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Using The Theory of Planned Behavior to Understand Student Compliance to Tobacco-Free Policies in California Universities

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USING THE THEORY OF PLANNED BEHAVIOR TO UNDERSTAND

STUDENT COMPLIANCE TO TOBACCO-FREE POLICIES IN CALIFORNIA

UNIVERSITIES

By

Harit Agroia

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A Dissertation in Partial Fulfillment of the Requirements for the

Degree of Doctor of Public Health in Health Education

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Each person whose signature appears below certifies that this dissertation, in his/her opinion, is adequate in the scope and quality as a dissertation for the degree of Doctor of Public Health.

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ABSTRACT OF THE DISSERTATION

Using the Theory of Planned Behavior to Understand Student Compliance to Tobacco-

Free Policies in California Universities

By

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Loma Linda University, 2018

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Background: In California, the mortality rate associated with smoking ranks as the sixth

highest among all states in the nation (CDPH, 2016). To reduce this rate, many

universities in California have adopted tobacco-free policies in recent years (Mamudu,

Veeranki, Kioko, Boghozian & Littleton, 2016). Due to the recent adoption of such

policies, there is limited research available which aim to assess the effectiveness of these

on tobacco use behavior on campus among university students.

Purpose: The purpose of this study was to understand student compliance to tobacco-free

policies within select universities in California, specifically those that implemented their

policy during 2014-2015. The primary aims of this study were: (a) to determine whether

student attitude, perceived behavioral control (PBC), and subjective norms (SN) are

associated with student intent to use tobacco on tobacco-free universities, (b) to

determine how student attitude, PBC, SN and student intention to use tobacco compare

with difference enforcement levels, (c) to determine how student attitude, PBC, SN and

student intention to use tobacco compares between tobacco-free universities that offer

smoking cessation programs versus those that do not offer such programs, and (d) to understand campus administrators' perception of student compliance to the policy.

Methodology: A cross-sectional study design was employed utilizing both qualitative and quantitative methods. Data collection tools, key informant interviews, a focus group with campus administrators and a survey administered among students, were developed using an integrated theory of planned behavior (TPB) model which included certain elements of the social ecological model (SEM). Campus officials from four universities meeting specific inclusion criteria provided written authorization to collect data, after which students and campus administrators were recruited by calls and/or emails. Data collection took place during March – May 2018.

Results: A total of 167 students participated in the survey (mean age = 18-24 years). Results indicated that attitude ($\beta = 0.12$, $p<0.025$), SN ($\beta = 0.18$, $p<0.001$), and PBC ($\beta = 0.33$, $p<0.001$) were significantly and positively associated with student intention. Results further indicated no significant differences between various enforcement levels. Finally, significant differences were found between student attitude and smoking cessation programs (t=2.55, F=6.50, $p <0.001$). Campus administrators (n=9) agreed that tobacco-free policies, current enforcement measures, and the availability of smoking cessation programs seem to be effective in ensuring student compliance to tobacco-free policies.

Conclusion: Tobacco-free policies, educational enforcement measures, and the availability of smoking cessation resources appear to be effective in reducing student tobacco use on campus. Further research is recommended to understand additional factors which influence student intention to use tobacco on campus.

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INTRODUCTION

A. Statement of the Problem

Tobacco use and smoking are known to cause disease and disability to almost every organ of the human body (CDC, 2017a). Specifically, tobacco use can cause cancer, heart disease, stroke, lung disease, diabetes and chronic obstructive pulmonary disease (COPD), in addition to other illnesses (CDC, 2017a). In response to these risks and the increasing number of young adults using tobacco, many colleges and universities in the United States have banned the use of tobacco products on their campuses through the implementation of health policy (California Youth Advocacy Network (CYAN), 2017). Although the use of policy is known to be one of the most influential forms of public health interventions (Fallin & Glanz, 2015), there is little research that conclusively provides evidence that tobacco-free policies on university campuses are effective in reducing student intent to use tobacco.

1. General Prevalence of Tobacco Use

In 2015, Global Health Observatory data published by the World Health Organization (WHO) (WHO, 2017a) indicated that over 1.1 billion people smoked tobacco worldwide, and according to the CDC (2017d), this number is nearly 40 million for the United States. WHO data also indicated that males generally use tobacco more than females and that the prevalence of smoking by region proves to be highest in the Eastern Mediterranean and the African Region (WHO, 2017a).

In terms of mortality, globally, nearly six million people die from tobacco use each year (Ghasemian, Rezaei, Saeedi Moghaddam, Parsaeian, Delavari &

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Naderimagham, 2015). In the United States, over 400,000 deaths are attributed to smoking each year (Levy, Fergus, Rudov, McCormick-Ricket & Carton, 2016). Ten percent of these deaths occur in California alone (California Department of Public Health (CDPH), 2016). Today, almost four million people continue to smoke in California today (University of California, 2017).

2. *Prevalence of Tobacco Use among Young Adults*

Young adults in the United States have the highest prevalence of tobacco use – 34%, compared to all other age groups (U.S. Department of Health and Human Services, 2012). Consistent with the WHO worldwide data, the prevalence is higher for males (36.6%) than for females (27.1%). According to the CDC (2017d), approximately 3,800 youths under the age of 18 smoke their first cigarette every day. In the United States, nearly nine out of ten cigarette smokers first tried smoking by the age of 18, and 99% tried smoking by the age of 26 (CDC, 2017d). If these smoking rates were to continue, close to six million young adults would be projected to face premature death from a smoking-related illness each year (CDC, 2017b). While 40 million US adults smoke cigarettes, about 4.7 million middle and high school students use at least one tobacco product, including e-cigarettes (CDC, 2017d).

One-third of current young adult smokers consist of college students who are likely to be influenced by social norms such as frequent attendance at night clubs and bars, both of which are known motivators to use tobacco (Mamudu, Veeranki, Kioko, Boghozian & Littleton, 2016). This is of particular concern since according to Green et al. (2007), the onset of tobacco addiction occurs most frequently among young adults in their college years. To support this claim, California Department of Public Health

(CDPH) (2016) found that over 68% of current and former tobacco users in California started smoking before the age of 18. On a national level, over 89% of tobacco users started smoking by the age of 18 (CDPH, 2016). Finally, 98% of all smokers in California started smoking by the age of 26 (CDPH, 2016). Both these rates are alarming due to the known negative consequences of smoking. For this reason, it is imperative to determine whether current interventions targeted toward young adults, such as policies on university campuses, are effective and can aid in reducing these rates.

3. Health Consequences of Tobacco Use

Tobacco use has been associated with a wide range of chronic conditions (Naik & Cucullo, 2015). According to the Centers for Disease Control (2017a), smoking can directly harm every organ of the body. Therefore, while the most common conceptions are that smoking leads to lung and throat cancer, research has found that heavy tobacco use may also result in an elevated risk of head and neck cancer, breast cancer, colorectal, liver and esophagus cancers. (Zhang, Zheng, Zeng, & Leischow, 2015). These increased risks are a result of the presence of many identified carcinogens in tobacco. Moreover, myocardium and blood vessel diseases are also common among smokers (Naik & Cucullo, 2015). This is of importance because uncontrolled high blood pressure can form clots in the body and may lead to stroke potentially resulting in permanent damage (CDC, 2017b). In terms of neurological diseases, heavy tobacco use can result in Alzheimer's disease, multiple sclerosis, and neurodevelopmental damage during pregnancy (Naik & Cucullo, 2015).

Smoking is also connected to diabetes (CDC, 2017f). The CDC (2017f) states that smoking actually directly causes type 2 diabetes and those who smoke regularly are about

40% more likely to develop type 2 diabetes than nonsmokers. Furthermore, smokers also struggle in managing their diabetes compared to their nonsmoker counterparts (CDC, 2017f). The CDC (2017f) also found that smokers with diabetes can also develop additional co-morbidities such as heart and kidney disease, poor blood flow in the legs and retinopathy. Heart disease, the number one cause of death in the United States today, is also connected to using tobacco (CDC, 2017g). Furthermore, smoking directly causes one of three deaths that occur from cardiovascular disease, and can also further cause complications relating to blood clots, damaged blood vessels, and thickening of the blood vessels (CDC, 2017g).

Aside from these physical effects of using tobacco, there are also mental health effects (Mental Health Foundation, 2017). Firstly, smoking can lead to addiction which means that the first exposure to nicotine improves mood, decreases anger and stress, and relaxes muscles (Mental Health Foundation, 2017). However, these positive sensations last temporarily as the body adjusts to this substance and becomes nicotine dependent, which leads to less desirable withdrawal symptoms. Smoking is also significantly tied to stress (Mental Health Foundation, 2017). Research shows that smoking helps individuals de-stress and help cope with unpleasant situations and unwelcome pressure (Mental Health Foundation, 2017). Furthermore, this stress, if it continues long-term, will likely lead to more severe symptoms of anxiety and depression. Smokers with anxiety and depression also use the nicotine source to relax and increase dopamine levels in their body for more positive feeling (Mental Health Foundation, 2017). However, it is important to note that while smoking and the use of tobacco seems to help with mental health issues such as addiction, stress, anxiety and depression, research actually shows

that most people with mental health problems started smoking before their problems

began (Mental Health Foundation, 2017). Furthermore, chain smoking does not lead to

fewer mental health problems in the long-term even though they may feel alleviated in

the short-term (Mental Health Foundation, 2017).

Additionally, second and third-hand smoke is a significant concern for those who

do not directly use tobacco. Each year, over 41,000 deaths among nonsmoking adults are

directly connected to second-hand smoke exposure (CDC, 2017c). Children are

particularly affected because they are often exposed to second-hand smoke through their

parents at a young age (CDC, 2017c). This results in less lung growth which increases

their chances for developing bronchitis or pneumonia (CDC, 2017c). Second-hand smoke

can also trigger more frequent asthma attacks in children with asthma which can put their

lives in danger (CDC, 2017c). Moreover, 400 infants also die each year due to the

second-hand smoke exposure (CDC, 2017c). As children are more vulnerable than adults,

and second-hand smoke exposure puts them at increased risk for infant death syndrome,

acute respiratory infections, middle ear disease, severe asthma, respiratory symptoms and

slowed lung growth (CDC, 2017c).

Children and non-smoking adults are also susceptible to the dangers of third-hand

smoke because they may be indirectly inhaling, swallowing or touching substances that

contain third-hand smoke (Mayo Clinic, 2017). According to the Mayo Clinic (2017),

third-hand smoke is the residual nicotine and other chemicals that are left on indoor

surfaces by tobacco smoke. These residuals expose people to such chemicals as people

often touch surfaces containing these chemicals and breathe the gas released from these

chemicals (Mayo Clinic, 2017). Furthermore, the types of surfaces third-hand smoke can

be found is on clothes, furniture, drapes, walls, bedding, carpet and vehicles (Mayo Clinic, 2017). While third-hand smoking is a relatively new discovery, preventing such exposure should still be considered through enforcement of tobacco-free environments (Mayo Clinic, 2017).

All in all, it appears through this research that there are a wide range of health consequences that result from tobacco-use. Further, while tobacco users are most susceptible to these health effects, non-smokers and children also face significant health effects through second-hand and third-hand smoke exposure. As research expands, the extent and severity of the health consequences of tobacco-use are still being uncovered.

4. *The Role of Tobacco-Free Policies in Reducing Levels of Tobacco Use*

Many college campuses in the United States have adopted tobacco-free policies to reduce tobacco use among students in recent years (Fallin & Glanz, 2015). A tobacco-free policy is defined as a policy that eliminates the use of any tobacco product including cigarettes, cigars, cigarillos, mini-cigars, hookah, spit tobacco, and snuff (Tobacco Free Campus, 2014). Tobacco-free policies are different from smoke-free policies because smoke-free policies only prohibit lit tobacco products (such as cigarettes), whereas tobacco-free policies are more comprehensive in prohibiting the use of all tobacco-products (Tobacco Free Campus, 2014). Specifically, a smoke-free policy is one that prohibits inhaling, exhaling, burning, carrying or possessing a lighted cigarette, cigar, pipe, electronic cigarette, hookah or other lit products that contain tobacco (University of Southern California, 2017). According to Fallin & Glanz (2015), any form of tobacco-control policies can reduce tobacco use as well as second-hand smoke exposure, ultimately reducing the burden of chronic disease. Limited assessments

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have been conducted to determine the effectiveness of these policies as tobacco-free

policies in colleges and universities have only been implemented in recent years.

One assessment of college smoke-free policies was conducted in 2010 by

Plaspohl, Parrillo, Vogel, Tedders & Epstein (2012). These researchers found that despite

the smoke-free policies in place, colleges had weak enforcement plans. Enforcement is

used to increase student compliance to policies. Examples of enforcement mechanisms

may include signage or fines. In another assessment by Ohmi, Okizaki, Meadows,

Terayama & Mochizuki (2013) the researchers measured the influence of a smoking ban

at a university in Japan. The researchers found that 47% of all smokers still smoked on

campus and on the streets right outside of campus (Ohmi et al., 2013). From the available

literature it is evident that further evaluation, assessment and modification may be needed

to ensure the effectiveness of college and university smoke-free policies.

5. *The Role of Health Education Programs in Reducing Tobacco Use*

Present research suggests that incorporating health education programs

specifically smoking cessation programs, within educational institutions that have

adopted tobacco-free or smoke-free policies may help lower tobacco use among students

(Lovato et al., 2006). These authors conducted a Google trends study on various tobacco-

free policies in the Netherlands to determine the extent and timing of the influence of

tobacco-free policies on the rate of searching for information on smoking cessation. They

found that, in general, after policy implementation, there was a significant increase in

search volume (up to 41%) after introducing a smoking ban in restaurants and bars in the

Netherlands (Lovato et al., 2006).

Furthermore, the Netherlands study suggests that incorporating health education may be an effective addition to a successful policy. Passing a policy sparks an initial curiosity which health educators may use to fuel the minds of those who may want to know more. Borders, Xu, Bacchi, Cohen & SoRelle-Miner (2005) also suggest that incorporating health education programs after implementing a tobacco-free policy may increase student compliance to the policy; however, it is unclear from their study which types of health education programs are effective in increasing student compliance to the policy.

6. *The Need for Further Research*

Over the last few years many public four-year colleges in California such as those within the University of California and California State University systems have adopted tobacco-free policies on their campuses. There is, however, literature that alludes to the fact that smoke-free policies have high levels of compliance in California (CDC, 2016b). According to the CDC (2016b), a statewide law prohibiting smoking in all indoor areas of bars took place in 1998, during which time the compliance rate was only at 46%. Four years after the law was implemented, the compliance rate has increased dramatically to 76% (CDC, 2016b). This suggests that with the proper enforcement and awareness mechanisms, policies on college and university campuses can yield high compliance rates. However, current literature on the influence of such tobacco-free policies on university campuses is still limited. There is also little or no research on the influence of tobacco-free policies on universities—specifically in the state of California.

B. Purpose of the Study

The purpose of this study was to determine: (a) how student attitude, perceived behavioral control, and subjective norms are associated with student intent to use tobacco on tobacco-free university campuses; (b) how student attitude, perceived behavioral control, subjective norms and student intention to use tobacco on university campuses compares between different enforcement types; (c) how student attitude, perceived behavioral control, subjective norms and student intention to use tobacco on university campuses compares between universities that integrate smoking cessation programs to accompany campus policies and universities that do not integrate such programs and (d) to gain an understanding of campus administrators' perception of student compliance to the policy.

C. Research Questions

1.   How are student attitude, perceived behavioral control and subjective norms associated with student intent to use tobacco on tobacco-free university campuses?

2.   How do student attitude, perceived behavioral control, subjective norms and student intention to use tobacco on university campuses compare:

   a) Between different policy enforcement types (e.g. signage and fines)?

   b) Between students at universities which have smoking cessation programs and students at universities that do not have these programs?

3.   What are campus administrators' perception on student compliance with

the policy?

D. Theoretical Framework

The theory of planned behavior (TPB) was used to assess student attitudes, subjective norms and perceived behavior control to predict student intent to use tobacco (Ajzen, 2006). The TPB is a theoretical model widely used in designing public health interventions because it helps researchers understand how to enact behavior change and what factors motivate individuals to perform actual behaviors (Boston University, 2016). The TPB takes roots in the theory of reasoned action (TRA) developed by Ajzen and Fishbein (Ajzen, 2006). By adding the perceived behavioral control construct into the TRA, the new TPB became more effective in understanding human behaviors (Ajzen, 2006).

According to the TPB, human behavior is guided by three different constructs: attitude, subjective norm, and perceived behavioral control. These three constructs in turn are influenced by behavioral, normative and control beliefs respectively (Ajzen, 2006). In this study, behavioral beliefs consist of student beliefs about the likely consequences of using tobacco, both in general and on their university campus. Normative beliefs consist of student beliefs about other people's opinions on the student's use of tobacco. Finally, control beliefs represent the students' beliefs regarding the specific factors in their lives that would impede or facilitate their intention to use tobacco. It is important to acknowledge these three types of student beliefs in this study because they directly influence the attitude, subjective norm and perceived behavioral control constructs within the TPB, all of which ultimately influence student intention to use tobacco on campus. The relationship between these elements of the TPB are illustrated in Figure 1.1 below.
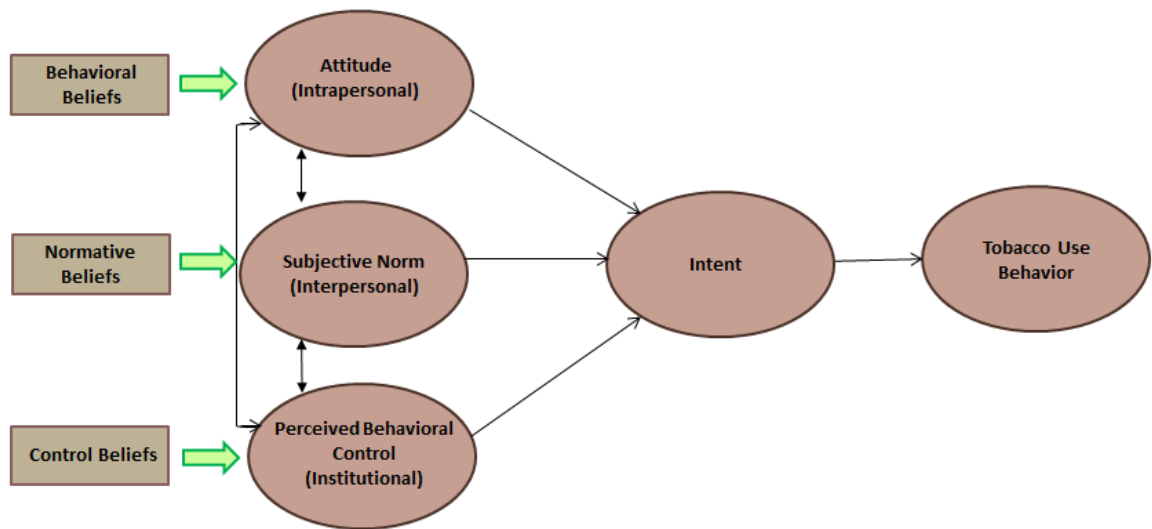
Figure 1.1. Theoretical Model: The Theory of Planned Behavior

In addition to these original TPB constructs, the following components of the social ecological model (SEM) are also incorporated into this model: intrapersonal, interpersonal and institutional factors (CDC, 2015). These components are integrated within Figure 1.1 as shown in parenthesis. According to the CDC (2015), the SEM allows for a multi-level approach to tobacco use prevention because this is a systems model that acknowledges multiple bands of influence outside of the individual beliefs, attitudes, subjective norms and perceived behavioral control measured through the TPB. Such bands of influence include public policies such as federal and state laws, clinical and program policies institutional policies and the influence of media. Since this study examines the influence of policy on student behavior, it is necessary to acknowledge and include the aforementioned components of the SEM in the study.

Overall, the theoretical framework illustrated in Figure 1.1 was utilized because it allows for comprehensive measurement of the various factors that may ultimately influence student intention to use tobacco on their university campus. This framework includes all of the factors from the TPB as well as the intrapersonal, interpersonal and institutional factors from the SEM. The SEM factors are integrated into the TPB model so that this study is overall guided by TPB's general principle: the more favorable a student's attitude, subjective norms and perceived behavioral control, the more favorable is the student's intention to refrain from using tobacco on campus.

1. *Attitude and Intrapersonal Factors*

Measuring student attitude toward tobacco use is important to determine whether the student views tobacco use as a positive or negative behavior (Ajzen, 2006). Attitude is influenced by behavioral beliefs, which are the students' personal beliefs about using tobacco moderated by their evaluation of those beliefs. An example is self-reported student assessment of whether tobacco use is good or bad. If a student states that tobacco use is good, then it is likely that their attitude towards tobacco use is one which justifies their use of tobacco, and vice versa. In Figure 1.1, it can be seen that student behavioral beliefs directly influence whether the student will have favorable or unfavorable attitude toward using tobacco on campus. It is important to acknowledge that these beliefs serve as the foundation used to construct the attitude questions in the survey that was administered among the college students.

Furthermore, the incorporation of intrapersonal factors from the SEM help to identify specific variables that were also used as control variables that should be assessed in accounting for student overall attitude toward using tobacco. At the intrapersonal level,

variables such as biological factors and personal history are found to be key in

determining whether there are genetic or historical motivators which may strongly

influence student intent to use tobacco. Other factors within this realm include student

self-reported age, educational level, income, substance use (other than tobacco), and/

history of drug abuse (Centers for Disease Control, 2015). Such intrapersonal factors

directly affect student attitude due to the fact that they influence student personal beliefs,

which, according to Ajzen (2006), directly influences student attitude about using

tobacco. For this reason, if any of these factors are found to be strong influencers, this

may be worthwhile to consider when designing or recommending a future intervention.

