or tobacco use initiation by implementing tobacco policies that restrict tobacco use on campus (Hall, Williams & Hunt, 2015). Many students on campuses support tobacco policies according to numerous studies

(Lupton and Townsend, 2015; Rigotti, Moran & Wechsler, 2003; American College Health Association, 2017b), and reducing tobacco use has been added to 2020 healthy campus goals (Plaspohl, Parrillo, Vogel, Tedders & Epstein, 2012). Tobacco policies have successfully reduced the number of smokers, pointing towards their success if implemented properly (Hall, Williams & Hunt, 2015; Trinidad, Gilpin, Pierce, 2004; Harris, Stearns, Kovach & Harrar, 2009). However, there are a number of published hurdles experienced by campuses introducing, implementing, and maintaining tobacco-free policies (Hall, Williams & Hunt, 2015; Trinidad, Gilpin, Pierce, 2004; Harris, Stearns, Kovach & Harrar, 2009).

One such difficulty is that college leadership may not consider tobacco use as a leading concern since tobacco use has a delayed risk of disease (Rigotti, Regan, Moran & Wechsler, 2003). Administrators tend to focus on policies that reduce immediate risks to students, such as excessive drinking (Rigotti, Regan, Moran & Wechsler, 2003). Furthermore, college administrators worry that tobacco use policies could potentially decrease enrollment (American College Health Association, 2017b). Though the exact impact of tobacco policies on US college campus enrollment has not been extensively studied, the preliminary findings suggest there is a negligible negative impact of tobacco policies and future enrollment (Miller, Yu, Lee, Ranney, Simons & Goldstein, 2015). Therefore, it is important to continue stressing the importance of tobacco policies on campuses and their future health benefits to community members (American College Health Association 2017b, Miller, Yu, Lee, Ranney, Simons & Goldstein, 2015). It is also important to involve campus administration to determine the tobacco policy that will best fit the campus needs (Glassman, Reindl & Whewell, 2011).

While campus tobacco policies are becoming the norm, each type of campus tobacco control policy is unique (American College Health Association, 2017a). There are policies that



permit tobacco use, but limit use in common areas, such as building entrances, or offer designated smoking areas (American College Health Association 2017a). However, the recommended and supported campus tobacco-free policy is the complete ban of nicotine related products versus smoke-free or designated areas (Lochbihler, Miller & Etcheverry, 2014; Fallin, Roditis & Glantz, 2015; Roditis, Wang, Glantz & Fallin, 2015). In a specific example, a published study used animal models to explain the shortfalls of designated smoking areas (Lochbihler, Miller & Etcheverry, 2014). The study found that when animals were administered nicotine in groups it was more rewarding than when they were alone (Lochbihler, Miller & Etcheverry, 2014). With designated smoking areas, secondhand smoke exposure is reduced, but it may in fact encourage current tobacco users to continue or increase use because of the social benefits and nicotine reward they receive from spending time with other tobacco users in designated smoking areas (Lochbihler, Miller & Etcheverry, 2014). However, even if the model ACHA tobacco-free policy is chosen and passed by college administration without a clear and actionable enforcement plans, the tobacco policy will be unsuccessful (Fennell, 2012). This means the tobacco-free policy will not create the desired effect, eliminating tobacco use and secondhand smoke exposure on campus (Fennell, 2012). The path to enforcement needs to be clear, but can be unique for each campus.

Policy enforcement differs from campus to campus, however the ACHA has published guidelines for creating a strong, enforceable tobacco policy (American College Health Association, 2011). These guidelines are broken down into 9 parts (American College Health Association, 2011):

1. Develop a well-worded tobacco policy that reflects known tobacco prevention, cessation, and control best practices. These best practices include clearly defining tobacco products

as anything derived from tobacco, prohibiting on all parts of campuses (leased or owned), prohibiting the sale of tobacco products and merchandise, and not allowing tobacco company advertising, recruiting, or funding, and providing comprehensive cessation services for all community members.

2. Widely and frequently distribute information on the tobacco policy in both printed and electronic formats to all community members, including visitors.
3. Support and promote prevention and education about the risk of all tobacco forms.
4. Offer evidence based clinical services to help tobacco users end tobacco use.
5. Continue advocating for or including tobacco cessation services in student health insurance plans.
6. Place signage and marketing products throughout campus to ensure all community members and visitors are aware of the tobacco policy.
7. Thoroughly plan and implement an enforcement plan for the tobacco policy rules, regulations, and practices. This includes a easy to access and publicized reporting system for violations.
8. Collaborate with other local, state, and national tobacco control stakeholders.
9. Develop and maintain a tobacco task force on campus. This task force will ensure needs and concerns, such as enforcement, compliance, and cessation, will receive timely attention. This task force should be comprised of diverse campus community stakeholders

An effective enforcement model includes both passive (no direct contact with individuals) and active (includes direct contact) enforcement (Fallin-Bennett, Reditis & Glantz, 2017).

Passive methods of tobacco use prevention include ground markings, signage, and removal of

tobacco disposal receptacles. While these passive methods communicate policy existence they appear to lose their effectiveness over time (Fallin-Bennett, Roditis & Glantz, 2017). Meanwhile, active methods, which include approaching violators, allow for increased education on the policy or stricter university sanctions, but are limited based on who is enforcing the policy and willingness to enforce (Institute for Global Tobacco Control, 2013). Colleges and universities have employed several approaches for passive and active enforcement but continue to identify barriers with implementation and enforcement (Institute for Global Tobacco Control, 2013). There are several forms of enforcement on college campuses across the US. One published enforcement procedure is the use of tobacco ambassador programs (Ickes, Gokun, Rayens & Hahn, 2015; Ickes, Hahn, McCann & Kercsmar, 2013). While some studies have found the use of ambassador programs effective in reducing tobacco violations positively (Ickes, Gokun, Rayens & Hahn, 2015; Ickes, Hahn, McCann & Kercsmar, 2013), there are concerns for safety if students are used as ambassadors (Ickes et al. 2013). Often, students are not viewed as having the authority to enforce the policy even though many policies are written to include students as enforcers (Ickes, Gokun, Rayens & Hahn, 2015; Ickes, Hahn, McCann & Kercsmar, 2013). Numerous other tobacco policies are written with social normative approaches towards enforcement (Institute for Global Tobacco Control, 2013). A social normative approach involves community members enforcing the policy and educating others on the tobacco policy (Institute for Global Tobacco Control, 2013). While this method of enforcement has the potential to be effective with extensive community member education, there are numerous barriers to overcome including overall reluctance of community members to confront violators (Institute for Global Tobacco Control, 2013). Numerous studies cite the shortcomings of having a social normative to enforcement relying on community members and having weakly written consequences of

violations (Institute for Global Tobacco Control, 2013; Hall, Williams & Hunt, 2015; Russette, Harris, Schuldberg & Green, 2014). Studies cite certain formal enforcement channels could be used, such as campus police, however there are several shortcomings with this approach as well (Institute for Global Tobacco Control, 2013). There is a fear about the use of excessive force, the legality of tobacco policy enforcement, and the other priorities of the campus police (Institute for Global Tobacco Control, 2013). Therefore, it has been suggested that other formal enforcement outlets be explored for tobacco policies, such as the campus health department (Institute for Global Tobacco Control, 2013). There is not a significant amount of literature on alternative formal enforcement entities for tobacco policies on college campuses. Further research and exploration is needed to create stronger enforcement and violation consequence policy components.

Regardless of their published shortcomings, past reviews of tobacco policies on college campuses, found overall decreases in undergraduate student smoking prevalence, diminished exposure to secondhand smoke and decreased daily tobacco use (Rigotti, Regan, Moran & Wechsler, 2003). However, these past studies were cross-sectional, so few longitudinal studies have been conducted regarding college tobacco policies (Hall, Williams & Hunt, 2015). One longitudinal study conducted demonstrated a reduction in tobacco use, smoking norms, and a positive increase in attitudes towards tobacco regulation (Seo, Macy, Torabi, Middlestadt). Many of the studies published, both cross-sectional and longitudinal, studied the effectiveness of tobacco policies in reducing tobacco use, while fewer studies examined the effectiveness of the policy enforcement.

