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Increasing Compliance with a Tobacco-Free Policy via a Campus Campaign

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INCREASING COMPLIANCE WITH A TOBACCO-FREE POLICY VIA A CAMPUS CAMPAIGN

DISSERTATION

A dissertation submitted in partial fulfillment of the
requirements for the degree of Doctor Philosophy in the
College of Communication & Information
at the University of Kentucky

By
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Lexington, Kentucky

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ABSTRACT OF DISSERTATION

INCREASING COMPLIANCE WITH A TOBACCO-FREE POLICY
VIA A CAMPUS CAMPAIGN

The implementation of a tobacco-free policy is the leading recommendation among health institutes for reducing the harms associated with tobacco exposure–for both smokers and nonsmokers–on college campuses. Despite the health benefits associated with tobacco-free policies, compliance with these policies remains a serious challenge on college campuses. Interventions aimed at increasing smokers' willingness to comply with tobacco-free policies are essential for improving public health.

Guided by the theory of planned behavior (TPB), the purpose of this study was to (a) investigate the factors associated with tobacco-free policy compliance among undergraduate students and (b) design and evaluate a theory-based campaign aimed at increasing compliance with a tobacco-free campus policy. To achieve these aims the current study was conducted in two phases. Phase One was a qualitative investigation that analyzed focus group data related to messaging strategies for increasing tobacco-free policy compliance. Phase Two was a quantitative investigation that used survey data to explore variables associated with tobacco-free policy compliance and to test the effectiveness of a campus-wide print-based campaign.

Results from Phase One suggest various ways to target the TPB variables in messages in order to improve tobacco-free policy compliance. Results from Phase Two suggest the psychological variables and the physical variable of nicotine dependence are not related to tobacco-free policy compliance behaviors; however, social variables, quit attempts, and daily cigarette use are predictors of compliance behaviors. Similarly, the TPB variables had mixed results for relating to tobacco-free policy compliance behaviors. In addition, the campaign materials were supported as effectively improving tobacco-free policy compliance behaviors, both through individual level survey reports of compliance and observed compliance behaviors on campus. Although the campaign materials were designed around the TPB variables and were supported for improving compliance behaviors, above average campaign exposure was only found to improve normative beliefs from pre- to post-intervention. In addition to theoretical and practical implications

offered from this study regarding tobacco-free policy compliance behaviors, this study also provides critical insight into the current compliance behaviors on the University of Kentucky's campus.

KEYWORDS: Tobacco-free Policy, Theory of Planned Behavior, College Campuses, Campaigns, Compliance Behaviors

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October 16, 2014
Date

INCREASING COMPLIANCE WITH A TOBACCO-FREE POLICY
VIA A CAMPUS CAMPAIGN

By

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THIS DISSERTATION PROJECT IS DEDICATED TO ANYONE WHO HAS EVER BEEN FRUSTRATED BY NONCOMPLIANT BEHAVIORS IN A TOBACCO-FREE AREA.

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Chapter One

Introduction

Despite decades of tobacco-related research, cigarette smoking remains a serious health threat in the United States (Centers for Disease Control & Prevention [CDC], 2009). The implementation of comprehensive tobacco-free policies is recommended to reduce cigarette use and improve public health (American College Health Association [ACHA], 2012; Americans for Non-smokers' Rights [ANR], 2014; CDC, 2011; Institute of Medicine [IOM], 2007). As of October 2014, 1,479 colleges and universities in the United States had implemented 100% smoke-free campus policies; of these, 976 had implemented 100% tobacco-free policies (ANR, 2014); a more detailed explanation of these two policy types occurs in Chapter Two. When smoking is restricted, smoking prevalence, average daily cigarette consumption, and secondhand smoke exposure are reduced (Bauer et al., 2005; Chaloupka & Wechsler, 1995; Chapman et al., 1999; Fichtenberg & Glantz, 2002). Similarly, smoke-free environments are associated with an increase in cessation attempts (Farkas, Gilpin, Distefan, & Pierce, 1999; Glasgow, Cummings, & Hyland, 1997). However, these policies are only effective at reducing individual health risks if people comply with them. Compliance with these policies remains a challenge (Hahn et al., 2012; Plaspohl et al., 2012).

In 2009, the University of Kentucky implemented a campus-wide tobacco-free policy. That is, the use of any tobacco product is prohibited anywhere on campus, including in parking garages, in University vehicles, and on sidewalks owned by the University. Previous research investigating tobacco-free policy compliance at the University of Kentucky found that 55% of smokers reported having always complied—

since the policy was adopted—with the tobacco-free campus policy, with an average of six violations per week (*SD* = 9.71; Record, March 2013). Research findings suggest that the best way to enforce compliance to a tobacco-free policy is to request smokers to decide (on their own accord) to comply with the policy (Cho & DeVaney, 2010; Niles & Barbour, 2011; Plaspohl et al., 2012). However, little research exists on best strategies for encouraging compliance among smokers. Without interventions that increase smokers' willingness to comply, the ability of tobacco-free policies to positively impact the health of both smokers (e.g., increased cessation) and non-smokers (e.g., reduced exposure to outdoor tobacco smoke) is jeopardized. Currently, little research exists on increasing compliance with tobacco-free campus policies. Therefore, guided by the theory of planned behavior (TPB; Ajzen, 1988; 1991), this study was designed to (a) investigate the individual level factors associated with tobacco-free policy compliance among college students and (a) develop, implement, and evaluate a theory-based campaign to increase both individual-level (i.e., self-reported) and population-level (i.e., observed by researcher) compliance with a tobacco-free campus policy.

Three individual level factors of policy compliance were investigated: psychological (i.e., stress, depression, anxiety, sensation seeking), physical (i.e., addiction, cessation), and social (i.e., social norms). All of these factors are known to be associated with smoking behaviors (Tyas & Pederson, 1998). However, only some of the factors have been investigated with regard to their relationship with tobacco-free policy compliance (e.g., Lazuras, Eiser, & Rodafinos, 2009; Schultz, Finegan, Nykiforuk, & Kvern, 2011). More research is needed to understand the extent to which these individual level factors affect tobacco-free policy compliance.

The study also sought to improve both individual and population level compliance with tobacco-free campus policies through development and testing of a campus-wide campaign. According to the TPB, behavior change occurs when attitudes toward a behavior are favorable (e.g., policy compliance is perceived positively), social norms are perceived as positive (e.g., others approve of policy compliance), and behavioral control is high (e.g., ability to comply with the policy; Ajzen, 1991). To achieve changes in smokers' perceptions of these three behavioral constructs, the messages were created to target attitudes, social norm perceptions, and behavioral control, and underwent pre-testing with undergraduate focus groups.

The study was conducted in two phases. Phase One entailed the design and pilot-testing of theoretically-informed messages that were used in the campus-wide campaign. Phase Two implemented and tested the effects of the campus campaign on individual- and population-level compliance outcomes. Specifically, the study sought to (a) better understand factors associated with tobacco-free policy compliance behaviors among college student smokers; (b) develop theoretically appropriate messages aimed at improving tobacco-free policy compliance; and (c) increase college student smokers' self-reported level of compliance, and observed population-level measures of compliance with a tobacco-free campus policy. Results from this study offer best practice suggestions for improving college student smokers' willingness to comply with tobacco-free campus policies, particularly at southern and tobacco-belt located universities.

Chapter Two

Literature Review

Cigarette Use

Cigarette smoking is the single most preventable cause of premature death in the United States (CDC, 2009). Specifically, cigarette use accounts for approximately one in every five U.S. deaths each year, with smokers dying an average of 13 to 14 years earlier than nonsmokers (CDC, 2013). Cigarette use causes harm to every organ in the body and can cause or increase the risk of numerous cancers and respiratory illnesses (CDC, 2013). For instance, smoking causes lung cancer and emphysema. In addition, cigarette use increases the risk of breast cancer, bladder cancer, cardiovascular disease, coronary heart disease, myocardial infarction, and chronic obstructive pulmonary disease. Cigarette use is not only dangerous to the user but also dangerous to nonsmokers, with exposure to secondhand smoke significantly increasing a nonsmoker's risk of the same illnesses, even if the person has never smoked a cigarette (Surgeon General's Report, 2010). Secondhand smoke contains more than 7,000 chemicals; 70 of which are known carcinogens (CDC, 2013).

In the United States, approximately 19.3% of adults over the age of 18 smoke cigarettes (CDC, 2010), with the highest rates in the southern regions. For example, the average smoking rate in southern-rural regions is nearly 30% of adults over the age of 18 (Ferketich et al., 2010). More specifically, the smoking rate in Kentucky is estimated to be between 22% and 26.8% (CDC, 2010).

Cigarette Use Among College Students. The ACHA (2013) estimates that approximately 12.4% of all college students have smoked a cigarette in the past 30 days,

with 27.5% having ever smoked a cigarette. Like national averages, these estimates are expected to be highest in southern regions of the United States. For instance, data collected between 2007 and 2008 estimated that between 17% and 19% of college students at the University of Kentucky and at the University of Louisville had smoked a cigarette in the last 30 days (Hahn et al., 2010).

Research is mixed on whether or not there are gender differences among college student smokers. Some research has found that, unlike the general population, there are not gender differences among college student smokers (Patterson, Lerman, Kaufmann, Neuner, & Audrian-McGovern, 2004; Rigotti, Lee, & Wechsler, 2000); other research has found that college student smokers are more likely to be female than male (Emmons, Wechsler, Dowdall, & Abraham, 1998; Morrell, Cohen, Bacchi, & West, 2005). Research is also unclear with regard to ethnicity differences among college student smokers. Some research suggests that college student smokers are more likely to be White (Rigotti et al., 2000; Wetter et al., 2004); other research suggests that college student smokers are more likely to be Hispanic or Asian (Morrell et al., 2005). Research is clear that smoking rates are most prevalent among college students who are unhappy, living on campus, members of a fraternity or sorority, and don't participate in athletics (Morrell et al., 2005; Patterson et al., 2004; Wetter et al., 2004).

The combination of independence, peer pressure, stress, and substance use on college campuses is the major contributor to college environments having surprisingly high smoking rates (Patterson et al., 2004; Wetter et al., 2004). Although most college smokers initiated smoking cigarettes before they were 18 (81%), approximately 19% of college student smokers initiated smoking after age 19 (Everett et al., 1999). What is

most interesting is that the smoking rate among college students remains fairly stable throughout the college experience. For example, Wetter et al. (2004) found that the majority of college student smokers maintained their behavior throughout college. That is, only 13% of daily smokers quit and only 50% of occasional smokers quit; 14% of occasional smokers increased their behavior and became daily smokers. Most (87%) daily smokers and 50% of occasional smokers were still smoking at the end of their four years in college.

The smoking rate among college students is surprisingly high considering the inverse relationship between higher education and smoking behaviors (Wetter et al., 2004). One explanation may be that the psychological factors associated with smoking are exacerbated among college students, such as stress, anxiety, and depression (Kisch, Leino, & Silverman, 2005; MacGeorge, Samter, & Gillihan, 2005). Although stress, anxiety, and depression are often combined as a single dimension, they are unique constructs. Depression measures assess dysphoric mood (e.g., sadness, worthlessness); anxiety indicators include physical arousal, panic attacks, and fear; stress measures include tension, irritability, and overreaction (Antony, Bieling, Cox, Enns, & Swinson, 1998). In addition, on academic medical campuses, such as the University of Kentucky, stress, depression, and anxiety are even higher due to these factors being increased during times of medical uncertainty (see Harrington & Duggan, 2015). In the most recent semi-annual survey conducted by the ACHA (2013), 97% of college students reported having experienced stress, 25% reported having experienced depression, and 63% reported having experienced anxiety.

Psychological factors are associated with both adolescent and college aged

smoking behaviors. Tyas and Pederson (1998), in a literature review, found that both stress and depression/distress were associated with smoking rates among adolescents. More specifically, stress from college exam preparation has been found to be a significant factor in explaining college student smoking behaviors (e.g., West & Lennox, 1992). One investigation asked college aged smokers to report their reasons for smoking; approximately 78% of smokers reported they smoked to relieve stress and/or to relax, and 28% reported they smoked to help them study (Levinson et al., 2007). Other research investigations have supported the findings that stress, depression, and anxiety are related to increased smoking behaviors among college students (e.g., DeBernardo et al., 1999; Koval, Pederson, Mills, McGrady, & Carfajal, 2000; Naquin & Gilbert, 19996; Patterson et al., 2004; Steptoe, Wardle, Plooard, Canann, & Davies, 1996). Another factor that may influence the smoking rate on college campuses is the high rate of alcohol consumption among college students. The positive relationship between alcohol consumption and cigarette use among college students is well documented (e.g., Patterson et al., 2004; Schorling, Gutgesell, Klas, Smith, & Keller, 1994; Wetter et al., 2004). This relationship is important to acknowledge; however, it is beyond the scope of this project.

Tobacco-free Policies

As mentioned in the introduction, there are multiple types of smoking-restrictive policies. One type is smoke-free policies that prohibit the use of cigarettes in a particular area. Another type is tobacco-free policies that ban the use of any tobacco product in a particular area (ANR, 2014). These two policy types may vary in their comprehensiveness; for example, some policy prohibit smoking within so many feet of a door, some policies may have designated smoking areas, and some policies maybe

comprehensive with no smoking anywhere on campus (like the University of Kentucky policy). Traditionally, smoke-free policies have referred to indoor policies that only prohibit smoked tobacco products. In contrast, tobacco-free policies are a more recent approach that does not restrict the policy to areas indoors and prohibits the use of any tobacco product. The major difference between the two policies is the health emphasis. That is, smoke-free policies have the goal of protecting nonsmokers from the harms of secondhand smoke whereas tobacco-free policies have the goal of protecting nonsmokers and tobacco users (BACCHUS Network, 2013).

Per the recommendation of prominent health reports, many college campuses around the country are implementing campus-wide tobacco-free policies (ACHA, 2012; ANR, 2014; CDC, 2011; IOM, 2007; Surgeon General's Report, 2010). As of October 2014, 1,478 colleges and universities in the United States had implemented 100% smoke-free campus policies; of those, 976 had implemented 100% tobacco-free policies (ANR, 2014). Tobacco-free policies are currently the gold standard for college campuses not only for their increased protection of public health but also for promoting a healthy environment on campus and the increased clarity (and improved compliance) with regard to what products are not permitted on campus (BACCHUS Network, 2013).

Studies consistently show that when smoking is restricted both smoking prevalence and average daily cigarette consumption among smokers are reduced (Bauer, Hyland, Li, Steger, & Cummings, 2005; Chaloupka & Wechsler, 1995; Chapman et al., 1999; Fichtenberg & Glantz, 2002). Thus, smoke-free environments are associated with an increase in cessation attempts (Farkas et al., 1999; Glasgow et al., 1997). For example, after Lexington-Fayette County, Kentucky implemented a comprehensive smoke-free

public places ordinance in July 2004, the smoking rate among adults declined by 32% in the 20 months post-implementation (Hahn et al., 2008). In addition, students exposed to smoke-free campus policies show a significant reduction in smoking rates. For example, in 2007 Indiana University students reported a smoking rate of 17%; in 2009, after implementation of a campus-wide smoke-free policy in fall 2008, Indiana University students reported a smoking rate of 13%. A comparable university that did not enact a smoke-free policy, Purdue University, saw a 0.6% increase in their student smoking rate during the same time period. In addition, Indiana University found the daily smoking rate dropped significantly from 8.9 cigarettes per day in 2007 (pre-smoke-free policy implementation) to 3.6 cigarettes per day in 2007 (post-smoke-free policy implementation). In comparison, Purdue University did not see any significant reduction in daily cigarette use among students (Seo, Macy, Torabi, & Middlestadt, 2011).

The reduction of smoking reduces the amount of secondhand smoke in the air; therefore, smoke-free policies also reduce exposure to outdoor tobacco smoke. Indeed, research has consistently supported that the implementation of smoke-free policies are associated with a reduction in exposure to secondhand smoke (Dove, Dockery, & Connolly, 2010; Eisner, Smith, & Blanc, 1998; Repace, 2003; Wilson, Shamo, Boynton, & Kiley, 2012). For example, Farrelly et al. (2005) conducted an investigation to assess hospitality workers' secondhand smoke exposure after implementation of New York's smoke-free law. Through the analysis of survey responses and saliva cotinine specimens, the researchers concluded that the hospitality workers were protected from secondhand smoke both three months post-policy and one year post-policy implementation.

Compliance with Tobacco-free Policies

Although the implementation of a tobacco-free campus policy is effective at lowering the smoking rates and increasing cessation attempts among college students, smokers do not always comply with the policy (Hahn et al., 2012; Plaspohl et al., 2012). For example, Schultz, Finegan, Nykiforuk, and Kvern (2011) conducted an observational investigation of compliance at Canadian hospitals and found blatant violations. Hospital patients and employees were observed smoking directly in front of no smoking signs or while standing on a no smoking pavement symbol. In addition, Schultz et al. reported large amounts of littered cigarette butts across the hospital's campus. Currently, there is not a standard measure for assessing compliance with tobacco-free campus policies. Different researchers have employed different strategies such as self-report measures (e.g., Record, March 2013), observational measures (e.g., Harris, Stearns, Kovach, & Harrar, 2009), and counts of littered cigarette butts (e.g., Fallin et al., 2013; Seitz et al., 2012).

Complications with policy enforcement make it hard to stop all students from smoking on college campuses. For example, one of the biggest challenges to enforcement is that sidewalks owned by other jurisdictions (i.e., city or state) are not covered by most college or university smoke- or tobacco-free policies (Hahn et al., 2012). In addition, enforcement is a challenge as students may be unwilling to report policy violators (Niles & Barbour, 2011) and they may believe that smokers should comply with the policy on their own (Cho & DeVaney, 2010). One research investigation found that only 13% of participants said they would be willing to confront a smoke-free policy violator (Vardavas et al., 2011).