2. *Subjective Norms and Interpersonal Factors*

Measuring student subjective norms regarding tobacco use is important to

determine whether the student perceives social pressure as a motivator to use tobacco

(Ajzen, 2006). According to Ajzen, subjective norm is determined by normative beliefs -

student's perceptions of social normative pressures regarding the use of tobacco

moderated by his/her desire to comply with such pressures and expectations. An example

is asking a student how much influence their friends may have on his/her decision to

smoke. If the student designates that friends strongly influence his/her decision to smoke,

then the student is likely to smoke if his/her friends also smoke. In Figure 1.1 it can also

be seen that normative beliefs directly influence a student's subjective norm. It is

important to acknowledge these beliefs serve as the foundation used to construct the

subjective norm questions in the survey that was administered to the college students.

Similarly, the SEM interpersonal level was incorporated into the student

subjective norm construct of the TPB behavior. In Figure 1.1, this is demonstrated in

parenthesis within the subjective norm construct of the TPB. The interpersonal level

from the SEM is integrated with the TPB because it helps to identify specific variables

that are included when assessing the subjective norms which influence student intent to

use tobacco. Such variables include the influence of close relationships, social circle-

peers, partners, and/or family members that may be motivators for performing their

behavior (CDC, 2015).

3. *Perceived Behavioral Control and Institutional Factors*

As seen in Figure 1.1, based on Ajzen (2006), control beliefs directly

influence student perceived control over their behavior. An example is the measurement

of student self-reported confidence levels in refraining from tobacco use on campus. This

self-reported data improves understanding of student perceived behavioral control

because it reflects their sense of autonomy in making the decision to use tobacco. For this

reason, this assessment can be seen as a significant factor in understanding what

influences student perceived behavioral control, which then predicts their intention to use

tobacco. Also, the qualitative data gathered from conducting the key informant interviews

and focus group helps to inform the perceived behavioral control construct as the campus

administrators were asked whether they feel the policy has influenced behavior change

through changes noticed in tobacco trash on campus and changes noticed in the number

of students using tobacco on campus. Hence, the relationship between perceived

behavioral control and intent to use tobacco in the overall TPB model becomes greatly

important in this study because it not only allows for measurement of the effectiveness of

the campus policy, policy enforcement mechanisms, and smoking cessation programs,

but it also allows for better understanding of campus administrator perceptions.

Since the relationship between perceived behavioral control and intent to use tobacco is a significant focus of this study, it is important to note that control beliefs directly influence this construct. To provide additional background, control beliefs are important to understand both from the behavioral standpoint as well as conceptually because these are the complex, psychological factors that influence individual intent. Control beliefs are the perceived factors that may facilitate or impede performance of a behavior (Ajzen, 2006). For example, if an individual has strong control beliefs, they feel competent, have high self-efficacy and feel empowered. If the individual does not feel "in control" of their actions or has low self-efficacy in refraining from smoking another cigarette, for example, then they are most likely experiencing a feeling of helplessness or loss of control. Control beliefs, in combination of the perceived power of each control factor, ultimately determine an individual's perceived behavioral control within the TPB. It is important to acknowledge that these beliefs will serve as the foundation to construct the perceived behavioral control questions in the survey that will be administered to the students. This section places this additional elaboration on control beliefs due to the complexity of the psychological factors that they aim to measure, however control beliefs were not separately measured or investigated as part of the study.

In addition, the SEM institutional level was assessed as part of the perceived behavioral control construct of the TPB behavior, as shown in Figure 1.1. The institutional level of the model helps to identify societal influences of student intent to use tobacco, such as the campus environment, the types of enforcement (e.g., signage), and assessing whether students are aware of the available health education resources and whether the availability and accessibility of these resources influences their intent to use

tobacco. It is especially important to include this level in the measurement because it allows for better understanding of how the specific tobacco policy, including various policy enforcement mechanisms, influences student intent to use tobacco. This is also important because this allows for measurement of student perception on the effectiveness of campus smoking cessation programs, which then helps to determine whether campus administrators should continue these programs or consider implementing them on their respective campuses if they do not already have them. The institutional level of the SEM allows for such factors to be measured and to determine how they influence student intent to use tobacco.

4. Student Intention to Use Tobacco on Campus

According to Ajzen (2006), the intent to perform a specific behavior is influenced by an individual's attitude, subjective norm and perceived behavioral control. As mentioned above, these three constructs are further influenced by student's behavioral, normative and control beliefs. To ensure all relevant factors are assessed, the TPB is the guiding theoretical framework of this study, with select integration of constructs from the SEM to allow for a comprehensive understanding of the relationships between individual, relationship and societal factors which influence student intentions to use tobacco on campus (CDC, 2015).

E. Significance to Health Education and Promotion

Measuring the influence of policy is important for stakeholders to determine whether a tobacco-free policy is an effective intervention to reduce tobacco use among students on campus. It is of particular interest for health educators to understand the role of health education programs within tobacco-free campuses and how integrating these

programs will influence student intent to use tobacco. Overall, understanding the factors that influence student intent to use tobacco on campus inform current and planned interventions aimed towards reducing tobacco use among students on university campuses. Findings from this study may help campus administrators determine whether their current tobacco policies should be strengthened or modified in order to ultimately achieve optimal health and behavioral outcomes.

CHAPTER 2

REVIEW OF LITERATURE

A. Overview

Since tobacco-free policies on college and university campuses in California have only gone in effect within recent years, there is limited research which demonstrates the approach educational institutions have taken to implement policy and enforcement activities after a policy has been passed on their campus in the United States. According to Tobacco Free Campus (2017), colleges have started going tobacco-free since 2012. The articles reviewed in this literature review suggest a possible effectiveness of tobacco-free or smoke-free policies, however, there appears to be insufficient data solidifying this claim. The purpose of this literature review is to identify the need for further research on the effectiveness of these policies in California. Also, through this review, crucial gaps in policy implementation and enforcement will be identified so that recommendations for change can be recommended to successfully achieve behavior change among college and university communities.

The objectives of this review include identifying tobacco use as a significant problem, especially in young adults, and examining current policies to reduce tobacco use among youth and young adults attending educational institutions in the U.S. Objectives also include evaluating the methodology of the studies in this review, as well as forming logical conclusions based on the weight of the presented evidence. The following databases were searched to retrieve literature: Web of Science Academic Search Premier, all EBSCO databases, and PubMed. Key terms searched included *tobacco policies, tobacco and health, youth, young adults, college student, university student, smoking*

policy, smoking ban, tobacco interventions, smoking interventions, and tobacco use.

This literature review is organized by first describing the health and economic implications of tobacco use. Then, the intensity of tobacco use world-wide, in the United States, and specifically among the youth and young adult population will be highlighted. Lastly, this review will focus on studies which measure effectiveness of current policies against tobacco use or smoking. There will also be a brief discussion on the overall methodologies used among all literature presented to identify common study designs and data collection tools as well as the overall summary and conclusions.

B. Implications of Tobacco Use

1. Health Implications

According to the CDC (2016a), tobacco use is the number one preventable cause of death in the United States and the world. From cancer to neurological diseases, tobacco use can be responsible for a wide range of chronic conditions (Naik & Cucullo, 2015). According to CDC (2017a), smoking can directly harm every organ of the body. Therefore, while the most common conceptions are that smoking leads to lung and throat cancer, research has also found that heavy tobacco use can result in an elevated risk of head and neck cancer, breast cancer, colorectal, liver and esophagus cancers. (Zhang, Zheng, Zeng, & Leischow, 2015). These increased risks are a result of a number of identified carcinogens in tobacco. Moreover, myocardium and blood vessel diseases are common among regular smokers (Naik & Cucullo, 2015).

In terms of neurological diseases, heavy tobacco use can result in diseases such as Alzheimer's disease, multiple sclerosis, and neurodevelopmental damage during pregnancy (Naik & Cucullo, 2015). Furthermore, smoking causes stroke and coronary

heart disease and can damage blood vessels to the extent that many heavy tobacco users suffer from high blood pressure. Uncontrolled high blood pressure can cause clots in the body, many times leading to permanently damaging strokes (CDC, 2017b). Smoking is also a large contributor to the development of respiratory disease such as chronic obstructive pulmonary disease (COPD), including emphysema and chronic bronchitis due to the fact that smoking damages the airways and alveoli found in the lungs (CDC, 2017b). The CDC further states that smokers are 12 to 13 times more likely to die from COPD than nonsmokers.

Each year, almost 300,000 oral cancers, over 140,000 pharynx cancers, and over 150,000 larynx cancers are diagnosed (Zhang et al., 2015). WHO (2017a) found that nearly 2.5 million smokers die world-wide from conditions they have developed as a result of smoking, such as heart disease and lung cancer. Alarmingly, cigarette smoking alone is the primary cause of death for nearly 500,000 Americans each year (CDC, 2017e). Due to the significant number of carcinogens found in tobacco and in cigarette smoke, those who smoke are at significant risk for heart attacks. For example, even young women who take birth control have a greater risk of heart attack (Chandler, 1986). So in general, heavy tobacco use can cause almost any type of known cancer and contributes to a wide range of diseases. Evidently, it seems as though those who smoke are engaging in this behavior at the cost of their future health and are substantially more likely to experience chronic conditions later in life.

2. *Economic Implications*

Aside from the opportunity cost of health, there is also an economic burden from tobacco use on both external entities as well as the individual and

individuals' families who are affected by a death or chronic health disease of their family member. Between 2009 and 2012, there was an estimated $289 billion in extra economic burden in the U.S. due to medical care and productivity loss related to tobacco use (Naik & Cucullo, 2015). Moreover, in 2015, the CDC (2017e) estimated that smoking-related illnesses costs the United States over $300 billion per year, including $170 billion utilized for direct medical services and approximately $156 billion lost from employee productivity due to these smoking-related illnesses. There is also income that is lost as a result of death from smoking. For example, if a mother of three children dies from lung cancer as a result of smoking, then the income that was being used to support the welfare of those children will be lost. As a result, the three children may suffer from poverty, malnourishment and other related factors. This could be potentially prevented through the implementation of tobacco control policies as they have been proved to be effective in reducing smoking rates by at least 6% (Ciercierski et al., 2011). Furthermore, if states allocated adequate funding in investing in programs or policies at college and university campuses, the economic burden which the CDC points to could be diminished by the occurrence of fewer deaths and decrease of chronic illnesses.

C. Intensity of Tobacco Use

1. Tobacco Use World-Wide

According to the World Health Organization (2015b), tobacco is the only legal drug that actually kills its users when used as intended by its manufacturers. This means that the projected one billion smokers in the world (Ghasemian et al., 2015) face significant risk in facing death or developing a serious smoking-relating illness that leads to death due to their current smoking behavior. Those who smoke also expose a

significant number of people to second-hand smoke, causing non-smokers to experience involuntary exposure and thus also increase their risk of developing potentially deadly chronic diseases (American Cancer Society, 2015). Furthermore, there is a world-wide epidemic of tobacco use that poses significant risk to the health of populations across the globe. Among the countries with the highest consumption rates include China, Eastern and Southern Europe, and Africa (World Lung Foundation, 2015a). In fact, China is the world's leading producer of tobacco, producing over 3 million tons of tobacco leaves in 2012 (World Lung Foundation, 2015b). Half of the world-wide increase in tobacco consumption is due to China, even though the country alone comprises 1/5th of the world's total population.

2. Tobacco Use in the United States

There are over 400,000 deaths due to smoking in the U.S. each year (Levy, et al., 2016). Over 40,000 of these deaths, which is about 10%, are linked to exposure to second-hand smoke (CDC, 2016a). In 2014, the Centers for Disease Control (2016a) identified almost 17% people in the U.S. who were current smokers and of these, over 75% smoked daily. The states with the highest smoking rates include Kentucky (30%), West Virginia (30%) and Mississippi (27%) and states with the lowest smoking rates include Utah (12%), California (15%), and Minnesota (16%) (McCarthy, 2014). In terms of prevalence, most smokers are non-Hispanic American Indian/Alaskan Natives (29%) with the minority being non-Hispanic Asians (10%). Between males and females, there is almost equal prevalence of smoking between both genders, and majority smokers are below the established poverty level (CDC, 2016a).

3. *Tobacco Use Among Youth and Young Adults*

The prevalence of tobacco use among youth worldwide is of particular concern because 9 out of 10 smokers start smoking before the age of 18 (U.S. Department of Health and Human Services (DHHS), 2017). Moreover, DHHS also indicates that in 2011, approximately 18% of high school students smoked cigarettes. Almost six million of today's children under the age of 17 are expected to die prematurely from a smoking related disease (Naik & Cucullo, 2015). Such alarming prevalence rates in children could be related to the social norms because research indicates that the first source of tobacco exposure for most children is through their parents since smoking parents openly smoke in front of their children (Naik & Cucullo, 2015).

In the United States, the prevalence of smoking among young adults aged 18 to 25 was almost 32% in 2012 (Mamudu et al., 2016). One-third of these smokers are college students where social norms (e.g. night clubs, bars) are significant motivators to smoke. Among middle and high school students, the 2012 National Youth Tobacco Survey results indicated that almost seven percent of middle school and 23% of high school students are smokers (Terry & Zhang, 2016). More recently in 2016, statistics for tobacco use rates for middle school students have stayed consistent (7%) and the tobacco use rate for high school students is at 18% (CDC, 2017h). According to Terry & Zhang (2016) each day almost 4,000 youth under 18 smoke their first cigarette; and by the age of 18, 90% of smokers develop a smoking habit. This would indicate that this age is a prime time to target intervention activities.

Specifically, high school athletes have a high prevalence of tobacco use (Agaku et al., 2015). In a study conducted by Agaku et al. (2015), the prevalence and trends in current use of combustible and smokeless tobacco products among high school students was examined by analyzing the National Youth Risk Behavior Surveys distributed between 2001 and 2013. A three-stage sample design was used to determine which students to include in the study so that the sample was nationally representative. Among a sample size of 13,583, the response rate was 71%. Based on survey results, researchers argued that if tobacco education programs designed for high school athletes were implemented, they could potentially increase awareness of the negative health implications of tobacco products and would therefore reduce tobacco use among high school athletes. This claim was supported by statistical results from survey responses, which indicated that smokeless tobacco use among high school athletes increased from ten to eleven percent over the years. However, the issue of tobacco use among high school athletes could actually be more prevalent than what is represented through the results of this study. In their study, Agaku et al. (2015) assessed only smokeless tobacco usage among this population, which does not provide the audience with the actual usage of tobacco in general among high school athletes. Smokeless tobacco was defined as chewing tobacco, snuff, or dip; however, there are also other forms of tobacco use including the most recent introduction of electronic cigarettes, hookah or even dissolvable tobacco. Further research would provide a more adequate measurement of tobacco use among this population, which is likely to be higher.

Furthermore, Green, McCausland, Xiao, Duke, Vallone, & Healton (2007) conducted a study focusing on college-educated and non-educated young adults and their

smoking behaviors. They aimed to identify how the behaviors among these two groups differ by using existing data from the 2003 Tobacco Use Supplement of the Current Population Survey. Data from this survey was analyzed to determine the smoking behaviors of young adults in the following age groups: 18-24 years and 24-34 years. They also used the data to determine if these individuals reported having a degree or were currently enrolled in college. Their survey results provided evidence that those who smoke are usually below the age of 18. Furthermore, among the college-educated smokers in the 18-24 years age group, 41.5% started smoking at age 18 or older, whereas the non-college educated in that same age group comparably had a statistic of 25.4%. Similarly, among the college-educated smokers in the 25-34 years age group, 57.3% started to smoke at age 18 or older, whereas in comparison the non-college educated group only had a statistic of 38.7%. While most smokers begin smoking under the age of 18, there is still a large percentage that start smoking during the college years. This is supported by the claim that Green et al. (2007) make that many smokers develop addiction during their college years. Thus, policies designed to banish tobacco from college and university campuses can be effective in preventing addiction. However, the effectiveness of such policies would need to be explored to determine if those attending colleges and universities smoke less.

Finally, young adult beliefs regarding tobacco use and the tobacco products that are of most interest to them was captured by a focus group conducted by the CYAN (Vagadori & Kipke, 2017). The CYAN and the Tobacco Control Evaluation Center (TCEC) conducted three rounds of focus groups: 2013, 2015 and 2017 with youth between the ages of 14 and 17 as well as young adults ages 18 to 24. In October of 2013,

six focus groups were conducted in Imperial, San Diego, Kern and Sacramento Counties. A total of 27 youth and 36 young adults participated in these focus groups. During April 2015 – May 2017, a total of 12 more focus groups were conducted within Alameda, Orange, Santa Barbara and Sacramento Counties. This yielded a total of 78 youth and 73 young adults. These data collectively represent the students' perceptions and beliefs over the past four years all throughout California and thus will inform and add strength to the proposed study.

One of the findings from these focus groups included the fact that age of initiation is important (Vagadori & Kipke, 2017). The youth and young adult population indicated that the majority of young people experiment with tobacco in their teen years and that the actual establishment of cigarette smoking occurs between the ages of 20 and 22. Moreover, it was found that e-cigarette use is very attractive toward this population because this population is quite selective in the types of products that are experimented with. Some examples of attractive products include hookah and flavored cigarettes. Another interesting finding captured from these data is that most young adults knew somebody within their immediate family or social circle that frequently used e-cigarettes and/or menthol products. For this reason, many participants formed the perception that these products are safer than cigarettes and are a good way to help smokers quit (Vagadori & Kipke, 2017). Moreover, products such as hookah pens formed the perception that if used discreetly, no one will find out about them. Finally, it was found that students generally knew that tobacco use was harmful to their health but felt that newer products such as e-cigarettes and hookah pens were less harmful than cigarettes.

The information students provided during these recent focus groups will serve as the foundation for constructing the measurement instruments for this study.

D. Current Tobacco Control Policies and Their Effectiveness

In response to the intensity of tobacco use and its overall implications toward negative health and negative environmental effects, in 2003 the first comprehensive smoke-free local law was passed in Lexington, Kentucky, a major tobacco growing city in Kentucky (Fallin & Glanz, 2015). This law comprehensively banned smoking in public places, restaurants and bars and triggered another 35 regions within the state to adopt smoke-free laws as well. According to Fallin & Glanz (2015), any form of tobacco-control policies can reduce tobacco use as well as exposure to second-hand smoke, ultimately reducing the burden of chronic disease. Lee et al. (2012) also state that although many colleges in the United States today have adopted some interventions for tobacco use on campus, more focus should be directed toward interventions including the development and implementation of tobacco-free policies or smoking bans since they are more effective than knowledge and informative interventions alone. Further, implementing tobacco-free or smoke-free policies or laws within places where people work is also a strong influencer of reducing tobacco-use (Hopkins, Razi, Leeks, Kalra, Chattopadhyay & Soler, 2010). These researchers observed reductions in tobacco use within a variety of working populations once smoke-free policies were implemented. Further, it was also concluded that smoke-free policies are also effective options to promote cessation among smoking employees.

However, this may not be easily implemented. Powerful tobacco companies serve as great obstacles in passing such policies (Fallin & Glanz, 2015). One way this is

accomplished is by funding and providing incentives to researchers to publish articles in journals such as the Indoor and Built Environment journal, to provide evidence that second-hand smoke poses minimal to no health risks, and therefore smoking should not be banned in indoor areas (Game et al., 2005). This also questions the researcher's ethics because the researchers had personal interests for making their stated conclusions and publishing findings within literature for their personal gain. For this reason, it is important to be able to distinguish studies such as these from those which present actual evidence regarding the harmful effects of tobacco use. Another way is simply by direct influence of the tobacco products that these companies produce. According to Leventhal & Barrington-Trimis, 2018, young adults that report a favorite tobacco product advertisement or commercial, or even simply report having seen a tobacco advertisement, they are more likely to initiate use of tobacco products. Such advertisements and commercials are especially appealing when marketing newer and innovative tobacco products such as electronic cigarettes and other non-cigarette tobacco products (Leventhal & Barrington-Trimis, 2018).

Included in this section is a review of two studies focusing on national U.S. mandates to reduce tobacco use and an evaluation of the effectiveness of these mandates. Also presented in this section are a series of studies focusing solely on college and university smoking or tobacco bans and their effectiveness on changing student smoking behaviors.

In 2009, in response to high smoking rates among youth in the U.S., the family smoking prevention and tobacco control act was implemented. This act specifically prohibited adding flavors other than menthol and tobacco in cigarettes so that youth

would be less inclined to use tobacco products (Corey, Ambrose, Apelberg, & King, 2015). The policy, however, did not include other tobacco products such as electronic cigarettes or hookah. As a result, the flavorful tastes found in electronic cigarettes and hookah continued to spark high school and middle school students' curiosity and largely influenced their intention to use these tobacco products (Corey, Ambrose, Apelberg, & King, 2015). To inform the Food and Drug Administration (FDA) regulatory actions, these authors evaluated the influence of the family smoking prevention and tobacco control act among middle and high school students during a cross-sectional, observational study by administering a questionnaire. This questionnaire asked participants if they had within the last 30 days used one of eight tobacco products, such as electronic cigarettes, hookahs, cigars, or smokeless tobacco. Similar to Agaku et al. (2015), a 3-stage cluster sampling was used to generate a representative sample of U.S. students attending either public or private schools. Recruitment resulted in a sample size of 22,007 students and a 73% response rate. They found that 70% of middle and high school students in the United States use at least one tobacco-flavored product, and in 2014, over 1.5 million children used e-cigarettes, over one million students used hookah and over 900,000 students smoked cigars. For this reason, it was concluded that there should be increased efforts to implement tobacco control policies and develop stronger strategies to prevent youth from using tobacco products, especially because youth are evidently most attracted to products with flavorful taste options.

One limitation of this study is that it does not include analysis of the use of all tobacco products in general. Understandably, the authors are measuring the effectiveness of the 2009 Family Smoking Prevention Control Act which targeted flavored products,

however having a comparison group which included all types of tobacco products would provide a greater perception of the actuality of the issue in the United States. Despite this limitation, it is evident that solely passing a policy does not guarantee adherence and enforcement. Further research would help identify the effectiveness of policies such as these and provide recommendations for improvement.