## **Theoretical framework**

In January, 2017 a policy evaluation survey was created by the University of South Florida (USF) staff, participants were asked about their current behavior regarding the tobacco policy enforcement on campus. The questions were asked to assess the communities' tobacco-free policy enforcement stage of change based on the Transtheoretical model (TTM) (Prochaska, J.O. & Diclemente, C.C., 1986). TTM theorizes that behavior change arises through a sequence of stages depending on an individual's inclination to change. In the original TTM study, smoking cessation was studied and the researchers noted that subjects described stages they went through as they attempted to quit smoking (Prochaska, J.O. & Diclemente, C.C., 1986). While each smoking cessation experience was unique, the stages the subjects described had similar attributes that allowed researchers to develop a model that is now used to describe a multitude of health behavior changes, such as tobacco-free policy enforcement (Prochaska, J.O. & Diclemente, C.C., 1986). The stages are as follows; precontemplation, meaning they are unwilling or unable to enforce the policy, contemplation, thinking about changing, preparation: and, beginning the process of changing, action, starting the behavior change, to maintenance, meaning they enforce the policy every time they seek a violation (Prochaska, J.O. & Diclemente, C.C., 1986).

The purpose of this review and study is to evaluate knowledge, attitudes, and beliefs regarding the policy, enforcement behavior, and overall compliance with the policy at the USF. These results are compared to other published college campus tobacco policy evaluations within the United States. By analyzing differences in policy and enforcement best practices can be revealed for future recommendations.

This study of the USF policy is comprised of two parts. The first is a quantitative survey measuring knowledge of policy and resources, tobacco use observations, stage of change

concerning policy enforcement, self-efficacy to enforce, and policy impact on perceived campus tobacco use. While the second is geographic information systems (GIS) mapping to visualize observed tobacco use and campus hotspots.

## METHODS

### Study Design

The tobacco-free policy of interest was passed at USF in Tampa, Florida in January 2016. USF is a large urban university in the southern US with approximately 42,800 enrolled undergraduate and graduate students and 1,700 faculty members (University of South Florida, 2018b). On January 1, 2016 the tobacco-free policy passed, which prohibits the use of all tobacco products, including cigarettes, cigars, smokeless tobacco, hookah, and e-cigarettes (University of South Florida, 2018a). The enforcement portion of the policy was written based on social normative approach, which focuses on peer enforcement and community education. There is a published option for gradual disciplinary action if the offender is referred to the student conduct office or Human Resources (University of South Florida, 2018a). There is currently no active tobacco-free task force at USF as recommended by the American College Health Association. The data used in this paper was collected during the spring 2017 semester. Research integrity and compliance approval for this study was granted through the USF's Institutional Review Board.

The study written about in this paper was a two-part study that consisted of an observational and survey element. Observation design methods were used to capture geospatial location information about tobacco use being observed on campus after the passage of the tobacco-free policy. This created a visualization of the present campus tobacco environment. The survey aspect of the study was used to then measure USF communities' knowledge, observations and opinions of the tobacco-free policy regardless of observed tobacco use. The two

parts of the study work together to create a more cohesive insight on the impact of the USF tobacco-free policy and future implications.

### **Survey Measures**

Along with the stages of change the survey also assessed the students, faculty, and staff understanding of policy and resources, tobacco use observations, self-efficacy to enforce, and policy impact on perceived campus tobacco use. During the spring 2017 semester, the survey was emailed to all enrolled graduate and undergraduate students (N=40123) from the Dean of Students. The survey was also emailed to faculty/staff (N=7884) from the Provost. Those who received the survey had two weeks to participate in the survey.

To assess the communities' tobacco policy knowledge, participants answered the question, "Which of the following is the current tobacco-use policy on this campus?" The response options included the correct answer ("The use of ALL tobacco products is prohibited on all CAMPUS property"), three incorrect answers, and "I do not know".

To assess beliefs about tobacco-free policy enforcement, participants responded yes or no to two questions: "Do you believe the tobacco policy is being enforced by students on campus?" and "Do you believe the tobacco policy is being enforced by faculty and staff on campus?" To measure their belief in tobacco-free policy impact a third question concerning the use of tobacco and tobacco-derived products on the university campus participants were asked. Responses included; "Yes, I feel tobacco use on campus has declined," "No, I do not feel tobacco use on campus has declined," and "I do not know if tobacco use on campus has declined."

Along with beliefs regarding policy impact belief, participants reported the estimated smoking, chewing tobacco, and e-cigarette usage they witnessed on campus in the past 30 days. If participants specified they witnessed use at least once in the past 30 days, they were probed



about how they reacted to the policy violation observation. This questioning was used to determine their readiness for change, or stage of change. The response options were:

- I did not approach the individual to inform them about the Tobacco and Smoke Free Policy and I don't plan on doing so in the near future (precontemplation).
- I did not approach the individual to inform them about the Tobacco and Smoke Free Policy, but I have thought about it (contemplation).
- I did not approach the individual to inform them of the Tobacco and Smoke Free Policy, but I intend to start within the next month (preparation).
- I have been approaching individuals to inform them of the Tobacco and Smoke Free Policy, but not regularly (action).
- I have been approaching individuals to inform them of the Tobacco and Smoke Free Policy each time (maintenance).

The survey also collected demographic information for participants including, sex, race, ethnicity, smoking status, status at the university (student, faculty, staff), college affiliation, and if they were affiliated with the university prior to the policy implementation.

### **GIS Mapping Technique**

Previous studies on enforcement have evaluated continued tobacco use by utilizing a multitude of strategies. Noteworthy strategies include, counting cigarette butts observed on the ground (Pires, Block, Belance & Marteach, 2015; Burke, Cinderich, Prince & Curtis, 2015) and GIS mapping (Kim, Lieberman & Dench, 2017; Patel, Nowostawski, Thomson, Wilson & Medlin, 2013; Fallin, Murrey, Johnson, Riker, Rayens & Hahn, 2012). Cigarette butt counts give researchers an estimate of how many cigarettes have been smoked on campus assuming grounds keeping on campuses' remove old cigarette butts. Also, if the researchers have a baseline count

before the policy was enacted the cigarette butt count can provide a direct way to calculate differential impact of tobacco policies across campuses (Pires, Block, Belance & Marteache, 2015). Using cigarette butt counts, as an evaluation strategy is simple, low cost, and makes the evaluation of tobacco policies easier for individuals unfamiliar and not trained in evaluation techniques or data collection. However, cigarette butt counts take excess evaluators, could be unreliable due to grounds cleaning schedule, and does not allow evaluators to observe all forms of tobacco included in 100% tobacco-free policies (Fallin, Murrey, Johnson, Riker, Rayens & Hahn, 2012; Ickes, Gokun, Rayens & Hahn, 2015).

A less published tobacco-free policy evaluation technique is GIS mapping. This technique has the potential to assess smoking across large geographic areas. In one published study, GIS was utilized to identify areas of campus that would have the highest estimated secondhand smoke exposure by attaching cameras on bicycles and reviewing the videos to observe smokers (Kim, Lieberman & Dench, 2017). By utilizing GIS and bicycles they were able to optimize both their observational field and time (Kim, Lieberman & Dench, 2017). Along with being able to frequently update, optimizing time and being easy to conduct, GIS use has a strong potential for crowdsourcing data (Patel, Nowostawski, Thomson, Wilson & Medlin, 2013; Fallin, Murrey, Johnson, Riker, Rayens & Hahn, 2012). The study conducted by Patel, et al. 2013 used a smartphone application to collect geospatial data in a variety of countries with numerous users tracking locations where persons would be at risk for secondhand smoke exposure. Published studies on the benefits of crowdsourcing tobacco use cite the benefits of having greater amounts of data outweighing the potential risks of incorrect data by untrained evaluators (Wechsler, 2014; Kim, Lieberman & Dench, 2015). Crowdsourcing also allows community members to feel more involved in policy evaluation, which could potentially

contribute to increasing peer policy enforcement (Wechsler, 2014; Kim, Lieberman & Dench, 2015).

ArcGIS Collector (ESRI, 2011) was used in the study at USF with volunteers collecting vector point geospatial data on observed tobacco use on campus as well as cigarette butt counts. The map of the USF – Tampa campus was provided by the USF Department of Geographic Researchers who also added an additional map layer that enabled observational data and notes, such as group size or location details. To ensure no other outside users could add data the final map was private and could only be accessed through invitation, which was sent to all the volunteers after data collection training. Volunteers were recruited through undergraduate public health courses. Those that volunteered were invited to two different sessions that were held at USF during the spring 2017 semester. The sessions were used to introduce the research study purpose, explained volunteer roles, and demonstrated how to use the ArcGIS application. The training diminished the risk of volunteers incorrectly inputting data and stressed the importance of only inputting what is seen during observations. For example, if a volunteer observed an individual smoking a cigarette outside the library building, they should remark on location and other notable observations, such as tobacco-free signage. However, they were not supposed to make assumptions regarding the individual, such as gender or their role on campus.