Some studies have explored policies and enforcement strategies on college campuses (e.g., Halperin & Rigotti, 2003; Plaspohl et al., 2012). Plaspohl et al. (2012) analyzed the policies of 175 universities with 100% tobacco-free campus policies. The findings showed that there are a number of strategies that universities can implement or enhance in order to increase compliance with smoke-free policies. For example, 75% of universities reported inconsistent enforcement of the policy on campus; only 60% covered cessation services in student insurance plans; and only 33% had a tobacco-free task force to monitor policy enforcement, issues, and marketing. Regardless of the recommended efforts to enforce a campus tobacco-free policy, complications with policy enforcement remain a serious challenge.

For example, at the University of Kentucky, systematic, deliberate, and ongoing efforts have been made to enforce the tobacco-free policy. Currently, the University relies on the *Tobacco-free Take Action! Ambassador Program* to promote compliance with the policy. The program was developed in Spring 2011: Ambassadors were trained in the proper way of approaching violators, including scripting techniques, how to respond if a violator refuses to comply with the policy, and how to properly document and report the violation (Ickes, Hahn, McCann, & Kercsmar, 2013). However, funding has been only available since April 2012 for two to four ambassadors to patrol the entire campus. Similarly, an online violation reporting system has been implemented; however, identifying names of violators, especially among students, makes corrective action a challenge. In addition, the *Tobacco-free Task Force* reports compliance issues, with some areas (e.g., behind the large classroom buildings, near the dorms, outside the international student classroom building) having more trouble than others (referred to as “hot spot”

violation areas). Specifically, a pilot investigation of policy compliance at the University found 55% of smokers (n = 77) reported having always complied; those who reported having not complied with the University of Kentucky's tobacco-free policy, reported an average of six violations per week (SD = 9.71; Record, March 2013).

Few research investigations have tested interventions to increase compliance with tobacco-free campus policies (e.g., Fallin et al., 2013; Harris et al., 2009). Harris et al. (2009) tested a postcard campaign to increase compliance with a University's policy prohibiting smoking within 30 feet of campus buildings. Data were collected outside four campus buildings for 30 minute sessions with ten observations per building per week (with a total of 120 observations throughout the project). Compliance was measured by researcher observation of the number of violating and non-violating individuals. Researchers passed out cards with positive reinforcement messages that thank smokers for their compliance and were redeemable for a free beverage on campus. The postcard campaign resulted in increased compliance from 33% pre-intervention to 74% immediately after the intervention. In a follow-up assessment a week later, compliance remained around 54%. Harris et al. also reported that there were major observed differences in the number of violators outside different buildings with some areas on campus were more prone to violations than others (e.g., around dormitories).

Similarly, Fallin et al. (2013) sought to increase compliance with the University of Kentucky's campus-wide tobacco-free policy. Like Harris et al. (2009), Fallin et al.'s intervention was a postcard-based intervention. However, the postcards in this study employed self-efficacy based messages aimed at increasing smoker's perceived ability to comply with the policy. The messages also contained information on campus cessation

resources. Compliance was assessed by observed numbers of littered cigarette butts (see Fallin et al., 2012). The number of littered cigarette butts was significantly decreased between pre- and post-intervention time points. The researchers concluded that the campaign showed promise for increasing compliance to the policy through campus-wide campaigns. Both Fallin et al. and Harris et al. incorporated an interpersonal level of communication through the process of handing out cards.

Reasons for Tobacco-free Policy Noncompliance

Challenges to tobacco-free policy enforcement are not the only gaps in tobacco-free compliance-related literature. One of the most critical questions is why some smokers comply with tobacco-free policies and others do not. Some research has attempted to investigate reasons for noncompliance. For instance, Schultz et al. (2011) talked with smoke-free policy violators on a hospital campus and found that most violators cited three key reasons for noncompliant behaviors: stress/anxiety, depression/loneliness, and a lack of policy enforcement. Record (2013) found similar reasons for noncompliant behaviors in a survey-based assessment of smokers at the University of Kentucky. Specifically, she found that smokers felt it was their right to smoke, that they were too addicted to comply, and that there was a lack of policy enforcement. Although these qualitative investigations provide valuable insight into noncompliant behaviors, few research investigations have assessed the factors associated with compliance. As a starting point for this much-needed investigation, the psychological, physical, and social factors known to increase general smoking should be investigated with regard to their relationship with tobacco-free policy compliance.

Psychological Factors. The psychological factors most commonly associated with increased cigarette use are stress, depression, and anxiety. As has already been discussed, stress, depression, and anxiety are positively associated with smoking behaviors (Lenz, 2004; Schleibcher, Harris, Catley, & Nazir, 2009; Tyas & Pederson, 1998). Because college campuses are high sources of stress, depression, and anxiety (Kish et al., 2005; MacGeorge et al., 2005), smoking rates tend to be higher than what would typically be expected of a location of higher education (DeBernardo et al., 1999; Koval et al., 2000; Naquin & Gilbert, 1996; Patterson et al., 2004; Steptoe et al., 1996; West & Lennox, 1992). One other psychological factor that is particularly associated with increased cigarette use among adolescents and young adults is sensation seeking. Stephenson, , Hoyle, Palmgreen, and Slater (2003) explain that "sensation seeking is a personality trait believed to have a biological basis that expresses as a need for physiological arousal, novel experience, and a willingness to take social, physical, and financial risks to obtain such arousal" (p. 279). Research has consistently supported the positive relationship between sensation seeking and smoking behavior (Carton, Jouvent, & Widlöcher, 1994; Gilbert, 1995; Terracciano & Costa, 2004). Despite the known relationships between stress, depression, anxiety, and sensation seeking and smoking behaviors, there is a gap in the literature that should be filled with regard to how these variables affect tobacco-free policy compliance.

Physical Factors. Addiction to nicotine is classified as a physical addiction (Fagerström, Heatherton, & Kozlowski, 1990). Being addicted to cigarettes perpetuates one's smoking behavior and increases cessation difficulty. In an investigation of college aged smokers' reasons for using cigarettes, approximately 48% of smokers openly

admitted that they smoked because they were addicted (Levinson et al., 2007). Some research already suggests that the physical dependence on nicotine may play a major role in behaviors with regard to tobacco-free policy noncompliance (Lazuras et al., 2009; Parks, Wilson, Turner, & Chin, 2009). Researchers interested in factors associated with compliance behaviors should include nicotine dependence and aim to increase explanation of its relationship to tobacco-free policy compliance.

Social Factors. Research has consistently found that social variables are one of the most influential factors associated with increased smoking among adolescent (Flay, Hu, & Richardson, 1998; Kobus, 2003; O'Loughlin, Paradis, Renaud, & Gomez, 1998; Swaim, Perrine, & Aloise-Young, 2007; Urberg, Degirmencioglu, & Pilgrim, 1999). During college, external pressures shift from predominantly parental pressure to predominantly peer pressure (Borsari & Carey, 2001). Research supports this with findings that the smoking rate among college students is still heavily influenced by social norms (Mercken, Candel, van Osch, & de Vries, 2011). For instance, one study reported that approximately 40% of college aged smokers smoked because their friends smoked (Levinson et al., 2007). Investigations are just beginning to understand the role of social norms with regard to tobacco-free policy compliance; current research suggests that social norms are a significant predictor of noncompliance (Lazuras et al., 2009). Thus, investigations that seek to assess factors associated with tobacco-free policy compliance should include social norm assessments and aim to better understand the relationship between the two constructs.

Predicting Tobacco-free Policy Compliance

One of the aims of this study is to identify a predictive model of self-reported

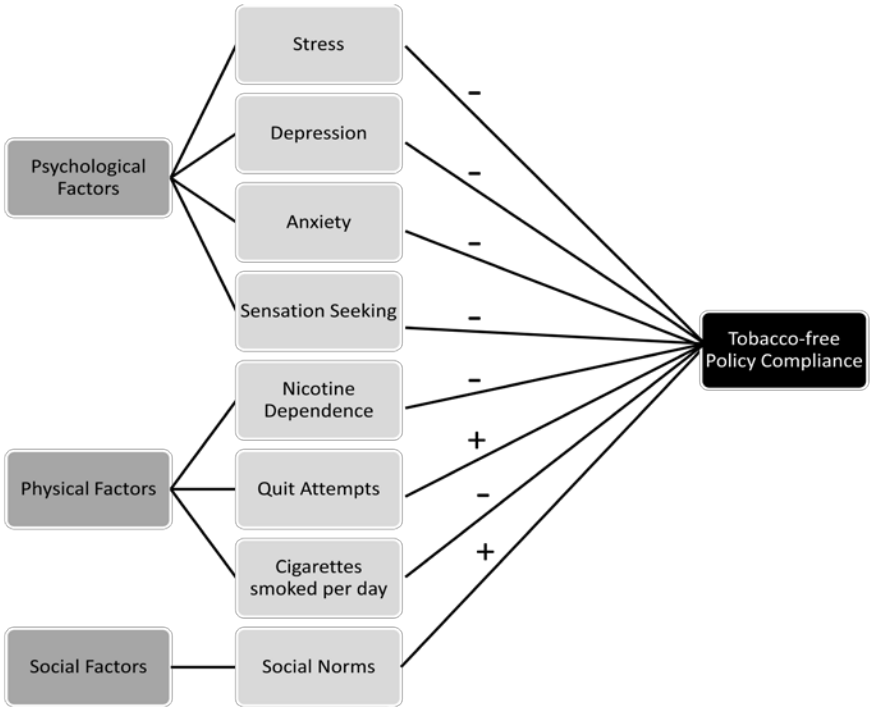
tobacco-free campus policy compliance, which will include psychological, physical, and social factors. The hypothesized predictions are modeled in Figure 1. The hypotheses and research question related to this aim are as follows:

H_1: Lower reports of stress, depression, anxiety, and sensation seeking will be associated with tobacco-free policy compliance among smokers.

H_2: Lower perceptions of nicotine dependence, higher number of quit attempts, and fewer cigarettes smoked per day will be associated with tobacco-free policy compliance among smokers.

H_3: Perceptions of social approval of compliant behaviors will be associated with tobacco-free policy compliance among smokers.

Figure 1. Hypothesized Predictions of Tobacco-free Policy Compliance



Improving Tobacco-free Policy Compliance

Another aim of this study is to investigate the effects of a campus-wide campaign on reported level of policy compliance and observed campus smoking behaviors, controlling for individual level factors. The hypotheses related to this aim are as follows:

H_4: The greater the intervention exposure, the higher the level of self-reported smoker compliance with UK's tobacco-free policy.

H_5: The number of observed smokers will decrease post-intervention compared to baseline.

Summary of Literature Review

Research findings suggest that the best way to enforce compliance to a tobacco-free policy is to request smokers to decide (on their own accord) to comply with the

policy (Cho & DeVaney, 2010; Niles & Barbour, 2011; Plaspohl et al., 2012). However, little research exists on best strategies for encouraging compliance among smokers. Research that does exist has just started exploring the best frameworks for guiding such tobacco-related policy compliance investigations. For instance, previous research suggests that fear appeal strategies may not be the most successful approach for changing behaviors (e.g., Hastings, Stead, & Webb, 2004; Keller, 1999; Krisher, Darley, & Darley, 1973), including attempts to scare violators into compliance (see Record, Unpublished data). Based on previous research demonstrating the strong relationship between attitudes, social norms, and behavioral control, the theory of planned behavior (TPB; Ajzen, 1988; 1991) will guide this investigation.

Theoretical Framework

The theory of planned behavior (TPB; Ajzen, 1988, 1991) is one of the most cited and employed theories in social scientific research (Ajzen, 2011). Stemming from a long history of theoretical testing and development, the TPB has been found to be an effective framework for explaining and predicting various behavioral outcomes. The majority of investigations that have used the TPB have focused on preventative (e.g., don't try a cigarette) and adoptive (e.g., quit smoking) behaviors (Montaño & Kasprzyk, 2008). Fewer investigations have examined the TPB's explanatory and predictive power with regard to compliance behaviors (e.g., don't smoke in smoke-free areas). Before demonstrating the theory's potential for guiding tobacco-free policy compliance related investigations, this section of the report offers a brief history and explanation of the TPB.

Expectancy-value Theory and the Theory of Reasoned Action

To understand the TPB, one must first understand the two frameworks that

provided the foundation for the TPB. The first is expectancy-value theory (EVT). EVT was based on the idea that people have two types of beliefs: (1) beliefs in the existence of a thing and (2) beliefs about a thing (Fishbein, 1967). For example, people can believe lung cancer exists (i.e., beliefs in a thing) and they can believe lung cancer is bad (i.e., beliefs about a thing). Fishbein's EVT posits that it is these beliefs that influence attitude and that attitude is a major factor in behavioral decision making. In addition, EVT also assumes that beliefs about how others want a person to behave (i.e., subjective norms) will also be a major predictor of behavior. Thus, EVT suggests that our behaviors are directly determined by our attitudes and subjective norms.

The second theory that is important to understand is the theory of reasoned action (TRA) proposed by Fishbein and Ajzen. The name for the TRA stems from Fishbein and Ajzen's theoretical assumption that humans are rational actors who use the information at their disposal to make judgments, form evaluations, and arrive at decisions (Fishbein & Ajzen, 1975). The TRA builds directly from the EVT with two key changes. The first is the addition of the construct of behavioral intention as a mediating variable for behavior. The TRA assumes that the best predictor of actual behavior is the intention to perform the behavior. with behavioral intention determined by attitude and subjective norms (Littlejohn & Foss, 2008).

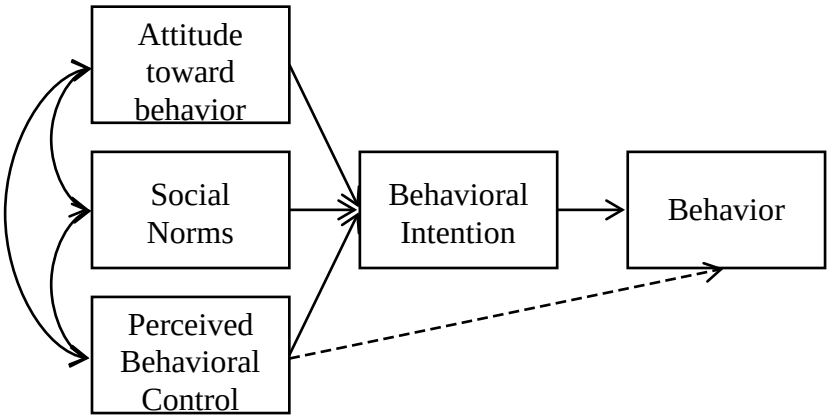
The second major change in the TRA from EVT is the conceptualization of attitude. In EVT attitude can refer to attitudes toward an object (e.g., lung cancer). In the TRA, attitude is the assessment of beliefs with regard to a behavior (Fishbein & Ajzen, 1975). For example, EVT could operationalize attitude with the statement "lung cancer is bad." However, the TRA posits that the belief about objects will not be as accurate for

behavioral predictions as the beliefs about behavior (Fishbein & Ajzen, 1975). Thus, the TRA could operationalize attitude with the statement “smoking cigarettes is bad.” In sum, the TRA suggests that attitudes (i.e., behavioral beliefs) and subjective norms predict behavioral intention which, in turn, predicts actual behavior.

The Theory of Planned Behavior

Built as an extension of the TRA, the TPB adds one crucial construct to the framework: perceived behavioral control. The TPB model can be seen in Figure 2. Perceived behavioral control refers to beliefs about the ease and/or difficulty of performing a behavior, such as time, money, skills, and cooperation of others (Ajzen, 1991). Ajzen (1988) proposed the addition of perceived behavioral control to account for situations when people’s behavior, or behavioral intention, is influenced by factors beyond their control. He hypothesized that perceived behavioral control could have a direct or indirect effect on behavior depending on the behavioral context. He provided two justifications for this construct having a direct effect on behavior. First, the ability to successfully perform a behavior may outweigh the feeling of control over a behavior. For example, two people may feel like the decision to quit smoking is up to them (i.e., in their control); however, the one who feels like he/she will actually succeed in quitting smoking will be the most likely to attempt to quit. The second justification for the direct effect of perceived behavioral control is that the perception of control can be used as a measure of actual control (Ajzen, 1991). The hypothesized indirect effect would impact behavioral intention along with the constructs of attitude and subjective norm.

Figure 2. Theory of Planned Behavior



(Ajzen, 1988; 1991)

Perceived behavioral control has received inconsistent support for which path (i.e., direct or indirect) is the most predictive of behavior (Montaño & Kasprzyk, 2008). Ajzen (1991) reviewed findings from previous TPB investigations to attempt to discern a pattern for which path is more predictive with what types of behaviors. He expected to find that behaviors of habit or behaviors that are difficult to have personal control over would have a direct effect on behavior and that behaviors that are less difficult to perform would have an indirect effect on behavior. However, he found no pattern, and research is still investigating justifications for why one path is more significant than the other in particular contexts.

Conceptualizing and Operationalizing the TPB Constructs

Of all of the constructs in the TPB, attitude is the one that has received the most attention and debate over the decades, with the most influential works stemming from the 1930s (e.g., Allport, Nelson, & Thurstone) and 1960s (e.g., Campbell, DeFlour, Greenwalk, & McGuire; see Fishbein & Ajzen, 1975). The turning point for the

conceptualization of attitude as we know it today came in 1975 with Fishbein and Ajzen's justification for determining behavior through the assessment of behavioral beliefs (i.e., behavioral-related attitudes). Thus, as in the TRA, the TPB conceptualizes attitude as the degree to which one has a favorable or unfavorable evaluation of a behavior. Like its conceptual definition, the operational definition of attitude has also varied significantly, with Fishbein and Ajzen (1975) reporting having reviewed over 500 distinct ways of operationalizing attitude. Ajzen (1991) suggests that attitude should be operationalized by the dimensions of behavioral beliefs (e.g., smoking will cause cancer) and behavioral evaluation (e.g., smoking is bad). For the current study, attitude is conceptualized as the degree to which one has a favorable or unfavorable evaluation of tobacco-free policy compliance.