Similarly, the Centers for Disease Control (CDC) also set a mandate for tobacco-free school policies in the U.S. for which an evaluation was conducted among schools in South Dakota to determine the status of policy implementation and if schools had implemented strong policies based on tobacco-free school (TFS) components (Fahrenwald et al., 2013). The evaluation process consisted of researchers first collecting a copy of the current school policy from school administrators, some of which opted not to participate. These policies were compared against a TFS 26-point checklist after which researchers conducted follow-up key informant interviews with superintendents. Overall, there was a 66% response rate (n=119) and one-way ANOVA tests were conducted to determine the differences in policy scores between the types of school (i.e. public, private). Independent t-tests were conducted to compare policy scores for districts that had received prior funding for tobacco control programs against those who had not received prior funding. Although this was a relatively low sample size, one concern with this research is that those who chose to participate in the study may have had stronger policies than those who chose not to participate. Lack of a strong policy could have been reason to opt out of the study, hence skewing the results. Nonetheless, of those whose policies were examined, results indicated that most all policies did not prohibit tobacco advertising and tobacco gifts, only six percent of all schools had an enforcement plan. It

was concluded that there is a need to improve policies among all schools within the state of South Dakota, which also points to a missing connection between solely adopting a policy and successful implementation and enforcement for the policy to be effective.

In terms of colleges and universities in America, Plaspohl et al. (2012) assessed the strength of policies among campuses which were 100% tobacco-free. Strength was determined by assessing the policies, procedures and practices and determining if the school adhered to the guidelines which promote tobacco-free environments in America's colleges and universities. This was a cross-sectional study design which was conducted between January 2010 and February 2010. Data to support their conclusions was gathered through administration of a survey among 162 key informants from the 175 institutions that were selected to participate in the study. The survey contained 35 items which addressed the overall school policy, procedures and enforcement practices. Adherence to these items was determined by the American College Health Association (ACHA) guidelines (Plaspohl et al., 2012). Results indicated that almost all colleges have a strong policy which reflects best practices, cessation and control. It was also found that eighty-five percent of all colleges had adequate marketing and signage of the policy to raise awareness. However, areas where the policies were weak were areas such as enforcement of the policy, maintaining a task force which should address ongoing needs and concerns, as well as offering prevention and educational materials which support the risks of tobacco use. Based on these results, the authors concluded that schools should shift their focus on areas that have been identified as weaker areas of their policies (Plaspohl et al., 2012). Although this study provides some evidence that policies should be strengthened, it was conducted on a fairly low sample size (n=162). Results did not reflect a major need

for school administrators to focus on their tobacco-free policies since over 70% of all survey participants responded in accordance with the ACHA guidelines and weaknesses were only noticed in four out of the nine guidelines, with the only major weakness being in the school's development or maintenance of a tobacco task force for ongoing policy needs. In addition, since these data were collected solely via self-reported survey responses, there is a high probability of bias that could be associated with these responses. Respondents may also be helpful subjects since they are representatives of their schools and may not want to respond in a way which gives their school a negative image.

Policy compliance could also be measured by conducting a tobacco trash pickup during different times to determine if students are still smoking any type of tobacco product on campus, which was how Lee, Ranney & Goldstein (2016) structured their study. Lee, Ranney & Goldstein (2016) measured the influence of smoke-free college campus policies among community colleges in North Carolina by counting the number of cigarette butts found near building entrances. They collected cigarette butts at main building entrances at two stages: baseline and follow-up. Having these two points of measurement added strength to the conclusion of this study which was that imposing a smoking ban is effective in creating a healthier environment for staff and students of the university. Also, to ensure that a tobacco trash pickup is effective in gathering the necessary data, the use of the Tobacco-Free Compliance Assessment Tool (TF-CAT) may be useful (Fallin et al., 2012). This tool is a psychometric testing and feasibility tool with established validity which essentially measures policy compliance within public universities accurately. Lastly, for schools that have fines associated with failure to

comply with the policy, fine records could be examined to determine how effective enforcement is over time. Then, conducting a student survey would help determine if students are reporting less smoking on campus due to implementation of the policy. Although the study by Plaspohl et al. (2012) was informative, further research is needed to measure policy effectiveness and how compliance could accurately be measured.

Although a tobacco ban or smoking ban may be effective in reducing smoking and second-hand smoke, it is unclear whether such a policy would be effective in reducing smokeless tobacco use. It may be difficult to identify those who are using smokeless tobacco since there would be no visible smoke or designated area needed to use smokeless tobacco products. In a study conducted by Meler et al. (2013), researchers sought to examine whether a tobacco ban at Midwestern University in Illinois was effective in reducing rates of smokeless tobacco use. In this cross-sectional study, the researchers administered a self-report survey to a sample of 2,393 students. Logistic regression was used to analyze survey results and it was found that overall, smokeless tobacco use decreased significantly. Particularly of interest were the fraternities, where after two years of the tobacco ban there was decrease in smokeless tobacco use among its members.

While these are favorable study results indicating that the tobacco ban was effective, the major concern is the heavy reliance on self-report data which can pose significant bias. Smokeless tobacco use is more difficult to measure, so a more effective means of conducting a study to solidify this evidence would be to include two different measurement tools, again, such as a tobacco trash pickup at baseline and at follow up post-policy implementation similar to the methodology used by Lee, Ranney & Goldstein

(2016). This way it can be more conclusively noticed that if there is a decrease in smokeless tobacco trash on campus, then students are likely using it less. The reason why tobacco trash would be an effective indicator is because spitting out the trash from using that type of a tobacco product can become a habit which students may commonly be doing while going about their day-to-day routine on campus. However, the study by Meler et al. (2012) was among the few studies that examined the use of smokeless tobacco after a policy intervention, which could provide some indication of effectiveness, but alluded to a need for further research. Essentially, they did include smokeless tobacco in their study which provides some indication of the use (or decrease in use) of tobacco after policy implementation. Also supporting the idea that solely passing a policy does not guarantee effectiveness, Ohmi et al. (2013) measured the influence of a smoking ban on staff and students at the Nayoro City University in Japan. This was another cross-sectional study where the survey measurement was taken in 2011 among faculty and students. The smoking ban was implemented five years prior to the study and researchers sought to determine the smoking behaviors of students, teachers and other workers in the university, and the overall influence of the policy on smokers. Their results indicated that approximately 47% of all smokers did not refrain from smoking at the university and some resorted to smoking on the streets outside of campus. A mere 30% reduced their total cigarettes smoked per day however overall survey results indicated that smokers were not motivated to quit as a result of the smoking ban. This led Ohmi et al. (2013) to conclude that a smoking ban motivates smokers to reduce smoking, but not quit smoking altogether. This further indicated that although policy implementation can be effective, there must be careful planning invested in post-policy implementation in order to ensure

overall effectiveness, including the development and implementation of a policy enforcement plan. The enforcement plan should include specific consequences of violation clearly posted on various locations on the college or university campus as well as steps which outline the formation and operations of a committee which evaluates the policy to address on-going changes or concerns.

Another cross-sectional study by Lovato, Sabiston, Hadd, Nykiforuk & Campbell (2006) measured the influence of school smoking policies on student perceptions as well as enforcement, prevalence and location of smoking. Survey data were collected from the students, faculty, and staff of the university. The researchers used a large sample (n=22,318) and assessed 81 Canadian school policies. Researchers used regression analysis to determine whether school policy predicts smoking prevalence among other factors. The results showed that school policy alone did not influence smoking prevalence, and this indicated a strong need for post-policy implementation enforcement and health education and promotion. Findings by Troelestra, Bosdriesz, de Boer & Kunst (2016) support the claim that providing health education and promotion after policy implementation can be effective. Using a quasi-experimental Google trends study on Netherlands tobacco policies they aimed to determine the extent and timing of the influence of these policies on the rate of searching for information on smoking cessation. The researchers found that in general, after policy implementation, there was a significant increase in search volume (up to 41%) after introducing a smoking ban in restaurants and bars in the Netherlands. This also indicated that incorporating health education can be effective as passing a policy may spark an initial curiosity which health educators can use to fuel the minds of those who may want to know more. The findings from the study

conducted by Borders et al. (2005) also supports the idea that incorporating health education and promotion after passing a policy can be effective. In Texas, these researchers conducted a study to determine if university tobacco control policies and tobacco control programs were effective in changing student smoking behaviors. Similar to other studies, this was a cross sectional study using a web-based survey with a sample size of about 13,000 undergraduate students among 12 universities in Texas. The data analysis used logistic regression to determine association of various smoking policies among the universities and student behaviors. The results of the study indicated that it would be more effective for college and university administrators to focus their attention towards implementing more tobacco prevention and education programs to reduce smoking rates among the student community. Specifically, it was found that restriction of tobacco distribution, banning sales and restricting students from smoking within 20 feet of buildings did not significantly influence their behavior to smoke. However, among students who participated in smoking cessation programs within their universities, there was a significant change in behavior, indicating that the programs are an effective way to reach this young adult population. This suggests that after passing a policy on campuses, administrators should include plans to implement or enhance their existing smoking cessation programs as one mechanism to increase effectiveness of their policies. However, additional research is needed on the types of mechanisms which might work in increasing effectiveness of policies within college and university campuses.

Baillie, Callaghan & Smith (2011) also attempted to investigate the gap between policy intent and the actual observed outcome. In their study, they solely focused on students' perspectives by collecting qualitative data in eight focus groups within four

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Canadian undergraduate campuses. They found that student smoking behaviors are not greatly influenced by these policies due to the lack of implementation and enforcement. While often times passing a policy may appear as a public health victory, stakeholders must continue investing their time to plan for successful policy implementation and enforcement to truly enact behavior change on campus. Although this study used a relatively small sample, the use of qualitative methods allowed researchers to examine student perceptions which would otherwise be difficult to capture through quantitative methodology alone (Creswell, 2013). Results of this study by Baillie, Callaghan & Smith (2011) aligned with other previous studies indicating that solely implementing a policy does not guarantee effectiveness.

Lastly, Naiman, Glazier & Moineddin (2011) explored the influence of public smoking bans on smoking status and exposure to second-hand smoke. In the region where participants were located, there were smoking restrictions (partial or full bans) in public places, workplaces, restaurants, bars, bowling alleys, bingo halls, racetracks, casinos. This cross-sectional study employed a Canadian Community Health Survey as the data collection tool. In contrast to other studies with similar methodology, this study focused on general smoking bans in public and not just bans within educational institutions. Contrary to other study results by Baillie, Callaghan & Smith (2011), Lovato et al. (2006) and other aforementioned authors, results of this survey indicated that these smoking bans played a role in decreasing second-hand smoke exposures and overall, the smoking bans were most effective in public places. Naiman, Glazier & Moineddin (2011) also found the smoking bans decreased the percentage of current smokers within the local area in which the smoking ban was passed. Recent data published by the CDC (2016a)

provides strong indications that smoking bans have proven to be effective. There are noticed improvements in health outcomes, such as decreased heart attacks. Specifically, in 2010 the CDC (2016a) conducted a meta-analysis of 17 studies (95% confidence interval) on the effect of smoke-free laws on acute coronary events and found that there was a statistically significant difference in the number of people seen for acute coronary events before and after the law was passed. In 2012, a similar study was conducted on 45 studies and lower rates of cerebrovascular accidents, respiratory diseases and other coronary events were observed.

Due to this difference in results between the different target populations, it would be worth investigating the differences between the implementation and enforcement processes between college or university level entities versus the general public. It could be the case that there are more resources available statewide, such as media broadcasting through television. Support from major politicians such as the state governor could also be another available resource that could create a social norm where smoking is frowned upon among the general public but is considered a social norm in college or university settings. This difference in norms could be due to the fact that policies or smoking bans may not be enforced with little to no signage to put extra pressure to not smoke for students.

E. Review of Relevant Methodology

In this review it can be noticed that most researchers used observational, cross-sectional study designs to collect and analyze their data to inform their conclusions. Ethically speaking, to protect human subjects in most of these studies, an observational study design was most practical as researchers could not actually propose an intervention

where a potential sample of participants were asked to smoke, for example, as this would violate the "do not harm" component of beneficence, which is one of the ethical principles of the Belmont Report which guides most research studies. (Shadish, Cook & Campbell, 2002). Self-reported surveys such as the National Youth Tobacco Survey (Terry & Zhang, 2016), the National Youth Risk Behavior Survey (Agaku et al., 2015), and the Canadian Community Health Survey were the most commonly used data collection tools (Naiman, Glazier & Moineddin, 2011). Other self-report surveys were designed by the researcher in the form of web-based surveys or developed by using formal guidelines such as guidelines from the American College Health Association (Plaspohl et al., 2012). Among studies that provided survey response rates, these were between 66% (Fahrenwald et al., 2013) and 71% (Agaku et al., 2015), which is an appropriate response rate for this type of a data collection tool. The questions asked on the surveys were standard and often guided by a set of guidelines or a checklist that ensured validity and reliability of the survey instrument. Such questions included asking participants if they had used a particular tobacco product recently, if students smoked socially, and if the implementation of a policy changed their smoking habits (Fahrenwald et al., 2013) (Agaku et al., 2015). Survey questions varied depending on the audience. Although most studies focused on the students, there were also some studies focusing on institution staff and administrators where they were assessed on their school policy and policy components. There was also one study in which cigarette butts were collected both at baseline and follow-up in order to measure the prevalence of smoking after a policy intervention had been placed (Lee, Ranney & Goldstein, 2016) and another study focusing on Google trends and the number of times a target population inquired about

tobacco use and smoking after a policy had been passed (Troelestra et al., 2016**).**

There was a mixture of both qualitative and quantitative data collected, with the majority of the studies focusing on quantitative data from survey results. With qualitative data, the sample size was lower than quantitative data, with a noticed sample size of approximately ten (n=10 for one study which used qualitative methods) participants for focus groups (Baillie, Callaghan & Smith, 2011). For quantitative data, there was a wider range of sample sizes, from 119 (Fahrenwald et al., 2013) to 22,318 (Lovato et al., 2006). With regard to data collection, descriptive statistics were used in almost all studies to ensure population characteristics were similar. Analysis of variance tests, t-tests and regression analyses were also performed in order to determine differences between groups, differences among two groups or to predict whether policy changes behavior, respectively.

F. Summary and Conclusions

In summary, tobacco use is a significant problem worldwide, in the United States and among the nation's youth and young adult population. There are a vast number of health risks that a smoker is susceptible to by using tobacco, such as cancer and lung diseases (CDC, 2016a). These health risks pose a great economic burden not only to the U.S. economy, but also to the economic situation of the households of those affected by chronic illnesses. Over the years, in response to the negative consequences associated with tobacco use, a number of policies and mandates have been implemented to reduce tobacco use. However, evaluation of the effectiveness of these policies leaves researchers with inconclusive results due in part to methodological issues. For this reason, it is important to bridge the gap between policy implementation and actual effectiveness of

the policy, because, as we have seen in this review, solely implementing a policy does not guarantee effectiveness in changing student behaviors. Further research is needed to conduct a collaborative study which would incorporate all viewpoints (students, staff, administrators and faculty) to measure if there is a plan for enforcing the policy after it is passed, a plan for monitoring policy compliance, and if students are reporting changes in behavior. Due to self-report posing bias into study results, it is necessary that future research include at least two mechanisms by which data is collected (e.g. survey and a cigarette butt pickup) which will help to validate the results of the study. Also, future studies should collect data at more than one point of time to obtain results as smoking behaviors are not likely to change instantaneously. Lastly, future research should include comparing a sole policy intervention with a policy intervention that includes a smoking cessation program to determine if the incorporation of both methods significantly changes behavior.

CHAPTER 3

METHODS

A. Study Design

This cross-sectional study was conducted over a three-month period between March and May 2018. Both qualitative and quantitative methods were utilized to collect data, and an integrated theoretical framework, which applied both the theory of planned behavior (TPB) and components of the social ecological model (SEM), guided the development of all data collection tools. In incorporating both methods, the goal was to capture comprehensive data that was representative of both the students and campus administrators' perspectives. This was done by administering a survey among students and conducting key informant interviews and a focus group among campus administrators. Additionally, the intent was for these combined qualitative and quantitative methods to complement one another in order to formulate one clear conclusion for each study research question. While both data sets were collected independently, they collectively aided in determining how compliant students are overall to tobacco-free policies on California university campuses.

B. Sampling

Convenience sampling was used to recruit students and campus administrators into the study. Four public four-year university campuses in California with a tobacco-free policy from were selected from which these students and campus administrators were then recruited; the four universities were selected through purposive sampling. The four universities were chosen due to the various ways in which each school implemented their tobacco-free policies, such as through different enforcement types or integrating

smoking cessation programs to increase student compliance to the policy. Analyzing such

factors by collecting data from multiple campuses was ideal to ensure that the results

from this study could be generalized. The universities were selected through the use of a

database operated by the California Youth Advocacy Network (CYAN). CYAN is an

organization based in Sacramento, CA that is dedicated to support the youth and young

adult population in tobacco control advocacy throughout California. This organization

has played an instrumental role in helping strengthen smoking and tobacco policies

among several colleges and universities within California and was instrumental in the

recent transition of the University of California and California State University systems

to become tobacco-free entities. CYAN regularly conducts research to determine which

colleges and universities in California have tobacco-free and/or smoke-free policies and

whether there is an opportunity for a particular campus to strengthen their policy. This

research is maintained in a database available for use in conducting sample selection for

this study. The specific selection details for each university are noted in the next section

of this chapter in Table 3.1.

C. Selection of University Campuses

There were four public universities in California identified for this study. The

inclusion criteria used to select the four universities were: (a) must be a public university

within the state of California; (b) must be a four-year institution; and (c) must have a

tobacco-free policy passed on campus during 2014-2015. Any university that did not

meet these inclusion criteria was excluded from the study. A campus official from each

selected university provided written authorization to the researcher in order for the data

collection process to begin. To obtain this authorization, campus officials were

approached by email and phone with the explanation of the purpose of this study and a request to authorize the university to participate. The CYAN has established relationships with campus officials within the selected public, four-year university in California, and assisted in establishing communication between the student investigator and contacts within each selected university.

1. *University #1*

This university campus met the required inclusion criteria for participation in this study. Specifically, University #1 adopted a tobacco-free policy in November 2014 prohibiting the use of smoking and tobacco use in all indoor and outdoor areas on campus, including vehicles and parking lots. Further, the areas on campus previously designated as smoking areas are hereby eliminated and the sale of tobacco use products is prohibited, as is tobacco related advertising and sponsorship. The policy applies to all individuals on campus, including students, faculty, staff administrators and visitors. The policy is enforced by signage posted throughout campus and the university holds the right to fine students for failure to comply. Finally, there is no smoking cessation program available on campus; however other available resources include the student health center, which provides Low-Cost Nicotine Replacement Therapies (NRT) and patches of gum. There are also student counseling and psychological services available individually or in groups. Finally, the university website provides web links to other community resources should students wish to seek help.

2. *University #2*

This university campus met the inclusion criteria for participation

in this study. University #2 adopted a tobacco-free policy in August 2015 prohibiting the use of smoking and the use of tobacco on all areas of campus, including parking lots and structures. Smoking and tobacco use products are also prohibited in leased spaces, including space within buildings shared with other agencies as well as on-campus residences. Smoking or using tobacco products in university-owned vehicles is prohibited as well. This university further specifies "all tobacco products" as cigarettes, cigars, pipes (including hookah), electronic smoking devices such as e-cigarettes, and smokeless tobacco products and nicotine delivery systems, including chewing tobacco, snuff and SNUS. This policy is applicable to all individuals on campus, including student, faculty, staff and visitors and those found in violation of the policy will be given warning by campus officials. There are no other enforcement types specified aside from this warning. The primary aim is for there to be increased awareness among students through health education so that students will be motivated to comply, which is why there are no other enforcement mechanisms implemented on this university campus. Finally, there is a smoking cessation program available through the Kiotz health center for students to access. The health center also provides quit kits, and nicotine-replacement therapy products. Counseling and peer health educators are also available for students to learn about resources. Lastly, there are web links to online resources and mobile apps on the school website for easy student access as well.

3. *University #3*

This university campus met the inclusion criteria for participation in this study. University #3 adopted a tobacco-free policy in January 2014 prohibiting the use of smoking and tobacco use on university owned or leased property and in university

vehicles. This policy also prohibits the sale, advertisement, distribution and sampling of all tobacco products and tobacco-related merchandise. Enforcement for this policy includes signage and effective communication by department heads and other university staff. In terms of resources, while a smoking cessation program is not available for students on campus, this university does offer a free, customizable smoking cessation mobile app with text messaging components. Other available resources include counseling services through the student health center, free quit kits, and helplines such as the California Tobacco Chewers' Helpline.

4. *University #4*

This university campus met the inclusion criteria for participation in this study. University #4 adopted a smoke and tobacco-free policy in January 2014 prohibiting the use of smoking and all other tobacco use at the university or any university-controlled property. The policy also prohibits smoking, use of smokeless tobacco products and the use of unregulated nicotine products. Further, the sale, advertising, promotion or distribution of tobacco products is hereby prohibited under this policy as well. All university students, academics, staff, contractors, visitors and anyone on university-controlled properties are expected to comply with this policy. Specified enforcement mechanisms include signage and word-of-mouth by department heads. There do not appear to be any fines or penalties associated with non-compliance. Finally, the university campus does have smoking cessation program available for student access, employees and retirees. Other resources to help quit include hotlines, web links to community resources and a mobile app.