The researchers created a gridded map that attempted to ensure all areas of campus had an equal opportunity of being selected. Each grid was assigned a location number and Excel (Microsoft, 2010) was used to randomly generate a list of locations where volunteers would be observing. Observations recorded included anyone observed using cigarettes, cigars, smokeless tobacco, hookah, or e-cigarettes, and since there were no identifying features or direct contact with tobacco policy violators all observations were included in the final study map. Exact

observation coordinate location was recorded using the ArcGIS Collector application, which collects location information using the GPS units within smartphones (Android or iOS). The following information was also recorded with each location coordinate: individual or group, lack of tobacco signage nearby, location description, and any comments that were not assuming (i.e. gender, campus role, etc.). Volunteers could also attach pictures that did not reveal a person's identity. The research team could view the final map allowing them to see all points, information, as well as who added the specific point. There were 72.4 volunteer observation hours recorded by 7 volunteers over six weeks. Figure 1 provides an image of the ArcGIS Collector application utilized by volunteers.

### **Statistical Analyses**

The study measured community attitudes towards policy and enforcement Using SPSS 23 these policy and enforcement opinions were analyzed (IBM, 2017). The analysis was conducted between different campus roles (student, faculty, staff) and stages of change, enforcement experience, opinions on the policy, and current tobacco use. Also, chi-square tests for independence were completed to determine statistical variations between smokers and non-smokers as well as between students and faculty/staff. Chi-square tests have been used to compare smokers verses non-smokers in other tobacco-free policy studies (Rigotti, Moran & Wechsler, 2003). This study analyzed smokers verses non-smokers opinions on tobacco-free policies on college campuses, similar to this study. However, this study goes further than opinions on the tobacco-free policy, analyzing respondents opinions on enforcing the policy.

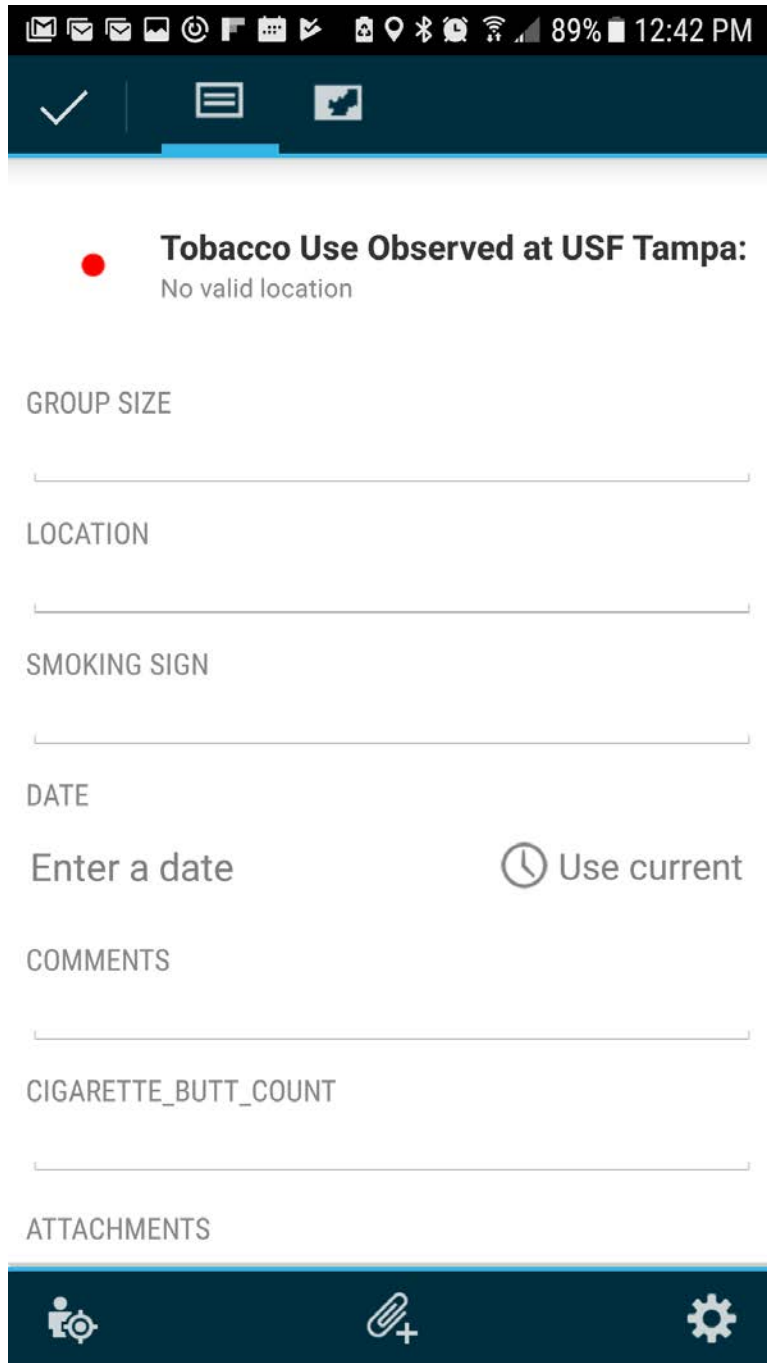


Figure 1. Picture of the ArcGIS Collector application utilized by volunteers to gather geospatial points of observed tobacco-free policy violations. \*

*\*Screenshot was provided by student for purposes of this study.*

## RESULTS

### Note to Reader

Portions of this thesis have been previously published in *Journal of Community Health*, 2018, 44, and have been reproduced with permission from Springer Nature. Used with Permission [Order Number: 4658911004449]. Contributors to the paper include: Amy Gatto, Emily F. Walters, Shahriar Zamani, Liberty B. Sales & Rita DeBate. The student who completed this manuscript was responsible for survey data analysis and report, volunteer education and coordination, and geospatial data analysis and mapping.

### Demographics

The study survey returned a 9.3% response rate (n=5242). The research team removed incomplete surveys resulting in a final sample of surveys (n=4470) for analysis included 200 (4.5%) faculty, 290 (6.5%) staff, and 3980 (89%) students. As described in Table 1, the majority of respondents were white, female, non-Hispanic, non-smokers, and affiliated with the USF prior to implementation.

Table 1. Demographic characteristics of participants

Total Survey Respondents (N = 5242)

	<b>Faculty N(%)</b>	<b>Staff N(%)</b>	<b>Students N(%)</b>	<b>Total N(%)</b>
Participants (N = <b>4470</b> )	200 (4.5%)	290 (6.5%)	3980 (89%)	4470 (100%)
Sex (N = <b>4256</b> )				
• Male	79 (45.1%)	64 (24.5%)	1472 (38.5%)	1615 (37.9%)
• Female	96 (54.9%)	197 (75.5%)	2348 (61.5%)	2641 (62.1%)
Ethnicity (N = <b>4,444</b> )				
• Non-Hispanic	183 (93.8%)	257 (88.9%)	3319 (83.8%)	3759 (84.6%)
• Hispanic	12 (6.2%)	32 (11.1%)	641 (16.2%)	685 (15.4%)

Table 1 (Continued)

<b>Race* (N = 3,983)</b>				
• White	151 (80.3%)	202 (75.9%)	2415 (68.4%)	2768 (69.5%)
• AA	5 (2.7 %)	26 (9.8%)	250 (7.1 %)	281 (7.1%)
• AI or AN	0 (0%)	0 (0%)	14 (0.4%)	14 (0.4%)
• Asian	9 (4.8%)	6 (2.3%)	318 (9.0%)	333 (8.4%)
• Other	18 (9.6%)	17 (6.4%)	189 (5.4%)	224 (5.6%)
• Multiple Races	5 (2.7%)	15 (5.6%)	343 (9.7%)	363 (9.1%)
<b>Smoking Status ( N = 4,424)</b>				
• Non-smoker	182 (94.8%)	272 (94.8%)	3564 (90.3%)	4018 (90.8%)
• Smoker	10 (5.2%)	10 (5.2%)	381 (9.7%)	406 (9.2%)
<b>College** (N = 4,444)</b>				
• AS	81 (41.5%)	36 (12.5%)	1531 (38.7%)	1648 (37.1%)
• BCS	28 (14.4%)	35 (12.1%)	262 (6.6%)	325 (7.3%)
• BUS	19 (9.7%)	26 (9.0%)	538 (13.6%)	583 (13.1%)
• EDU	10 (5.1%)	18 (6.2%)	228 (5.8%)	256 (5.8%)
• ENG	21 (10.8%)	20 (6.9%)	564 (14.2%)	605 (13.6%)
• GS	0 (0%)	1 (0.3%)	18 (0.5%)	19 (0.4%)
• Honors	4 (2.1%)	5 (1.7%)	3 (0.1%)	12 (0.3%)
• MS	2 (1.0%)	5 (1.7%)	9 (0.2%)	16 (0.4%)
• MED	0 (0%)	6 (2.1%)	116 (2.9%)	122 (2.7%)
• NUR	1 (0.5%)	4 (1.4%)	72 (1.8%)	77 (1.7%)
• PH	0 (0%)	4 (1.4%)	123 (3.1%)	127 (2.9%)
• PHARM	0 (0%)	3 (1.0%)	29 (0.7%)	32 (0.7%)
• More than One College	3 (1.5%)	6 (2.1%)	226 (5.7%)	235 (5.3%)
• Other	18 (9.2%)	112 (38.8%)	133 (3.4%)	263 (5.9%)
• ARTS	8 (4.1%)	8 (2.8%)	108 (2.7%)	124 (2.8%)
<b>Affiliated with USF Prior to January, 2016 (N = 4467)</b>				
• Yes	181 (91.4%)	250 (86.2%)	2930 (73.6%)	3361 (75.2%)
• No	17 (8.6%)	40 (13.8%)	1049 (26.4%)	1106 (24.8%)