Ajzen (1991) conceptualized subjective norms as the perceived pressure to perform or not perform a behavior. The subjective norms construct is determined by both normative beliefs (i.e., specific individuals/groups of individuals that would approve or not approve of performing a behavior) and motivation (i.e., motivation to behave how specific individuals/groups of individuals want a person to behave). Ajzen operationalized subjective norms by the dimensions of normative beliefs and motivation. Many researchers only assess normative beliefs as an operationalization of subjective norms with no assessment of motivation (e.g., Anderson & Lavallee, 2008; Chen & Chen, 2011; Mercken et al., 2011). In addition, some researchers have utilized descriptive norms (e.g., percent of individuals/groups of individuals that smoke) as an operationalization of subjective norms (Montaño & Kasprzyk, 2008). The concern with the use of descriptive norms as an assessment measure is that it does not directly address

pressure to perform a behavior, which the conceptual definition suggests is important. For the current study, subjective norms were conceptualized as the perceived pressure to comply or not comply with a tobacco-free policy.

Ajzen (1991) conceptualized perceived behavioral control as the degree to which one feels performing the behavior will be easy or difficult. Perceived behavioral control differs from other cognitive control constructs in that it is not a stable sense of control, such as locus of control, but is a context dependent sense of control and is broader than (but inclusive of) measures of ability (where as self-efficacy is strictly a measure of perceived personal ability). Perceived behavioral control was initially operationalized by the dimensions of control beliefs (e.g., it is up to me whether or not I smoke a cigarette) and power (e.g., I am capable of quitting smoking; Ajzen, 1991). For the current study, behavioral control was conceptualized as the degree to which one feels complying with the tobacco-free policy is easy or difficult.

With regard to all three constructs, the format of the scales used to operationalize the constructs has varied considerably. Fishbein and Ajzen (1975) suggested that all measures should be operationalized on a -3 to +3 bipolar scale. However, Ajzen (1991) has since retracted this requirement and has suggested that the decision of scale format is context and researcher dependent; that is, some circumstances will better support operationalizations on a unipolar one to seven scale and some will better support operationalizations on a bipolar -3 to +3 scale. In addition, he notes that regardless of which of the two measurement formats is used, the reliability of the scale (for any of the three constructs) should be between .75 and .8. Some researchers have continued to use the -3 to +3 bipolar measures (e.g., Anderson & Lavallee, 2008; Mercken et al., 2011;

Montaño & Kasprzyk, 2008), whereas others have preferred to use alternative measures (e.g., Chen & Chen, 2011; Swaim et al., 2007). The measures section will review the scales used for each TPB variable.

Summary of Theory Development

In sum, the TPB is a cognitive framework with three key constructs: attitude, subjective norms, and perceived behavioral control. These constructs are important to behavioral performance because the human mind can only attend to a small number of beliefs at a time, and these three sets of beliefs are the most salient with regard to behavioral decision making (Ajzen, 1991). Thus, these three constructs predict behavioral intention, which predicts actual behavior (although occasionally, perceived behavioral control will directly predict actual behavior). Because attitude, subjective norms, and perceived behavioral control are the most important beliefs for behavioral decision making, it is assumed that all other influential factors (e.g., culture, personal experience) operate through these three constructs and do not have a direct effect on behavior (Rimer & Glanz, 2005). The TPB is a context specific model that will produce varying results depending on the behavior being advocated (Ajzen, 1991). This variance is due to some behaviors being more influenced by one construct over the other (Montaño & Kasprzyk, 2008). For example, research has found that smoking-related behaviors are most greatly determined by subjective norms (e.g., Mercken et al., 2011; Swaim et al., 2007), whereas compliance-related behaviors are most greatly determined by perceived behavioral control (e.g., Anderson & Lavallee, 2008; Moan & Rise, 2011).

Strengths and Weaknesses of the Theory of Planned Behavior

The TPB has a well-established foundation in communication research. In

addition, the TPB has the highest scientific impact score of any social science theory among United States and Canadian psychology research (Ajzen, 2011). Montaño and Kasprzyk (2008) discussed two major strengths of the TPB. First, the theory has hypothesized causal relationships among the key components with clearly specified measurement and computation directions outlined by Fishbein and Ajzen. Second, the theory provides a framework to identify key behavioral, normative, and control beliefs affecting behaviors. This framework allows for interventions to be designed in a way so as to target and change these beliefs, thereby affecting attitude, subjective norms, and/or perceived behavioral control, leading to changes in intentions and behaviors. For instance, in the current intervention targets the variable of social norms through images of the university campus, attitudes through statements related to compliance, and behavioral control through an empowering slogan.

However, some have argued against the use of the TPB. The main reason for rejection of the TPB as an adequate framework for predicting behavior has been for its underlying assumption that humans are rational actors (Ajzen, 2011). Beyond that foundational criticism, McCaul, Sandgren, O'Neill, and Hinsz (1993) presented three specific criticisms of the TPB. First, they suggest that the model does not take enough influential factors into consideration (e.g., personal experience). Second, they point out that attitude has been known to have a direct effect on behavior. Third, they argue for the need for additional causal elements, such as emotional reaction to messages.

Tests of the Theory of Planned Behavior

These criticisms aside, the TPB has been tested and found to be an effective model in various health-related behavior contexts. For example, Sheeran and Taylor

(1999) conducted a meta-analysis of TPB investigations of condom use and found the TPB to be a significant predictor of intention to use a condom. Similarly, Cooke and French (2008) conducted a meta-analysis to look at the TPB's predictive ability for attendance at screening prevention programs. Findings in this meta-analysis also supported the model as a significant predictor of behavior. Other behaviors that have found the TPB to be a significant predictor of behavior include binge drinking (e.g., French & Cooke, 2012; Gardner, Bruijn, & Lally, 2012), flossing (e.g., McCaul et al., 1993), and breast cancer self-exams (e.g., McCaul et al., 1993).

Investigations of the TPB in smoking-related contexts have found similar support (e.g., Hiemstra, Otten, & Engels, 2012; Mercken, Candel, van Osch, & de Vries, 2011; Swaim, Perrine, & Aloise-Young, 2007). For example, Mercken et al. (2011) used the TPB to predict adolescent smoking behaviors. Specifically, the researchers sought to expand on the subjective norms construct by including an assessment of perceptions of future friends. Findings suggest that the TPB is an effective model for predicting smoking behaviors with intention, previous smoking, and norms as the most predictive constructs. Similarly, Swaim et al. (2007) tested the TPB for predicting lifetime cigarette use among fourth through sixth graders. Their results supported the TPB, in this case, as being a model capable of predicting lifetime smoking behaviors from a very young age.

These successes aside, few studies have assessed the TPB with compliance-related behaviors and even fewer have assessed the TPB with smoking-related compliance behaviors. Although a few TPB compliance-related studies have focused on athletic training adherence (e.g., Anderson & Lavallee, 2008), the majority of TPB studies that assess compliance have been automobile-related behaviors focusing on either

drinking and driving or speeding. For example, Moan and Rise (2011) assessed intentions to drink and drive (i.e., not comply with the no drinking and driving law) using the TPB. The researchers built a regression model to attempt and predict intention to drink and drive. Results of the model found the TPB to be a significant predictor of intention to drink and drive, explaining 10% of the variance.

Similarly, Chen and Chen (2011) assessed intention of motorcyclists in Taiwan to speed (i.e., not comply with the speed limit). The researchers aimed to assess both TPB measures and affective measures (e.g., enjoyment) to build a predictive model for intention to speed. Although the regression model indicated that the TPB constructs were significant predictors of intention to speed, affective constructs were more significant predictors. The researchers concluded that this finding is an indication that noncompliant behaviors may have underlying factors beyond the TPB constructs that need to be controlled for when predicting compliance-related behaviors.

Some research has sought to investigate the effectiveness of the TPB for predicting smoking-related compliance behaviors. For example, Lazuras, Eiser, and Rodafinos (2009) surveyed college students who were members of Greek organizations to attempt to predict noncompliance with public smoke-free policies. Although Lazuras et al. did not intend to specifically test the components of the TPB, they did include the constructs of the TRA in the regression model. The researchers found three constructs to be significant predictors of smoke-free policy noncompliance explaining 40% of the variance: normative beliefs, tobacco dependence, and support for smoke-free policy.

Lazuras et al.'s (2009) study is important for future TPB smoking-related compliance investigations for two key reasons. First, their findings support Chen and

Chen's (2011) hypothesis that there are underlying factors beyond the TPB constructs that can help predict compliance and should be statistically controlled. Lazuras et al.'s investigation found tobacco dependence and support for smoke-free policies to be such constructs with regard to smoking-related compliance behaviors. Second, the researchers did not include measures of perceived behavioral control. Previous TPB investigations of compliance behaviors have consistently found perceived behavioral control to be the most significant predictor of compliance behaviors (e.g., Anderson & Lavallee, 2008; Chen & Chen, 2011; Moan & Rise, 2011). Therefore, inclusion of perceived behavioral control could have helped explain more model variance.

Theory of Planned Behavior and Tobacco-free Policy Compliance

A final aim of this study is to design and pilot test theoretically-informed, culturally appropriate intervention messages to improve tobacco-free policy compliance. The following research question and hypothesis will guide the investigation of this aim:

RQ_1: What do undergraduate students perceive as effective print-based messages for encouraging tobacco-free policy compliance?

H_6: Attitudes, perceived social norms, behavioral control, and behavioral intention related to tobacco-free policy compliance will be associated with tobacco-free policy compliance.

H_7: Attitudes, perceived social norms, behavioral control, and behavioral intention related to tobacco-free policy compliance will improve with greater campaign exposure.

Summary of the Theory of Planned Behavior

The TPB has a long history of being an effective model for explaining and

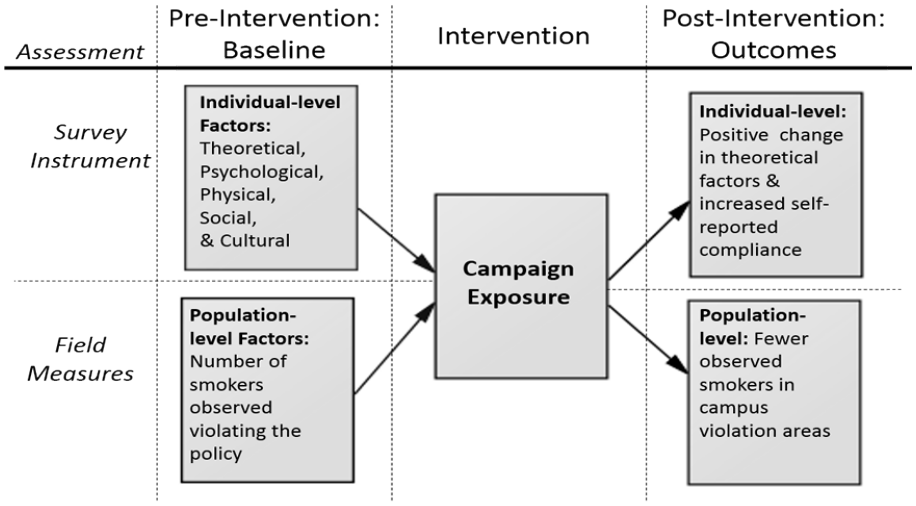
predicting health-related behaviors (Rimer & Glanz, 2005). Compliance behaviors are a less studied behavior-type for TPB investigations; however, the existing investigations hold promise for the use of the TPB for explaining and predicting compliance-related behaviors. Previous research has found the TPB to be an important model for specifically understanding behavioral decisions of college-aged students (e.g., French & Cooke, 2012). In addition, the TPB has been found to specifically explain and predict smoking-related behaviors both generally (e.g., Hiemstra et al., 2012; Swaim et al., 2007) and among college students (e.g., Mercken et al., 2011). TPB investigations of compliance-related behaviors have continued to support the use of the theory for predicting compliance (e.g., Anderson & Lavallee, 2008; Chen & Chen, 2011; Moan & Rise, 2011); TPB constructs have even specifically been found to be significant predictors of smoke-free policy compliance (e.g., Lazuras et al., 2009). In addition to the model being a significant predictor in all these contexts, the constructs have been shown to be uniquely important to smoking and compliance behaviors. That is, subjective norms have been found to be the most significant factor in smoking-related investigations (e.g., Mercken et al., 2011; Swaim et al., 2007), perceived behavioral control has been found to be the most significant factor in compliance-related investigations (e.g., Anderson & Lavallee, 2008; Moan & Rise, 2011), and previous campaign research has found the most important construct for campaigns to consider is attitude (Wang, 2009). Therefore, the TPB will provide important explanations of compliance, potentially predict compliance behaviors, and will provide strong foundation for an intervention campaign.

Research Approach

In order to investigate tobacco-free policy compliance on a college campus this

study was conducted in two phases. During Phase One, messages were tested and selected for use in the campus-wide campaign. Phase Two encompassed two purposes. First, survey data weres collected to investigate potential predictors of tobacco-free policy compliance. Second, a campus-wide campaign was implemented with the aim of improving tobacco-free policy compliance; tobacco-free policy compliance was investigated at both the individual (via survey responses) and the population (via counts of policy violators) level of compliance. The research plan is displayed in Figure 3.

Figure 3. Research Plan for Assessing Tobacco-free Policy Compliance



Chapter Three

Phase One Methods

Procedures

Phase One assessed research question one. Due to the effectiveness of print campaigns for encouraging positive behavior change (e.g., Pittet et al., 2000; Potter, Moyniham, Stapleton, & Banyard, 2009; Saarela, 1989), this study sought to develop and test a campus-wide, theoretically-informed campaign that included the print materials of posters and yard signs. This phase was a descriptive phase to develop and pilot-test the theoretically-informed messages that were used in the campus-wide campaign. Due to previous smoke-free policy investigations that found that undergraduate students (including smokers) will openly discuss university smoking policies (Baillie, Callaghan, & Smith, 2011), data from Phase One relied on qualitative conversations with undergraduate smokers. Approval for Phase One was received from the Institutional Review Board at the University of Kentucky.

Phase one began with the collection of tobacco-related messaging materials that could be discussed with undergraduate students. Thirty-four nationwide tobacco-prevention campaigns listed on the CDC's *Media Campaign Resource Center* database of messages (http://www.cdc.gov/tobacco/media_campaigns/ index.htm) were reviewed and categorized as either adaptable for the purpose of increasing tobacco-free policy compliance or not adaptable. To be categorized as adaptable, the messages had to address–or have the potential of addressing–all of the TPB constructs in the message and/or the image. That is, all of the messages had to address attitudes, subjective norms, and behavioral control in some way. From the 34 campaigns, 14 messages were

categorized as adaptable. These messages were taken to an expert panel of four faculty members; one faculty member was an expert in tobacco, two in campaigns, and one in message design. This committee discussed the 14 messages and selected nine to be adapted for this project.

The adaptation process started with a Google image search of possible images of UK's campus and student body that could pair with the idea of the message (e.g., if the message was from a business owner the Google image selected was of UK's president). Each message was carefully adjusted from the previous focus (e.g., cessation, policy support) and tailored to be specifically about tobacco-free policy compliance on UK's campus. The nine draft messages were taken to UK Public Relations as models to request their support in providing professional photos to be used in the campaign. UK Public Relations provided a selection of 50 images that could be used for this study. All images taken to focus groups were from these 50 images.

In addition to the adapted messages, four slogans were also designed for use on the messages. The slogan would be one brief statement used on every message; this would clearly identify the messages as part of the same campaign. The four slogans taken to focus groups were *Choose to Comply, It's Not Cool to Smoke on Campus, Let's Clear the Air, Respect the Policy*. These slogans were selected based on conversations with experts at the University's Tobacco Prevention Center. focus group participants were asked to share thoughts on both the adapted messages and on the four slogans.

The adapted messages were presented to six focus groups of six to twelve undergraduate communication students who had smoked at least one cigarette in the last 30 days. Before signing up for a focus group, participants followed a Qualtrics link to a

survey and answered the question: *Have you ever smoked a cigarette on UK's campus?* Participants were then grouped by compliance behaviors, with two focus groups of students who reported having ever smoked on UK's campus and four focus groups of students who reported having never smoked on UK's campus. All focus group sessions were held by the primary researcher in a conference-style room. Each session lasted for approximately one hour and was conducted in two parts. During the first part of the session, participants spent approximately five minutes completing a Qualtrics survey; the survey items asked about demographic and smoking-related questions (see Appendix A). The remaining time was for the focus group conversation that evaluated the nine adapted messages (see Appendix B for focus group protocol); this part of the session was recorded and later transcribed.

The question protocol used in Phase One was adapted from the protocol used in Baillie et al. (2011). The session began by the primary researcher reminding the participants of UK's tobacco-free policy (i.e., *In 2009 the University of Kentucky implemented a tobacco-free campus policy. This means that on any campus property, such as streets, sidewalks, parking lots, parking garages, or in vehicles, tobacco products of any kind are not allowed.*). Participants were then asked to evaluate each of the four potential slogans (i.e., *Choose to Comply, It's not Cool to Smoke on Campus, Let's Clear the Air, Respect the Policy*) and then each message individually. Evaluations for each message included the following questions: *What are your first reactions to this message?; What do you think about the text message alone?; What do you think about the image alone?; How well does the message and the image work together?;* and *How effective do you think this message would be at increasing compliance to our tobacco-*

free policy. Upon focus group conclusion, participants were asked to share any additional thoughts they had about any of the messages they saw.