The policies of these selected university campuses can be compared as follows:

Table 3.1. Comparison of Selected Campus Policies

	University #1	*University #2*	*University #3*	*University #4*
When Adopted	August 2014	August 2015	January 2014	January 2014
Who is Affected	All individuals on campus	All individuals on campus	All individuals on campus	All individuals on campus
Enforcement Mechanism	Communication, Signage & Fines	Communication, Signage	Communication	Communication
Items Prohibited	Smoking and the use of all tobacco products, including e-cigarettes	Smoking and the use of all tobacco products, including e-cigarettes	All tobacco, including smokeless tobacco and unregulated nicotine products	All tobacco, including smokeless tobacco and unregulated nicotine products
Sales, Marketing & Purchases Prohibited?	Yes	Yes	Yes	Yes
Smoking Cessation Program?	No	Yes	No	Yes
Other Available Resources?	Student Counseling and Psychological Services, Nicotine Replacement Therapy, the Patch and Gum, and web links to community resources	Employee Assistance Program, Online Resources and Mobile Apps	Smoking Cessation Mobile App, Counseling Services, Free Quit Kits, and other community resources	Help lines, a Mobile App and web links to other community resources

D. Study Participants and Recruitment

Study participants included the students and campus administrators within the four selected schools. During the process of identifying study participants, the following inclusion criteria were used to recruit students: (a) must be 18 years of age or older; and (2) must be a student (full-time or part-time) at the selected university campus. Students who did not meet these inclusion criteria were excluded from the study. Finally, the inclusion criteria used to recruit campus administrators was: (a) must have been employed with the university both before and after the tobacco-free policy was

implemented and (b) must be employed within the university's central administration. The administrators were asked if they were willing to participate, and if they agreed, they were allowed to participate in the study.

Recruitment for students was conducted by asking faculty members to forward the electronic survey link, recruitment flyer and a consent letter to the students within their classes. Each university campus had a website which was used to locate the faculty directory. The faculty directory included the names, titles, email addresses and phone numbers of professors and instructors that teach on campus. The student investigator then emailed these individuals and asked whether they can forward the student survey link to the students in their classes. This process was used because the student investigator did not have access to email addresses for all students on campus and was recommended by each university's Institutional Review Board to contact these individuals to send the survey link to their students on behalf of the student investigator. By emailing faculty members within different subject areas, the goal was to collect survey data from students attending classes in different subject disciplines. For example, administering the survey to one health science class, one business class and one drama class captures data that is more representative of the student body as opposed to data collected from students only enrolled in health or medical classes.

Finally, recruitment for campus administrators was done by emailing and/or cold calling the administrators. A list of campus administrators was found on the university web page for each university. If contacted by email, many administrators preferred to set-up a short 10–15-minute block of time with the student investigator to understand the study fully before providing their consent to participate. Hence, the researcher organized

informational meetings one-on-one with the administrators prior to moving forward in conducting key informant interviews and the focus group.

E. Procedures for Data Collection

Data collection was conducted through three methods: (1) key informant interviews, (2) focus group and (3) surveys.

1. Key Informant Interviews

For the key informant interviews, two-three campus administrators from each selected university were interviewed to determine their perception of student compliance with the tobacco-free policy on their respective campus. Prior to scheduling the interview, the researcher obtained signed consent which denoted that the campus administrator understands the purpose of this study and voluntarily consents to provide data. Once the signed consent was obtained, the researcher worked with each campus administrator to schedule a 30-minute interview. The key informant interview questions can be found in Appendix B. Each campus administrator was interviewed individually and the administrators had the option to meet in-person, via zoom or any other conference/meeting platform most suitable to them (e.g. WebEx). During the interview, the researcher reiterated the purpose of the study, stated that consent was received on the noted date, and obtained additional consent to use a voice recorder to record the interview. The researcher also took written notes during the interview which was included as part of the qualitative data analysis. The campus administrators received a gift card and 'thank you' card upon completion of the interview. These incentives were sent in the mail for those choosing to opt out of an in-person interview.

2. *Focus Group*

One 40-minute focus group was conducted over the phone via Zoom technology. It included four campus administrators total (one from each selected university). The focus group aimed to encourage information sharing among campus administrators, to discuss issues trending among the campuses and identify strategies to resolve them. The questions used to facilitate the focus group discussion were developed according to the responses received from the key informant interviews. The questionnaire used to facilitate the focus group can be found in Appendix C. The findings from this focus group are essential to draw meaningful conclusions and provide recommendations that can also be applied among other California universities and help improve student compliance to tobacco-free policies.

The focus group participants consisted of the same campus administrators that participated in the key informant interviews. The informed consent form that had been initially provided to campus administrators included a section for administrators to check a box indicating that they were interested in participating in the focus group. For the administrators that had checked this box, the student investigator sent a Doodle poll to schedule the focus group shortly after key informant interviews were concluded. During the focus group, the student investigator reiterated the purpose of the study and focus group, stated that consent was received on the noted date, and obtained additional consent to record the focus group discussion. This additional consent had to have been unanimous in order for the student investigator to proceed with recording, which it was. The student investigator also took written notes during the focus group which was included as part of the qualitative data analysis. These campus administrators that agreed to participate in the

focus group received a coffee mug upon completion of the focus group. These were sent in the mail since the focus group was conducted online via Zoom technology.

3. *Surveys*

The survey instrument was used to collect data from the students only, and was available for distribution in both hard copy format and electronic format for use in Qualtrics, a research survey software used to record survey responses to allow for responses to be exported into SPSS for analysis. While the survey was available in both formats, hard copies were not distributed since the online participation rate was high and fulfilled the sample size requirements for this study.

a. Constructing the survey. The survey was constructed in accordance with Ajzen's guidance on how to construct a TPB questionnaire (Ajzen, 2002). The survey, found in Appendix A, contained a total of 40 questions including additional 15 questions to capture demographic information. The demographic questions were taken from surveys used in the past, such as those from the Center for Survey Measurement of the U.S. Census Bureau (2012), U.S. Department of Education National Center for Education Statistics (2002), and World Health Organization (2011) and the University of California, Davis' Center for Evaluation and Research (n.d.), and the CYAN. All questions were adapted to follow Ajzen's format and model.

To formulate survey questions, secondary data from a previously conducted focus groups between 2013-2017 by the CYAN and the Tobacco Control Evaluation Center (TCEC) was used to understand student beliefs pertaining to tobacco use (California Youth Advocacy Network, 2017). After identifying these beliefs, the questions for the actual survey questionnaire were developed to measure the following constructs: (1)

attitude toward the behavior, (2) subjective norms, (3) perceived behavioral control, and, finally, (4) intention to use tobacco.

        b. Piloting the survey. Prior to piloting the survey, it was reviewed by the CYAN, and a professor from California State University, San Marcos. Since these individuals and organizations specialize in this area of research, they were able to assess the survey for face validity. All aforementioned parties agreed to review the survey and provide their expert feedback prior to construction of the survey. Upon conclusion of face validity, the student investigator met with three individuals within the student investigator's personal network to conduct a "think out loud pre-test". As part of this exercise, the student investigator asked these individuals to respond to the survey by stating each question out loud and stating the first thing that came to mind out loud upon reading the question. The student investigator was then able to use this feedback to make the survey questions more understandable and to ensure that the questions captured the correct information. Finally, the survey was piloted among seven university students to ensure the questions were easy to understand and respond to. Corrections were made to this survey once this feedback is received. Finally, the Cronbach's alpha test was used to establish internal consistency for each construct. Any question that was inconsistent with the overall construct was dropped and the cut-off value was 0.7. The attitude variable resulted in Cronbach's alpha of 0.92. The subjective norms variable resulted in Cronbach's alpha of 0.93, the perceived behavioral control variable resulted in Cronbach's alpha of 0.73 and lastly, the intention variable resulted in Cronbach's alpha of 0.71. Finally, all negatively worded statements were reverse coded to ensure accurate measurement of final variables.

c. Survey administration. During the recruitment process, the researcher sent emails to various campus faculty members using the online directory available on each university's online website. These emails were to ask faculty members if they can send the online survey link to students that are enrolled in their class sessions. To incentivize students and increase participation, water bottles and t-shirts were mailed to faculty members to provide to the students that participated. This ensured that the researcher had no way of knowing which students responded to the survey and complete anonymity was maintained during this process.

F. Study Variables, Instrumentation and Measurement

The data collection instruments used for this study included surveys administered among students and key informant interviews and a focus group conducted among campus administrators. The survey aimed to measure the student attitude, subjective norm, and perceived behavioral control constructs while ensuring integration of the respective SEM levels as illustrated in Figure 1.1. The survey also captured demographic variables, some of which acted as control variables. While the control variables were not tested independently, they were used to better understand the relationship between the predictor and outcome variables. The intent behind this was to determine if there are other factors that are not explained by the control variables that should be better understood through this study. The specific survey questions are presented under the respective variables they measure below. The entire survey can be found under Appendix A. The key informant interviews and focus group aimed to provide greater understanding of the perceived behavioral control construct and helped to identify issues with student compliance to the policy and recommendations to address these issues. The key

informant interview questionnaire can be found under Appendix B and the focus group

questionnaire can be found under Appendix C. It is to be noted that the questionnaire

used to facilitate the focus group was developed once the responses from the key

informant interview questionnaire were compiled and analyzed.

1. *Intention to Use Tobacco*

The intention to use tobacco variable was measured by these five

questions in the survey: (1) "I intend to use tobacco products on my university campus",

(2) "I intend to follow the tobacco-free policy implemented on my university campus",

(3) "I plan to seek campus resources to help me quit or reduce my tobacco use", (4) "I

intend to be a tobacco-free student" and (5) "I intend to use tobacco on campus only

when law enforcement officials are not looking". The responses to these questions were

presented using a 5-point Likert scale from: "*strongly disagree"* to *"strongly agree".* The

final variable was a scale variable based on the average of all responses for this construct.

This variable served as an independent, predictor variable for research question #1

and then again as a dependent, outcome variable for research question #2.

2. *Attitude*

The attitude construct was measured by five questions on the survey

which are based on the student beliefs obtained from secondary focus group data

collected by the CYAN. Survey respondents were given five sets of antonyms and were

asked to select their attitude toward tobacco use as it pertains to the specific antonym.

The antonym sets included: (1) bad or good; (2) unhealthy or healthy; (3) unnecessary or

necessary; (4) unpleasant or pleasant; and (5) unenjoyable or enjoyable. These questions

used a semantic scale from one to five. The final variable was calculated as an average of

all responses received for this construct. The SEM intrapersonal factors also helped to inform the attitude construct, through the direct measurement of the following demographic variables on the survey instrument: (1) age, (2) home zip code, (3) language spoken, (4) lived in smoke/tobacco-free neighborhood, (5) race and ethnicity, (6) parent educational level, (7) gender, (8) family history of smoking and (9) family history of drug abuse. These variables were captured independently as part of the "demographics" section of the survey questionnaire. Student responses to the five sets of antonyms captured in Section 1 of the survey questionnaires were then divided by the aforementioned SEM demographic variables in order to clearly pinpoint which factors were most influential to influencing student attitude toward using tobacco. Additionally, of these demographic variables, the following acted as control variables: (1) parent educational level, (2) family history of smoking, and (3) family history of drug abuse. The CDC (2015) identifies these three specific variables as those that fall within the intrapersonal level of the SEM and are most likely to influence the outcome variable and were therefore controlled during the final data analysis.

This variable served as an independent, predictor variable for research question #1 and then again as a dependent, outcome variable for research question #2.

3. *Subjective Norm*

A total of six survey questions were used to measure the subjective norm construct: (1) "most people who are important to me approve of me using tobacco on my university campus", (2) "most people like me use tobacco on campus", (3) "the people in my life whose opinions I value would use tobacco on campus", (4) "the people in my life whose opinions I value would support my using tobacco on campus", (5) "the people in

my life whose opinions I value use tobacco on campus", and (6) "the people in my life whose opinions I value use tobacco". These questions were developed based on the student beliefs obtained from secondary focus group data collected by the CYAN and also because the questions are aligned with the SEM interpersonal level. The SEM intrapersonal level focuses on individual relationships with may influence their decision to use tobacco, such as those within an individual's social circle, peers, partners and family members. Responses to these questions were presented in a 5-point Likert scale from: "*strongly disagree" to "strongly agree".* An average of all responses for this construct was computed to determine the final scale variable.

This variable served as an independent, predictor variable for research question #1 and then again as a dependent, outcome variable for research question #2.

4. *Perceived Behavioral Control*

A total of nine survey questions were used to measure the perceived behavioral control: (1) "it would be impossible for me to stop using tobacco on campus", (2) "I am in complete control of my own tobacco use choices", (3) "factors outside of my control encourage me to use tobacco on campus", (4) "it is mostly up to me if I use or do not use tobacco on campus", (5) "having a tobacco-free policy on my campus will help me quit using tobacco on campus'", (6) "having a smoking cessation program on my campus would help me quit using tobacco on campus", (7) "knowing that I may receive a warning from campus officials will help me quit using tobacco on campus", (8) "seeing these "tobacco-free" signs on my campus help me refrain from using tobacco on campus", and (9) "knowing that I will get fined will motivate me to refrain from using tobacco on campus". It is to be noted that these 9 nine questions aimed to measure the

perceived behavioral control construct of the TPB as well as two variables from the institutional level of the SEM: (1) policy enforcement types and (2) universities that have a smoking cessation program. Question #1-5 aimed to measure perceived behavioral control as part of the TPB, questions #7-9 aimed to measure the "enforcement types" variable of the SEM institutional level and finally, question #6 aimed to measure the "universities that have a smoking cessation program" variable of the SEM institutional level. The responses to these questions were all presented to students on a scale from one to five from "*strongly disagree" to strongly agree".* The final scale variable was based on the average of all responses for this construct.

Qualitative data from the key informant interviews and focus group among the campus administrators also informed the perceived behavioral control variable of this study. There was a total of nine questions asked during the key informant interviews: (1) "please tell me about your involvement in the passing, implementation or enforcement of your university's tobacco-free campus policy", (2) how long has the policy been in effect on your university campus and how did the transition between policy passing and implementation occur?", (3) "have you observed a decrease in student tobacco use on campus as a result of this policy?", (3a) "if so, what are some examples of these observations?", (3b) "if not, why do you suppose there is lack of student compliance?", (4) "how is the campus' tobacco-free policy enforced and how were enforcement mechanisms put in place?", (5) "what do you perceive as student response to the enforcement mechanisms? That is, do you think consequences resulting from being non-compliant with the policy prevents students from using tobacco on campus?", (6) "do you think enforcement can be strengthened?", (6a) "if so, what are some barriers to

strengthening enforcement?", (6b) "do you know of any future enforcement efforts to reduce tobacco on campus?", (7) "what are the available resources on campus for student smokers to quit or reduce their tobacco use?", (7a) "are staff providing these resources aware of the tobacco-free policy on campus and how do they outreach to students potentially needing to be linked to these resources?", (7b) "do you think these resources are effective in reducing tobacco use on campus?", (7c) "how effective do you think the policy would be in reducing tobacco use if these resources were not available to students?", (7d) "what resources do you think are lacking on campus that could help improve student compliance to the policy?", (7e) "is there a smoking cessation program on campus and if so, how effective do you think the smoking cessation program is in reducing tobacco use on campus?", (7f) "how effective do you think the policy would be in reducing tobacco use if the smoking cessation program was not available to students?", (8) "in terms of compliance to the policy, how effective do you think enforcement is compared to availability of resources such as smoking cessation programs? That is, could enforcement alone reduce tobacco use or is there significance to ensuring students have access to resources that help them quit using?", (8a) "are both enforcement and smoking programs needed or just one? Why?", and (9) "is there anything else you can share with me regarding your perception of how effective you believe the tobacco-free policy is on your university campus?". The complete interview questionnaire can be found in Appendix B. Finally, once the key informant interviews were completed, a focus group was organized to gather follow-up qualitative data. The focus group contained representation from at least one campus administrator from each campus. In order to construct the focus group questionnaire, the student investigator compiled the key

informant interview responses and organized them to identify follow-up questions that would make up the questionnaire used for the focus group. These questions helped in determining general consensus among campus administrators to the issues identified during the key informant interviews and also helped to identify solutions and recommendations that these administrators proposed to address these issues.

There was a total of five questions asked during the focus group: (1a) A majority of the key informant interview responses indicated that the transition between policy passing and implementation was primarily guided through electronic memos that were released from university administration. Do you think that this was sufficient?, (1b) Do you think any other measures to implement the policy could have been effective in increasing student awareness to the policy?, (1b) What are some examples?, (2) A majority of responses also indicated that signage and communication are primary modes of policy enforcement which seems to be effective for the majority of students. However, many responses also indicated that instead of fining students and imposing harsh consequences on them, that campuses should be moving toward a cultural shift toward creating a tobacco-free norm. What do you think are some efforts that faculty or campus administrators can make to create such a shift?, (3a) Research indicates that addiction usually happens between 18-26 years of age and social influences are particular causes for this. Tobacco-free policies are one way to prevent this addiction from happening, but it seems many campus-related events that happen through clubs or societies take place off campus where tobacco-use is noticed. Is there any special messaging that can be provided to campus clubs or organizations to raise awareness?, (3b) What clubs or organizations specifically?, (3c) What strategies do you think may be effective with this group of

people?, (4a) Some campuses report incorporating smoking cessation programs to aid students that are current tobacco users to reduce or quit their tobacco use. Do you think these programs are effective and/or participation has been sufficient?, (4b) If not, what alternative resources do you recommend?, (5) Are there any other final thoughts you can share with me regarding suggestions or improvements to the current policies on your campus to increase student compliance?

These qualitative data from the campus administrators regarding their perception of student compliance to the policy helped to validate whether students have high or low self-efficacy in refraining from using tobacco on campus as a result of the tobacco-free policy. This also helped to identify any self-report bias from the student surveys. This variable served as an independent, predictor variable for research question #1 and then again as a dependent, outcome variable for research question #2.

5. *Predictor Variable: Enforcement Types*

This was a categorical variable pre-assessed by the researcher by analyzing the individual policies of each selected campus. Depending on the type of enforcement mechanism used by each university, the specific enforcement types were categorized as "communication", "communication, signage & fines", and "communication & signage". This predictor variable was needed to address research question #2a. An analysis of the campus policies can further be found in Table 3.1. This variable was aligned with the SEM institutional level as it aimed to explore how the university as an institutional setting provided ways to encourage (or discourage) student tobacco use on campus, based on the level of enforcement campus administration has upheld within their respective institution.

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6. *Predictor Variable: Universities That Have a Smoking Cessation Program*

This was a dichotomous variable pre-assessed by the researcher by analyzing the individual policies of each selected campus. If a university campus had a smoking cessation program, then that university was classified as "smoking cessation program" and if the university campus did not have a smoking cessation program, then that university was classified as "no smoking cessation program". This predictor variable was needed to address research question #2c. An analysis of the campus policies can further be found in Table 3.1. This variable was aligned with the SEM institutional level as it aimed to explore how the university as an institutional setting provided ways to encourage (or discourage) student tobacco use on campus, based on the accessibility of campus resources that campus administration has invested in, such as implementing smoking cessation programs, to increase compliance to the tobacco-free policy on their respective university campus.

7. *Demographic Variables*

The survey contained a total of 15 demographic questions that was used to help analyze the overall data: (1) "what is your age?", (2) what is your gender?", (3) "what is your home zip code?", (4) "what is your race/ethnicity?", (5) what language(s) are spoken in your home?", (6) "what is your current university grade level?". (7) "what is the highest level of education your parents have completed?", (8) "is there past history of tobacco or nicotine addiction among at least one (1) or more of your immediate family members?", (9) "is there past history of drug abuse among at least one (1) or more of your immediate family members?", (10) "do you currently use tobacco on a daily basis, less than daily, or not at all?", (11) "in the past, have you used tobacco on a daily basis,

less than daily, or not at all?", (12) "what was your first exposure to tobacco?", (13) "are you currently attempting to quit using tobacco?", (14) "in the past, have you attempted to quit?", (15) "what resources are you using/have you used to quit?" These variables were a combination of fill-in-the blank, nominal, and ordinal variables. Question #1-5 and 7-11 were chosen as recommended by the CDC (2015) as they are aligned with the intrapersonal level of the SEM. In addition, question #6, 12-15 were selected as they may prove to be relevant when presenting final findings of this study.

G. Data Management

Statistical analysis was conducted using SPSS 23.0 software to determine the outcomes of the research questions. There were no participants with missing information since the questions on the survey were mandatory in order for participants to submit their responses. Use of the Qualtrics survey software aided in reducing human error through manual data input into SPSS. All electronic data is being kept in a secure, password protected, locked computer.

With regard to the qualitative data that was gathered, the key informant interviews and focus group were recorded on a voice recorder and the researcher took notes during the interview as well. These items were all kept in a secure, password protected, locked computer after content analysis was completed. The researcher was the only individual with access to the data.

H. Data Analysis

1. Quantitative Data Analysis

Table 3.2 provides detail and justification of the quantitative data analysis

methods that were applied for research questions #1 and #2. Quantitative data analysis

was conducted for research questions #1 and #2 only. The table is organized so that the

variables associated with each research question lead to the correct statistical test that was

used to address the research question.

Table 3.2. Data Analysis

Research Question #1: How are attitude, perceived behavioral control and subjective norms associated with student intent to use tobacco?		
Variable	**Type of Variable**	**Scale /Categorical**
Attitude	Independent	Scale: Ratio
Subjective norms	Independent	Scale: Ratio
Perceived behavioral control	Independent	Scale: Ratio
Intent to use tobacco	Dependent	Scale: Ratio
Statistical Test: Multiple Linear Regression		

Research Question #2a: How do student attitude, perceived behavioral control, subjective norms and student intention to use tobacco on university campuses compare between different enforcement types?		
Variable	**Type of Variable**	**Scale /Categorical**
Attitude	Dependent*	Scale: Ratio
Perceived behavioral control	Dependent*	Scale: Ratio
Subjective norms	Dependent*	Scale: Ratio
Intent to use tobacco	Dependent*	Scale: Ratio
Enforcement types	Independent	Categorical: Nominal (3 Categories)
*Note: Since there are four dependent variables, this statistical test will be used four times.		
Statistical Test: One-Way ANOVA (Kruskal Wallis if assumptions not met). Bonferroni To Measure		

Group Differences (if p<0.05)

Research Question #2b: How do student attitude, perceived behavioral control, subjective norms and student intention to use tobacco on university campuses compare among students in universities which have smoking cessation programs and students in universities that do not have these programs?