**\*Note.- AA = African-American; AI or AN = American Indian or Alaskan Native**

**\*\*Note.- AS = Arts and Sciences; BCS = Behavioral and Community Sciences ; BUS = Business; EDU = Education; ENG = Engineering; GS = Global Sustainability; Honors = Honors; MS = Marine Sciences; MED = Medicine; NUR = Nursing; PH = Public Health; PHARM = Pharmacy; Other = All other schools; ARTS = Arts**

The research team and study volunteers did not collect demographic information for the

ArcGIS observations, as they would be assumptive.

## Survey

The USF tobacco-free policy survey found moderate knowledge of the university current policy and low beliefs for policy enforcement. Knowledge of the policy was recoded from response options included the correct answer, which is “The use of ALL tobacco products are prohibited on all CAMPUS property”, three incorrect answers, and “I do not know” as do not know. Specific results regarding knowledge of the policy were 67.5% of respondents correctly recognized the USF smoking policy while 19.6% answered incorrectly and 12.9% did not know. The university community members also expressed a lack of confidence that the policy is being upheld as only 19.6% of survey respondents believed students were enforcing the policy, while 32.8% believe faculty or staff were enforcing the policy. Table 2 describes knowledge and beliefs regarding the policy.

Table 2. Knowledge and Beliefs concerning USF Smoke & Tobacco-Free Policy

	<b>Faculty N(%)</b>	<b>Staff N(%)</b>	<b>Students N(%)</b>	<b>Total N(%)</b>
<b>Knowledge regarding USF Smoke &amp; Tobacco-Free Policy (N = 4,470)</b>				
• Smoking is allowed on Campus only in designated smoking areas	12 (6.0%)	18 (6.2%)	359 (9.0%)	389 (8.7%)
• Smoking not allowed in Campus buildings and within 25 feet outside of buildings	0 (0%)	1 (0.3%)	36 (0.9%)	37 (0.8%)
• Smoking is prohibited everywhere on Campus, but smokeless tobacco use is allowed	29 (14.5%)	22 (7.6%)	400 (10.1%)	451 (10.1%)
• The use of all tobacco products are prohibited on all campus property	148 (74.0%)	234 (80.7%)	2634 (66.2%)	3016 (67.5%)
• I do not know the current tobacco use policy at USF	11 (5.5%)	15 (5.2%)	551 (13.8%)	577 (12.9%)



Table 2 (Continued)

Knowledge of USF Policy (N = 4,470)

• Correct Knowledge	148 (74.0%)	234 (80.7%)	2634 (66.2%)	3016 (67.5%)
• Incorrect Knowledge	41 (20.5%)	41 (14.1%)	795 (20.0%)	877 (19.6%)
• Don't know	11 (5.5%)	15 (5.2%)	551 (13.8%)	577 (12.9%)

Knowledge e-cig considered smoking (N = 4,470)

• Yes	157 (78.5%)	219 (75.5%)	2853 (71.7%)	3229 (72.2%)
• No	11 (5.5%)	21 (7.2%)	448 (11.3%)	480 (10.7%)
• Don't know	32 (16.0%)	50 (17.2%)	679 (17.1%)	761 (17.0%)

Beliefs (N = 4,470)

• Yes, I believe the policy is being enforced by students on USF campus	44 (22.0%)	59 (20.3%)	774 (19.4%)	877 (19.6%)
• No, I do not believe the policy is being enforced by students on USF campus	156 (78.0%)	231 (79.7%)	3206 (80.6%)	3593 (80.4%)
• Yes, I believe the policy is being enforced by faculty/staff on USF campus	45 (22.5%)	70 (24.1%)	1352 (34.0%)	1467 (32.8%)
• No, I do not believe the policy is being enforced by faculty/staff on USF campus	155 (77.5%)	220 (75.9%)	2628 (66.0%)	3003 (67.2%)

Almost half (49.5%) of survey participants identified they had been exposed to secondhand smoke following the tobacco-free policy implementation while 74.3% witnessed tobacco use on campus. Many community members indicated they were in the precontemplation stage of change, which is where they do not approach a violator to inform them of the policy and had no intention to do so in the future. This precontemplation stage was similar for tobacco use (66.8%), chewing tobacco (79.9%), and e-cigarettes (78.4%). Many respondents had multiple reasons for not approaching violators (50.5%), including being unsure if they should address it and being uncomfortable. For chewing tobacco and e-cigarette use, the behavior outcomes

related to observing use was that most respondents did not approach violators (72.2% and 72.1% respectively) to enforce the policy. Details for tobacco use, chewing tobacco, and e-cigarette use are in Tables, 3, 4, and 5.

There were statistically significant variations between smokers and non-smokers concerning policy enforcement, beliefs, and knowledge ( $\chi^2 (5, N = 5242) = 116.98, p < .001$ ). Ninety-five percent of smokers were in the precontemplation stage of change, while only 63.9% of non-smokers were in precontemplation. Meanwhile, 31.5% of non-smokers presented in the contemplation stage of change indicating they were thinking about enforcing the tobacco-free policy compared to 3.7% of smokers. However, the readiness to change between smokers and non-smokers at the preparation stage were roughly the same, 0.3% and 0.8%. There were 0.7% of smokers in the action stage while there were 3.0% non-smokers. The maintenance stages were the same between smokers and non-smokers, 0.7%. The surveyed smokers were less likely to believe the USF tobacco-free campus policy has reduced tobacco use (46.7%) compared to non-smokers (55.3%) ( $\chi^2 (2, N = 5242) = 11.056, p = .004$ ). Smokers were also more likely to possess accurate knowledge of the tobacco-free policy (73.9%) compared to non-smokers (66.8%) ( $\chi^2 (2, N = 5242) = 11.415, p = .003$ ). Approximately 24% of smokers believed that students were enforcing the policy while only 19% of non-smokers believed the policy was being enforced ( $\chi^2 (1, N = 5242) = 5.412, p = .020$ ). Reflecting a similar trend above, 39% of smokers believed faculty/staff were enforcing the policy versus 32% of non-smokers ( $\chi^2 (1, N = 5242) = 8.462, p = .004$ ). Smokers indicated both students and faculty/staff are enforcing the policy more than non-smokers. These results are detailed in Table 6 along with other discussed variations.