A final set of five messages was selected based on focus groups reactions to the nine messages they were presented. All five of the messages were changed, one last time, based on feedback from the focus groups. Three of the images used in the messages were from the selection provided by UK PR. The other two images were taken by the primary researcher for use in this project. All of the images featured undergraduate students who signed forms agreeing to their photo being used for this study. The printing of the final 550 posters (color printed on 11" X 17" paper with UV coating) and 18 color printed yard signs (for areas with minimal message boards) was funded by UK Public Safety ($1,000). Appendix F presents the transitions that the final five messages selected for the campaign went through from model to final product.

Participants and Recruitment

The purpose of Phase One was to create and focus group test theoretically-based messages to be used in the campus-wide campaign. Sixty-five undergraduate students enrolled in lower division courses in the College of Communication & Information were recruited to participate in one of six, one-hour focus group sessions. Recruitment of students was achieved through SONA, the Department of Communication's undergraduate research-recruitment system, which exchanges study participation for required class credit. To be eligible to participate, students had to be at least 18 years of age and to have smoked at least one cigarette in the last 30 days. On the SONA website, interested participants followed a Qualtrics link to a survey and answered the question: *Have you ever smoked a cigarette on UK's campus?* Participants were then grouped by

compliance behaviors with two focus groups of students who reported having ever smoked on UK's campus and four focus groups of students who reported having never smoked on UK's campus.

Of the 65 participants, 45 (69.2%) were male and 20 (30.8%) were female. Participant ages ranged from 18 to 25 (M = 19.1, SD = 1.6). Most participants were freshman (n = 40, 61.5%) and fewer were sophomores (n = 14, 21.5%), juniors (n = 7, 10.8%), or seniors (n = 4, 6.2%). Ethnic representation among participants included White (n = 53, 81.5 %), Asian (n = 7, 10.8%), Hispanic (n = 1, 1.5%), and other (n = 4, 6.2%). All participants had smoked at least one cigarette in the last month. Compliance behaviors for these participants were as follows: has never smoked on campus (n = 21, 32.3%), rarely smokes on campus (n = 18, 27.7%), occasionally smokes on campus (n = 15, 23.1%), often smokes on campus (n = 5, 7.7%), and frequently smokes on campus (n = 6, 9.2%). Of the participants who reported having ever smoked on campus (n = 44), only five (11.4%) reported having ever been approached and asked to comply with UK's tobacco-free policy. Among these 44 participants, their self-reported average weekly violation ranged from one to 20 cigarettes smoked on campus each week (m = 2.8, SD = 3.7). Most of these participants reported violating most often on University sidewalks (n = 23, 35.4%) and around the dorms (n = 22, 33.8%). Participants also reported violating outside of Whitehall Classroom Building (n = 12, 18.5%), the student center (n = 6, 9.2%), the hospital (n = 5, 7.7%), in the international complex (n = 3, 4.6%), and areas other than those previously listed (n = 6, 9.2%).

Chapter Four

Phase One Results

The research question for Phase One asked what undergraduate students perceived as effective messages for encouraging tobacco-free policy compliance. Focus group data were analyzed to address this research question. Once focus groups were completed the audio recordings were transcribed and analyzed by the primary researcher and a secondary coder. The focus group transcripts were analyzed using a thematic open coding analysis methodology (Boyatzis, 1998; Creswell, 2013; Lindlof & Taylor, 2002). Open coding is an initial coding process that allows for major themes or categories of information to arise from the data itself as the coding is unrestricted (categories have not yet been defined; Creswell, 2013; Lindlof & Taylor, 2002). From there, the researchers engaged in axial coding to identify theoretical subcategories surrounding message reactions. Axial coding results in collapsed categories with deeper meanings by making connections between the themes or categories identified in open coding and allows for subthemes to be identified (Creswell, 2013; Lindlof & Taylor, 2002).

The qualitative investigation used a theoretical-thematic analysis to explore perceived effective attitudes, subjective norms, and behavioral control in the context of tobacco-free policy compliance among undergraduate students. In the context of attitude, there was some overlap in coding (by both the primary and secondary coder) with subjective norms and behavioral control. For example, teasing out when emphasizing nonsmoker health was an attitude and when it was behavioral control was subjectively difficult. In these circumstances the categories defaulted to attitude. Thus, attitude may appear to be the most thoroughly covered construct; however, it is also the broadest category with some overlap into the constructs of subjective norms and behavioral

control. The constructs of subjective norms and behavioral control are purposely more streamlined and focused for the ease of analysis and discussion. The final messages used in the campaign were created based on the qualitative feedback that will be discussed in the following paragraphs. See Appendix F for the transition process that all five of the final messages went through.

Attitude

Focus group participants discussed attitudes that would be both effective and ineffective for messages aimed at increasing compliance with UK's tobacco-free policy. Within the discussions of effective and ineffective strategies, participants talked both about attitudes in the message content and attitudes about the message aesthetics. All of these different angles of attitude will be discussed in the following paragraphs. The discussion will begin with conversations of ineffective message content focused on components within the message design that led to negative attitudes about the message.

One ineffective attitude was a portrayal of messages in a juvenile or childish way. For example, when reflecting on the slogan *It's not cool to smoke on campus*, one participant said, "*I feel it's kinda more like a younger type scenario because when you're younger you're more concerned about being cool and what not but when you get older it kinds of goes away*." Another participant echoed a similar statement with the following: "*I think of an after school special. We're not kids anymore. We're not smoking cause it's cool.*" About the same slogan, another participant said, "*I think people will laugh at it*." Beyond the slogan, some messages that came off as juvenile were also discussed in a similar way. For example, when discussing a message that was not included in the final five messages, one participant specifically said, "*kinda juvenile*" and later elaborated

with the following: "*Specifically, the 'I'm a role model' thing* [referring to the statement in the message]…*it sounds like something a 13 year old kid would say*." Thus, participants were very quick to discourage messages that implied college students were in anyway kids or immature.

Another ineffective attitude focus was messages that came off too harsh for fear of reactance. For example, one message implied that compliance was the "smart" decision, and participants responded fairly defensively. One participant explained,: "*I think maybe it can be a little offensive because it's saying you're smart but you're smoking so it's kind of calling you not smart.*" Similarly, another participant retaliated against the message by saying the following: "*One thing that's gonna go through my mind is that you had the audacity to implement in a smoke-free policy but I'm still getting away with it, so.*" A few participants even noted that offensive messages could persuade them to smoke more while on campus; for instance, on participant said: "*It is off putting. I would be, I would probably just straight up do more.*" Similarly, in response to an image of UK's president next to the statement "I'm sick of the disrespect," participants gave comments such as "*It's kind of harsh," "It's way too harsh,*" and "*I think it's too negative*". In a similar vein, participants also didn't think discussing the punishment of noncompliance was a motivating emphasis. For example, one participant stated: "*I feel like after a couple weeks of being a freshman you realize that you're not, you're not going to get in trouble*." Generally, participants felt like getting punished for not complying with the tobacco-free policy was so unheard of that it wouldn't move people to consider compliance. Messages that tried to make a point through emphasizing intelligence, through harsh feelings, or through emphasis of punishment were

immediately disliked by focus group participants with regard to the potential effectiveness of increasing tobacco-free policy compliance.

An additional point of discussion had to do with the length of a message. Although this was not about the attitude conveyed in the message, all focus groups had participants mention multiple times that long messages would simply not get read. Participants held the perspective that for a message to be effective and even be read it would have to on the shorter side. For example, in one focus group session a participant refused to read a few messages on the screen—during the session—simply because of their length. Similarly, it was very important that the attitude being reflected in the message was also clearly reflected in the image. For instance, when referring to a photo of a bunch of students on UK's campus, one participant said: "*I think if it was a more focused picture on something specific, not just a bunch of students.*" In the same vein, another participant remarked approvingly about a picture/message pair focused on a single student: "*It goes along with what's being said, like he has a backpack on and is going to class.*" When these two message components were not in complete agreement then participants had immediate negative reactions to the purpose of the message. Similarly, when messages were short, direct, and consistent with the image participants overwhelmingly approved. Discussions like these demonstrate the structural components required for creating positive attitudes in audiences.

Focus group participants also discussed effective attitudes for increasing compliance with the tobacco-free policy. One of these strategies was a focus on the secondhand smoke effects experienced by nonsmoking undergraduate students. For instance, when responding to the use of a health effects statistic, participants made states

such as, "*I think you would have sympathy for the people around you for sure after that.*," "*It's about looking out for other people not just stop smoking*," and "*It makes me think I can wait a few more minutes to go off campus if I want to smoke a cigarette.*" Within this context, one participant even gave a message suggestion: "*If you really want to get the point across show a picture of somebody standing there smoking and two people having to walk by them.*" In general, participants were moved by messages that focused on the effects of nonsmokers. Specifically, the use of the word "respect" got a lot of attention in all focus groups. For instance, one participant said, "*I think it's good because he respects UK. So like if you smoke campus it's like you don't respect UK so I think it's good.*" Another participant explained, "*I would feel obligated* [to comply] *just because it says respect.*" Even if messages didn't directly discuss nonsmokers, messages that could lead someone to consider nonsmokers were also deemed as an effective strategy for increasing tobacco-free policy compliance. For instance, in response to the slogan "Let's clear the air," one participant stated,

> That's the one that would get me. I mean I hardly ever smoke on campus but, and the biggest reason is because I don't want other people to have to smell it if they're allergic or they just don't like the smell.

Although the slogan did not directly discuss the harm to others, the slogan caused participants—like the one quoted above—to think about the impact their smoking would have on others. Again, thinking about the impact on others was, across all focus groups, deemed as an important message focus for increasing compliance.

Another recommended strategy for encouraging positive attitudes was the use of messages that did more than just provide a "comply" statement but also included at least

a short "why" or "how" statement. For instance, in response to a message about using nicotine replacement products one participant remarked, "*I like how it's offering a way, like help, in some way. It's not just telling you to stop, go do this, or giving you something to do*." This was also part of the rationale for why the participants perceived messages that discussed the harms to others as effective—it provided a reason that someone should comply with the tobacco-free policy. For instance, when responding to a message that provided a statistic of health effects smoking has on others one participant shared the following: "*This one is actually pretty good. It tells you that it actually hurts people.*" Another participant suggested that a focus on environmental impact may provide a motivational rationale for noncompliant smokers: "*Maybe like directing you to help keep the campus clean or something like that that might be a more, you know, directed towards some goal that are not like, just stop smoking on the campus!"* The statements given here demonstrate that providing a rationale can help motivate people to consider compliance.

A final effective attitude strategy was through the use of known and relatable people. For example, one participant made the following remark:

> I like that it uses an authoritative figure, like our university's president, because people look up to him. If someone like him is saying something like this like for the tobacco-free policy then people will be more likely to listen to it.

The participants noted that it was important that the message appeared to be coming from fellow students. For example, one participant said, "*I like how it's coming from a student and you're not being told to stop smoking.*" Featuring fellow students—even more than known campus figures—strongly contributed to messages being received positively.

Similarly, the importance of the image portraying a well-known area on campus was discussed in all focus groups. For instance, one participant suggested changing a photo and gave the following explanation:

> I feel like it could use more like a well-known area of the campus, like Willie T. or an area everyone goes to. So like, it's very symbolic but if someone was walking by who didn't really know the school they wouldn't know.

Being able to recognize the location of the image had the effect of creating positive attitudes of relevance for the participants.

In sum, participants were dissuaded to comply with UK's tobacco-free policy when the message was perceived as too harsh or too juvenile. Similarly, messages that were too wordy or inconsistent with the image were also not deemed effective at increasing willingness to comply with UK's tobacco-free policy. However, messages that focused on the health of nonsmokers, justified compliance with a reason, and pictured UK individuals and landmarks were perceived as effective for increasing compliance with UK's tobacco-free policy.

Subjective Norm

With regard to the context of subjective norm, participants discussed both the current smoking-related norms on campus and strategies for combating noncompliant norms. To begin, participants described the smoking-related norms on campus to be centered on the lack of enforcement of the tobacco-free policy. Participants in all focus groups discussed the feeling that the tobacco-free policy at UK was not enforced. Participants made statements such as, "*I feel like punishments might have happened, somebody might have been expelled or somebody might have been fired but it was*

probably in 2009 or 2010 when they were trying to make a statement but not anymore," "*Yea I feel like after a couple weeks of being a freshman you realize that you're not, you're not going to get in trouble,*" "*There's hardly any consequences. Like the chances of you getting caught by someone who can actually punish you for it is like slim to none,*" and "*So many people do smoke on campus on a daily basis and it never gets addressed.*" The belief that UK's tobacco-free policy wasn't enforced seemed to foster the perception that no smokers complied with the tobacco-free policy. Numerous statements were made in all focus groups that suggest this, such as, "Y*ou see so many people smoke on campus every day," "I feel like most people don't care that it's a smoke-free campus,*" and "*So many people do smoke on campus on a daily basis and it never gets addressed.*" Similarly, participants discussed that there is an unwritten understanding of designated smoking areas on campus. For example, participants made remarks such as, "*You can always find the smoker's areas kind of hidden over in the corners,*" "*I mean I just like the idea of a tobacco-free campus is enough to make people be halfway respectful when they do it,"* and "*Usually the smokers have their own section.*" This perception is critical with regard to understanding tobacco-free policy compliance because it suggests that a lack of enforcement can cause people to believe that it is okay to smoke on UK's campus. The importance of this misperception was demonstrated in some of the participant statement. For example, one participant said, "*When somebody lights it up, like I saw somebody light it up walking through campus and I was like 'I guess it doesn't really matter'.*" Another participant echoed this sentiment with the following statement: "*I saw somebody light it up walking through campus and I was like I guess it doesn't really matter."* Thus, the perceived norms of no enforcement, which led to a perceived normalization of

noncompliance, is incredibly important because it can increase noncompliant behaviors on campus.

Focus group participants emphasized a few strategies for combating the perceived social norm of noncompliance that persists on UK's campus. First, participants encouraged messages that focused on the impact that noncompliance has on the university, such as on nonsmokers, UK's reputation, and the environment. Statements from participants that demonstrate this include "*It's about helping more than just you, I guess, it's about helping the environment*," "*It's kind like respect for more than just the university too I guess, cause it's hitting everybody, not just students*," and "*A statement like 'choose to comply' or the other one, it's saying it's not just you it affects everybody*." Another recommendation from participants was to avoid statements that imply everyone feels a particular way. For instance, in response to a message that read "UK students deserve a tobacco-free environment," participants made claims such as, "*When it says UK students I think not all of them expect it. So I guess it's generalizing people who don't necessarily believe in it*," and "*I would immediately assume it was that one student and that's one student. And right now there's five that differ*." As a final suggestion for combating perceived norms of noncompliance, participants emphasized finding the balance between stereotyping smokers and showing images that they could relate to. For example, one participant gave the following explanation:

> Something that kind of annoys me with like don't smoke ads and what not is that it's just kind of like, it doesn't actually ever address someone who smokes. It never like, it doesn't picture that or anything like that, it just kind of like, everyone else. You have to make it about the person smoking because they're the

ones that have to stop.

Other participants echoed this sentiment with statements such as, "*You gotta think who you're talking to,*" and "*If you want to hit home with smokers you have to show what they are.*" These were the primary strategies provided by focus group participants as a way to directly address the perception that the tobacco-free policy at UK isn't enforced and that no one complies with the tobacco-free policy.

In sum, the perceived norm on UK's campus is that the tobacco-free policy is not enforced. This leads to a secondary perception that no one complies with the tobacco-free policy. This is a major problem because these two misperceptions are the rationale that some smokers use to justify smoking on campus. Participants provided three key strategies for combating the perceived noncompliance on UK's campus. These strategies were a focus on the impact of noncompliance, not over-generalizing beliefs, and finding the balancing between relating to smokers without stereotyping them.

Behavioral Control

The behavioral control-related statements made by participants suggested specific components of the messages that would be persuasive enough to make the reader want to comply with UK's tobacco-free policy. It is important to first mention that in each focus group at least one participant discussed the magnitude of the task of encouraging tobacco-free policy compliance. Participants made statements to this challenge, including "*If they want to smoke then they're gonna smoke*," "*People are gonna smoke a cigarettes on campus, they're not gonna' care at all*," and "*They'll just keep doing it more*". However, the majority of focus group participants were able to support that some messages, they felt, would be effective at increasing compliance with UK's tobacco-free

policy. Although it was often difficult for the focus group participants to elaborate on why they felt one message would be more effective than another, participants were able to identify some strategies that they felt would be effective at influencing people to either want to comply, or to feel capable of complying, with UK's tobacco-free policy.

One such strategy was featuring people that are relatable to the typical UK undergraduate student, such as other students or prominent UK figures. One participant demonstrates this with the following statement in response to a message that feature UK's president.

> I like that it uses an authoritative figure, like our university's president, because people look up to him. If someone like him is saying something like this like for the tobacco-free policy then people will be more likely to listen to it, kinda think more about it.

In a similar vein, some focus groups debated the motivational strategy of what parts of campus should be featured in the images. One participant gave the following explanation: "*I would kind of keep that in mind because if there's a crowd of people like that, if I'm walking in a crowd of people like that I will not smoke.*" However, a participant quickly followed up this comment discussing how none of the most frequented violation areas on UK's campus are in crowded areas, that images should represent the known violation areas. This second sentiment was the most commonly emphasized in focus groups. Participants felt that the most motivation to comply would come from demonstrations of compliance in typical violation areas (e.g., around Whitehall Classroom Building or Willie T. Library). In general, participants felt that using a person that a UK undergraduate student could relate to or that using images of areas where people violated

would be the most persuasive at encouraging tobacco-free policy compliance.