Variable	Type of Variable	Scale /Categorical
Attitude	Dependent*	Scale: Ratio
Perceived behavioral control	Dependent*	Scale: Ratio
Subjective norms	Dependent*	Scale: Ratio
Intent to use tobacco	Dependent*	Scale: Ratio
Smoking cessation programs (Y/N)	Independent	Categorical: Nominal (Yes/No)

*Note: Since there are four dependent variables, this statistical test will be used four times.

Statistical Test:
Independent T-Test

The following table lists demographic variables that were captured from each student choosing to participate in the study. These demographic variables were used to identify the nature and distribution of the final sample. Having this demographic information helped to connect the study results, for example, to specific age groups, by region (zip codes), by race/ethnicity, and by smoking status.

Table 3.3. Demographic Variables

Variable	Type of Variable	Ratio/Categorical
Age	Independent	Categorical
Gender	Independent	Categorical
Zip Code	Independent	N/A
Race/Ethnicity	Independent	Categorical
Spoken Languages	Independent	Categorical

University Grade Level	Independent	Categorical
Parent Educational Level	Independent, Control	Categorical
Past Family History of Tobacco/Nicotine Addiction	Independent, Control	Categorical
Past Family History of Drug Abuse	Independent, Control	Categorical
Current Tobacco Use	Independent	Categorical
Past Tobacco Use	Independent	Categorical
First Tobacco Exposure	Independent	Categorical
Current Quit Attempts	Independent	Categorical
Past Quit Attempts	Independent	Categorical
Resources Sought to Quit	Independent	Categorical

2. Qualitative Data Analysis

Qualitative data analysis was conducted to investigate research question #3: *what is campus administrators' perception on overall student compliance with the policy?* To address this question, key informant interviews and a focus group were conducted among campus administrators. The feedback received from these individuals was then coded using qualitative coding data analysis methods. These codes were used to create links within the data and to identify themes. Miscellaneous information not falling into the established codes was recorded separately and examined against the quantitative data analysis results in order to determine whether this miscellaneous information fits into the study. If not, it was disregarded. However, the student investigator took caution to ensure that the coding mechanism continued to fit the data, maintains its original context and was broad in nature to avoid over-specific coding which would not have fit much of the data.

First, the descriptive coding method was applied to establish factual knowledge, such as the individuals participating in the key informant interviews and focus groups,

their gender, and other relevant and similar demographic information that is captured within the survey questionnaire. Then, the location and time of each key informant interview and the focus group was noted. Finally, the context was used to determine why each campus administrator was selected and the role that each individual played in the key informant interview, the focus group and overall as part of the study. This descriptive coding was not focused on interpretation and was only used to answer descriptive questions.

Second, the topic coding method was applied to find patterns within the collected data. Since the notes from the key informant interview and focus group were taken on a laptop, the student researcher used different fonts and colors in Microsoft Word to create the different topics or "themes" that are noticed within the responses to the key informant interview and focus group questions. The responses that fell under each topic or "theme" were then inserted under the topic in Microsoft Word via cut/paste methodology. To preserve the original data, a backup copy of the key informant interview and focus group responses was kept so that the student investigator could refer to the document after completion of the topic coding method to ensure that the method was used appropriately and was aligned with the purpose of the study.

Finally, analytic coding methods were applied to build context from the key informant interview and focus group responses. The student investigator used this methodology to explore and develop new categories or concepts that could have been highlighted in the data but not explicitly stated to allow for contrast of findings and exploring of different avenues. In applying this method, the student investigator ensured

that these new concepts fit the overall data and are simply being used to provide more in-depth analysis on the topic.

All in all, these analysis methods helped to better understand campus administrators' perception on student compliance to the tobacco-free policy. The descriptive coding method was particularly useful when comparing individual responses with one another to determine whether individuals are saying the same thing or different thing, which further allowed for exploration of new topics or "themes" within the data. Collectively, the goal of this process was to ensure that the results of this qualitative data analysis added perspective to the analysis of the quantitative data and aid in yielding final conclusions.

I. Power Analysis

Power analysis was conducted in two-steps using the G-power software since multiple statistical tests were used to address the research questions for this study. (Erdfelder, Faul & Buchner, 1996). The statistical tests that were used in this study were multiple linear regression, one-way ANOVA and independent t-tests. The a priori method was used to calculate power in order to determine the sample size needed to detect a significant difference. To conduct linear regression, one-way ANOVA and independent t-tests, the power analysis was based on a small effect size for this statistical test of $f=0.01$, power $= 0.80$, and an alpha significance level of 0.05. In order to ensure that this study had power equating to 0.80 to conduct all three statistical tests, the highest sample size number of 158 participants was used. A 10% attrition rate was accounted for in case participants drop-out of the study. Taking these factors into consideration, the student

researcher aimed to recruit a minimum of 173 participants into the study and received

167 total responses to the survey (n=167).

From each university, the researcher aimed to engage approximately 43 students

(25% of the required 173 participants) from each of the four selected universities to

ensure equal sampling among the four universities. It is to be noted, however, that while

the researcher exerted best efforts to maintain a balanced selection, students within three

universities provided the 43 students and one university provided the researcher with 47

responses. With regard to campus administrators, the researcher recruited a total of

eleven administrators for the study to provide qualitative data for this study. Of these, one

individual from each campus then participated in the focus group (n=4).

J. Strengths and Limitations

A significant strength of this study is the fact that there were several school

policies investigated to determine their effectiveness. Due to the multi-site aspect of this

study and because these schools were located within different California regions, the

results may be generalized for the state of California. Another strength is the fact that

both qualitative and quantitative data collection methods were utilized for this study. This

approach allowed for a greater understanding of participant perceptions and helped to

better understand the quantitative data collected. This was due to the expectation that the

questions included within the survey instrument may not trigger responses which may be

otherwise triggered through one-on-one dialogue through key informant interviews. Also,

since there was no intervention (manipulation of participants) in this study, it was overall

less time consuming and inexpensive. Lastly, collecting data at one point in time was an

effective way to obtain an overall idea of the prevalence of tobacco-use among students

attending a public, tobacco-free university campus.

Limitations included the fact that all data collected was based on self-report and therefore there is still a probability of bias among participants. Additionally, due to the cross-sectional design of this study, it is still difficult to determine if the measured student intent to use tobacco is solely influenced by the tobacco-free policy or whether there were other factors that could have been of influence. With regard to the level of student participation and engagement, it is possible that the students felt emotionally charged when asked to complete a study about tobacco use on campus since this can be considered a sensitive subject. Further, while students completed the surveys voluntarily, those who like to receive incentives may have been more inclined to participate. Further, cross-sectional studies do not allow for temporal relationships between exposure and outcome to be tracked since they lack the time element, and also collecting data at one point in time could have led to extreme rates of prevalence (either in excess or too little).

K. Research Ethics

Principles from the Belmont Report guided this study to ensure that all study participants were protected. In order to ensure respect for persons, an informed consent letter was provided to students prior to the administration of the surveys. Campus administrators were required to sign and return an informed consent form in order to proceed with participating in the key informant interviews and focus group. At any time prior to providing the researcher with data, the individual had the right to decline participation in the study. For the key informant interviews and focus group with campus administrators, confidentiality was maintained by ensuring that the notes, recorders and any other documents containing administrator names are kept in a secure, locked and

password protected computer. The student survey data was collected anonymously and due to this, the researcher has no way of knowing which students participated in the study.

Since this was a cross-sectional study design without a researcher manipulated intervention, harm was minimized to participants to ensure beneficence. This study was marked as a minimal risk study by the Loma Linda University Institutional Review Board as well. Further, all participants that met the inclusion criteria had an equal opportunity to participant in the study to ensure justice.

Finally, prior to collecting data, the research department at each selected university was contacted to determine whether Institutional Review Board (IRB) approval is needed from each selected university. No such approval was required from any of the four universities selected for this study.

CHAPTER 4

FIRST PUBLISHABLE PAPER

Using the Theory of Planned Behavior to Understand Student Intention to Use Tobacco

on Tobacco-Free California Universities

Note: The following formatting and referencing style are not in accordance with dissertation guidelines and is according to journal specifications.

Abstract

Background: Most tobacco use starts between 18-26 years of age (California Department of Public Health, 2016). To prevent this, the University of California (UC) and California State University (CSU) have implemented system-wide tobacco-free policies in recent years.

Aims: The objective of this study was to investigate the association of the theory of planned behavior (TPB) constructs: attitude, subjective norms (SN), and perceived behavioral control (PBC) with intention to use tobacco among students in tobacco-free universities in California. Additional objectives were to understand whether these primary TPB constructs were influenced by various policy enforcement levels (i.e., communication and signage), and the availability of smoking cessation programs on campus.

Methods: In this cross-sectional study conducted during March – May 2018, a survey was administered among students within select UC and CSU campuses. Students were recruited by cold-calling and emailing faculty to request assistance in disseminating an electronic survey to their students.

Results: There was a total of 167 survey respondents (mean age =18-24 years). Results indicated that attitude ($\beta = 0.12$, $p<0.025$), SN ($\beta = 0.18$, $p<0.001$), and PBC ($\beta = 0.33$, $p<0.001$) were significantly and positively associated with student intention. Results showed no significant differences between different enforcement levels and TPB constructs but did show significant positive differences in student attitude between campuses that offer smoking cessation programs and campuses that do not (t=2.55, F=6.50, $p <0.001$).

Conclusion: These study findings are consistent with existing research. Specifically within California universities, findings indicate that tobacco-free policies positively influence TPB constructs.

Key words: theory of planned behavior, social ecological model, tobacco-free policies, tobacco-free universities, college students, policy compliance.

Using the Theory of Planned Behavior to Understand Student Intent to Use Tobacco on

Tobacco-Free Policies in California Universities

The Centers for Disease Control and Prevention (CDC) (2018) states that tobacco use leads to health effects that are harmful to nearly every organ of the body. Data show that over 16-million Americans currently live with a disease caused by tobacco use (CDC, 2018). Specific conditions include cancer, heart disease, and stroke. The California Department of Public Health (CDPH) (2016) further states that those exposed to secondhand smoke and aerosol exposure are also at risk. Furthermore, over 50% of adults in California report being frequently exposed to secondhand smoke (CDPH, 2016).

While California's smoking rate is one of the lowest in the United States, California also has the highest number of smokers nation-wide due to its high population (CDPH, 2016). According to the CDPH (2016), approximately 20% of California adults are tobacco users. Additionally, current data show that while tobacco use rates have steadily declined during 1996 -2011, they have remained at a steady 20% among California adults since 2011 (CDPH, 2016). This observed plateau suggests that tobacco use rates may rise again in the future likely due to the production of innovative and appealing tobacco products by the tobacco industry, such as electronic cigarettes, which have caught the attention of many current and former cigarette smokers (CDPH, 2016). Research shows that 20% of former smokers who have been successful in the past in quitting tobacco use are now utilizing electronic cigarettes. These newer, innovative products are particularly popular among the young adult population (CDPH, 2016).

According to the CDPH (2016), over 98% of current tobacco users start using by the age of 26. This means that most users likely engage in tobacco use in their late high school years or during their undergraduate studies. This further implies that reducing the initiation rate among the young adult population could be a highly effective and efficient method for reducing future long-term tobacco use rates (CDPH, 2016). Furthermore, research suggests that tobacco-control policies can significantly reduce tobacco use and second-hand smoke exposure, ultimately reducing the burden of chronic disease (Fallin & Glanz, 2015). Additionally, incorporating smoking cessation programs to aid tobacco users in quitting or reducing their tobacco use may help lower tobacco use rates (Lovato, Sabiston, Hadd, Nykiforuk & Campbell, 2006).

In an effort to reduce the tobacco initiation and use rate among the young adult population, two university systems in California have implemented tobacco-free policies system-wide. The University of California (UC) has adopted a system-wide tobacco-free policy to improve the health and safety of all students, staff, faculty, patients and visitors to the University of California campuses (UC Office of the President, n.d.). California State University (CSU) also released an executive order for a system-wide tobacco-free environment to reduce adverse health effects as well as medical and organizational costs related to tobacco use (CSU, 2017). Select universities within both systems offer smoking cessation programs to their students to increase student compliance to these policies.

Using the theory of planned behavior (TPB), the purpose of this study was to determine: (a) how student attitude, subjective norms (SN), and perceived behavioral control (PBC), are associated with student intent to use tobacco on tobacco-free university campuses; (b) how student attitude, SN, PBC, and student intention to use

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tobacco on university campuses compare between different enforcement types; and (c) to determine how student attitude, SN, PBC, and student intention to use tobacco on university campuses compare between universities that offer-smoking cessation programs to accompany campus policies and universities that do not integrate such programs.

METHODS

This study was approved by the Loma Linda University Institutional Review Board (IRB). This was a cross-sectional study surveying students within selected tobacco-free universities in California to understand their attitude, subjective norms (SN), perceived behavioral control (PBC), and intention to use tobacco on campus. The survey was constructed following Ajzen's (2002) guidelines to assess each of the TPB constructs and incorporated select elements from the social ecological model (SEM). The TPB constructs attitude, SN, and PBC, assessed student attitude regarding using tobacco on campus, subjective norms-student interpersonal influences, such as mentors or friends, that may influence their intention to use tobacco on campus (subjective norms), and perceived behavioral control–intrinsic factors (i.e., self-control), policy enforcement mechanisms and the availability of smoking cessation programs to determine their influence on student intention to use tobacco on campus). Select elements from the SEM were incorporated to further assess factors within the PBC construct, such as the implementation of different levels of enforcement mechanisms and the influence of the availability of smoking cessation programs. See Figure 4.1 for a diagram of this framework.

Prior to survey administration, the survey was reviewed for face validity by subject matter experts and shared with three individuals who conducted a "think out loud

pre-test", an exercise where each person read the questions out loud and stated the first thing that came to mind so that the researcher could understand whether the questions made sense (Chase, Reicks, Smith, Henry, & Reimer, 2013). Modifications were made based on the feedback, and then the survey was piloted among seven university students to ensure the questions were understandable. Cronbach's alpha was also calculated to establish internal consistency for each construct. Statements that lowered Cronbach's alpha were discarded. The final Cronbach's alpha values were 0.92 for attitude, 0.93 for SN, 0.73 for PBC, and 0.71 for intention.

The final survey contained 48 total questions, including 15 demographic questions. The remaining questions assessed student attitude, SN, PBC, and intention to use tobacco on campus. The complete survey is available upon request. Survey items for each construct used 5-point Likert-type scale responses, except those for attitude, which relied on a 5-point semantic differential scale. Negatively worded statements that assessed behavioral intention were reverse coded to ensure consistency in the measurement of each TPB construct. The final score for each TPB construct was calculated as the mean of all respective items.

Students were recruited from four universities. All four universities were selected based on similarities found through analysis of their tobacco-free policies, such as when each policy was adopted, who was affected, and what type of enforcement mechanism was utilized to ensure compliance.

Prior to collecting data, the researcher contacted campus officials from each university to obtain written authorization to collect data on campus. Once authorization was received, the researcher utilized the "directory" function available on each

university's webpage to cold call and/or email faculty members to request their assistance with disseminating the electronic survey to their students. Faculty that responded to these calls and/or emails were provided a student consent letter and a Qualtrics-based survey link. The consent letter included detailed information about the study as well as the contact information for the principal investigator. Faculty received instructions on how to forward the consent letter and the survey link to the students in their classes. Faculty members that assisted received incentives, consisting of t-shirts and water bottles to distribute among their students.

RESULTS

Student Demographics

A total of 167 students from all four campuses responded to the survey (mean age = 18-24 years). A majority of respondents (70%) were female. Approximately 57% of all respondents were juniors, 41% seniors, 2% freshmen and 0% sophomores. There was close to equal distribution of the number of students that responded from each selected university. Table 4.1 contains additional student demographic information.

Association of TPB Primary Constructs with Intention to Use Tobacco on Campus

Multiple linear regression was conducted to determine whether there was a statistically significant association between student attitude, subjective norms (SN), perceived behavioral control (PBC), and student intention to use tobacco on campus. On the survey instrument, these constructs were assessed on a scale of 1-5, where higher response numbers were indicative of increased student intention to use tobacco on campus and lower response numbers were indicative of increased intention to refrain from using tobacco on campus.

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When testing assumptions, it was found that there were three outliers in the data, which were omitted from the final analysis. Potential confounders (parent educational background, history of nicotine use, and history of drug abuse) were also incorporated into the initial model to determine whether these factors influenced results. This process confirmed that the unstandardized coefficients for the independent variables were not influenced by any of the three potential confounding variables. Therefore, these variables were not included in the final model. All other assumptions, including normality of the dependent variable, linearity, multicollinearity, and Cook's distance were met.

The final model included student attitude, SN, and PBC as independent variables and student intent to use tobacco as the dependent variable. Overall, the final model explained 32% of variance in student intention to use tobacco based on an adjusted R^2 value. The final analysis of results indicated positive, statistically significant associations between the three primary TPB constructs and student intention to use tobacco on campus F $(3,164)$ =26.840, $p<0.001$, adjusted $R^2 = 0.318$. Further analysis showed that individually, student attitude, SN and PBC were significantly and positively associated with student intention to use tobacco on campus. Regression coefficients and standard errors are in Table 4.2. Results indicate that each unit increase in attitude was associated with a 0.12 increase in intention to use tobacco on campus, with each unit increase in SN there was a 0.18 increase in intention to use tobacco on campus, and with each unit increase in PBC there was a 0.33 increase in intention to use on campus.

Comparison of TPB Constructs with Policy Enforcement Types

The four campuses selected for this study enforced their policy at different levels. These levels counted as separate categories in this analysis to determine whether specific

TPB constructs are significantly influenced by any of these enforcement types, which include (a) communication, (b) communication and signage, and (c) communication, signage and fines. Only one university enforces by communication only which means that this university solely utilizes a health education approach to enforce their policy. Two universities utilize both communication and signage to enforce their policy. This means that in addition to health education, these campuses have permanently visible signs posted throughout the campus to enforce the policy. Finally, one utilizes three enforcement mechanisms: communication, signage and fines. This means that in addition to health education and permanent signage, this campus (solely in their on-campus housing units) fines students for using tobacco.

In this analysis, student attitude, SN, PBC, and intention to use tobacco were compared between universities that implement the three enforcement categories using one-way ANOVA and several Kruskal-Wallis statistical tests. For the intention variable, one-way ANOVA was utilized as there were no outliers, the data were normally distributed (as assessed by boxplot) and there was homogeneity of variances, as assessed by Levene's test (p=0.08). For the attitude, SN and PBC constructs, these test assumptions for one-way ANOVA were violated, thus Kruskal-Wallis tests were used to determine whether these constructs were significantly influenced by different levels of enforcement. Results yielded non-significant findings for all constructs, indicating that attitude, SN and PBC were not significantly influenced by different levels of policy enforcement in our study. See Tables 4.3 and 4.4 for complete results.

Comparison of TPB Constructs with Campuses that Offer Smoking Cessation Programs

Two campuses offer free smoking cessation programs to their students through their campus wellness center. The other two campuses do not offer such programs. In order to determine whether the availability of such resources significantly influences the TPB constructs, independent t-tests were conducted among campuses that offered smoking cessation programs versus campuses that did not.

Findings from these analyses revealed that there was no statistically significant difference between student attitude, SN, PBC, and intention to use tobacco between students attending universities where smoking cessation programs are offered versus students attending universities where such programs are not offered. Student attitude ($p<0.001$) between campuses was significantly associated with the availability of smoking cessation programs. See Table 4.5 for results.

DISCUSSION

The results of this study are consistent with existing research on utilizing the TPB in predicting tobacco use behavior. Overall, the multiple linear regression model explained 32% of the variance in behavioral intention, consistent with other studies (Armitage & Conner, 2001). In a study conducted by Topa & Moriano (2010), it was found that the strength of the associations between TPB constructs and smoking behavior was largely influenced by the characteristics of study participants. Their specific findings, which were based on secondary data of 19 studies previously conducted in the U.S. and in Europe, indicated that smoking behavior was related to smoking intentions, and that these intentions were related to participant attitudes, SN, and PBC relating to their intention to smoke (Topa & Moriano, 2010).

Similar studies yielded a mix of non-significant associations between SN and behavioral intention. In this study, this association yielded significant results. Topa and Moriano (2010) suggest that factors which influence this particular association are largely personal factors, instead of social ones. Upon review of participant demographics, this may be because a majority of students that participated in the study are not current (92%) or past (81%) tobacco users. Tobacco use is also typically lower among 4-year college students, as was found in a study conducted by Lenk, Rode, Fabian, Bernat, Klein & Forster, 2014. Further research is recommended to explore this association among a greater percentage of current and past tobacco users as well as those enrolled in different types of colleges.

Topa & Moriano (2010) also propose that the association between PBC and intention may not always capture all factors that measure individual control over their behaviors. Due to this, other factors may need to be considered when concluding whether an association exists between the two constructs and the strength of the association. Examples of such factors include external factors, such as campus policies, enforcement and smoking cessation resources, to ensure that these influences were accounted for when assessing this association (Topa & Moriano, 2010). Upon doing so, it provided greater understanding of which factors of the tobacco-free policies were significantly associated with student intention to use tobacco on campus. Further, Pearson correlation tests were conducted to determine whether student awareness of policy provisions and smoking cessation resources correlated with PBC and behavioral intention, and Topa and Moriano (2010) found that this awareness was significantly and negatively correlated with their PBC (r= -0.55, n=167, p<0.001) and intention (r= -0.34, n=167, p<0.001) variables. This

indicates that awareness to the policy does not necessarily mean that desired behavior will be observed among students.

In examining the primary TPB constructs and the different enforcement types, it was found that all TPB constructs were not significantly associated with different levels of enforcement. Macy, Middlestadt, Seo, Kolbe & Jay (2011) conducted a study in which the TPB was applied to explore the relationship between smoke-free air laws and quitting intentions through which the authors captured data among smokers in Texas, concluding that the smoke-free air laws influence quitting through formation of positive attitudes and creation of a cultural norm in public so that smokers are able to fight the urge to quit. This is consistent with the findings of this study, since there were positive, significant associations between student attitude and student intention to use tobacco on campus.