Table 3. Previous 30-day Observation of Tobacco Use Violations and Intervention

	<b>Faculty N(%)</b>	<b>Staff N(%)</b>	<b>Students N(%)</b>	<b>Total N(%)</b>
Exposed to second-hand smoke on USF campus (N = <b>4,458</b> )				
• No	102 (51.3%)	158 (54.5%)	1993 (50.2%)	2253 (50.5%)
• Yes	97 (48.7%)	132 (45.5%)	1976 (49.8%)	2205 (49.5%)
If Exposed, how many days within the last 30 days (N = <b>2,217</b> )				
• Yes, 1-2 days	24 (24.5%)	40 (30.3%)	454 (22.8%)	518 (23.4%)
• Yes, 3-5 days	20 (20.4%)	21 (15.9%)	325 (16.4%)	366 (16.5%)
• Yes, 6-9 days	11 (11.2%)	15 (11.4%)	181 (9.1%)	207 (9.3%)
• Yes, 10-19 days	11 (11.2%)	9 (6.8%)	158 (8.0%)	178 (8.0%)
• Yes, 20-29 days	7 (7.1%)	4 (3.0%)	75 (3.8%)	86 (3.9%)
• Daily	25 (25.5%)	43 (32.6%)	794 (40.0%)	862 (38.9%)
Witnessed tobacco use on USF Campus within the last 30 days (N = <b>4,468</b> )				
• No	55 (27.6%)	74 (25.5%)	1020 (25.6%)	1149 (25.7%)
• Yes	144 (72.4%)	216 (74.5%)	2959 (74.4%)	3319 (74.3%)
If Witnessed, how many days in the last 30 days (N = <b>3,321</b> )				
• Yes, 1-2 days	18 (12.4%)	45 (20.8%)	436 (14.7%)	499 (15.0%)
• Yes, 3-5 days	19 (13.1%)	41 (19.0%)	387 (13.1%)	447 (13.5%)
• Yes, 6-9 days	9 (6.2%)	15 (6.9%)	138 (4.7%)	162 (4.9%)
• Yes, 10-19 days	13 (9.0%)	15 (6.9%)	162 (5.5%)	190 (5.7%)
• Yes, 20-29 days	6 (4.1%)	7 (3.2%)	76 (2.6%)	89 (2.7%)
• Yes, daily	80 (55.2%)	93 (43.1%)	1761 (59.5%)	1934 (58.2%)

Table 3 (Continued)

Respondent behavior when witnessing tobacco use (N = <b>3,317</b> )				
• I did not approach the individual(s) to inform them of the USF policy and I do not plan on doing so in the future	79 (54.5%)	125 (57.9%)	2011 (68%)	2215 (66.8%)
• I did not approach the individual(s) to inform them of the USF policy, but thought about it	45 (31.0%)	59 (27.3%)	853 (28.9%)	957 (28.9%)
• I did not approach the individual(s) to inform them of the USF policy, but I intend on doing so in the near future	1 (0.7%)	1 (0.5%)	25 (0.8%)	27 (0.8%)
• I have approached the individual(s) to inform them of the USF policy, but not regularly	18 (12.4%)	24 (11.1%)	52 (1.8%)	94 (2.8%)
• I have approached the individual(s) to inform them of the USF policy each time	2 (1.4%)	7 (3.2%)	15 (0.5%)	24 (0.7%)
Reasons for not approaching individual(s) to inform them of the USF policy (N = <b>3270</b> )				
• Was not sure if the individual was really in violation of the policy	2 (1.5%)	2 (1.0%)	87 (3.0%)	91 (2.8%)
• Wasn't sure if I had the authority to address the issue	7 (5.1%)	13 (6.5%)	139 (4.7%)	159 (4.9%)
• Did not know what to say	3 (2.2%)	2 (1.0%)	22 (0.8%)	27 (0.8%)
• Thought the person would get upset	3 (2.2%)	11 (5.5%)	55 (1.9%)	69 (2.1%)
• I was not comfortable	20 (14.6%)	37 (18.4%)	308 (10.5%)	365 (11.2%)
• I notified someone else to address the issue	1 (0.7%)	0 (0.0%)	8 (0.3%)	9 (0.3%)
• Other	53 (38.7%)	57 (28.4%)	788 (26.9%)	898 (27.5%)
• More than One Reason	48 (35.0%)	79 (39.3%)	1525 (52.0%)	1652 (50.5%)
Factors that would make it more comfortable to approach a violator (N = <b>3321</b> )				
• Training on the policy and how to approach tobacco users	4 (2.8%)	6 (2.8%)	43 (1.5%)	53 (1.6%)
• Training on how to deal with uncomfortable situation(s)	0 (0.0%)	0 (0.0%)	40 (1.4%)	40 (1.2%)
• Observing other peer(s) approach violator(s)	5 (3.4%)	16 (7.4%)	167 (5.6%)	188 (5.7%)
• More information on the consequences of not following the policy	9 (6.2%)	15 (6.9%)	208 (7.0%)	232 (7.0%)
• Seeing more tobacco-free signage visible across campus	10 (6.9%)	28 (13.0%)	406 (13.7%)	444 (13.4%)
• Other	61 (42.1%)	75 (34.7%)	961 (32.5%)	1097 (33.0%)
• More than one factor	56 (38.6%)	76 (35.2%)	1135 (38.3%)	1367 (38.2%)

Table 4. Previous 30-day Observation of Chewing Tobacco Use Violations and Intervention

	<b>Faculty N(%)</b>	<b>Staff N(%)</b>	<b>Students N(%)</b>	<b>Total N(%)</b>
Witnessed chewing tobacco use on USF Campus within the last 30 days (N = <b>4,468</b> )				
• Yes	37 (18.5%)	63 (21.7%)	1040 (26.1%)	1140 (25.5%)
• No	163 (81.5%)	227 (78.3%)	2938 (73.9%)	3328 (74.5%)
Number of days witnessed chewing tobacco use on USF Campus (N = <b>1,142</b> )				
• 1-2	8 (21.6%)	15 (23.8%)	273 (26.2%)	296 (25.9%)
• 3-5	6 (16.2%)	10 (15.9%)	135 (13.0%)	151 (13.2%)
• 6-9	5 (13.5%)	6 (9.5%)	80 (7.7%)	91 (8.0%)
• 10-19	3 (8.1%)	2 (3.2%)	70 (6.7%)	75 (6.6%)
• 20-29	3 (8.1%)	6 (9.5%)	37 (3.6%)	46 (4.0%)
• Daily	12 (32.4%)	24 (38.1%)	447 (42.9%)	483 (42.3%)
Respondent behavior when witnessing chewing tobacco use (N = <b>1,136</b> )				
• I did not approach the individual(s) to inform them of the USF policy and I do not plan on doing so in the future	26 (72.2%)	41 (65.1%)	841 (81.1%)	908 (79.9%)
• I did not approach the individual(s) to inform them of the USF policy, but thought about it	7 (19.4%)	16 (25.4%)	167 (16.1%)	190 (16.7%)
• I did not approach the individual(s) to inform them of the USF policy, but I intend on doing so in the near future	1 (2.8%)	0 (0%)	8 (0.8%)	9 (0.8%)
• I have approached the individual(s) to inform them of the USF policy, but not regularly	2 (5.6%)	4 (6.3%)	14 (1.4%)	20 (1.8%)
• I have approached the individual(s) to inform them of the USF policy each time	0 (0%)	2 (3.2%)	7 (0.7%)	9 (0.8%)

Table 4 (Continued)

Reasons for not approaching individual(s) to inform them of the USF policy (N = **1,119**)

• Was not sure if the individual was really in violation of the policy	4 (11.4%)	1 (1.6%)	90 (8.8%)	95 (8.5%)
• Wasn't sure if I had the authority to address the issue	1 (2.9%)	6 (9.8%)	52 (5.1%)	59 (5.3%)
• Did not know what to say	0 (0.0%)	4 (6.6%)	25 (2.4%)	29 (2.6%)
• Thought the person would get upset	1 (2.9%)	4 (6.6%)	19 (1.9%)	24 (2.1%)
• I was not comfortable	5 (14.3%)	8 (13.1%)	115 (11.2%)	128 (11.4%)
• I notified someone else to address the issue	0 (0.0%)	0 (0.0%)	6 (0.6%)	6 (0.5%)
• Other	14 (40.0%)	20 (32.8%)	326 (31.9%)	360 (32.2%)
• More than one reason	10 (28.6%)	18 (29.5%)	390 (38.1%)	418 (37.4%)

Factors that would make it more comfortable to approach a violator (N = **1,142**)

• Training on the policy and how to approach tobacco users	1 (2.7%)	1 (1.6%)	34 (3.3%)	36 (3.2%)
• Training on how to deal with uncomfortable situation(s)	0 (0.0%)	0 (0.0%)	13 (1.2%)	13 (1.1%)
• Observing other peer(s) approach violator(s)	0 (0.0%)	4 (6.3%)	61 (5.9%)	65 (5.7%)
• More information on the consequences of not following the policy	2 (5.4%)	9 (14.3%)	90 (8.6%)	101 (8.8%)
• Seeking more tobacco-free signage visible across campus	6 (16.2%)	3 (4.8%)	163 (15.6%)	172 (15.1%)
• Other	17 (45.9%)	25 (39.7%)	403 (38.7%)	445 (39.0%)
• More than one factor	11 (29.7%)	21 (33.3%)	278 (26.7%)	310 (27.1%)

Table 5. Previous 30-day Observation of E-Cigarette Use Violations and Intervention