Another strategy that could make the reader feel capable and willing to comply was using powerful keywords. For example, one participant gave the following statement while reflecting on the use of the word "respect": *"I would feel obligated to comply just because it says respect."* On the other side of the issues, participants felt very strongly that the use of the word "choose" would not result in increased compliance behaviors. For instance, one participant provided the following rationale: *"I think it's based off your opinion, like choose like you're choosing to do it or not and I don't think a lot of people would choose to comply*." Participants across all of the focus groups also felt like statistics were persuasive; however, one participant in most groups pointed out that statistics were also overused and that smokers have heard them and still don't care. For example, one participant remarked, "*We're bombarded with anti-smoking ads and commercials and campaigns constantly. So it's not like we don't know*." Similarly, another participant demonstrated distrust in research statements: "*It doesn't like seem believable first off, so I wouldn't take it into account probably*." Thus, participants felt that the word choice had to be very careful in order to effectively make the reader want to or feel capable of complying.

In sum, although participants struggled to elaborate on why they felt some messages would be more effective than others, they were able to confirm some message strategies that would be more persuasive. These strategies included picturing UK figures, picturing compliance in UK's violation areas, and using carefully selected language. Overall, some messages, as a whole, either did or did not stand out for being able to increase tobacco-free policy compliance at UK, and most often participants were not

always able to articulate why. All of the five messages that were selected as the final messages to be used in the campaign were overwhelming discussed by focus group participants as having potential for increasing tobacco-free policy compliance on UK's campus.

Chapter Five

Phase Two Methods

Procedures

Phase Two assessed hypotheses one through seven. This phase was a quasi-experimental, non-control group design that aimed to (a) understand individual-level factors related to policy compliance and (b) test the effects of a campus-wide campaign on individual- and population-level compliance with the tobacco-free campus policy. Data were collected through survey and observational measures. To incentivize participation to complete the online survey, $800 was designated for use of purchasing 16 $50 checks to be given to randomly selected participants who completed both the pre- and post-intervention survey. Of the $800 used for participant incentives, $500 came from a fellowship in the College of Communication & Information at the University of Kentucky's entitled *Carozza Graduate Fellowship for Excellence in Health Communication*, $200 came from Dr. Nancy G. Harrington's *Douglas A. and Carole A. Boyd's Professor Endowment*, and $100 came from Dr. Matthew W. Savage's Assistant Professor Startup funds. Phase Two occurred in three consecutive stages: (a) pre-intervention for three weeks (February 9th, 2014 through March 1st, 2014), (b) during intervention for four weeks (March 2nd, 2014 through April 5th, 2014, excluding spring break week of March 16th, 2014 through March 22nd), and (c) post-intervention for three weeks (April 6th, 2014 through April 26th, 2014). Each stage of Phase Two will be discussed in detail in the following paragraphs.

Pre-intervention. Pre-intervention data consisted of survey data from an online survey and observational data of tobacco-free policy violators. The individual-level survey data were collected from February 9th, 2014 through March 1st, 2014. This data were used for three purposes. First, the survey data were used to develop models aimed at

predicting smoker compliance with UK's tobacco-free policy. Second, it was used to assess the theoretical relationships of the TPB variables to policy compliance. Finally, the data were used to assess self-reported levels of compliance with the tobacco-free policy. Survey data were collected using an online Qualtrics survey. Participants were recruited through the University of Kentucky's Registrar's office. The Registrar's office provided a list of 15,000 undergraduate students who were invited to complete the pre-intervention survey. The 15,000 participant sample estimate was based on smoker prevalence data from the University's Tobacco-free Task force, which estimated that 30% of participants would qualify as smokers, and on survey data from Cohen and Helme (Unpublished data), which estimated the participation rate to be around 11%. To be eligible, participants had to report having smoked a cigarette in the past 30 days and having smoked at least 100 cigarettes in their lifetime (smoking qualification items from Pierce, Choi, Gilpin, Merritt, & Farkas, 1996). Participants were informed that if they completed both surveys involved in this study (i.e., pre and post) then they could be entered into a drawing for one of 16 $50 checks. Of the 15,000 undergraduate students invited to participate 479 (3.2%) completed the pre-intervention survey.

The observational data were used to assess observed compliance with the University's tobacco-free policy. To determine the necessary number of observations and violation locations that would be needed to assure enough power in the time series analysis being used to test the observational data, a consultation was held with the *Applied Statistics Lab* in the Department of Statistics at the University of Kentucky. Results from a power analysis for repeated measures analysis of variance (ANOVA; Henry, 1990) suggested that a minimum of ten violation locations (with 12 violation

locations preferred) would be needed with at least three observation periods in each location every week. For feasibility reasons, observational data were collected in the ten major violation areas on campus. The specific violation areas on campus were selected based on conversations with the *Tobacco-free Task Force*; their insight of the major violation areas on campus was critical for selecting the locations with the most tobacco-free policy violations. Each of the ten locations was visited three times a week, once a day Monday through Wednesday, for 30 minutes each visit. During data collection a researcher recorded the number of observed smokers in each violation area (by gender), as well as documented the current weather conditions.

During intervention. During intervention data consisted of campaign implementation and observational data collection. After three weeks of individual and population level data collection pre-intervention, the four week campaign began on March 2nd, 2014 and continued through April 5th, 2014. All observational measure procedures that took place during pre-intervention continued during the intervention in all ten of the violation areas (i.e., three 30 minute observation periods in each location each week, once a day Monday through Wednesday). During spring break, the very middle of the project (the week of March 16th, 2014 through March 22nd), the intervention was paused and no data were collected.

Campaign materials were placed on campus on March 2nd and included 550 posters (color printed on 11" X 17" paper with UV coating) and 18 color printed yard signs (for areas with minimal message boards). All poster message boards were inside campus buildings (the University had recently removed all outdoor message boards from campus). Due to the size of the campus, posters could not be put in every building.

Therefore, buildings were selected based on their (a) proximity to violation areas and (b) amount of undergraduate traffic during the week. All messages were hung in groups of two to eight. Messages were hung in four consecutive weekly waves: initial implementation wave, wave two, wave three, and wave four. The initial wave of message implementation began with 150 posters and six yard signs. The posters were initially hung in the 10 buildings most often frequented by undergraduate students; these buildings included five main classroom buildings, the student center, the main library, the international building, and two freshman dorm towers. The yard signs were placed around the main library and the freshman dorms (which are offset from the main campus). After the initial wave of message implementation, the remaining three weeks included three additional waves of message placement (i.e., one wave a week). On the Monday of each new wave, 100 additional posters and four additional yard signs were used to, first, replace missing or damaged signage and then, with all remaining materials allotted for the wave, placed in additional areas and buildings around campus. In addition to the once a week main wave of materials that were added, all locations with posters were checked twice a week between Wednesday and Friday and any damaged or missing posters were replaced (missing yard signs were not replaced except on Mondays due to limited amounts of signage). By the end of the intervention period, 515 posters had been hung across 14 campus structures (structures ranging from one to four buildings), including six main classroom buildings, the student center, three libraries, the international complex, a commons area, and three freshman dorm complexes. In addition, all 18 yard signs had been placed around the main library and the freshman dorms.

Based on focus group feedback, four of the five posters were selected as the

predominant materials for the campaign (messages one through four in Appendix F). The fifth message (message five in Appendix F) addressed cessation services on campus. Because focus groups were consistently concerned with the need to separate a 'quit campaign' from a 'compliance campaign', the fifth message was not placed as predominantly as the other four messages. Instead, this message was placed mainly around the one convenient on the main campus store that sold nicotine replacement products and above water foundations where the message boards were more secluded.

Post-intervention. Post-intervention data collected included survey data from an online survey and observation data of tobacco-free policy violators. All messaging materials were removed on April 5th, 2014. Post-intervention data collection took place April 6th, 2014 through April 26th, 2014. Participants who completed the pre-intervention survey (n = 479) were invited to complete the post-intervention survey. Participants were sent weekly reminders about completing the survey and were reminded that upon completing this second survey, they could be entered into a drawing to win one of 16 $50 checks. Of the 479 who completed the pre-intervention survey, 290 (60.5%) completed the post-intervention survey (1.9% of the initial 15,000 undergraduate students invited). All observational measure procedures that took place pre-intervention and during intervention continued in all ten of the violation areas (i.e., three 30 minute observation periods in each location each week once a day Monday through Wednesday).

Participants & Recruitment

Participants for Phase Two data collection were randomly selected from the University of Kentucky's Registrar's office. The Registrar's office provided a list of 15,000 undergraduate e-mail addresses for invitation to complete the pre-intervention

survey. To be eligible, participants had to report having smoked a cigarette in the past 30 days and having smoked 100 cigarettes in their lifetime. Selected participants were e-mailed a notice of selection one week before they were e-mailed an official survey invitation. In addition, participants received weekly reminder e-mails for two weeks (ending the week before campaign implementation). The pre-intervention survey was completed by 479 undergraduate students.

Participants who completed the pre-intervention survey ranged in age from 18 to 63 (M = 22.16, SD = 5.4). Participant sex was fairly evenly distributed with 244 males (51%) and 235 females (49%). Ethnic representation varied in the following way: White (n = 413, 86%), Asian (n = 19, 4%), Black (n = 18, 4%), Hispanic/Latino (n = 18, 4%), American-Indian (n = 13, 3%), Hawaiian (n = 3, 1%), and other (n = 16, 3%); note that percent total for ethnicity adds up to 105% because participants were allowed to select all ethnic categories that they felt described themselves. Participants were more strongly represented by upper classmen than lower classmen with 89 freshman (19%), 97 sophomores (20%), 140 juniors (29%), and 153 seniors (32%). The majority of participants reported that they were on campus five days a week (n = 340, 71%) with 61 participants on campus four days a week (13%), 44 on campus three days a week (9%), and 34 on campus once or twice a week (7%). Most participants were from the state of Kentucky (n = 367, 77%); however, 22 additional states were represented among the remaining participants (for a complete list see Appendix D). Most participants described their hometown as being suburban (n = 223, 47%), with 148 participants describing their hometown area as rural (31%), 92 as urban (19%), and 16 (3%) were unsure.

After the campaign ended, the 479 participants who completed the pre-

intervention were e-mailed a request to complete the post-intervention survey. Two reminder e-mails were sent, and the survey closed three weeks after the campaign ended, with 290 undergraduate students having completed the post-intervention survey. As an incentive for completing both surveys, 16 participants were randomly selected to receive a $50 check. These 16 participants were notified via e-mail and collected their checks the week after the study ended. Participants who completed the post-intervention survey ranged in age from 18 to 63 (M = 22.55, SD = 5.97). Participant sex was fairly evenly distributed with 149 males (51%) and 141 females (49%). Ethnic representation varied in the following way: White (n = 259, 89%), Asian (n = 11, 4%), Black (n = 6, 2%), Hispanic/Latino (n = 12, 4%), American-Indian (n = 6, 2%), Hawaiian (n = 1, 1%), and other (n = 7, 2%); note that percent total for ethnicity adds up to 104% because participants were allowed to select all ethnic categories that they felt described themselves. Participants were more strongly represented by upper classmen than lower classmen with 46 freshman (16%), 50 sophomores (17%), 92 juniors (32%), and 102 seniors (35%). The majority of participants reported that they were on campus five days a week (n = 212, 73%) with 29 participants on campus four days a week (10%), 32 on campus three days a week (11%), and 17 on campus once or twice a week (6%). Most participants were from the state of Kentucky (n = 231, 80%); however, 19 additional states were represented among the remaining participants (for complete list see Appendix D). Most participants described their hometown as being suburban (n = 132, 45%), with 96 participants describing their hometown area as rural (33%), 54 as urban (19%), and 8 (3%) were unsure.

Measures

Measures used in Phase One can be found in Appendix A (survey items) and B (focus group protocol); these measures included demographics, smoking behaviors, compliance behaviors, and message evaluation. Table 1 provides a brief summary of all measures collected during Phase Two; the entire survey used in Phase Two can be found in Appendix C. All measures from both phases will be reviewed in the following paragraphs.

Table 1: Phase Two Measures

CONSTRUCT	ASSESSMENT	INSTRUMENT/DESCRIPTION
Control Variables- Individual-Level		
(1) Psychological Factors	(a) Stress	7 items from the Depression Anxiety Stress Scale (DASS-21)
	(b) Depression	7 items from the DASS-21
	(c) Anxiety	7 items from the DASS-21
	(d) Sensation Seeking	8-item, Shortened Sensation Seeking Scale
(2) Physical Factors	(a) Nicotine Dependence	6-item, Fagerström Test for Nicotine Dependence
	(b) Cessation Attempts	2-item measure, *Have you tried to quit smoking for at least 24 hours in the last 6 months?*; *How many times have you tried to quit for at least 24 hours in the last six months?*
	(c) Daily Cigarette Use	Single item from Fagerström Test for Nicotine Dependence
(3) Social Factors	Perceived Social Norms	12-item adapted TPB measure
Dependent Variables- Individual-Level		
(4) Theoretical Factors	(a) Attitude	14-item adapted TPB measure
	(b) Perceived Social Norms	12-item adapted TPB measure
	(c) Behavioral Control	10-item adapted TPB measure
	(d) Behavioral Intention	3-item adapted TPB measure
(5) Compliance	Self-reported Compliance	Adapted 2-item measure, *Have you smoked on the University's campus in the last 6 months?*; *How many times have you smoked on the University's campus in the last 6 months?*
Dependent Variables- Population-Level		
(6) Smoking Behaviors	Smoker Observation	The number of non-compliant smokers will be recorded along with the smoking location on campus and the weather conditions pre-, during, and post-intervention.
Independent Variables- Individual-Level		
(7) Exposure to Intervention	Adapted Cued recall	Show images of message and ask participants how often they have seen poster on campus if (never, rarely, occasionally, often, frequently)
Independent Variables- Population-Level		
(8) Intervention	Adapted Poster Campaign	Messages designed based on pilot study qualitative responses, and put through pre-testing with focus groups

Demographics. The demographic items included on both the Phase One and the Phase Two surveys were age, gender, sex, home state, class rank, and time spent on campus. Demographic questions were collected to provide descriptions of the samples. Bivariate analyses (i.e., analyses for comparing two groups; Agresti & Finlay, 2009) were

run to assess demographic relationships with compliance behaviors. Gender did reveal significant differences in compliance behaviors (t = -2.37, p < .05), with men being noncompliant more often than women. Age was not significantly correlated with number of noncompliant instances (r = -.04, p > .05). Results from an ANOVA procedure (Sprinthall, 2012) found year in school to have significant differences in compliance behaviors among the different years, (F[3, 475] = 2.82, p < .05); Bonferroni's post-hoc test (Holm, 1979) revealed that the only significant difference was between Freshman and Juniors (m_{dif} = 4.73, p = .05), with Freshman smoking on campus more often than Juniors.

Smoking behaviors: *Smoker categorization*. Smoker categorization questions were used to determine eligibility to participate in all phases of the study. For Phase One, the smoker categorization question was *Have you smoked at least one cigarette in the last 30 days?* To be eligible to participate in the Phase One study, participants had to select yes to this item. For Phase Two's pre- and post-intervention survey, the two standard questions used in academic research for determining whether or not a person is considered a smoker were used to categorize potential participants (Pierce et al., 1996). These questions were as follows: 1) "*Have you smoked at least 100 cigarettes in your lifetime?"*; and 2) "*Have you smoked any cigarettes in the last 30 days (even a puff)?"* These two items have been used to classify a person as a smoker in previous investigations (e.g., Gilpin, Pierce, & Farkas, 1997; Pierce, Choi, Gilpin, Farkas, & Berry, 1999; Wakefield, Kaufman, Orleans, Barker, & Ruel, 2000). To be eligible to participate in the Phase Two study, participants had to select yes to both items.

Theoretical constructs. ***Attitude*****.** A measure of attitude was used to assess hypotheses six and seven. Attitude was conceptualized as the degree to which one has a favorable or unfavorable evaluation of tobacco-free policy compliance at UK. Ajzen (1991) suggests that attitude should consist of two dimensions: behavioral beliefs (e.g., smoking on campus harms others) and behavioral evaluation (e.g., smoking on campus is bad). The two dimensional measure used in this study was adapted by first reviewing scales from the following studies: Anderson and Lavallee, 2008; Chen and Chen, 2011; McCaul et al., 1993; Mercken et al., 2011; Moan and Rise, 2011; Montaño and Kasprzyk, 2008; Rimer and Glanz, 2005; and Swaim et al., 2007. The measure was then tested with undergraduate student smokers at the University of Kentucky; that study resulted in support for a reliable measure of attitude within the context of tobacco-free policy compliance (see Record & Savage, Under review).

The final measure was a 14-item measure of attitude toward tobacco-free policy compliance with seven items for each of the two dimensions of attitude. The questions employed a bipolar response format on a seven point scale with varying endpoints of positive and negative attitudes toward the tobacco-free policy. Participant responses on the 14-item measure of attitude ranged from one to seven; a composite mean value was created for each participant (M = 4.75, SD = 1.68). Using Cronbach's alpha (Cronbach, 1951) as a test of reliability (and .7 as the standard for acceptable reliability), the dimensions of behavioral beliefs (α = .95) and behavioral evaluations (α = .94) were each independently reliable, as was the entire 14-item measure of attitude (α = .97).

Subjective Norm**.** The measure of subjective norms was used to test hypotheses three, six, and seven. Subjective norm was conceptualized as the perceived pressure to

comply or not comply with UK's tobacco-free policy. Subjective norm consists of the three dimensions of normative (e.g., my friends want me to comply with UK's tobacco-free policy), descriptive (e.g., my friends comply with UK's tobacco-free policy), and motivational beliefs (e.g., I am motivated to do what my friends want me to do). The three dimensional measure used in this study was adapted by first reviewing scales from the following studies: Anderson and Lavallee, 2008; Chen and Chen, 2011; McCaul et al., 1993; Mercken et al., 2011; Moan and Rise, 2011; Montaño and Kasprzyk, 2008; Rimer and Glanz, 2005; and Swaim et al., 2007. The measure was then tested with undergraduate student smokers' at the University of Kentucky; that study resulted in support for a reliable measure of subjective norm within the context of tobacco-free policy compliance (see Record & Savage, Under review).