Additionally, all universities selected for this study did not impose punitive enforcement for student non-compliance to the policy. Research indicates that fines or penalties for non-compliance to policies are typically effective, as was observed in a study conducted by Leonard, Pokorny & Schoeny (2010), where it was found that fines on youth smoking significantly decrease tobacco use rates and prevent the onset of addiction at an early age. In this study, only one campus imposed fines on students for non-compliance, however the reason this was not a significant finding in this particular study could be due to the fact that the fines implemented are only within the student housing area of campus and not the entire campus. This could also be due to the fact that not many students have been seen violating the tobacco-free policy on this campus. Since a majority of survey respondents within this university indicated their grade level as junior or seniors, these are typically the years during college when students move to off-

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campus housing, which means these students would not be subject to fines for using tobacco on campus. Further research is recommended among campuses that impose punitive enforcement mechanisms to determine whether these significantly influence TPB constructs. Finally, attitude was significantly influenced by the availability of smoking cessation programs. This implies that smoking cessation programs influence student attitude which then was found to be significantly associated with student intention to use tobacco on campus. However, further research is also recommended to understand whether student awareness of the availability of smoking cessation programs is associated with attitude.

In summary, attitude, SN and PBC were found to be significantly associated with student intention to use tobacco on campus. Different levels of enforcement did not yield significant results between campuses among all TPB constructs and attitude was significantly associated by the availability of smoking cessation programs. Further research is recommended to understand other factors that may influence these associations, such as punitive enforcement mechanisms, student enrollment at four-year universities versus two-year or student field of study.

LIMITATIONS

One limitation of this study is that students provided self-report data which may result in response bias. Although all responses were provided anonymously, there may have been external sources which could have influenced students' responses to survey questions. This can lead to response bias because the student would be submitting answers which he/she may know to be true but doesn't reflect their true opinion or behavior.

Another limitation is related to participant recruitment. The student researcher conducted cold calls and/or emails to university faculty members in various departments and only a select few responded. Those that replied represented a certain department within the university, therefore the participants recruited are only within certain subjects or disciplines. However, these subjects or discipline varied so that both health-related and non-health related subjects were represented. Additionally, there was not enough data to evaluate results between tobacco users and non-tobacco users because over 90% of participants indicated no current tobacco use behaviors, leaving only a small percentage of participants who actually use tobacco on campus. Similarly, most survey respondents were female which could also add additional female bias into the survey results.

STRENGTHS

A strength of this study is the fact that IRB departments of each institution allowed the first author to collect this data. While the IRB restricted the first author from contacting students directly which did not make it possible to capture response rate, this allowed the first author access to campus affiliates that could help provide this useful and informative data.

Another strength of this study is that since the CSU and UC systems have implemented tobacco-free policies within recent years, this is among the first studies conducted to determine whether the policy has influenced student intention to use tobacco on campus. Results from this study will be particularly useful to better understand factors that will ensure that these policies are successful in ensuring smoke and tobacco-free university environments.

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Finally, as previously stated, the prevalence of tobacco use has plateaued in recent years and is likely to rise again due to the availability of more innovative tobacco products being produced by the tobacco industry targeted specifically for this young adult population. This study aims to understand the factors that influence student tobacco use on campus so that future efforts can be aimed toward reducing the prevalence of future addiction and disease among this population as a result.

Implications for Practice

CSU and UC system administrations may use these findings to inform interventions aimed toward increasing student compliance to their tobacco-free policies. Strategic planning and program development aimed to strengthen the association between student attitude, SN and PBC could be significant in ensuring this compliance. Further research in identifying additional factors that contribute to the association between PBC and student intention will aid in the program planning and development process. Finally, other colleges and universities considering implementation of a smoke or tobacco-free policy on their campus can apply these findings to move toward a tobacco-free environment.

ETHICAL APPROVAL

This study was approved as a minimal risk study by the Loma Linda University

Institutional Review Board, and by the participating universities.

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TABLES

Table 4.1. Demographics of Study Participants

Age	n	%
18-24 years old	138	83%
25-34 years old	24	14%
35-44 years old	3	2%
45 years or older	2	1%
Total	167	100%
Gender		
Female	117	70%
Male	48	29%
Transgender	2	1%
Total	167	100%
Grade Level		
Freshman	4	2%
Sophomore	0	0%
Junior	95	57%
Senior	68	41%
Total	167	100%
Parents Education		
Did not finish high school	38	23%
Graduated from high school/GED	53	32%
Graduated from 2-year school	31	19%
Graduated from 4-year school	13	8%
Completed Master's degree	15	9%
Completed PhD or other advanced degree	17	10%
Total	167	100%
Student Smoking History		
No Tobacco USe	153	92%
Current Tobacco User	13	8%
Total	167	100%

Table 4.2. Regression Analysis of the Association of TPB Constructs and Student Intention to Use Tobacco on Campus

Variable	β (*SE*)
Intercept	0.633
Attitude	0.12* (0.06)
Subjective Norms	0.18** (0.05)
Perceived Behavioral Control	0.33** (0.06)

*p < 0.05
**p<0.001
Adjusted R² = 0.318

Table 4.3. Comparison of Student Intention and Levels of Policy Enforcement Using One-Way ANOVA

Variable	df	F	*p*
Intention			
Between	2	2.541	0.82
Within	165		

Table 4.4. Comparison of Attitude, SN & PBC with Levels of Policy Enforcement Using Kruskal-Wallis

Constructs	Enforcement Levels	N	Mean Rank	df	X²	*p*
Attitude	Communication Only	40	72.18			
	Communication & Signage	80	90.86	2	5.355	0.07
	Communication, Signage & Fines	47	82.38			
SN	Communication Only	40	77.89			
	Communication & Signage	80	84.68	2	1.097	0.58
	Communication, Signage & Fines	47	88.04			
PBC	Communication Only	40	74.69			
	Communication & Signage	80	89.09	2	2.392	0.30
	Communication, Signage & Fines	47	83.26			

Table 4.5. Comparison of Means between TPB Constructs and Smoking Cessation Resources Using Independent T-Test

Variable	Smoking Cessation Program	N	Mean**	Std. Deviation	*p*-Value
Attitude	Yes	80	1.61	0.834	<0.001*
	No	87	1.33	0.590	
Subjective Norms	Yes	80	1.57	0.768	0.268
	No	87	1.63	0.912	
Perceived Behavioral Control	Yes	80	2.39	0.618	0.192
	No	87	2.25	0.718	
Intention	Yes	80	1.97	0.634	0.159
	No	87	1.79	0.525	

*Significant at p<0.05
**Higher mean values are indicative of increased student intention to use tobacco on campus.
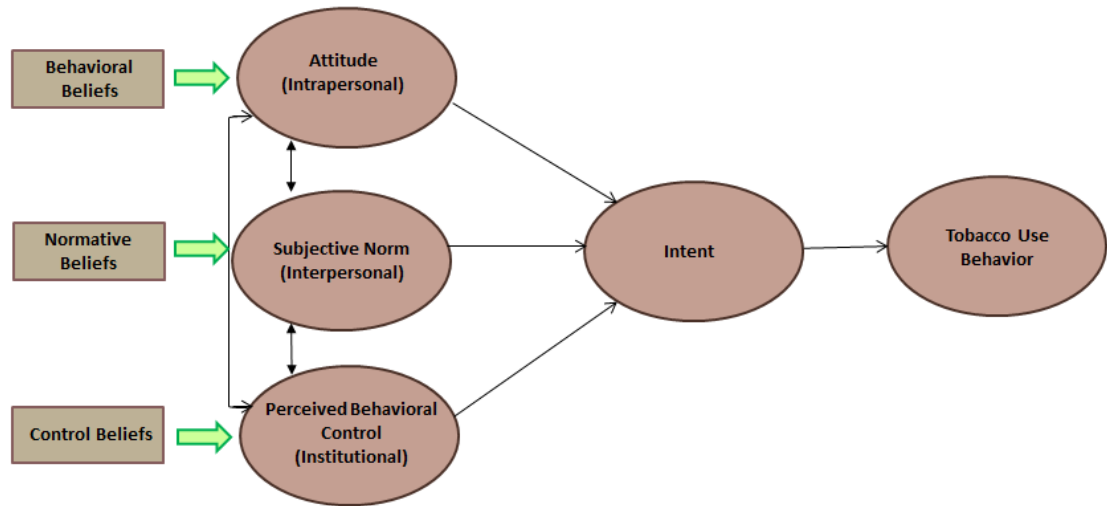
Figure 4.1. Theoretical Framework

CHAPTER 5

SECOND PUBLISHABLE PAPER

Campus Administrator Perceptions of the Effectiveness of the Tobacco-Free Policies in

California Universities

Note: The following formatting and referencing style are not in accordance with dissertation guidelines and is according to journal specifications.

Abstract

Background: In response to high levels of tobacco use among university students, the California State University and University of California systems adopted tobacco-free policies in recent years. While few existing studies capture student response to these policies, there is no research that captures campus administrator perceptions on the effectiveness of these policies.

Aim: To understand campus administrator perceptions of student compliance to tobacco-free policies in California universities.

Methods: This was a qualitative study guided by Ajzen's theory of planned behavior framework to understand campus administrator perceptions of student compliance to the tobacco-free policies on select California universities. Data collection included key informant (KI) interviews and a focus group (FG) with campus administrators from selected universities. Content analysis was conducted to interpret results.

Results: Nine campus administrators participated in KI interviews and four further participated in a FG during March–May 2018. Overall analysis of the results indicated that all administrators believe tobacco-free policies on their respective campuses are effective in reducing student tobacco use. Additionally, some administrators believed punitive methods were needed, while others felt creation of a cultural norm would be most effective, and all administrators believed smoking cessation programs were helpful resources to ensure policy compliance. Participants further agreed stronger implementation strategies relating to communicating policy provisions are needed to ensure student understanding of policy.

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Conclusion: Administrators perceive that tobacco-free policies are effective in reducing tobacco use among university students. It is recommended that additional strategies are utilized to increase student awareness of the policy.

Key words: theory of planned behavior, campus administrators, tobacco-free policies, tobacco-free universities, college students, policy compliance

Campus Administrator Perceptions of the Effectiveness of the Tobacco-Free Policies in

California Universities

While there has been significant progress in reducing tobacco use among young

adults, many still continue to use tobacco today (Surgeon General, 2018). The Surgeon

General report states that prevention efforts must be targeted toward young adults ages

18-25, since nearly 90% of all tobacco use starts by age 18. Previous interventions that

target this population focused on increasing student awareness of the adverse health

effects resulting from tobacco use. Examples of such health effects include lung cancer,

respiratory illness, and increased risk for mortality (Centers for Disease Control, 2018).

Previous research also aimed to understand student attitudes and beliefs about

using tobacco on campus (Lee et al., 2011). In a recent study, Seitz, Kabir, Greiner and

Davoren (2018) analyzed over 130,000 survey responses from students, faculty, and staff

on university campuses and found that there was overall support and approval for

smoke/tobacco-free campus policies. According to Ickes, Rayens, Wiggins and Hahn

(2017), tobacco-free policies on college campuses have the potential to highly decrease

tobacco use rates on college campuses. These findings, in addition to others, have

resulted in increased movement toward the adoption of tobacco-free policies on college

campuses in recent years, although the effectiveness of these policies remains in question.

Several studies investigated student perceptions on the effectiveness of tobacco-

free campus policies, such as a study conducted by Alyanak (2015) which focused on

evaluating the implementation of a tobacco-free policy across 30 university institutions in

Georgia. Alynak (2015) found, through analysis of student survey responses, that

tobacco-free policies were effective and successful in reducing tobacco use on university

campuses. While such studies aimed to understand policy effectiveness through analysis of student responses, there is no existing research available that captures campus administrator perspectives on the same. Since student self-report data can potentially pose self-report bias, which may then question validity of their responses, the purpose of this study was to understand campus administrator perceptions on student compliance to tobacco-free policies within the California State University and University of California systems. Specifically, in addition to understanding campus administrator perceptions on overall effectiveness of the policy, the aim was also to understand campus administrator perceptions on the effectiveness of policy enforcement mechanisms, and whether campus administrators perceive smoking cessation programs as an effective resource to reduce student tobacco use on campus.

METHODS

This study was approved as a minimal risk study by the Loma Linda University Institutional Review Board in Loma Linda, California.

This was a qualitative study utilizing both key informant (KI) interviews and focus group (FG) data collection methods to understand campus administrator perceptions of the tobacco-free policies on four university campuses. The criterion for campus administrators to participate in the study was that they were employed with their respective university before and after policy adoption in an administrator role. These four universities were selected based on the similarities found in the provisions of their tobacco-free policies as seen in Table 5.1. The study was guided by the theory of planned behavior (TPB) with the specific focus on perceived behavioral control (PBC) construct of the framework. PBC refers to student perception of their self-control in refraining to

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use tobacco on campus. Elements of the social ecological model (SEM) were also incorporated into the theoretical framework to assess additional influences of policy enforcement mechanisms and availability of smoking cessation programs on policy compliance. A diagram of this theoretical framework is found on Figure 5.1.

Prior to recruiting participants, officials from each university were contacted to request authorization to collect data. Once this authorization was received, the first author utilized the "directory" function on each university's webpage to cold call and/or email campus administrators to ask whether they would be willing to participate in this research study. Some universities had webpages that listed contact information for key campus administrators which were utilized to contact campus administrators. The first author conducted brief phone calls with those who responded to this outreach to explain what their participation would entail and to provide more information about the study. The response rate was approximately 2%; 400 administrators were contacted. The first author spoke with those that responded to this initial email and asked questions to determine whether they fit the inclusion criteria to participate in the study. Ultimately, nine administrators that met this criterion agreed to participate. Once informed consent was received, KI interviews were scheduled with the administrators. The consent form provided space for the campus administrator to indicate whether they would be willing to participate in FG after completing the KI interview. Those who indicated their willingness to participate in both received emails upon conclusion of the KI interview with a link to a Doodle poll, which allowed for scheduling of the FG. Finally, upon conclusion of the KI interviews, all participants received a "thank you" note with a gift card. Those who participated in the follow-up FG additionally received a gift coffee mug.

A total of nine consented campus administrators participated in KI interviews conducted during March – May 2018 via Zoom technology. Each KI interview lasted between 30-40 minutes and was digitally recorded. After the KI interviews were completed, four of the nine campus administrators (one from each selected university) self-selected to participate in a focus group. The focus group was conducted and recorded via Zoom technology in May 2018 and lasted a total of 40-minutes. Each of the campus administrators provided consent to record the interview. Once consent was received, the first author facilitated introductions which included an ice breaker question. Then, upon informing participants that the purpose of the FG was to summarize key findings on overall effectiveness of tobacco-free policies on university campuses and to present recommendations for improving student compliance to these policies, the FG was conducted.

To analyze responses from the KI interviews, three coding methods used: descriptive, topic and analytic coding (Biber, 2010). The descriptive coding method was used to obtain descriptive information about the campus administrators such as their role on campus, their area of expertise, and the number of years they have been employed with their respective university. The topic coding method was used to find patterns within the topics/themes. A grouping methodology was applied by taking the notes that the first author took during each KI interview and grouping common statements under the same topic/theme. Finally, analytic coding was used to build context from the KI interview and formulate discussion questions for the FG.

RESULTS

Campus Administrator Descriptives

Participating administrators served in various roles, which often included dual-roles as instructional faculty. Examples of their primary roles included Director of Risk Services and Student Health Center Coordinator. Collectively, administrators represented various university departments, such as risk services, student wellness center, university visitor center, social work, art and theatre. When asked about their involvement in the passing, implementation or enforcement of their campus policy, five administrators (56%) stated previous involvement in the passing and implementation of the policy, such as by serving on committees focused on developing educational materials which were disseminated to students upon policy implementation. Others advocated for a tobacco-free policy prior to policy implementation by sending letters to university leadership, conducting cigarette butt counts, and administering surveys to determine overall campus support for the policy.

With regard to enforcement, seven administrators (77%) stated involvement in policy enforcement, such as through creation of signage and identifying signage placements on campus. Additional involvement included launching a student ambassador program focused on training students to enforce the policy among their peers. Several administrators also served on the UC system-wide taskforce which focused on policy compliance and the development of educational materials for tobacco-free campuses.

Perceptions on Tobacco Use on Campus

Overall, all administrators believed the tobacco-free policy implemented on their respective campus seemed to be effective in reducing tobacco use among students. It was specifically stated that, "While there are still hotspots observed on campus, such as by the library and behind the student health center, there appears to be less prevalence within the

same hotspots than before the tobacco-free policy was implemented". All administrators agreed that a majority of individuals still seen using tobacco in these hotspots are international students from native countries where using tobacco is the norm. One administrator also stated that prior to the passing of the policy in 2013, only seven students requested services through their student health center to reduce or quit their tobacco use. After policy implementation, in 2014, this number more than quadrupled in size, and over 30 students received services at their student health center to reduce or quit tobacco use. In 2017, this number went up further to 43 students.

There were differences between campuses in tobacco use prior to policy adoption. For instance, some administrators reported that while the policy seems to be effective, there was insignificant tobacco use among students prior to policy passing for there to be a noticeable change in tobacco use after the policy was passed. Alternatively, some administrators observed high smoking prevalence prior to policy passing, which they now believe has subsided substantially post-policy passing, stating that "The other day I breathed deeply and felt that there was finally no smoke in the air".

Perceptions on Student Response to Enforcement

There were mixed perceptions on student response to policy enforcement mechanisms. There was consensus on the fact that the reason stronger enforcement mechanisms were not implemented in both systems was because there were system-wide mandates to enforce the policy primarily through educational means. Given this, some administrators felt implementing stronger enforcement mechanisms would be highly effective. For instance, some students are fined for using tobacco in student housing areas which administrators believe is effective because "Students would rather comply with the

policy than jeopardize their student housing privileges". It was also stated that "Strengthening enforcement mechanisms should be a priority although the system-wide mandate to enforce primarily through educational means is a barrier. Also, the police department would have to allocate resources to impose punitive enforcement measures, which does not appear to be a priority at the moment".

Alternatively, other administrators felt that punitive enforcement measures would instill fear among students which is not the desired outcome. These administrators felt it necessary to create a no-tobacco use norm for optimal policy compliance. They proposed increased signage as a means to achieve this within targeted areas, such as university visitor centers, student housing areas, behind major buildings, and in less populated areas. This suggestion was perceived positively among all administrators.

Perceptions on Effectiveness of Smoking Cessation Programs

All participants perceived smoking cessation programs as effective in increasing student compliance to the tobacco-free policy. It was specifically stated "If the policy isn't enforced through punitive measures, then the only other way to increase compliance is to offer resources so that students have the necessary tools to comply with the policy". Administrators further believed that offering smoking cessation programs would help achieve a tobacco-free norm on campus, which "enforcement will only do to a certain extent". Administrators representing campuses that currently offer smoking cessation programs stated that their program has been effective.

Campus Administrator Recommendations

All participants agreed that additional measures could have been instituted to increase awareness of the tobacco-free policy among students. To increase awareness,

participants recommended these specific measures: (a) notices on flat screen television screens, (b) placing flyers in residential halls and housing areas, (c) utilizing social media applications such as Twitter and Facebook, (d) sending notifications via university applications. When asked how signage can be strengthened, campus administrators stated that many students are unaware that parking lots are part of the university campus, hence increased signage in these areas would be effective in increasing awareness. It was further recommended that incorporating signage on campus shuttles would also be effective to increase awareness. Lastly, it was stated that targeted signage could be effective to increase student compliance since hotspots are frequently changing since, as a result of the policy, students have moved to less visible areas to use tobacco. Signage containing messaging that yields an emotional student response, such as the environmental impact of using tobacco, was also found as an effective strategy on a couple campuses.

Further, campus administrators further felt that there is a strong need to increase awareness among social groups, such as Greek organizations. International student groups also require increased awareness as these students originate from countries where tobacco use is a norm, hence adjusting to a tobacco-free campus norm is difficult for this group. Lastly, when asked how such a tobacco-free norm could be achieved on campus, all campus recommended that in addition to signage, trainings for faculty/staff should be incorporated so that faculty/staff are able to enforce the policy to students.

Overall, all study participants expressed positive influences of the tobacco-free policy on their respective campuses on student intention to use tobacco on campus. All participants observed decreases in overall student tobacco use on campus after policy

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implementation and further stated that providing students with resources to quit their tobacco use likely increases student motivation to comply with the policy. Finally, all participants collectively recommended that future efforts to increase policy compliance would focus on raising student awareness to the policy through strategic efforts such as targeted signage.

DISCUSSION

Results of this study are consistent with existing research available on the effectiveness of tobacco-free policies in educational institutions. Research indicates that there are three things that must be done to ensure successful adoption of tobacco-free policies on college campuses: "tell", "treat", and "train" (Hahn, Fallin, Darville, Kercsmar, McCann & Record, 2012). To "tell" means to ensure adequate and timely communication about the policy provisions, specifically who is affected, and how the policy will be enforced. Strategic placement of signage is an important piece of this process. This aligns well with the results of this study as all the administrators agreed that signage should be placed in targeted areas to respond to changes in hot spots.

To "treat" entails offering treatment services, such as cessation resources, to accompany the policy (Hahn, et al., 2012). Research indicates that the integration of tobacco education and prevention programs in addition to the policy is most effective to ensure policy compliance (Borders, Xu, Bacchi, Cohen & SoRelle-Miner, 2005). This also aligns with study results as all study participants stated that having smoking cessation programs is useful and necessary to increase policy compliance.

Finally, "training" entails ensuring that campus administrators and student leaders understand the provisions of the policy and can approach those violating the policy

(Hahn, et al., 2012). Two universities selected for this study have student ambassador programs where students are recruited and trained annually to be able to simultaneously enforce the policy and provide education and awareness to students about the policy. These efforts have received positive feedback from administrators at both schools, and it would be worthwhile incorporating a similar training program on other campuses as well.