	<b>Faculty N(%)</b>	<b>Staff N(%)</b>	<b>Students N(%)</b>	<b>Total N(%)</b>
Witnessed E-cigarette use on USF Campus within the last 30 days (N = <b>4,466</b> )				
• Yes	86 (43.2%)	130 (44.8%)	2407 (60.5%)	2623 (58.7%)
• No	113 (56.8%)	160 (55.2%)	1570 (39.5%)	1843 (41.3%)
Number of days witnessed E-cigarette use on USF Campus (N = <b>2,627</b> )				
• 1-2	30 (34.5%)	39 (30.0%)	569 (23.6%)	638 (24.3%)
• 3-5	16 (18.4%)	28 (21.5%)	382 (15.9%)	426 (16.2%)
• 6-9	9 (10.3%)	9 (6.9%)	208 (8.6%)	226 (8.6%)
• 10-19	9 (10.3%)	7 (5.4%)	213 (8.8%)	229 (8.7%)
• 20-29	3 (3.4%)	6 (4.6%)	79 (3.3%)	88 (3.3%)
• Daily	20 (23.0%)	41 (31.5%)	959 (39.8%)	1020 (38.8%)
Respondent behavior when witnessing E-cigarette use (N = <b>2,611</b> )				
• I did not approach the individual(s) to inform them of the USF policy and I do not plan on doing so in the future	62 (72.1%)	90 (69.8%)	1895 (79.1%)	2047 (78.4%)
• I did not approach the individual(s) to inform them of the USF policy, but thought about it	23 (26.7%)	31 (24.0%)	448 (18.7%)	502 (19.2%)
• I did not approach the individual(s) to inform them of the USF policy, but I intend on doing so in the near future	0 (0%)	0 (0%)	24 (1.0%)	24 (0.9%)
• I have approached the individual(s) to inform them of the USF policy, but not regularly	1 (1.2%)	5 (3.9%)	20 (0.8%)	26 (1.0%)
• I have approached the individual(s) to inform them of the USF policy each time	0 (0%)	3 (2.3%)	9 (0.4%)	12 (0.5%)

Table 5 (Continued)

Reasons for not approaching individual(s) to inform them of the USF policy (N = **2580**)

• Was not sure if the individual was really in violation of the policy	7 (8.1%)	9 (7.5%)	253 (10.7%)	269 (10.4%)
• Wasn't sure if I had the authority to address the issue	5 (5.8%)	12 (10.0%)	97 (4.1%)	114 (4.4%)
• Did not know what to say	4 (4.7%)	3 (2.5%)	57 (2.4%)	64 (2.5%)
• Thought the person would get upset	2 (2.3%)	2 (1.7%)	45 (1.9%)	49 (1.9%)
• I was not comfortable	13 (15.1%)	21 (17.5%)	270 (11.4%)	304 (11.8%)
• I notified someone else to address the issue	1 (1.2%)	1 (0.8%)	8 (0.3%)	10 (0.4%)
• Other	31 (36.0%)	32 (26.7%)	653 (27.5%)	716 (27.8%)
• More than one reason	23 (26.7%)	40 (33.3%)	991 (41.7%)	1054 (40.9%)

Factors that would make it more comfortable to approach a violator (N = **2627**)

• Training on the policy and how to approach e-cigarette users	4 (4.6%)	4 (3.1%)	66 (2.7%)	74 (2.8%)
• Training on how to deal with uncomfortable situation(s)	0 (0.0%)	1 (0.8%)	30 (1.2%)	31 (1.2%)
• Observing other peer(s) approach violator(s)	3 (3.4%)	6 (4.6%)	176 (7.3%)	185 (7.0%)
• More information on the consequences of not following the policy	7 (8.0%)	17 (13.1%)	208 (8.6%)	232 (8.8%)
• Seeing more tobacco-free signage visible across campus	11 (12.6%)	17 (13.1%)	371 (15.4%)	399 (15.2%)
• Other	39 (44.8%)	47 (36.2%)	831 (34.5%)	917 (34.9%)
• More than one factor	23 (26.4%)	38 (29.2%)	728 (30.2%)	789 (30.0%)



Table 6. Differences between Smokers and Non-Smokers

	<b>Smoker N(%)</b>	<b>Nonsmoker N(%)</b>	<b>Chi- Square</b>	<b>p-value</b>
<b>Participants (N = 3290)</b>				
<b>Respondent behavior when witnessing tobacco use*</b>				
• Do not approach individuals about the USF tobacco-free policy and don't plan on doing so in the near future.(Precontemplation)	282 (94.6%)	1912 (63.9%)	116.983	< .0001
• Do not approach individuals about the USF tobacco-free policy but have thought about it.(Contemplation)	11 (3.7%)	943 (31.5%)		
• Do not approach individuals about the USF tobacco-free policy, but intend to start within the next month.(Preparation)	1 (0.3%)	25 (0.8%)		
• Have been approaching individuals about the USF tobacco-free policy, but not regularly.(Action)	2 (0.7%)	91 (3.0%)		
• Have been approaching individuals about the USF tobacco-free policy each time.(Maintenance)	2 (0.7%)	21 (0.7%)		
<b>I believe the tobacco-free policy has reduced tobacco-use (N = 3320)</b>				
• Yes	141 (46.7%)	1670 (55.3%)	11.056	.004
• No	152 (50.3%)	1223 (40.5%)		
• Don't know	9 (3.0%)	125 (4.1%)		
<b>Knowledge regarding USF Smoke &amp; Tobacco-Free Policy (N = 4424)</b>				
• Correct	300 (73.9%)	2683 (66.8%)	11.415	.003
• Incorrect	73 (18.0%)	795 (19.8%)		
• Don't know	33 (8.1%)	540 (13.4%)		
<b>I believe the policy is being enforced by students on USF campus (N = 4424)</b>				
• Yes	97 (23.9%)	767 (19.1%)	5.412	.020
• No	309 (76.1%)	3251 (80.9%)		
<b>I believe the policy is being enforced by faculty/staff on USF campus (N = 4424)</b>				
• Yes	159 (39.2%)	1288 (32.1%)	8.462	.004
• No	247 (60.8%)	2730 (67.9%)		

The survey also collected information on participant campus role, which was student, faculty, or staff. Students were more likely than faculty/staff to be in the precontemplation stage of change, 68% and 56.5% respectively. Faculty/staff participants were significantly more likely than students to be in the action stage of change, 11.6% and 1.8% respectively ( $\chi^2$  (5, N = 5242) = 134.97,  $p < .0001$ ). Faculty/staff were also more likely to think the tobacco-free policy reduced tobacco use (64.7%) when compared to students (53.2%) ( $\chi^2$  (2, N = 5242) = 147.403,  $p < .0001$ ) and were more likely to properly identify the policy (78%) ( $\chi^2$  (2, N = 5242) = 35.944,  $p < .0001$ ). Students believed faculty and staff were enforcing the policy (34%) compared to faculty and staff perception of their enforcement (23.5%) ( $\chi^2$  (1, N = 5242) = 21.818,  $p < .0001$ ) and there were no statistically significant differences in perceived observation of student enforcement. Table 7 demonstrates these findings.

### **ArcGIS Mapping**

There were 158 observed tobacco-free policy violations at the USF Tampa campus. When mapped, the observed violations uncovered persistent tobacco use on campus. There was a centralized mean and median, these along with no clear directional distribution, which suggested that tobacco-free policy violations occurred across campus with no apparent trends, suggesting that policy noncompliance is not geographically constrained on the USF Tampa campus. While the tobacco-free policy violation map did not identify any clusters or hotspots it did reveal there was continued widespread tobacco-free policy noncompliance and lack of community enforcement. The observations are shown below in Figure 2.