The final measure was a 12-item measure of subjective norms. The measure included four items for each norm construct (i.e., normative, motivational, and descriptive) across four referent groups. The four referent groups, selected because they were deemed as the most relevant for assessing college student subjective norms with regard to tobacco-free policy compliance, were friends at UK, best friend at UK, people who are important to me at UK, and people my age at UK. Each subjective norm dimension had an item that related to the four referent groups. The four items for the normative construct employed a bipolar response format on a seven point scale with endpoints of "*should not comply with UK's tobacco-free policy*" and "*should comply with UK's tobacco-free policy*." The eight items for the motivational and descriptive constructs employed a Likert-type response format on a seven point scale from strongly disagree to strongly agree. Participant responses on the 12-item measure of subjective

norms ranged from one to seven; responses to all items were averaged to create a composite mean value for each participant (M = 3.40, SD = 1.34). Using Cronbach's alpha (Cronbach, 1951) as a test of reliability, the normative (α = .93), descriptive (α = .94), and motivational (α = .95) dimensions were each independently reliable, as was the entire 14-item measure of attitude (α = .92).

Behavioral Control. Behavioral control was used to assess hypotheses six and seven. Behavioral control was conceptualized as the degree to which one feels complying with UK's tobacco-free policy is easy or difficult. Behavioral control consists of the two dimensions of control beliefs (e.g., it is up to me whether or not I smoke on campus) and power (e.g., I am capable of not smoking on campus). The two dimensional measure used in this study was adapted by first reviewing scales from the following studies: Anderson and Lavallee, 2008; Chen and Chen, 2011; McCaul et al., 1993; Mercken et al., 2011; Moan and Rise, 2011; Montaño and Kasprzyk, 2008; Rimer and Glanz, 2005; and Swaim et al., 2007. The measure was then tested with undergraduate student smokers' at the University of Kentucky; that study resulted in support for a reliable measure of behavioral control within the context of tobacco-free policy compliance (see Record an&d Savage, Under review).

The final measure is a 10-item measure of perceived behavioral control with five items for each dimension. The measure employed a Likert-type response format on a seven point scale from strongly disagree to strongly agree. Participant responses on the 10-item measure of behavioral control ranged from one to seven; responses to all items were averaged to create a composite mean value for each participant (M = 5.69, SD = 1.26). Using Cronbach's alpha (Cronbach, 1951) as a test of reliability, the dimensions of

behavioral beliefs (α = .89) and power (α = .95) were each independently reliable, as was the entire 14-item measure of attitude (α = .93).

***Behavioral Intention*.** Behavioral intention was used to assess hypotheses six and seven. The three item measure was a unidimensional assessment of behavioral intentional, which was conceptualized as intent to comply with UK's tobacco-free policy. These items were *I plan to comply with UK's tobacco-free policy, I intend to comply with UK's tobacco-free policy*, and *I am going to comply with UK's tobacco-free policy*. Due to the similarity between the three items, one item was asked after each of the sets of items for attitude, subjective norms, and behavioral control. Participant responses on the 3-item measure of behavioral intention ranged from one to seven; scores were averaged to create a composite mean value for each participant (M = 4.71, SD = 2.06). Using Cronbach's alpha (Cronbach, 1951), the dimension of behavioral intention was supported as reliable (α = .97).

Psychological Factors. Measures of the psychological constructs of stress, anxiety, depression, and sensation seeking were used to investigate hypothesis one. The measure for each of the three constructs of stress, anxiety, and depression came from the 21-item Depression Anxiety Stress Scale (DASS-21; Antony et al., 1998), which has been supported in previous research as valid (e.g., Crawford & Henry, 2003; Henry & Crawford, 2005) and reliable (e.g., Antony et al., 1998; Brown, Chorpita, Korotitsch, & Barlow 1997; Crawford & Henry, 2003). The measure of sensation seeking comes from the 8-item Brief Sensation Seeking Scale (BSSS; Palmgreen, Donohew, Lorch, Hoyle, & Stephenson, 2001), which has also been supported as valid and reliable (e.g., Derefinko et al., 2014; Hoyle, Stephenson, Palmgreen, Lorch, & Donohew, 2002; Norman, Schmied,

& Larson, 2014; Stephenson et al., 2003; Stephenson et al., 2002). Participant responses on the pre-intervention survey (n = 479) were used for the investigation of the psychological factors.

***Stress*.** Stress was conceptualized as tension, irritability, and overreaction (Antony et al., 1998) and operationalized by using the seven stress items from the DASS-21 (Antony et al., 1998). Participants were asked to respond to each item on a one to seven Likert-type response format based on how well each item best describes them. Based on scores from these items, a composite mean value of stress was created for each participant. Participant responses on the measure of stress ranged from one to seven (M = 3.53, SD = 1.45). The measure had an acceptable Cronbach's alpha (α = .92) above .7, indicating that this was a reliable measure (Cronbach, 1951).

***Anxiety*.** Anxiety was conceptualized as physical arousal, panic attacks, and/or fear (Antony et al., 1998) and operationalized by using the seven anxiety items from the DASS-21 (Antony et al., 1998). Participants were asked to respond to each item on a one to seven Likert-type response format based on how well each item best describes them. Based on scores from these items, a composite mean value of anxiety was created for each participant. Participant responses on the measure of anxiety ranged from one to seven (m = 2.59, SD = 1.44). Using Cronbach's Alpha (Cronbach, 1951), the measure of anxiety was supported as reliable (α = .92).

***Depression*.** Depression was conceptualized as dysphoric mood, such as sadness and worthlessness (Antony et al., 1998). Depression was operationalized in this study by using the seven depression items from the DASS-21 (Antony et al., 1998). Participants were asked to respond to each item on a one to seven Likert-type response format based

on how well each item best describes them. Based on scores from these items, a composite mean value of depression was created for each participant. Participant responses on the measure of depression ranged from one to seven (M = 2.39, SD = 1.53). Using Cronbach's alpha (Cronbach, 1951), the measure of depression was supported as reliable (α = .96).

***Sensation seeking*.** Sensation seeking has been defined as a personality trait believed to have a biological basis that expresses as a need for physiological arousal, novel experience, and a willingness to take social, physical, and financial risks to obtain such arousal (Stephenson et al., 2003). Sensation seeking was operationalized using the 8-item BSSS (Palmgreen et al., 2001). The participants were asked to respond to each item on a one to seven Likert-type response format based on how well each item best describes them. By using scores from these items, a composite mean value of sensation seeking was created for each participant. Participant responses on the measure of sensation seeking ranged from one to seven (m = 4.85, SD = 1.20). The measure had an acceptable Cronbach's Alpha (α = .84), indicating that this was a reliable measure (Cronbach, 1951).

Physical Factors. ***Nicotine dependence*.** Nicotine dependence was used to investigate hypothesis two. Nicotine dependence was assessed using the 6-item Fagerström Test for Nicotine Dependence (FTND; Heatherton, Kozlowski, Frecker, & Fagerström, 1991). Adapted from the Fagerström Tolerance Questionnaire (Fagerström, 1978), the FTND has been found to be a valid and reliable self-report measure of nicotine dependence (e.g., Payne, Smith, McCracken, McSherry, & Antony, 1994; Pomerleau, Carton, Lutzke, Flessland, & Pomerleau, 1994). The response format for this scale is

uniquely tailored to each item; Table 2 displays the items and scoring for each item. Participant responses on the pre-intervention survey (n = 479) were used for this particular investigation. For an individual score, the responses to each item were summed, with higher scores indicating a greater dependence on nicotine (Fagerström et al., 1990). An individual's score on this scale can range from zero to 10. For this study, participant scores ranged between zero and eight (M = 1.16, SD = 1.62).

Table 2
Items and Scoring for Fagerström Test for Nicotine Dependence*

Questions	Answers	Points
1. How soon after waking do you smoke your first cigarette?	Within 5 minutes	3
	6-30 minutes	2
	31-60 minutes	1
	After 60 minutes	0
2. Do you find it difficult to refrain from smoking in places where it is forbidden; e.g., in church, at the library, in a cinema, etc.?	Yes	1
	No	0
3. Which cigarette would you hate most to give up?	The first one in the morning	1
	All others	0
4. How many cigarettes per day do you smoke?	10 or less	0
	11-20	1
	21-30	2
	31 or more	3
5. Do you smoke more frequently during the first hours after waking than during the rest of the day?	Yes	1
	No	0
6. Do you smoke if you are so ill that you are in bed most of the day?	Yes	1
	No	0

*Table retrieved from Fagerström et al., 1990

Average daily cigarette consumption. A single item measure was used to assess average daily cigarette consumption. The question was: *On Average, how many cigarettes do you smoke on a daily basis?* Participants were asked to round up to their best estimate. This item was part of the FTND (Heatherton et al., 1991); however, the item remained an interval level variable for this variable and the item is converted to an

ordinal variable for the variable of nicotine dependence (see question four in Table 2).

***Cessation*.** A measure of cessation was used to investigate hypothesis two. Cessation was assessed using a 2-item measure. These two items have been used in previous research to assess quit attempts (e.g., Buller et al., 2003; Kozlowski, Porter, Orleans, Pope, & Heatherton, 1994) and have been used as validity checks for studies investigating intention to quit (e.g., Biener & Abrams, 1991). In addition, they have been found to be reliable items associated with cessation- and smoking-related stages of change (e.g., DiClemente et al., 1991; Prochaska, Velicer, DiClemente, & Fava, 1988). Participant responses on the pre-intervention survey (n = 479) were used for this particular investigation. Participants were first asked to report yes or no to the following question: *Have you tried to quit smoking for at least 24 hours in the last 6 months?* Participants who reported yes (n = 230, 48%) were then asked to respond to the following question: *How many times have you tried to quit for at least 24 hours in the last six months?* Responses to this second item ranged from one to 200 (M = 3.65, SD = 15.03) with most of these participants having attempted to quit once or twice in the last six months (n = 170, 75%).

Compliance Behaviors. The two levels of tobacco-free policy compliance were the dependent variables for this investigation. Individual-level policy compliance was used to build predictive models of tobacco-free policy compliance (H_1 through H_3 and H_6). Both individual-level (H_4) and population-level (H_5) compliance data were used to explore intervention effectiveness at increasing tobacco-free policy compliance.

***Individual-level*.** A measure of individual-level compliance was used to investigate hypotheses one through four and six. Individual-level compliance was

assessed using self-report items adapted from Buller et al. (2003) and Lazuras et al. (2009). Although these items are prone to participants' giving socially desirable responses, the items have been used in previous investigations effectively, with honest reports of noncompliant behaviors (Namkoong, Nah, Record, & Van Stee, Unpublished data; Record, 2013; Unpublished data). On the survey, participants were first given the definition of UK's tobacco-free policy, including what campus areas are covered under the policy, and then asked to respond to the following question: *Since UK implemented its campus-wide tobacco-free policy, have you smoked any cigarettes on campus?* Participants could select one of the following response options: *never*, *rarely*, *occasionally, often*, or *frequently*. If a participant selected a response between rarely and frequently (n = 378, 79%), then he/she was asked to respond to three additional questions. The first question was *During your average week, how many times per week would you say you smoke cigarettes on UK's campus?* Participant responses to this question ranged from one to 200 (M = 5.53, SD = 14.73), with most participants reporting having ever smoked on campus only once (n = 201, 53%). Second, participants were asked *When you have smoked on campus, has anyone ever approached you and asked you to comply with UK's tobacco-free policy?* Most participants reported that no one had ever approached them (n = 257, 54%). Finally, participants were asked when they did smoke on campus, where on campus they smoked; results from this item are displayed in Table 3. For the written in responses for "other" see Appendix E.

Table 3
Reported Smoking Areas on Campus*

Location	N	%**
Outside of the hospital	37	6%
Near dorms	91	15%
Outside of Whitehall Classroom building	127	20%
In the International complex	17	3%
Near the student center	69	11%
On University sidewalks	190	30%
Other^	97	15%

*Participants were allowed to select all that apply
**Percent of total locations checked (n = 628)
^A complete list of other locations can be found in Appendix E

Population-level. A measure of population-level compliance was used to investigate hypothesis five. Population-level compliance was assessed using an observational measure of the number of smokers observed violating UK's tobacco-free policy. This method has been found to be an effective tool for evaluating tobacco-free policy compliance, both on UK's campus (Fallin et al., 2012, 2013) and on other campuses (Harris et al., 2009; Lazuras et al., 2009). Three-hundred observation periods were recorded over the 10 week intervention period. Total violators for a 30 minute observation period ranged from zero to 44 (m = 3.63, SD = 7.88) with 40% (n = 121) of the observation periods having no violators. In a single observation period, the number of male violators ranged from zero to 28 (M = 2.66, SD = 5.57) and the number of female violators ranged from zero to 16 (M = 1.09, SD = 2.46). The outside temperature and weather details were also recorded during observation periods; the temperature ranged from 13 to 78 degrees throughout the ten weeks (M = 45.37, SD = 16.40).

Campaign Exposure. Campaign exposure was an independent variable that was used to investigate hypotheses four and seven. Exposure to the campaign was assessed on the post-intervention survey using an adapted cued recall measure. Previous cued recall measures used for assessing campaign exposure have provided participants with a description of the campaign message and asked if they had seen a message meeting that description (e.g., Donovan, Boulter, Borland, Jalleh, & Carter, 2003; Stephenson et al., 2002). For this study, participants were shown pictures of the campaign messages and asked the following question for each of the five messages used in this study: *How often have you seen the above message on campus over the last few weeks?* Participants could select *never, rarely, occasionally, often,* or *frequently*. A categorical campaign exposure scale was created by first summing the responses to the five messages (with 0 = never and 4 = frequently); the range for this score was between zero and 20. Next, a mean split (m = 2.53, SD = 3.92) was to create levels of no campaign exposure (never saw any of the message, n = 147), below average campaign exposure (n = 51), and above average campaign exposure (n = 92) categories of campaign exposure. A mean split was used over a media split because the median for this measure was zero.

Participants who responded that they had never seen any of the five messages on campus (n = 147, 51%) moved onto the next section of the survey. Participants who, at the very minimum, selected seeing at least one message rarely were asked to respond to three additional questions. The first two questions were on a five point scale with response options of *never, rarely, occasionally, often,* or *frequently*. These questions were *How often did the messages you saw around campus make you think about complying with UK's tobacco-free policy?* and *How often did the messages you saw around campus*

make you decide about complying with UK's tobacco-free policy? The third question asked: *Overall, after seeing these messages did your likelihood of smoking on campus increase, decrease, or stay the same?*

Chapter Six

Phase Two Results

Hypothesis 1: Psychological Factors

To investigate hypothesis one, a predictive model of tobacco-free policy compliance was built using a regression procedure with the pre-intervention survey data (n = 479). Multiple linear regression (Aiken, West, & Pitts, 2003) was employed, which included the predictor variables (IVs) of stress, anxiety, depression, and sensation seeking, with the goal of predicting tobacco-free policy compliance using the self-reported measure of compliance behaviors (DV). Multiple regression models control for all the variables included in the model and have four assumptions: the expected value of the error (i.e., e_i) is zero, the error has a constant variance, the error is normally distributed, and the distributions are independent (Dielman, 2005). On the basis of the results of the bivariate demographic analyses, gender was also included as a control in the regression model. The goal of this model was to examine the predictive power of the psychological factors for explaining tobacco-free policy compliance behaviors. This type of regression model has been used to test compliance with speeding laws (Chen & Chen, 2011) and drinking and driving laws (Moan & Rise, 2011). One investigation did test a hierarchical regression model to predict smoke-free policy noncompliance (Lazarus et al., 2009); however, this test only included a limited number of controls.

Hypothesis one predicted that lower reports of stress, depression, anxiety, and sensation seeking would be associated with tobacco-free policy compliance among smokers. The multiple regression model of psychological factors, controlling for gender, was not supported as a good fit (r^2 = .02, F[5, 473] = 2.02, p > .05) for predicting

tobacco-free policy compliance. That is, little variance in compliance behaviors was explained by the four psychological factors. Similarly, none of the four psychological factors were significant predictors of tobacco-free policy compliance. Specifically, the standardized beta weights of stress (β = -.07, t = -1.15, p > .05), depression (β = -.03, t = -.55, p > .05), anxiety (β = .05, t = .80, p > .05), and sensation seeking (β = .07, t = 1.44, p > .05) were all not significantly related to tobacco-free policy compliance, and only the factors of stress and depression were in the hypothesized direction.

To explore this further, a test of multicollinearity was run for the four variables included in the psychological model. Multicollinearity occurs when explanatory variables are so highly correlated with one another that they are explaining the same phenomenon in the regression model (Dielman, 2005). Issues of multicollinearity are most likely present in regression models when included variables have a correlation greater than .5 (Dielman, 2005). The variables of stress, depression, and anxiety were all significantly correlated with each other (r > .57, p < .001) above the accepted cut off of .5; none of the variables of stress, depression, or anxiety were significantly correlated with the variable of sensation seeking (r < -.004, p > .469). Thus, H_1 was not supported and this may be partially attributed to issues of multicollinearity between the variables of stress, depression, and anxiety.

Hypothesis 2: Physical Factors

To investigate hypothesis two, a predictive model of tobacco-free policy compliance was built using a regression procedure with the pre-intervention survey data (n = 479). Multiple linear regression (Aiken et al., 2003) was employed, which included the predictor variables (IVs) of cessation attempts, nicotine dependence, and daily

smoked cigarettes, with the goal of predicting tobacco-free policy compliance using the self-reported measure of compliance behaviors (DV). On the basis of the bivariate demographic analyses, gender was also included as a control in the regression model. The goal of this model was to examine the predictive power of the physical factors for explaining tobacco-free policy compliance behaviors.