In terms of enforcement, many administrators stated that punitive enforcement mechanisms would be unfair, especially to students addicted to nicotine with less self-control than other students. This supports the findings of Kumar, O'Malley and Johnston (2005) whose results indicated that the greater consequences for non-compliance to the policy were associated in students being less likely to decrease their tobacco use and an increased approval for cigarette use in general. Kumar et al. (2005) also found that some schools have resorted to punitive measures such as expulsion to enforce their policy, which did not result in a change in student attitude regarding tobacco use.

Consistent with existing research, which concludes that quit attempts among students significantly increased as a result of campus-wide tobacco-free policies, the overall finding of this study is that tobacco-free policies are associated with reduced tobacco use among students in the CSU and UC systems (Hahn, et al., 2012). Hahn, et al. (2012) also found that an increased number of students sought cessation and treatment services after policy implementation. This aligns with the results of this study as administrators observed an increased number of students seeking cessation services after the policy was implemented. Finally, our study findings are consistent with the results of Hahn, et al. (2012), who recommend movement toward a tobacco-free campus norm in lieu of punitive enforcement measures.

Strengths and Limitations

A strength of this study is that it provides an assessment of campus administrator perceptions, which is not found in other studies that were examined. The observations provided by campus administrators are valuable in understanding what factors may help increase student compliance to tobacco-free policies, and what factors currently limit or pose barriers to compliance. Since student self-report data may pose bias, these additional administrators' perceptions help to validate self-report data and provide context behind responses students may self-report. Campus administrator responses also provide insight on tobacco use behaviors, which students may otherwise refrain from sharing with external researchers.

Another strength of this study is that multiple data collection methods were utilized, which helped to funnel down initial data captured from the KI interviews. The incorporation of a FG allowed administrators from all campuses to share information with one another to recommend findings that can be applied to other universities that are moving toward tobacco-free campuses or are interested in strengthening existing policies. Finally, all campus administrators selected for participation in this study have been employed with their respective university campus both prior to and after passing of their university's tobacco-free policy. This allowed for campus administrators to combine their perceptions of tobacco use on campus from before the policy was implemented and after implementation, which may not be 100% possible if capturing data from students only, since students are only enrolled with the university for as long as they need to complete their academic programs.

A limitation is that most administrators that responded to outreach efforts were those that supported and were in favor of the policy. This could be because these individuals were passionate and invested in preventing nicotine addiction among students and ensuring success of the policy. Another limitation of this study is the low sample size for the FG. This was not the case with the KI interviews as saturation was achieved due to the consistency of responses and consensus among administrators. Possible reasons for both limitations are because the first author received minimal response to recruitment efforts, which could be due to busy schedules and because the FG was conducted at the end of the instructional term, which is the time when administrators focus their time on concluding their courses. Another limitation is that it is difficult to make a definitive causality between the policy and student tobacco use behaviors, as the reductions in tobacco use could be the result of external factors, such as media or personal influences, rather than the tobacco-free policy itself.

Implications for Practice

The results of this study point to several implications for practice targeted toward university campus administrators. First, it is important to develop a robust implementation plan prior to implementing the policy to ensure all modes of communication are incorporated to increase policy awareness among the student population. Suggested modes of communication include social media applications, emails, memos, and strategic signage. Second, it is important to ensure those involved in enforcement of the policy are adequately trained to ensure they can approach individuals who are found in violation of the policy and provide education about the policy provisions and available resources that can help them reduce or quit tobacco use on

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campus. Third, it is recommended that campus administrators take steps to ensure

adequate resources are available so that students can access resources to comply with the

policy. Smoking cessation programs are one example of such effective resources. A

combination of these recommendations will help to promote a cultural shift on campus

toward a tobacco-free environment.

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participation in the study. The authors also thank the California Youth and Advocacy

Network (CYAN) for their support, guidance and resources that aided in recruiting

participants for this study.

ETHICAL APPROVAL

This study was approved as a minimal risk study by the Loma Linda University

Institutional Review Board in Loma Linda, California, as well as by the participating

universities.

TABLES

Table 5.1. Comparison of Selected Campus Policies

Criteria	University #1	University #2	University #3	University #4
When Adopted	August 2014	August 2015	January 2014	January 2014
Who is Affected	All individuals on campus	All individuals on campus	All individuals on campus	All individuals on campus
Enforcement Mechanism	Communication, Signage & Fines	Communication, Signage	Communication	Communication
Items Prohibited	Smoking and the use of all tobacco products, including e-cigarettes	Smoking and the use of all tobacco products, including e-cigarettes	All tobacco, including smokeless tobacco and unregulated nicotine products	All tobacco, including smokeless tobacco and unregulated nicotine products
Sales, Marketing & Purchases Prohibited?	Yes	Yes	Yes	Yes
Smoking Cessation Program?	No	Yes	No	Yes
Other Available Resources?	Student Counseling and Psychological Services, Nicotine Replacement Therapy, the Patch and Gum, and web links to community resources	Employee Assistance Program, Online Resources and Mobile Apps	Smoking Cessation Mobile App, Counseling Services, Free Quit Kits, and other community resources	Help lines, a Mobile App and web links to other community resources
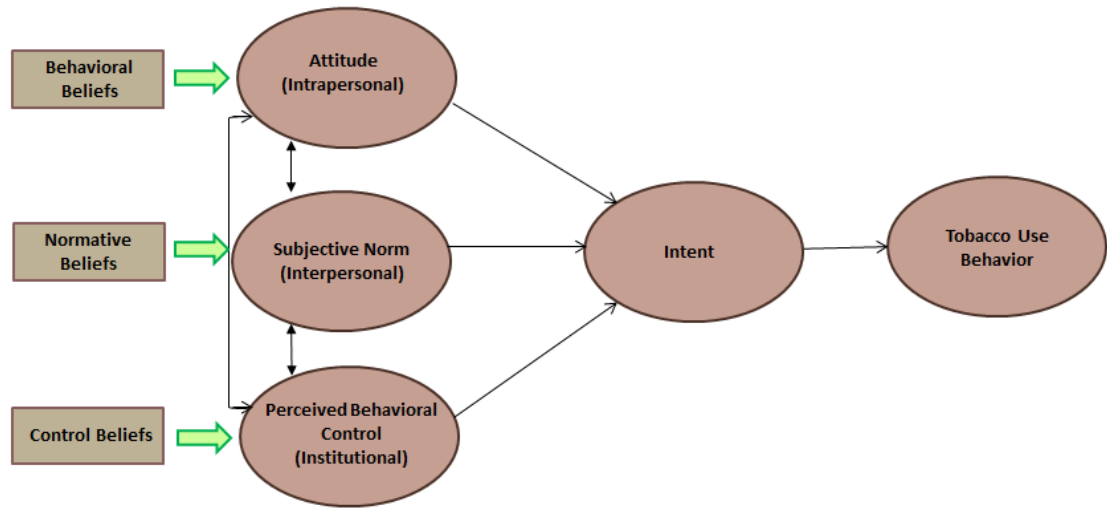
Figure 5.1. Theoretical Framework

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CHAPTER 6

SUMMARY AND CONCLUSIONS

A. Summary of Findings

The purpose of this study was to understand student compliance to tobacco-free policies in California universities. Both qualitative and quantitative data collection methods were employed, which consisted of surveys among students and key informant interviews and a focus group among campus administrators.

1. *Quantitative Analysis*

Students that participated in this study (n=167) had demographic similarities. Since this study was conducted among university students, it was expected that the study population would consist mainly of young adults, which was found to be the case as participant mean age ranged between 18 and 24 years old. Additionally, 70% of all respondents were female. Consistent with findings from past research (Lenk, Rode, Fabian, Bernat, Klein & Forster, 2014), most respondents (81%) had little to no prior experience using tobacco, and a minimal number of respondents (8%) indicated that they are current tobacco users.

Analysis of the associations between TPB constructs and intention to use tobacco on campus yielded significant associations between all constructs. The final regression model explained approximately 32% of the variation in behavioral intention. These results match findings from existing research, such as a study conducted by Topa & Moriano (2010), where secondary analysis of 19 studies indicated that smoking behavior was related to smoking intentions, and that these intentions were related to participant attitude, subjective norms and perceived behavioral control. In other studies, however,

findings included no significant influence between subjective norms and behavioral intention (Armitage & Conner, 2011). For example, one similar research study conducted among students enrolled in two-year institutions yielded significant differences between subjective norms and levels of tobacco use on campus (Lenk, Rode, Fabian, Bernat, Klein & Forster, 2014). These findings may be due to the fact that students in two-year institutions are enrolled at their college campuses for a shorter period of time and many tend to spend less time on campus outside of their scheduled classes due to other personal commitments. Due to this, these students may simply wait to use tobacco off campus. As seen in this study, a majority students enrolled in four-year programs are within the 18-24 age range, implying that they most likely enrolled in the institution upon graduation from high school. For this reason, these students are likely enrolled in their respective university campus as full-time students and may spend more time on campus outside of their scheduled classes compared to students enrolled in two-year institutions. Additionally, most study participants indicated no current or past tobacco use experience, which could be another reason why most student responses were supportive of behavioral intention to comply with the tobacco-free policy implemented on their respective campus. These factors may also be worth exploring in future research.

Further analysis of the primary TPB constructs (attitude, subjective norms and perceived behavioral control) through one-way ANOVA and multiple Kruskal-Wallis tests, indicated that neither was significantly influenced by different levels of policy enforcement. This could be the case as all universities selected for this study enforced their policy primarily using education and signage methods and without the use of punitive measures. As students did not face severe consequences for failing to comply

with the policy, this may explain why the primary TPB constructs were not influenced by the different levels of policy enforcement implemented on each selected university campus. Finally, study results indicated that student attitude was significantly influenced by the availability of smoking cessation programs on campus while subjective norms and perceived behavioral control yielded no significant associations. This could also be due to the specific participant demographics, where it was noticed that in most student responses, those who have never used tobacco or past tobacco users did not feel the need to seek smoking cessation resources in order to come into compliance with the tobacco-free policy while these students reported positive attitudes about the existence of such resources.

2. Qualitative Analysis

Campus administrators (n=9) who participated in this study had similar backgrounds with regard to their involvement in the passing, implementation and enforcement of the tobacco-free policy on their campus. Additionally, all participating administrators reported being employed with their respective university both before and after implementation of the tobacco-free policy. Administrators with prior experience in the passing and implementation of the policy reported specific involvement which entailed serving on taskforces and committees, drafting advocacy letters and educational materials. Those with experience enforcing the policy reported developing signage and student ambassador programs.

Qualitative analysis of the key informant interviews yielded several conclusions. First, all administrators stated that the tobacco-free policy implemented on their respective campus is effective in reducing tobacco use among students. Specific

examples which supported these statements included direct observations from administrators working in their university's student health center, reporting increased number of students seeking smoking cessation resources to quit using tobacco post-policy implementation. Additionally, all administrators reported visually observing less prevalence of student tobacco use on campus. Further, locations that were previously hot spots contain significantly fewer or even no student smokers on campus at the time of the key informant interview.

With regard to enforcement, some administrators stated that strengthening enforcement to more punitive measures would further increase student compliance to the policy. Other stated, however, that instead of imposing punitive measures, which would only instill fear among students, that it would be beneficial to create a tobacco-free norm on campus. This would allow students to understand why it is important to comply with the policy and why tobacco use can result in adverse health and environmental consequences, which in turn would positively influence student attitude, subjective norms and perceived behavioral control. In terms of the effectiveness of current enforcement measures, administrators stated that these appear effective as student prevalence of tobacco use has decreased upon adoption of the tobacco-free policy.

Finally, upon analyzing administrator responses pertaining to the effectiveness of the availability of smoking cessation programs on campus, all administrators stated that these programs seem useful to offer to students, specifically current tobacco users who may have to exert the most effort to come into compliance with the tobacco-free policy. Additionally, administrators stated that offering smoking cessation programs would be

one effective strategy to achieve a tobacco-free campus norm to increase student compliance to the policy.

A focus group conducted among administrators from each selected university further confirmed these findings. Administrators agreed to several recommendations, which included increasing student awareness of the policy through effective campus communication and increased and targeted signage. Examples of effective communication methods include tailoring communication to the student body through the use of social media platforms, placing flyers in residential halls and putting notices on flat screen television screens. Examples of targeted signage includes placing signs in parking lots and in migrating hot spot areas on campus.

B. Strengths

The design of this study incorporates a mix of qualitative and quantitative data collection methods, which allowed for validation of study results. Also, study participants included both students and campus administrators, which significantly lowers student response bias and also provides additional insight into how student compliance could potentially be increased as viewed by campus administrator's direct observations. Further, campus administrator observations may have yielded findings which students may otherwise have been reluctant to report in a research study.

Results from this study add value to literature as this is among one of the first studies where an integrated theoretical model was applied to understand the effectiveness of tobacco-free policies passed recently within the California State University (CSU) and University of California (UC) systems. Additionally, as these policies have been implemented in recent years, this is among one of the first studies which aims to

determine the effectiveness of such policies. This study is also one of the first that captured campus administrator perceptions of the effectiveness of tobacco-free policies on university campuses.

According to the CDPH (2016), tobacco-use rates among the young adult population are expected to rise due to the increased development of innovative and tailored tobacco products, such as electronic cigarettes and vapes. Due to this, findings from this study can be used to prevent tobacco addiction among the current and future young adult population.

C. Limitations

A limitation of this study is the fact that it is difficult to determine whether the positive and significant association between TPB constructs and desired behavioral intention is due to the implementation of the tobacco-free policy or other factors, such as media advertising. While the survey instrument aimed to capture social, family and underlying factors that may influence student intention, there is still the possibility that other factors may contribute to this association. Additionally, it could have been advantageous to compare student responses between different institution types, such as four-year versus two-year, to determine whether tobacco-free policies are effective in all types of university campuses.

Another limitation of this study is the low participant number (n=4) for the focus group. The focus group contained one representative from each selected university campus, however having only one representative did not allow for diversity in campus administrator representation and responses from each university. The first author received little interest from campus administrators to participate in the focus group as the timing of

the focus group was during a busy time when the semester and/or quarter was ending on each respective campus. As a result, many administrators were only willing to participate in the key informant interview and opted out of the focus group.

With regard to enforcement, many campus administrators stated that the UC and CSU system-wide mandate contained restrictions on what was allowed as an enforcement activity versus what was not allowed. The mandate specifically required all campuses to institute educational enforcement mechanisms and refrain from more punitive measures, such as student fines. For this reason, a greater range of enforcement levels could not be assessed as part of this study to determine their effectiveness on student compliance.

Finally, another limitation to this study is that over 80% of student participants reported never using tobacco in the past not current tobacco use. This did not allow for an adequate and even representation of both smokers and non-smokers in this study, and as a result, the findings primarily represent responses from non-smokers. It is suspected that if there was even representation of smokers and non-smokers in this study, that the results may contain variations and be applied toward a more generalizable population.

D. Recommendations

Findings from this study yield several recommendations geared toward future research. First, it is recommended that future studies capture data from participants who either have had past experience using tobacco or are current tobacco users, in addition to those who have no past or current tobacco use experience. This will ensure responses are captured from both population groups. This would be useful in future studies as policy enforcement measures and the availability of smoking cessation programs are most

impacted by those who are current and past tobacco users, as this group of individuals are the most likely to be found violating policy provisions.

Second, it is recommended that future studies include universities that impose strong enforcement mechanisms in addition to universities that enforce primarily through educational means. This will allow for comparison of student response to the policy, as well as an understanding of how punitive enforcement mechanisms influence student attitude, subjective norms and perceived behavioral control. Such comparisons will also allow for a greater generalization of study findings which can be incorporated on multiple university campuses.

Third, it is recommended that future studies include different institutional types, such as both two-year and four-year universities, to determine whether compliance to tobacco-free policies is greater among certain institutions as opposed to others. This will also allow for other factors to be identified which may influence compliance rates among students within certain institutions versus students in other institutions.

Finally, it could be valuable to capture qualitative data from students to validate their responses to the survey questions. Answering questions on a survey can be a repetitious and tedious process, where students may be likely to check the same answer multiple times in order to avoid reading through the questions in detail. Qualitative data can provide more insight on what students perceive as valuable resources on campus and what motivates them to either use or not use tobacco on campus. Knowing what motivates students to engage in a certain behavior can be particularly valuable to design targeted and strategic interventions.

E. Implications for Practice

Results from this study can be applied within educational institutions either seeking to adopt a tobacco-free policy or interested in strengthening their current policy. Campus administrators within such institutions could target their health education interventions to influence the associations between the primary TPB constructs and desired behavioral intention. Factors identified through this study which influence the strength of these associations and yielded significant findings, such as the availability of smoking cessation programs, should be incorporated to increase student compliance to tobacco-free campus policies.

Timely communication is also an important component of successful policy implementation. Several campus administrators who participated in this study stated that there was insufficient communication from the university when the policy was initially passed, resulting in low student awareness and education rates. Suggested ways to improve this communication include releasing university memos to the campus community which contains specific policy provisions and enforcement mechanisms, installing signage in highly visible areas, such as in hot spots, in the student wellness center, campus parking lots, and on university shuttles and buses. These are areas where most students visit frequently on campus, and campus administrators specifically stated that parking lots are areas where students are still seen violating the policy as there appears to be confusion on whether parking lots are part of the campus or are considered "off-campus". Additionally, when implementing the policy, it is recommended that faculty and staff that interact with students on a day-to-day basis receive special instructions and training in order to be able to enforce the policy on campus.

Through the qualitative analysis, campus administrators also stated that although the UC and CSU mandates have required educational enforcement mechanisms, it would be difficult to fine students or impose other punitive measures because that would require a significant number of resources to match the number of students on campus. Due to this, it would be strategic and effective to train the already existing resources, such as faculty and staff who interact with students daily, on enforcing the policy in order to increase awareness and strengthen enforcement on a wider scale.

Finally, as of May 2018, the Board of Governors of the California Community Colleges system has recommended a system-wide resolution toward a tobacco-free campus environment (California Community Colleges, 2018). Findings from this study would be particularly timely and relevant to ensure successful implementation and enforcement of their campus tobacco-free policies in order to ensure student compliance.

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APPENDIX A. STUDENT TOBACCO USE SURVEY

SECTION 1

1. What is your age?

   a. 18-24 years old
   b. 25-34 years old
   c. 35-44 years old
   d. 45 years or older

2. What is your gender?
   a. Female
   b. Male
   c. Transgender

3. What is your home zip code?

   _____

4. What is your race/ethnicity?

   a. Asian or Pacific Islander
   b. Hispanic/Latino
   c. White/Caucasian
   d. Black/African American
   e. American Indian/Native
      American
   f. Other: _____

5. What language(s) are spoken in your home?

   a. English
   b. Spanish
   c. Other:

   _____
   _____

6. What is your current university grade level?

   a. Freshman
   b. Sophomore

c. Junior
d. Senior

7. What is the highest level of education your parents have completed?

   a. Did not finish high school
   b. Graduated from high school or equivalent (GED)
   c. Graduated from a two-year school (such as a vocational or technical school, junior or community college)
   d. Graduated from a four-year college
   e. Completed a Master's degree
   f. Completed a Ph.D., M.D., or other advanced professional degree
   g. I don't know

8. Is there past history of tobacco or nicotine addiction among at least one (1) or more of your immediate family members?

   a. Yes
   b. No
   c. Don't know

9. Is there past history of drug abuse among at least one (1) or more of your immediate family members?

   a. Yes
   b. No
   c. Don't know

10. Do you <u>currently</u> use tobacco on a daily basis, less than daily, or not at all?

    a. Daily
    b. Less than daily
    c. Not at all

11. In the <u>past</u>, have you used tobacco on a daily basis, less than daily, or not at all?

    a. Daily
    b. Less than daily
    c. Not at all

12. What was your first exposure to tobacco?

    a. Parents or family
    b. Friends or other social influences
    c. Media (i.e. television ads, billboards, etc.)
    d. Other: _____

13. Are you currently attempting to quit using tobacco?

    a. Yes
    b. No

14. In the past, have you attempted to quit?

    a. Yes
    b. No

15. What resources are you using/have used to quit?
    a. Substance use treatment facility
    b. Campus wellness center
    c. Primary care provider
    d. Other: _____

See next page…

SECTION 2

When answering the questions below, please check <u>ONE</u> the circle that most closely represents your answer:

	1	2	3	4	5	
16. **Bad**	O	O	O	O	O	**Good**
17. **Unhealthy**	O	O	O	O	O	**Healthy**
18. **Unnecessary**	O	O	O	O	O	**Necessary**
19. **Unpleasant**	O	O	O	O	O	**Pleasant**
20. **Unenjoyable**	O	O	O	O	O	**Enjoyable**

Using Tobacco On Campus Is….