Table 7. Differences between Students and Faculty/Staff

	<b>Student N(%)</b>	<b>Faculty/Staf f N(%)</b>	<b>Chi- Square</b>	<b>p-value</b>
Participants (n=5242)				
Respondent behavior when witnessing tobacco use				
• Do not approach individuals about the USF tobacco-free policy and don't plan on doing so in the near future (Precontemplation)	2011 (68.0%)	204 (56.5%)	134.970	< .0001
• Do not approach individuals about the USF tobacco-free policy but have thought about it (Contemplation)	853 (28.9%)	104 (28.8%)		
• Do not approach individuals about the USF tobacco-free policy, but intend to start within the next month (Preparation)	25 (0.8%)	2 (0.6%)		
• Have been approaching individuals about the USF tobacco-free policy, but not regularly (Action)	52 (1.8%)	42 (11.6%)		
• Have been approaching individuals about the USF tobacco-free policy each time (Maintenance)	15 (0.5%)	9 (2.5%)		
I believe the tobacco-free policy has reduced tobacco-use				
• Yes	1558 (53.2%)	279 (64.7%)	147.403	< .0001
• No	1290 (44.0%)	96 (22.3%)		
• Don't know	82 (2.8%)	56 (13.0%)		
Knowledge regarding USF Smoke & Tobacco-Free Policy				
• Correct	2634 (66.2%)	382 (78.0%)	35.944	< .0001
• Incorrect	795 (20.0%)	82 (16.7%)		
• Don't know	551 (13.8%)	26 (5.3%)		
I believe the policy is being enforced by students on USF campus				
• Yes	774 (19.4%)	103 (21.0%)	0.685	.399
• No	3206 (80.6%)	387 (79.0%)		
I believe the policy is being enforced by faculty/staff on USF campus				
• Yes	1352 (34.0%)	115 (23.5%)	21.818	< .0001
• No	2628 (66.0%)	375 (76.5%)		

## Spatial Distribution of Tobacco Policy Violations at USF

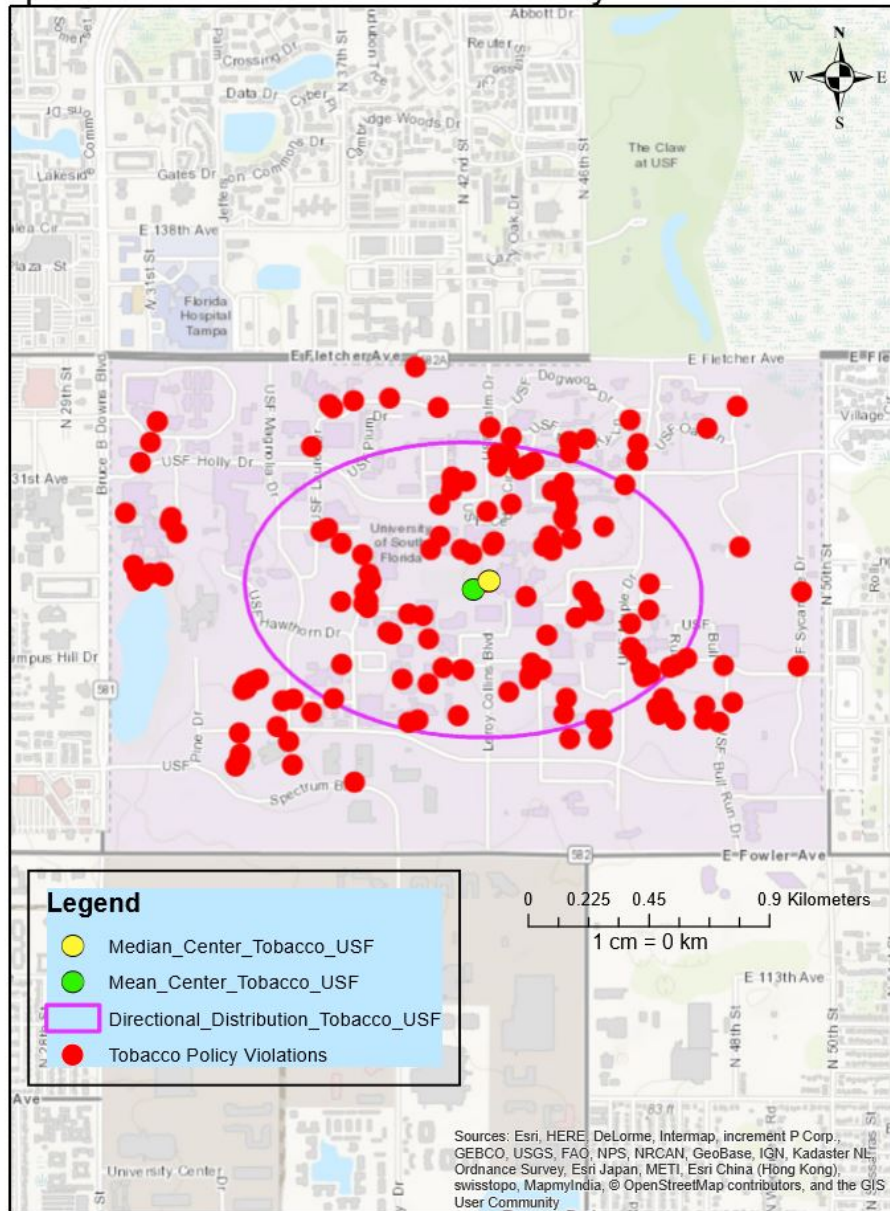


Figure 2. Spatial Distribution map of tobacco-free policy violations seen by volunteers on USF main campus. \*

\*Map provided by student for purposes of this study.

## DISCUSSION

This study assessed the efficiency of a large urban university's tobacco-free policy one year after enactment and revealed deficiencies of the policy. The two parts of the project, the violation map and survey, discovered that the current policy is ineffective in decreasing tobacco use across campus. Other campuses have published the results of their tobacco-free or smoke-free policies to effectively reduce tobacco use (Bennett, Deiner & Pokhrel, 2017; Fallin-Bennett, Reditis & Glantz, 2017; Russette, Harris, Schuldberg & Green, 2014; Fennell, 2012). Bennett, Deiner & Pokhrel, 2017 reviewed numerous tobacco-free policy studies and found that a 100% tobacco-free policy, compared to designated smoking areas, was associated with reduced smoking and had high campus support. Compared to other studies, the sample size, captured demographics, study type, and tobacco-free policy studied are all similar to other campus tobacco-free studies. However, before this study was completed there was a lack of research done analyzing the reasoning behind the lack of enforcement. This study differs from other referenced tobacco-free policy investigations because the opinions and reasoning behind enforcement or nonenforcement are studied with a large sample size. While this study had positive results, there was no comparison study completed on USF's designated smoking area policy. So, the overall smoking rate was not compared, but instead the appearance of the tobacco-free campus and the respondents' opinion on the effectiveness of the policy was analyzed. This study is different than other tobacco-free policy studies because the survey focused on the TTM and policy enforcement. This in-depth analysis gives greater insight to different campus populations knowledge and thoughts regarding tobacco-free policy and

enforcement. Along with the in-depth analysis of enforcement behavior the study also provides an illustration of tobacco use, which gives a picture to visualize the lack of enforcement according to survey results. This study of USF is analyzing a 100% tobacco-free policy, which according to the Bennett, Deiner & Pokhrel, 2017, study is more effective than smoking-designated tobacco policies.

According to this USF study and Bennett, Deiner & Pokhrel, 2017 there should be more targeted and continued efforts to disseminate the tobacco-free policies at USF. Another study that published difficulties with proper smoking locations for smokers was Russette, Harris, Schuldberg & Green, 2014, that looked specifically at smokers and their current habits on a 100% tobacco-free campus. While this USF study collected information on both smokers and non-smokers, the two groups were analyzed separately. In the Russette, Harris, Schuldberg & Green, 2014, study smokers expressed a desire to follow the policy but lacked the knowledge ( $\chi^2[1, N = 60] = 10.59, p = .002$ ). This enforces the need for greater tobacco-free policy dissemination at USF to let campus community members, especially smokers, know of the full policy and how to enforce it. However, at USF non-smokers were more likely to incorrectly identify the tobacco-free policy ( $\chi^2(2, N = 5242) = 11.415, p = .003$ ). This could contribute to the relatively high number of campus members in precontemplation stage since knowledge appears to be less disseminated in certain populations. If they are not confident in their knowledge on the tobacco-free policy, there could be hesitation to correct non-compliant tobacco use. The enforcement also relies on the enforcers to have both the knowledge of the policy and the confidence to socially enforce.

There are notable pitfalls identified when social enforcement is the strategy chosen to maintain tobacco-free campuses. The 2017 study by Fallin-Bennett, Roditis & Glantz published

finding that described difficulties with a social enforcement approach towards tobacco policies. Social enforcement approaches towards tobacco-free policies are common, these are where campus community members, not necessarily formal police or security, are responsible for enforcement (Fallin-Bennett, Roditis & Glantz, 2017). While Fallin-Bennett, Roditis & Glantz, 2017, discussed the difficulty with recruiting formal enforcement officers, when using only social approaches there are reported barriers to campus community members enforcing the policy including a perceived lack of ability, knowledge, and power to enforce (Fallin-Bennett, Roditis & Glantz, 2017). There are similar difficulties as published within this study. By having more formal enforcement upholding the USF tobacco-free policy, perhaps more community members will acquire the confidence to enforce the policy themselves. The Fennell, 2012, publication reiterates the need for a formal and defined enforcement policy for campus tobacco-free policies. If a new tobacco-free policy is put forward by a college without formal enforcement outlined there is the potential for confusion and discontent among campus community members (Fennell, 2012). While there was a formal policy roll-out for the USF tobacco-free policy the gaps in knowledge suggest further policy education would be beneficial. Many institutions are evaluating the efficacy of their tobacco-free policy in the hopes that best practices should emerge (Fallin-Bennett, Roditis & Glantz, 2017; Burke, Cinderich, Prince & Curtis, 2015; Procter-Scherdtel & Collins, 2013). About two-thirds, 68%, of university presidents pinpoint enforcement concerns as a main institutional hurdle to the success of tobacco-free campus policies (Reindl, Glassman, Price, Dake & Yingling, 2014). To create improved enforcement strategies additional research regarding overall tobacco-free policy implementation and enforcement needs to be completed and disseminated (Reindl, Glassman, Price, Dake & Yingling, 2014). This study offers reasons given by campus populations on why

they may or may not personally enforce the policy while also giving a physical snapshot of observed tobacco use.