The second hypothesis expected lower perceptions of nicotine dependence, higher number of quit attempts, and fewer cigarettes smoked per day to be associated with tobacco-free policy compliance among smokers. Although the multiple regression model, controlling for gender, was supported as a good fitting model (r^2 = .44, F[4, 474] = 94.38, p < .001) that explained 44% of the variance in compliance behaviors, the data produced mixed results for the three physical factors. On the basis of the standardized beta weights, the number of quit attempts (β = .59, t = 17.00, p < .001) and the number of cigarettes smoked per day (β = .31, t = 6.86, p < .001) were significant predictors of tobacco-free policy compliance. However, the number of quit attempts was in the opposite direction predicted, with more quit attempts predicting less policy compliance. Dependence on nicotine was not a significant predictor of policy compliance (β = .02, t = .44, p > .05). To explore this further, a test of multicollinearity was run for the three variables included in the physical model. The variables of nicotine dependence and daily cigarette use were significantly correlated with each other (r = .65, p < .001) above the accepted cut off of .5; neither variable was significantly correlated with the variable of quit attempts (r < .028, p > .215). Thus, H_2 was only partially supported.

Hypothesis 3: Social Factors

To investigate hypothesis three, a predictive model of tobacco-free policy

compliance was built using a regression procedure with the pre-intervention survey data (n = 479). Multiple linear regression (Aiken et al., 2003) was employed, which included the predictor variable (IV) of normative subjective norms, with the goal of predicting tobacco-free policy compliance using the self-reported measure of compliance behaviors (DV). On the basis ofthe bivariate demographic analyses, gender was also included as a control in the regression model. The goal of this model was to examine the predictive power of normative beliefs for explaining tobacco-free policy compliance behaviors.

Hypothesis three predicted that perceptions of social approval of compliant behaviors would be associated with tobacco-free policy compliance among smokers. Using the four subjective norms items from the normative dimension (i.e., the dimension that assesses perceptions of current compliance behaviors among four referent groups), a small, but significant, regression value, controlling for gender, was found (r^2 = .05, F[2, 476] = 12.81, p < .001). However, little variance in compliance behaviors was explained by the social norms variable. The perception of social norms with regard to compliance behaviors was a significant predictor of tobacco-free policy compliance in the hypothesized direction (β = -.20, t = -4.45, p < .001). That is, the more participants believed tobacco-free policy compliance behaviors to be the norm, the more likely they were to comply with UK's tobacco-free policy. Thus, H_3 was supported.

Hypothesis 4: Intervention Exposure

To investigate the relationship between intervention exposure and tobacco-free policy compliance, an ANOVA (Sprinthall, 2012) was run with the post-intervention survey data (n = 290). ANOVA analyses assume that population data are normally distributed with identical means (Agresti & Finlay, 2009). The purpose of the ANOVA

was to examine the mean difference of compliance behaviors among the three levels of campaign exposure (i.e., no exposure, below average exposure, and above average exposure). In addition, to investigate self-reported impact of campaign exposure, descriptive analyses were run on the following three items: *How often did the messages you saw around campus make you think about complying with UK's tobacco-free policy? How often did the messages you saw around campus make you decide about complying with UK's tobacco-free policy?* and *Overall, after seeing these messages did your likelihood of smoking on campus increase, decrease, or stay the same?*

The fourth hypothesis predicted that greater intervention exposure would result in a higher level of reported smoker compliance with UK's tobacco-free policy. Using the categorical measure of campaign exposure (i.e., no, below average, and above average levels of campaign exposure), an ANOVA (Sprinthall, 2012) was run to assess the difference in compliance behaviors among the three levels. The ANOVA revealed significant differences between the three levels of campaign exposure and compliance behaviors ($F(2, 287) = 140.72$, $p < .001$). Using Bonferroni (Holm, 1979) as a more conservative post-hoc test, significant differences in compliance behaviors were found between all three groups. Specifically, no campaign exposure had significant mean differences in compliance behaviors from below ($m_{dif} = -2.13$, $p < .05$) and above ($m_{dif} = -12.42$, $p < .001$) average categories of campaign exposure; similarly, above average campaign exposure had significant mean differences in compliance behavior from the below average category ($m_{dif} = 10.29$, $p < .001$) of campaign exposure. In other words, greater campaign exposure was more likely to be associated with greater compliance behaviors with UK's tobacco-free policy.

In addition, self-reported campaign impact was also assessed. The first item assessed if the campaign messages made the participants think about complying with UK's tobacco-free policy. The mean score for this item was 2.48 (*SD* = 1.25), indicating that the messages made most participants think about complying with the tobacco-free policy between rarely and occasionally. The second item assessed if the campaign messages made the participants actually decide to comply with UK's tobacco-free policy. The mean score for this item was 2.19 (*SD* = 1.25), indicating that the messages rarely made most participants decide to comply with the tobacco-free policy. The final question assessed if the messages, overall, decreased, increased, or had no impact on their likelihood to smoke on campus in the future. Only nine participants (6%) reported that exposure to the messages increased their likelihood of smoking on campus in the future; 96 participants (64%) reported that the messages did not affect their likelihood of smoking on campus in the future; 46 participants (30%) reported that the messages decreased their likelihood of smoking on campus in the future. Thus, H_4 was supported.

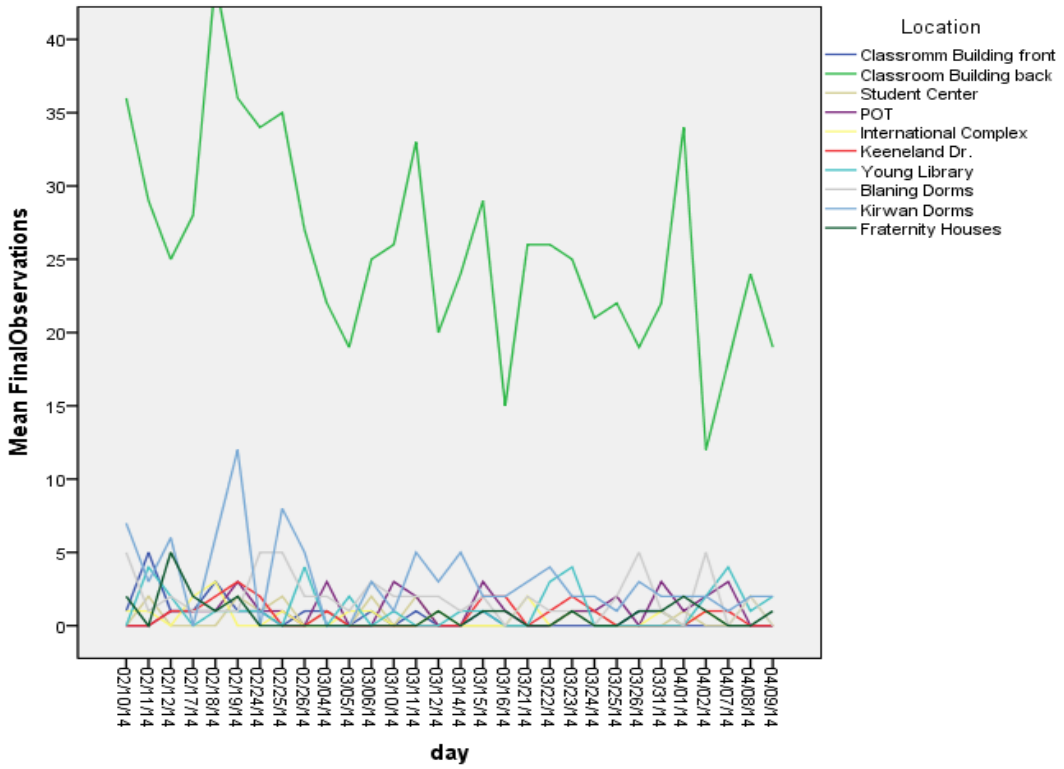
Hypothesis 5: Observed Violations

Hypothesis five aimed to investigate the campaign's effectiveness at increasing population-level compliance with the tobacco-free policy. The data used for this analysis was the population-level data, which was observation of the number of noncompliant smokers across campus. It was expected that the number of observed smokers would decrease post-intervention. To investigate this hypothesis a time series design was necessary to observe differences in measures over the course of the ten week intervention. Due to the nature of the variable having numerous observations of zero, the number of observed variables could not be treated as a continuous variable. Similarly, the

location with most violators (i.e., the back of Whitehall Classroom Building) appears, statistically, as an outlier; see Figure 4 for a graphic demonstration of how the back of Whitehall Classroom Building was a statistical outlier.

On the basis of a consultation with the *Applied Statics Lab* in the Department of Statistics at the University of Kentucky, a multilevel negative binomial regression procedure (Hilbe, 2011) was used to analyze the time series observational data. There are two key assumptions of a negative binomial regression. First, the response variable is a count variable. Second, each subject has the same length of observation time. Finally, the dependent variable is over-dispersed and does not have an excessive number of zeroes (Hilbe, 2011). According to the stats lab, 40% of our observations were zero and this was not deemed as excessive for this particular statistical procedure. Thus, a multilevel negative binomial regression was employed to investigate the impact of the campaign on the number of observed noncompliant smokers.

Figure 4. Violations by Location



Hypothesis five predicted that the number of observed noncompliant smokers would decrease post-intervention compared to baseline. Using a multilevel negative binomial regression that controlled for the temperature outside (β = .40, p = .001), a statistical difference was found between (1) the number of observed violators pre-intervention and during intervention (β = -.59, p < .001) and (2) the number of observed violators pre-intervention and post-intervention (β = -.59, p = .001). Figure 5 displays a graphic distribution of the number of violators observed pre-, during, and post-intervention (note that during intervention data were collected one week longer [three data points] than pre- and post-intervention data collection). Figure 6 displays the average slope of each time period as a line graphed through the data points for that time period. These two figures depict a significant decrease in the number of observed smokers on campus. Thus, H_5 was supported.

Figure 5. Observed Violation Differences Pre, During, and Post

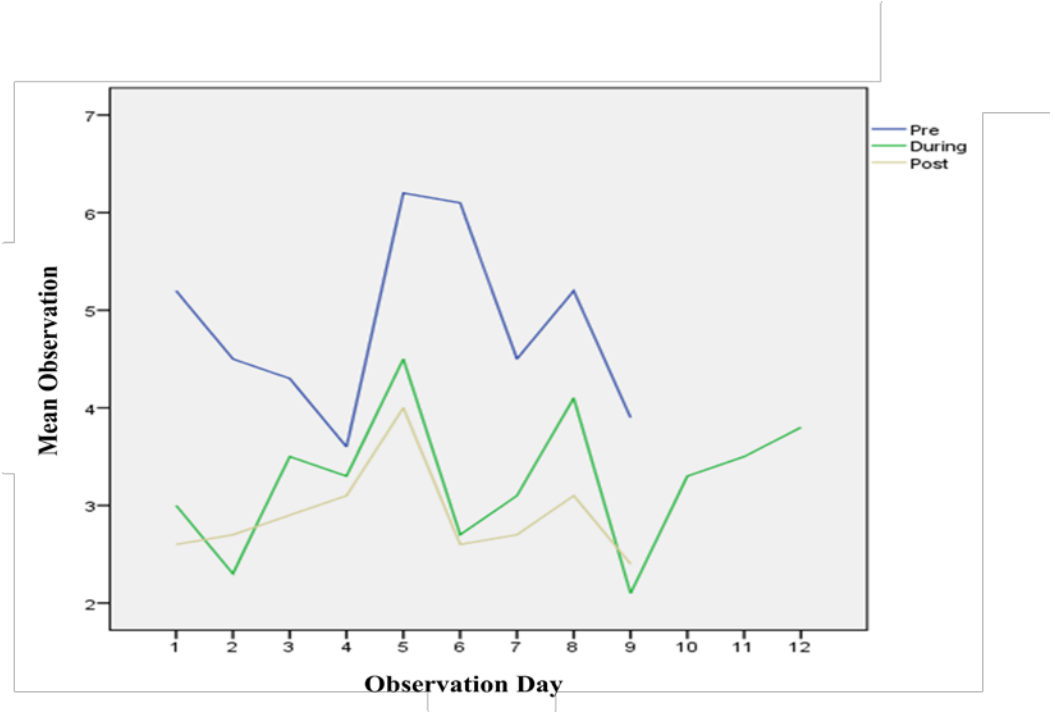
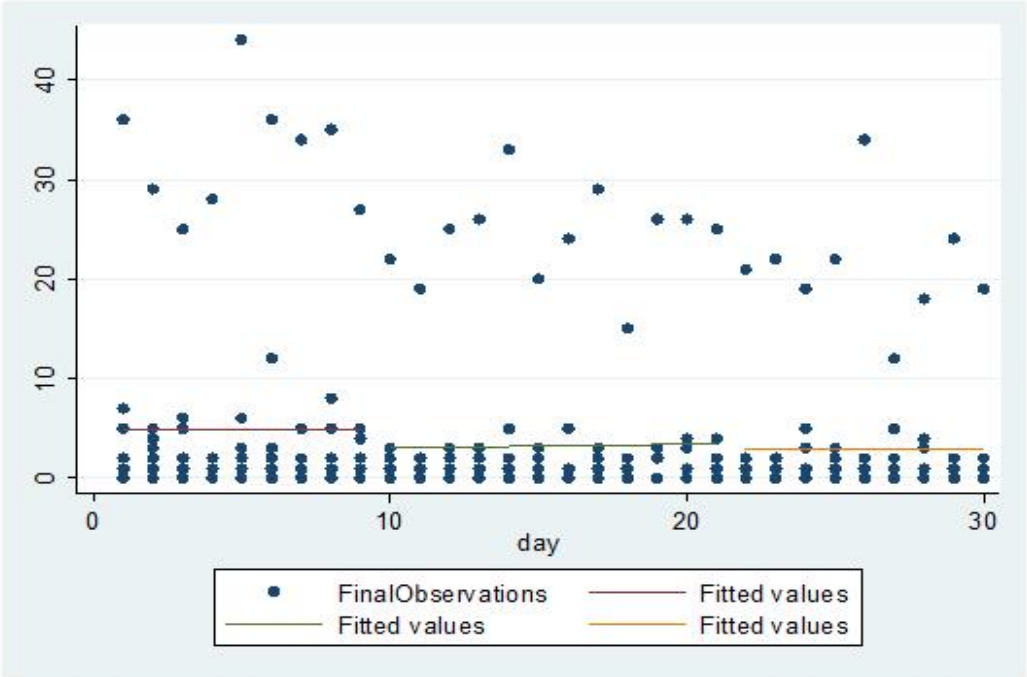


Figure 6. Average Slope Comparisons Pre, During, and Post



Hypothesis 6: Theoretical Relationships

Hypothesis six investigated the associations between the TPB constructs (i.e., attitudes, subjective norms, behavioral control, and behavioral intention) and tobacco-free policy compliance. With compliance as the dependent variable and the TPB constructs as the independent predictor variables, a multiple linear regression model (Aiken et al., 2003) was built with the pre-intervention survey data (n = 479). On the basis of the bivariate demographic analyses, gender was used as a control in the regression model. The goal of this model was to examine the predictive power of the TPB constructs for explaining tobacco-free policy compliance behaviors. H_6 predicted that attitudes in support of complying with the tobacco-free policy, perceptions of peer pressure to comply with the tobacco-free policy, a higher belief in personal control over one's ability to comply with the tobacco-free policy, and intention to comply with the tobacco-free policy will all be positively associated with compliance.

The sixth hypothesis anticipated that attitudes, perceived social norms, behavioral control, and behavioral intention would be associated with tobacco-free policy compliance. Table 4 displays the regression results for the theoretical variables. The multiple regression model, controlling for gender (r^2 = .18, F[9, 469] = 11.51, p < .001), although significant, explained only 18% of variance in compliance behaviors. Similarly, the data produced some mixed results for the four theoretical variables. On the basis of the standardized beta weights, the dimensions of attitude were both significant predictors of tobacco-free policy compliance. Interpretation of the direction of the prediction suggests that although positive behavioral beliefs about tobacco-free policy compliance can lead to more noncompliant behaviors (β = .29, t = 2.78, p < .01), positive behavioral

evaluation of the impact of tobacco-free policy compliance leads to less noncompliant behaviors (β = -.22, t = -2.02, p < .05). All three dimensions of subjective norms, normative (β = -.04, t = -0.63, p > .05), motivation (β = .10, t = 1.67, p > .05), and descriptive (β = -.09, t = -1.96, p > .05), were not significant predictors of tobacco-free policy compliance. The two dimensions of behavioral control had some significance, with control beliefs not being a significant predictor of policy compliance (β = -.03, t = -0.50, p > .05) and power being a significant predictor of policy compliance (β = -.26, t = -4.05, p < .001). Interpretation of this variable suggests that although perceived control over the ability to comply with the tobacco-free policy is not related to compliance behaviors, perceived capability of complying with a tobacco-free policy is a significant predictor of more compliant behaviors. Finally, behavioral intention (β = -.22, t = -2.86, p < .01) was a significant predictor of tobacco-free policy compliance with greater intention to comply predicting fewer noncompliant behaviors. Thus, H_6 was partially supported.

Table 4. Regression Model for TPB Variables

TPB Construct	Dimension	β (Standardized)
Attitude		
	Behavioral Belief	.29**
	Behavioral Evaluation	-.22*
Subjective Norm		
	Normative	-.04
	Descriptive	.10
	Motivation	-.09
Behavioral Control		
	Control Beliefs	-.03
	Power	-.26***
Behavioral Intention		-.22**

Note. * p <.05, ** p < .01, *** p < .001

Hypothesis 7: Theoretical Change

Hypothesis seven predicted that greater campaign exposure would result in post-campaign change with regard to attitudes, subjective norms, behavioral control, and behavioral intentions in the context of tobacco-free policy compliance. To explore this hypothesis, survey responses were used from participants who completed both the pre- and post-intervention survey (n = 290). Across the three categorical groups of campaign exposure (i.e., no exposure, below average exposure, above average exposure), a paired sample t-test (Sprinthall, 2012) was run for each of the four TPB variables.