SECTION 3

When answering the questions below, please check <u>ONE</u> circle that most closely represents your answer:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
21. Most people who are important to me approve of me using tobacco on my university campus.	O	O	O	O	O
22. Most people like me use tobacco on campus.	O	O	O	O	O
23. The people in my life whose opinions I value would use tobacco on campus.	O	O	O	O	O
24. The people in my life whose opinions I value would support my using tobacco on campus.	O	O	O	O	O
25. The people in my life whose opinions I value use tobacco on campus.	O	O	O	O	O

26. The people in my life whose opinions I value use tobacco.	O	O	O	O	O

SECTION 4

When answering the questions below, please check <u>ONE</u> circle that most closely represents your answer:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
27. It would be impossible for me to stop using tobacco on campus.	O	O	O	O	O
28. I am in complete control of my own tobacco use choices.	O	O	O	O	O
29. Factors outside of my control encourage me to use tobacco on campus.	O	O	O	O	O
30. It is mostly up to me if I use or do not use tobacco on campus.	O	O	O	O	O
31. I am not confident that anyone can help me quit using tobacco.	O	O	O	O	O
32. I am aware that there is a tobacco-free policy on my campus.	O	O	O	O	O
33. Having a tobacco-free policy on my campus will help me quit using tobacco on campus.	O	O	O	O	O
34. A smoking cessation program is available to me on my campus.	O	O	O	O	O
35. Having a smoking cessation program on my campus would help me quit using tobacco on campus.	O	O	O	O	O
36. I would find it difficult to quit using tobacco on	O	O	O	O	O

campus if my campus did not have a smoking cessation program.					
37. My campus faculty, staff and administrators have informed me that my campus is tobacco-free.	O	O	O	O	O
38. I am aware that if I use tobacco on campus I may receive a warning from campus officials.	O	O	O	O	O
39. Knowing that I may receive a warning from campus officials will help me quit using tobacco on campus.	O	O	O	O	O
40. I am aware that there are "tobacco-free" signs on my campus.	O	O	O	O	O
41. Seeing these "tobacco-free" signs on my campus help me refrain from using tobacco on campus.	O	O	O	O	O
42. I am aware that I will be fined if I use tobacco on campus.	O	O	O	O	O
43. Knowing that I will get fined will motivate me to refrain from using tobacco on campus.	O	O	O	O	O

SECTION 5

When answering the questions below, please check ONE circle that most closely represents your answer:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
44. I intend to use tobacco products on my university campus.	O	O	O	O	O
45. I intend to follow the tobacco-free policy	O	O	O	O	O

implemented on my university campus.					
46. I plan to seek campus resources to help me quit or reduce my tobacco use.	O	O	O	O	O
47. I intend to be a tobacco-free student.	O	O	O	O	O
48. I intend to use tobacco on campus only when law enforcement officials are not looking.	O	O	O	O	O

☺ **Thank you for your participation!** ☺

APPENDIX B. CAMPUS ADMINISTRATOR KI QUESTIONNAIRE

CAMPUS ADMINISTRATOR KEY INFORMANT INTERVIEW QUESTIONS

LOMA LINDA
UNIVERSITY

School of Public Health

TITLE: **STUDENT COMPLIANCE TO TOBACCO-FREE POLICIES IN CALIFORNIA UNIVERSITIES**

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anelson@llu.edu

1. Please tell me about your involvement in the passing, implementation or enforcement of your university's tobacco-free campus policy.

2. How long has the policy been in effect on your university campus and how did the transition between policy passing and implementation occur?

3. Have you observed a decrease in student tobacco use on campus as a result of this policy?

    a. If so, what are some examples of these observations?

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_____
_____
_____

      b. If not, why do you suppose there is lack of student compliance?

_____
_____
_____
_____

4. How is the campus' tobacco-free policy enforced and how were enforcement mechanisms put in place?

_____
_____
_____
_____

5. What do you perceive as student response to the enforcement mechanisms? That is, do you think consequences resulting from being non-compliant with the policy prevents students from using tobacco on campus?

_____
_____
_____
_____

6. Do you think enforcement can be strengthened?

_____
_____
_____
_____

      a. If so, what are some barriers to strengthening enforcement?

_____
_____
_____
_____

      b. Do you know of any future enforcement efforts to reduce tobacco on campus?

_____
_____
_____
_____

7. What are the available resources on campus for student smokers to quit or reduce their tobacco use?

a. Are staff providing these resources aware of the tobacco-free policy on campus and how do they outreach to students potentially needing to be linked to these resources?

b. Do you think these resources are effective in reducing tobacco use on campus?

c. How effective do you think the policy would be in reducing tobacco use if these resources were not available to students?

d. What resources do you think are lacking on campus that could help improve student compliance to the policy?

e. Is there a smoking cessation program on campus and if so, how effective do you think the smoking cessation program is in reducing tobacco use on campus?

f. How effective do you think the policy would be in reducing tobacco use if the smoking cessation program was not available to students?

_____
_____
_____
_____
_____

8. In terms of compliance to the policy, how effective do you think enforcement is compared to the availability of resources such as smoking cessation programs? That is, could enforcement alone reduce tobacco use or is there significance to ensuring students have access to resources that help them quit using?

_____
_____
_____

      a. Are both enforcement and smoking cessation programs needed or just one? Why?

_____
_____
_____
_____

9. Is there anything else you can share with me regarding your perception of how effective you believe
the tobacco-free policy is on your university campus?

_____
_____
_____
_____

APPENDIX C. CAMPUS ADMINISTRATOR FOCUS GROUP

QUESTIONNAIRE

CAMPUS ADMINISTRATOR FOCUS GROUP QUESTIONS

LOMA LINDA
UNIVERSITY

School of Public Health

TITLE: **STUDENT COMPLIANCE TO TOBACCO-FREE POLICIES IN CALIFORNIA UNIVERSITIES**

PRINCIPLE INVESTIGATOR: *Anna Nelson, DrPH, CHES*
24951 North Circle Drive, Nichol Hall #1323
Loma Linda, CA 92350
Contact: (909) 558-1000 ext. 47164;
anelson@llu.edu

1. Most key informant interview responses indicated that the transition between policy passing and implementation was primarily through electronic memos that were released from university administration. Do you think that this was sufficient?

_____

_____

_____

_____

    a. Do you think any other measures to implement the policy could have been effective in increasing student awareness to the policy?

_____

_____

_____

_____

    b. What are some examples?

_____

_____

_____

_____

2. Most responses also indicated that signage and communication are primary modes of policy enforcement which seems to be effective for the majority of students. However, many responses also indicated that instead of fining students and imposing harsh consequences on them, that campuses should be moving toward a cultural shift toward creating a tobacco-free norm. What do you think are some efforts that faculty or campus administrators can make to create such a shift?

_____

_____

_____

_____

3. Research indicates that addiction usually happens between 18-26 years of age and social influences are particular causes for this. Tobacco-free policies are one way to prevent this addiction from happening, but it seems many campus-related events that happen through clubs or societies take place off campus where tobacco-use is noticed. Is there any special messaging that can be provided to campus clubs or organizations to raise awareness?

_____

_____

_____

_____

      a. What clubs or organizations specifically?

_____

_____

_____

_____

      b. What strategies do you think may be effective with this group of people?

_____

_____

_____

_____

4. Some campuses report incorporating smoking cessation programs to aid students that are current tobacco users to reduce or quit tobacco their tobacco use. Do you think these programs are effective and/or participation has been sufficient?

_____

_____

_____

_____

      a. If not, what alternative resources do you recommend?

_____

_____

_____

_____

_____

5. Are there any other final thoughts you can share with me regarding any suggestions or improvements to the current policies on your campus to increase student compliance?

_____

_____

_____

_____

APPENDIX D. LOMA LINDA UNIVERSITY IRB APPROVAL

INSTITUTIONAL REVIEW BOARD

RESEARCH PROTECTION PROGRAMS

24887 Taylor Street • Suite 202 • Loma Linda, CA 92350

(909) 558-4531 (voice) • (909) 558-0131 (fax)

LOMA LINDA UNIVERSITY
HEALTH

Initial Approval Notice - Expedited   **IRB# 5170434**

To: Nelson, Anna

Department: **Ctr for Nutrition Lifestyle and Disease Prevention**

Protocol: **Using the theory of planned behavior to understand student compliance to tobacco-free policies in California Universities**

This study was reviewed and approved administratively on behalf of the IRB. This decision includes the following determinations:

Risk to research subjects: **Minimal**

Approval period begins: **23-Jan-2018** and ends **22-Jan-2019**

Stipulations of approval:

See attached list of items (if applicable).

See Appendix A for Conditions of Approval.

Adverse events and unanticipated problems must be reported in accord with the attached Adverse Event Reporting Matrix **A**.

All investigators are responsible for assuring that studies are conducted according to the approved protocol. Principal investigators are responsible for the actions of sub-investigators and staff with regard to this approval.

Please note the PI's name and the assigned IRB number, as indicated above, on any future communications with the IRB.

Direct all communications to the IRB c/o Research Protection Programs.

Thank you for your cooperation in LLU's shared responsibility for the ethical use of human subject in research.

_____   _____

IRB Chair/Designee   Date

AUTHORIZATION REQUEST TO COLLECT RESEARCH DATA FROM

[INSERT CAMPUS NAME HERE]

LOMA LINDA UNIVERSITY
School of Public Health

TITLE OF RESEARCH: **STUDENT COMPLIANCE TO TOBACCO-FREE POLICIES IN CALIFORNIA UNIVERSITIES**

PRINCIPLE INVESTIGATOR: *Anna Nelson, DrPH, CHES*
24951 North Circle Drive, Nichol Hall #1323
Loma Linda, CA 92350
Contact: (909) 558-1000 ext. 47164;
anelson@llu.edu

PURPOSE OF THIS REQUEST:

Approval to collect data from [INSERT NAME OF CAMPUS] is requested for research purposes. The purpose of this study is to understand the various factors that influence student behavior in using tobacco on their university campus. This study also aims to understand whether student tobacco use behavior is influenced by the campus tobacco policy, enforcement mechanisms or by available smoking cessation programs. It is further a significant aim of this study to understand campus administrator perceptions of student compliance to the tobacco-free policy on their university campus. This study is guided by the rationale that student attitude, subjective norms and perceived behavioral control directly influence behavioral intentions. [INSERT NAME OF CAMPUS] is invited to participate in this study because it meets the specific inclusion criteria for participation in this study and the data gathered from both students and campus administrators will be used to recommend future interventions. This study is an academic requirement for completion of the Doctor of Public Health degree for Harit Agroia.

TOTAL NUMBER OF STUDY PARTICIPANTS:

Approximately 173 students will participate in this study by completing a survey. Since data is being collected at four selected universities, approximately 43

students from your university will participate. A total of eight campus administrators, two from each school will also participate in a key informant interview. Of these campus administrators, at least four, one from each school, will further participate in a focus group. Hence, there will be approximately 181 individuals participating in this study.

DURATION OF STUDY:

Data collection for this study is expected to take no longer than one to two months on the [INSERT NAME OF CAMPUS] campus. Findings from this study are expected to be presented to the Loma Linda University School of Public Health Doctoral Committee by Summer 2018.

WHY WAS [INSERT NAME OF CAMPUS] SELECTED?

[INSERT NAME OF CAMPUS] was selected as a campus that meets the inclusion criteria for participation in this study. The inclusion criteria are: (a) must be a public university within the state of California; (b) must be a four-year institution; and (c) must have a tobacco-free policy on campus passed between the years 2014-2015. Three other university campuses will participate in this study once the student investigator receives formal authorization from those universities as well.

Providing authorization to allow your campus to participate in this study will allow the student investigator to conduct the following activities: (1) recruit two campus administrators from your campus to participate in a 30-40-minute key informant interview. These interviews will be recorded on a recorder and will be conducted in-person, via Zoom technology, or any other technological platform most suitable to the campus administrator. The purpose of these interviews is to understand campus administrator perceptions of student compliance to the tobacco-free campus policy, (2) recruit at least one of these two administrators to participate in a 40-minute focus group, which will be conducted via Zoom technology. The purpose of this focus group is to facilitate information sharing among administrators from all the selected universities and to develop cohesion on the improvements needed to increase student compliance to the policy, and finally (3) recruit students to complete a survey. The purpose of this survey is to understand student personal attitudes, norms and perceptions and how these factors influence student intent to use of tobacco on their university campus. The survey will also capture basic student demographic information such as age, gender, race and ethnicity.

The student investigator will carry out data collection activities in a respectable fashion, as to not disturb the climate on campus. Students and campus administrators will be recruited through email or telephone conversation. Students will also be approached during campus events and during their classes, if allowed by course professors.

HOW THE STUDY WILL BENEFIT [INSERT NAME OF CAMPUS]:

The findings from this study will be used to design or strengthen interventions to improve health outcomes among the young adult population. Hence, the collective responses acquired from all study participants are quite significant in determining the current needs among the youth population with regard to quitting or refraining from using tobacco.

WHAT ARE MY RIGHTS AS A PARTICIPATING UNIVERSITY?

Participation in this study is purely voluntary. Study participants will not be asked to provide any data to the student investigator if they do not consent to participating in this study. Even after providing this authorization, you still have the option to withdraw, during which time any data you will have provided will be disregarded.

RISK AND CONFIDENTIALITY NOTICE:

There is minimal risk involved to individuals participating in this study. Efforts will be made to keep study participant personal information confidential. We will keep responses in a secure, locked location to which only the principal investigator and research team members will have access. We cannot guarantee absolute confidentiality. Study participant personal information may be disclosed if required by law. While study participants will not be identified by name in any publications describing the results of this study, we will refer to the participating university campus by name.

COSTS:

There is no cost to participate in this study.

INCENTIVE:

If authorized to participate in this study, the student investigator will provide incentives to both the students and campus administrators that provide data to the student investigator. The students will receive free key chains and/or t-shirts and the campus administrators will receive gift cards and/or a coffee mug.

AUTHORIZATION STATEMENT:

By signing below, I agree to the following:

- ❖ I have read the contents of this authorization form.
- ❖ The student investigator has explained the purpose of this study, the study protocol and has answered all questions I have concerning this study.

- ❖ A copy of this authorization form will be provided to me once signed.
- ❖ I understand that the name of this university campus, [INSERT NAME OF CAMPUS] will be disclosed in the publications resulting from this study.
- ❖ I hereby provide authorization for Harit Agroia to collect data from individuals attending or representing this university campus.

_____   _____
Signature of Campus Official   Authorization Date

_____   _____
Printed Name of Campus Official   Name of University Campus

APPENDIX F. STUDENT INFORMED CONSENT

STUDENT INFORMED CONSENT

LOMA LINDA
UNIVERSITY

School of Public Health

TITLE: STUDENT COMPLIANCE TO TOBACCO-FREE POLICIES IN CALIFORNIA UNIVERSITIES

PRINCIPLE INVESTIGATOR: *Anna Nelson, DrPH, CHES*
24951 North Circle Drive, Nichol Hall #1323
Loma Linda, CA 92350
Contact: (909) 558-1000 ext. 47164;
anelson@llu.edu

WHY IS THIS STUDY BEING DONE?

The purpose of this study is to understand the various factors that influence student behavior in using tobacco on their university campus. This study also aims to understand whether student tobacco use behavior is influenced by the campus tobacco policy, enforcement mechanisms or by available smoking cessation programs. This study is guided by the rationale that student attitude, subjective norms and perceived behavioral control directly influence behavioral intentions. You are invited to participate in this study as your responses to the survey will help design more effective future interventions. This study is an academic requirement for completion of the Doctor of Public Health degree for Harit Agroia.

HOW MANY PEOPLE WILL TAKE PART IN THIS STUDY?

Approximately 173 students will participate in this study by completing a survey. Since data is being collected at four selected universities, approximately 43 students from your university will participate. A total of eight campus administrators, two from each school will also participate in a key informant interview. Of these campus administrators, at least four, one from each school, will further participate in a focus group. Hence, there will be approximately 181 individuals participating in this study.

HOW WILL I BE INVOLVED?

You are eligible for participating in this study if you are at least 18 years of age or older AND are a registered student within at least one of the four selected university campuses [retracted].

Participation involves completing a survey relating to your personal attitudes, norms and perceptions on the use of tobacco on your university campus. The survey will also capture basic demographic information, such as age and gender.

ARE THERE ANY RISKS INVOLVED IF I PARTICIPATE?

There is minimal risk involved if you participate in this study.

WILL THERE BE ANY BENEFIT TO ME OR OTHERS?

While this study may not benefit you individually per se, the findings from this study will be used to design or strengthen interventions to improve health outcomes among the young adult population. Hence, the collective responses acquired from all study participants are quite significant in determining the current needs among the youth population with regard to quitting or refraining from using tobacco.

WHAT ARE MY RIGHTS AS A PARTICIPANT?

Participation in this study is voluntary. Your decision whether to participate or withdraw at any time from this study will not affect your status as a student. You will not be asked to provide any data to the student investigator if you do not provide consent. Even after providing consent, you still have the option to withdraw consent, during which time any data you would have provided will be disregarded.

HOW WILL INFORMATION ABOUT ME BE KEPT CONFIDENTIAL?

Efforts will be made to keep your personal information confidential. We will keep your responses in a secure, locked location to which only the principal investigator and research team members will have access. We cannot guarantee absolute confidentiality. Your personal information may be disclosed if required by law. You will not be identified by name in any publications describing the results of this study.

DOES IT COST TO PARTICIPATE?

There is no cost to participate in this study.

WHAT DO I GET FOR PARTICIPATING?

Your decision to participate in this study is appreciated and therefore all student participants will receive a free key chain or water bottle for participating.

STUDENT STATEMENT OF CONSENT:

By signing below, I agree that the following is true:

- ❖ I have read the contents of this consent form.
- ❖ The student investigator has informed me of my rights for participation in this study and has answered all questions I have concerning this study.
- ❖ I may contact Anna Nelson at (909) 558-1000 ext. 47164 or anelson@llu.edu if I have any questions.
- ❖ I am eligible for participating in this study.
- ❖ A copy of this consent form will be provided to me once signed.
- ❖ I hereby provide voluntary consent to participate in this study.

Student Signature	Consent Date

Printed Name of Student	Name of University Campus

INVESTIGATOR'S STATEMENT:

I have reviewed the contents of this consent form with the person signing above. I have explained potential risks and benefits of the study.

Signature of Investigator	Date

Printed Name of Investigator

APPENDIX G. CAMPUS ADMINISTRATOR INFORMED CONSENT

CAMPUS ADMINISTRATOR INFORMED CONSENT

LOMA LINDA
UNIVERSITY

School of Public Health

TITLE: STUDENT COMPLIANCE TO TOBACCO-FREE POLICIES CALIFORNIA UNIVERSITIES

PRINCIPLE INVESTIGATOR: *Anna Nelson, DrPH, CHES*
24951 North Circle Drive, Nichol Hall #1323
Loma Linda, CA 92350
Contact: (909) 558-1000 ext. 47164;
anelson@llu.edu

WHY IS THIS STUDY BEING DONE?

The purpose of this study is to understand the various factors that influence student behavior in using tobacco on their university campus. It is also a significant aim of this study to understand campus administrator perceptions of student compliance to the tobacco-free policy on their university campus. This study is guided by the rationale that student attitude, subjective norms and perceived behavioral control directly influence behavioral intentions. You are invited to participate in this study as your perspective and feedback will help design more effective future interventions. This study is an academic requirement for completion of the Doctor of Public Health degree for Harit Agroia.

HOW MANY PEOPLE WILL TAKE PART IN THIS STUDY?

Approximately 173 students will participate in this study by completing a survey. Since data is being collected at four selected universities, approximately 43 students from your university will participate. A total of eight campus administrators, two from each school will also participate in a key informant interview. Of these campus administrators, at least four, one from each school, will further participate in a focus group. Hence, there will be approximately 181 individuals participating in this study.

HOW WILL I BE INVOLVED?

You are eligible for participating in this study if you are a campus administrator at one of these four selected university campuses: [retracted] AND if you were

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employed with the university both before and after the tobacco-free policy was passed.

Participation involves working with the student investigator to schedule a suitable time for a 30–40-minute key informant interview. Participation also involves providing responses to interview questions while being recorded. You will have the option to schedule the interview over the phone, via Zoom technology, or any other technological platform most suitable to you. The purpose of this interview is to gather your perception on how effective you think the tobacco-free policy is on your campus.

Finally, you also have the option to participate in a 40-minute focus group. Participation in the focus group is not mandatory and you have the option to opt for participation in only the key informant interview or both the key informant interview and the focus group. The purpose of the focus group is to encourage information sharing among campus administrators within the four selected universities, as well as to cohesively make recommendations for improvements in current or future tobacco-free policies, to ultimately increase student compliance to the policies. These findings will be sent for publishing to raise awareness among campus administrators within campuses that have similar tobacco use policies.

ARE THERE ANY RISKS INVOLVED IF I PARTICIPATE?

There is minimal risk involved if you participate in this study.

WILL THERE BE ANY BENEFIT TO ME OR OTHERS?

While this study may not benefit you individually per se, the findings from this study will be used to design or strengthen interventions to improve health outcomes among the young adult population. Hence, the collective responses acquired from all study participants are quite significant in determining the current needs among the youth population with regard to quitting or refraining from using tobacco.

WHAT ARE MY RIGHTS AS A PARTICIPANT?

Participation in this study is voluntary. Your decision whether to participate or withdraw at any time from this study will not affect your employment. You will not be asked to provide any data to the student investigator if you do not provide consent. Even after providing consent, you still have the option to withdraw consent, during which time any data you would have provided will be disregarded.

HOW WILL INFORMATION ABOUT ME BE KEPT CONFIDENTIAL?

Efforts will be made to keep your personal information confidential. We will keep your responses in a secure, locked location to which only the principle investigator and research team members will have access. We cannot guarantee absolute confidentiality. Your personal information may be disclosed if required by law. You will not be identified by name in any publications describing the results of this study.

DOES IT COST TO PARTICIPATE?

There is no cost to participate in this study.

WHAT DO I GET FOR PARTICIPATING?

Your decision to participate in this study is appreciated and therefore all campus administrators will receive a Starbucks Coffee gift card for participating. Campus administrators that further participate in the focus group will receive a coffee mug.

CAMPUS ADMINISTRATOR STATEMENT OF CONSENT:

Please check one of the following options:

☐ I wish to participate in the key informant interview only.

☐ I wish to participate in both the key informant interview and the focus group.

By signing below, I agree that the following is true:

- ❖ I have read the contents of this consent form.
- ❖ The student investigator has informed me of my rights for participation in this study and has answered all questions I have concerning this study.
- ❖ I may contact Anna Nelson at (909) 558-1000 ext. 47164 or anelson@llu.edu if I have any questions.
- ❖ I am eligible for participating in this study.
- ❖ A copy of this consent form will be provided to me once signed.
- ❖ I hereby provide voluntary consent to participate in this study.

Campus Administrator Signature	Consent Date

Printed Name of Campus Administrator	Name of University Campus

<u>INVESTIGATOR'S STATEMENT:</u>

I have reviewed the contents of this consent form with the person signing above. I have explained potential risks and benefits of the study.

Signature of Investigator	Date

Printed Name of Investigator