This study found a large percentage of campus population not enforcing the policy but went one step further by giving respondent reasoning for their behavior using the TTM. Many gave a multitude of reasons for nonenforcement, but a common one for students, staff and faculty is the uncomfortable nature of enforcement. The study also highlighted the different percentages of the population that can be found in different stages of change. There does not appear to be tobacco-free campus policy studies that examine campus roles. This study illustrates that different campus roles effect enforcement opinions and behavior, with faculty or staff appearing to be more likely to be in the action stage of change, and believing the policy has reduced tobacco use compared to students. So, there needs to be different strategies to encourage enforcement of the policy. Those that are in precontemplation need different support than those in contemplation or maintenance or with different opinions on the effectiveness of the tobacco-free policy. The campus roles and smoking status also have differences in policy efficacy belief. Students and smokers were more likely to believe that the policy has not reduced tobacco use on campus following the enactment of the tobacco-free policy. However, their role and behavior, i.e. smoking, perhaps influence their perception. By using GIS this study illustrates that tobacco use continues and can be explained by the opinions towards enforcement.

Compared to the above studies, this USF study utilized geospatial technology in hopes of allowing researchers and campus leadership to visualize tobacco use at USF after the tobacco-free policy. The use of ArcGIS with the USF study revealed tobacco use was not specific to any location making it difficult to target “hot spots” as hoped, and contrast findings by other tobacco-free studies (Pires, Block, Belance & Marteache, 2015; Burke, Cinderich, Prince & Curtis,



2015). The Pires, Block, Belance & Marteache, 2015 study tracked the position of littered cigarette butts on a campus. Their hotspots were clustered around classrooms, administrative buildings, parking lots and garages (Pires, Block, Belance & Marteache, 2015). However, this study only analyzed cigarette butts compared to the USF study which collected geospatial coordinates on observed tobacco-free violations and cigarette butts. In comparison, the Burke, Cinderich, Prince & Curtis, 2015 study analyzed observed smoking to identify hotspots at a college campus. Perhaps the addition of observed tobacco-free violations and cigarette butts contributed to the lack of identifiable hotspots. Whereas the Burke, Cinderich, Prince & Curtis, 2015 and Pires, Block, Belance & Marteache, 2015 study focused on either observable violations or cigarette butt count respectively. While there are no studies to identify differences, perhaps cigarette butts are commonly disposed of in the identified hotspots, classrooms, administrative buildings, parking lots and garages, compared to observable smoking which may be more likely to be identified in other spots. By using real-time observational data the map created in this study gives a snapshot of continued observable tobacco use. There were also notable observations recorded by volunteers as well, such as tobacco use near 100% tobacco-free campus no smoking signs. This points to a passive campus attitude towards continued tobacco use.

While the tobacco-free policy knowledge is moderately high, there should be continued education to ensure knowledge can remain high. Given that more faculty and staff could accurately identify the policy compared to students perhaps there should be more weight on educating new students. This is logical since student turnover at universities occurs yearly and a comprehensive plan that educates incoming students on the policy and also reminds all current students of the policy would increase overall tobacco-free policy knowledge. However, even with knowledge the current policy is constructed on a peer-enforcement model, which creates a

divide from what the tobacco-free policy asks of campus community and what they are willing to do based on the study survey results. As discovered by the survey, a majority of students, faculty, and staff indicated that they currently do not approach violators about the tobacco-free policy and they do not intend to in the near future. Community members revealed multiple reasons, including feeling uncomfortable or fearing the other person would get upset. New approaches to the peer-enforcement model should be discussed at the USF to increase enforcement of the tobacco-free policy to ensure it is achieving the intended goal of reducing tobacco use and second-hand smoke exposure on campus.

For a successful tobacco-free policy implementation there needs to be elements of education and enforcement (Fallin-Bennett, Roditis & Glantz, 2017). Based on the two elements of the USF tobacco-free policy study, the ArcGIS mapping and current stage of change among student, faculty, and staff, the tobacco-free policy should be reconsidered. Many universities, similar to the USF, are implementing tobacco-free campus policies and need to evaluate their communities' ability to change during the policy development stage. Similar to another tobacco-free evaluation study, there was strong institutional support for a 100% tobacco-free campus policy (Alyanack, 2015). This tobacco-free evaluation study found that student, faculty, and staff enforcement is unproductive because the tobacco-free policy was implemented without specific plans for supplying community members with the information and services to safely and effectively enforce the policy. If the USF wants to successfully implement a tobacco-free policy they need to prepare plans to empower community members. When community members are empowered, they can energetically enforce the policy, which catapults them to the action and maintenance stages of the TTM, which would make enforcement more active. The USF tobacco-free policy evaluation study was conducted to revise and improve the current tobacco-free policy

on the Tampa campus. Continued review is recommended after policy revisions are made to measure the impact of revised policy enforcement and overall effect.

### **Strengths**

This study had numerous strengths including survey population stratification, using the stages of change theoretical framework and utilizing multiple components. The multiple populations include; faculty, staff, and students, smokers, and nonsmokers. While other reviewed tobacco-free publications included surveys analyzing students only, or opinions of faculty and staff only, the inclusion of both populations allows the USF study to compare them and analyze for differences. The survey population was also divided into smoker and nonsmoker categories, which has been done in other tobacco-free policy studies, however they did not also include student, faculty and staff. By further stratifying the survey responses, this survey was able to analyze differences between multiple populations in one study and get a deeper look into population differences on tobacco-free policy knowledge, enforcement and opinions. The survey also included questions that were used to measure the stages of change the respondent was at in terms of tobacco-free policy enforcement. Stages of change framework was a unique way to gauge the USF communities willingness to enforce the policy and can further inform future interventions. With more tailored interventions addressing the majorities stage of change, there would be a greater number of tobacco-free policy enforcements. This study also had multiple components, a survey and a geospatial component, which allows researchers to evaluate the USF tobacco-free policy in terms of physical violations and community perception. While the survey is important to form future interventions around community perception and readiness, the geospatial data allows for a current snapshot on immediate changes that could be made to reduce violations.

## **Limitations**

While there were several above listed strengths for this study there were limitations as well. For the USF tobacco-free policy study, the locations for tobacco-free violation surveillance were randomized, but the times were not able to be randomized due to schedule restrictions and safety concerns of volunteers. So, they were asked to only collect geospatial data during daylight hours. There were only a small number of volunteers to gather violation observation data compared to the size of the campus. With more volunteers and volunteer hours the violation map would be more precise. The lack of violator interaction restricts the information available on observed violators, including campus role or age. Also, violations of smokeless tobacco use are more difficult to observe compared to cigarette butts or smoking so the occurrence may not be reflected accurately on the map. The cross-sectional survey in the study analyzed responses from a large sample of community members, but it was a convenience sample. The survey was sent via email and there may be disparities among those who completed it and those who did not. For example, the demographics of those who completed the survey differ from the campus population on USF, there was a greater sample of white, non-hispanic women students than other demographics. There was a considerable number of students who completed the survey in contrast to faculty and staff. Perhaps a greater number of races, ethnicities, and campus roles would paint a better picture on the tobacco-free policy.

## **CONCLUSION**

After studying the USF and other university tobacco-free policies, a myriad strategies for enforcement emerge. The USF tobacco-free policy assessment successfully identified if and where tobacco use is occurring and identifies community opinion concerning the policy and the stages of change in relation to enforcement. The accompaniment of GIS information on where violations are occurring highlighted focus areas for administrators working on tobacco-free policies and enforcement. While the evaluation was limited to the USF Tampa campus, the methods utilized could be used at other large institutions with a tobacco-free policy. The evaluation procedures can be replicated for use at other institution campuses to establish continued tobacco use patterns via geospatial data gathering and attitudes and experiences by community-wide survey. Many institutions are passing smoke and tobacco-free policies, so unique and efficient evaluation tools are needed. This will ensure institution leaders that the tobacco-free policy implementation can easily and efficiently be evaluated.

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