The seventh hypothesis predicted that attitudes, perceived social norms,

behavioral control, and behavioral intention would improve with greater campaign exposure. To explore this hypothesis paired sample t-tests were run for each of the TPB variables across the campaign exposure groups of no exposure, below average exposure, and above average exposure. Table 5 displays the results from the 12 paired sample t-tests. Only one TPB variable saw significant change between the three groups of participants. Among participants with above average levels of campaign exposure, normative beliefs with regard to complying with tobacco-free policies improved from pre-intervention (m = 3.88, SD = 1.80) to post-intervention (m = 4.2, SD = 1.70).That is, greater campaign exposure was specifically associated with improved perceptions of compliance as the normal behavior on campus. Thus, H_7 had partial support.

Table 5. TPB Changes among Campaign Exposure Groups

Campaign Exposure	TPB Variable	*Df*	*T*
None	Attitude	138	-1.05
	Normative Beliefs		.86
	Behavioral Control		.45
	Behavioral Intention		-1.36
Below Average	Attitude	67	-1.04
	Normative Beliefs		-.66
	Behavioral Control		1.55
	Behavioral Intention		-.38
Above Average	Attitude	82	-1.04
	Normative Beliefs		-1.94*
	Behavioral Control		.87
	Behavioral Intention		-1.00

*$p < .001$

Chapter Seven

Discussion

The implementation of a tobacco-free policy is the leading recommendation among health institutes for reducing the harms associated with tobacco exposure—for both smokers and nonsmokers—on college campuses (ACHA, 2012; ANR, 2014; CDC, 2011; IOM, 2007). As of October 2014, 1,478 colleges and universities across the United States, including the University of Kentucky, had implemented either a smoke- or tobacco-free campus policy (ANR, 2014). Despite the positive health benefits associated with tobacco-free policies, compliance with them remains a serious challenge on college campuses (Hahn et al., 2012; Plaspohl et al., 2012). The University of Kentucky is one of the many universities to experience the struggle of tobacco-free policy compliance. Interventions aimed at increasing smokers' willingness to comply with tobacco-free policies are essential for improving the health of both smokers and nonsmokers. Thus, the purpose of this study was to (a) investigate the factors associated with tobacco-free policy compliance among college students and (b) design and evaluate a theory-based campaign at increasing compliance with a tobacco-free campus policy. In addition to theoretical and practical implications offered from this study, this study also provides critical insight into the current compliance behaviors on UK's campus.

To understand compliance behaviors on a college campus, it is first important to be aware of the estimated rate of compliance behaviors on the campus of interest. Therefore, this paragraph presents the compliance behaviors rate on UK's campus learned through the pre-intervention survey data of this study. Previous research investigating tobacco-free policy compliance at the University of Kentucky found that

55% of smokers reported having always complied with UK's tobacco-free policy (Record, March 2013). In the current study, 21% of participants reported having always complied with UK's tobacco-free policy. The difference in estimated compliance could be due to a number of factors. First, the past study was not directly advertised as being about compliance but, instead, about general smoking behaviors. The current study was advertised to participants as being about UK's tobacco-free policy. Therefore, the compliance questions in the first study may have caught some participants by surprise and, therefore, have led to more issues of social desirability than experienced in the current study. Similarly, the first study response format was yes/no; the response format in the current study was on a five-point frequency scale. The five-point scale allowed participants to respond in a way that was more descriptive of their previous behaviors and was possibly not as intimidating as answering with a direct "yes." To date, this study provides the most thorough exploration of tobacco-free policy compliance behaviors on UK's campus.

Results from this study offer both theoretical and practical implications for improving college student smokers' willingness to comply with UK's tobacco-free campus policy. The following discussion will be divided into three sections. First, theoretical implications will be discussed, focusing on how the TPB-related results from this study (a) expand our understanding of the TPB, including application of the theory, and (b) clarify how the variables of the TPB can help explain tobacco-free policy compliance. Second, practical implications will be divided into two sections; the first section will discuss implications with regard to understanding factors associated with tobacco-free policy compliance and the second section will discuss implications with

regard to improving tobacco-free policy compliance behaviors on college campuses.

Theoretical Implications

The TPB is well supported in communication literature as an effective model for examining health behavior. For instance, the TPB has been the focus of a few meta-analyses aimed at summarizing the theoretical effects (e.g., Cooke & French, 2008; Sheeran & Taylor, 1999); the meta-analytic investigations have supported the use of the TPB as an effective prediction model in various health behavior contexts–including tobacco-related behaviors (supportive studies include: Hiemstra, Otten, & Engels, 2012; Mercken, Candel, van Osch, & de Vries, 2011; Swaim, Perrine, & Aloise-Young, 2007). Although the TPB has been used to investigate tobacco-related behaviors and compliance-related behaviors (e.g., Anderson & Lavallee, 2008; Chen & Chen, 2011; Moan & Rise, 2011), use of the TPB to investigate tobacco-free policy compliance behaviors was a novel use of the theory. Although not all of the TPB variables were supported as significant predictors of tobacco-free policy compliance, the overall TPB model was supported by the data as a good fitting model for predicting tobacco-free policy compliance ($r^2 = .18$, $F[8, 470] = 12.69$, $p < .001$). Ajzen (2002) emphasized the importance of understanding how each TPB variable impacts a particular context because each variable plays an individual role in explaining the beliefs related to a particular context. Therefore, the following paragraphs will discuss each variable individually with a specific focus on the impact of the variable in the context of tobacco-free policy compliance.

Attitude. Both dimensions of attitude (i.e., behavioral beliefs, behavioral evaluation) were significant predictors of tobacco-free policy compliance. However, the

direction of the two dimensions was opposing. That is, positive beliefs about tobacco-free policy compliance led to more noncompliance (β = .29, p < .01), but positive evaluation of the impact of tobacco-free policy compliance led to less noncompliance (β = -.23, p < .05). On the surface it may seem counterintuitive that these two dimensions of attitude are opposing; however, at a deeper level this relationship makes sense: Our general beliefs about compliance do not improve our compliance behaviors, but how we evaluate the importance of those beliefs does affect our compliance behaviors. For instance, one's perception that compliance is generally a good thing may not change the behavior of that individual. However, if that individual believes that compliance does have a positive impact, such as improving the university campus or protecting the health of others, then that individual is more likely to comply with the tobacco-free policy. The results from this study suggest that how one evaluates compliance with tobacco-free policies is the most important attitudinal belief for increasing compliance. Strategies for improving perceived behavioral evaluations will be discussed in the *Practical Implications for Improving Tobacco-free Policy Compliance* section to follow.

In addition to this important finding, this study is also the first investigation of attitudes as they directly relate to tobacco-free policy compliance behaviors. Lazarus et al. (2009) is the only other investigation aimed at predicting tobacco-free policy compliance. In their investigation, attitudes were operationalized as they related to the general act of smoking and then used to assess the latent variable of attitude toward tobacco-free policies. Some studies, such as Lechner, Meier, Miller, Wiener, and Fils-Aime, 2012, have directly assessed attitudes toward tobacco-free policy favorability as a way to assess attitudes toward policy compliance. Thus, the current study is the first to

assess attitudes as they directly relate to the context of tobacco-free policy compliance, contributing important theoretical insight into how attitudes relate to tobacco-free policy compliance behaviors.

Subjective Norm. None of the three dimensions of subjective norms were supported as significant predictors of tobacco-free policy compliance. This was surprising given that the previous tobacco-free policy compliance investigation by Lazuras et al. (2009) found subjective norms to be a significant predictor of tobacco-free policy compliance. However, operationalization of their measure was very different from the measure used in this study. In Lazuras et al., only normative beliefs were assessed, with the referent groups of various family members (i.e., mother/stepmother, father/stepfather, and siblings), best friend, and boyfriend/girlfriend. Although those referent groups reflect people most likely to be important to an individual, they do not reflect the people that an average undergraduate student would socially be around most often. For instance, in a previous test of the measure used to assess subjective norms in the context of tobacco-free policy compliance, the referent group of family members factored out of the measure in a confirmatory factor analysis (see Record & Savage, Under review). Thus, the referent groups used in the current study more closely reflected the influential peers currently around undergraduate students (e.g., UK students, closest friends at UK). In addition to the different referent groups, the statistical controls in Lazuras et al. (2009) were also different from the variables controlled for in this model.

The assessment of different referent groups and the controlling of different variables could be possible explanations for why the results found here were not consistent with the results from Lazuras et al. (2009). Although other compliance-focused

investigations were not in the context of tobacco-free policy compliance, the finding of subjective norms not being a significant predictor of compliance is consistent with many of the findings from those studies. For instance, most of the compliance studies in the context of driving laws have found subjective norms to be significant predictors only in particular circumstances (Chen & Chen, 2001; Moan & Rise, 2011). For example, Chen and Chen (2011) found subjective norms to be a significant predictor of speed limit compliance only with one category of drivers in their sample (i.e., novice drivers) but not with the sample as a whole or with any other category of drivers in their sample. Similarly, Moan and Rise (2011) found only the descriptive norms dimension to be a significant predictor for men's intention to drink and drive but not for women's intention to drink and drive. The results from the current study, finding all subjective norms dimensions to be non-significant predictors, is most consistent with an exercise compliance study, which also found subjective norms to be non-significant predictors in all circumstances (Anderson & Lavalle, 2008). Thus, the impact of subjective norms on compliance behaviors has varied in different contexts and remains inconsistent in the context of tobacco-free policy compliance. However, trends suggest that subjective norms are, overall, not reliable predictors of tobacco-free policy compliance.

Behavioral Control. Previous TPB investigations of compliance behaviors have consistently found perceived behavioral control to be the most significant predictor of compliance behaviors (e.g., Anderson & Lavallee, 2008; Chen & Chen, 2011; Moan & Rise, 2011). The results from this study are consistent with previous research in that the power dimension of perceived behavioral control was found to be the most significant predictor of tobacco-free policy compliance among all of the TPB variables (β = -.25, p <

.001). For the purposes of this study, the power dimension assessed one's perceived capability (or efficacy) of complying with UK's tobacco-free policy, whereas control beliefs assessed the role of individual decision (e.g., it is up to me) in complying with UK's tobacco-free policy. The control beliefs dimension was not found to be a significant predictor of tobacco-free policy compliance ($\beta = .03$, $p > .05$). The results here indicate that the more a smoker perceives that they are capable of complying with a tobacco-free policy, the less likely they are to smoke on campus. This is consistent with the results found in Fallin et al. (2013), which found a significant increase in compliance behaviors before an intervention that used efficacy-based messages. Thus, the TPB results of this study suggest that the key to increasing compliance with tobacco-free policies partially lies in increasing efficacy beliefs with regard to one's capabilities of complying. Strategies for accomplishing this will be discussed in the *Practical Implications for Improving Tobacco-free Policy Compliance* section to follow.

Summary. According to the TPB, behavior change occurs when attitudes toward a behavior are favorable (e.g., policy compliance is perceived positively), social norms are perceived as positive (e.g., others approve of policy compliance), and behavioral control is high (e.g., ability to comply with the policy; Ajzen, 1991). To achieve changes in smokers' perceptions of these three behavioral constructs, the messages were created to target attitudes, social norm perceptions, and behavioral control, and pre-tested with focus groups of undergraduate student smokers. Ajzen (2002) noted that behavioral intention can be improved through the targeting of even one of the TPB variables. Results from the current study suggest that targeting (1) evaluations of the benefits of tobacco-free policies and (2) personal capability beliefs for tobacco-free policy compliance will

result in the greatest increases in tobacco-free policy compliance behaviors.

Practical Implications for Understanding Tobacco-free Policy Compliance

Research is just starting to delve into why some people comply with tobacco-free policies and some do not with only a few published studies focusing on this specific question. Most of these studies have been qualitative (Jancey et al., 2014; Record, 2013; Schultz et al., 2011), with one descriptive study (Russette et al., 2014) and one quantitative study (Lazuras et al., 2009). Although qualitative investigations provide valuable insight into noncompliant behaviors, quantitative studies are needed to create a more generalizable understanding of relationships to compliance behaviors. As a starting point for this much-needed investigation, the psychological, physical, and social factors known to increase general smoking behaviors (Carton et al., 1994; Flay et al., 1998; Gilbert, 1995; Kobus, 2003; Lenz, 2004; Levinson et al., 2007; Mercken et al., 2011; O'Loughlin et al., 1998; Schleibcher et al., 2009; Swaim et al., 2997; Terracciano & Costa, 2004; Tyas & Pederson, 1998; Urberg et al., 1999) were investigated with regard to their relationship to tobacco-free policy compliance. The following paragraphs will expand on the results found for each of the classification of variables.

Psychological Factors. The four psychological factors of stress, depression, anxiety, and sensation seeking were investigated to assess their relationship to tobacco-free policy compliance. Previous research has investigated the psychological factors explored here as they relate to smoking behaviors. The vast majority of that research found the factors to be associated with smoking behaviors among both adolescents and undergraduate students. Specifically, the psychological variables of stress, depression, and anxiety are well supported as being positively associated with smoking behaviors

(Lenz, 2004; Schleibcher et al., 2009; Tyas & Pederson, 1998). Similarly, sensation seeking has also been found to be positively associated with smoking behaviors (Carton et al., 1994; Gilbert, 1995; Terracciano & Costa, 2004). However, only some of the factors have been investigated with regard to their relationship to tobacco-free policy compliance. For instance, in a qualitative investigation of perceptions of smoke-free policies on hospital campuses, Schultz et al. (2011) found many participants to cite stress and anxiety relief as a reason for noncompliance. Jancey et al. (2014) found similar results in their qualitative analysis. The current investigation, however, is the first to test the statistical relationship between these factors and tobacco-free policy compliance.

The non-significant results of the psychological variables of stress, depression, and anxiety are surprising considering the amount of literature that suggests that the relationships should be significant. One of the major problems with these variables was an issue of multicollinearity across all three variables. Although the measures used for each variable were carefully created and tested to assure that each measure specifically explored only the intended variable (Antony et al., 1998), these three constructs are still definitionally similar and, thus, operationalization of each variable independently is challenging.

Another explanation for the current results could be that although the measure is conceptualized as a three-dimensional scale, a confirmatory factor analysis suggests the measure is unidimensional, explaining 52% of the variance (λ = 10.98). However, even when the regression is run with the unidimensional measure instead of the three independent measures, there was no significant difference in the prediction model of the psychological variables (initial model: r^2 = .11, F[4, 474] = 1.54, p > .05; second model:

r^2 = .01, F[2, 476] = 2.34, p > .05). Another explanation could be that this data was collected in February, toward the beginning of the semester, and students were not yet fully experiencing much stress, anxiety, or depression. Future research may find that these variables only impact tobacco-free policy compliance behaviors during particular times of the school year.

For the variable of sensation seeking, it appears that one's level of sensation seeking has no role with regard to compliance behaviors. That is, people don't violate for the thrill of violating but, instead, because they want a cigarette. This could be a unique finding that is present on college campuses where perceived enforcement of the tobacco-free policy low. Future research may find that on campuses where tobacco-free policies are more heavily enforced—either through greater punishment or more frequent citations—that sensation seeking does play a more significant factor in tobacco-free policy compliance behaviors.

In sum, results from the current study indicate that psychological factors, although known associates for smoking behaviors, were not found to be significant predictors of tobacco-free policy compliance behaviors. The variables of stress, depression, and anxiety may not have been statistically supported due to the earliness of the semester, and the variable of sensation seeking may have been found to be non-significant due to the lack of perceived punishment for violating on UK's college campus. More research is needed to tease out a clearer explanation for the relationship of these psychological factors to tobacco-free policy compliance behaviors.

Physical Factors. The physical factors investigated with regard to their relationship to tobacco-free policy compliance were nicotine dependence, number of quit

attempts, and average number of cigarettes smoked per day. Each variable will be discussed individually in the following paragraphs, beginning with nicotine dependence. Lazuras et al. (2009) is the only previous research investigation to explore the relationship of nicotine dependence to tobacco-free policy compliance. The finding from the current study is inconsistent with their findings; Lazuras et al. (2009) found nicotine dependence to be a significant predictor, negatively associated with tobacco-free policy compliance. That is, they found that the more dependent one perceives themselves to be to nicotine, the less they will comply with a tobacco-free policy. One explanation for the potential differences between these two results is that two different measures of nicotine dependence were used; Lazuras et al. (2009) used the Fagerström Tolerance Questionnaire (FTQ; Fagerström, 1978) and the current study used the Fagerström Test for Nicotine Dependence (FTND; Heatherton et al., 1991). This part of the hypothesis not being supported and being inconsistent with the one previous finding indicates that it will be important for future research to explore this relationship further. Despite the positive relationship between nicotine dependence and smoking behaviors, there may not be a relationship between nicotine dependence and tobacco-free policy compliance behaviors.

Another explanation of the non-significant finding of nicotine dependence can be found in the culture of the college-aged smoker. The surveyed undergraduate smokers are part of a generation of college-aged smokers that do not identify as a traditional "smoker" but as a "social smoker" (Levinson et al., 2007). Research has found that social smokers tend to feel more immune to the health effects of smoking because they do not see themselves as a smoker (Levinson et al., 2007; Luoto, Uutela, & Puska, 2000; Rollins, Malmstadt Schumacher, & Ling, 2002, November). Thus, the generation of social

smokers may also not perceive themselves to be dependent on nicotine the way that the classic smoker had. Future research looking to assess this relationship should consider a biological test of nicotine dependence (e.g., cotinine sample, neuroimaging scan), either instead of or to accompany the FTND.

The other two physical factors explored in this study were average daily cigarette consumption and cessation attempts in the last six months. Like the variable of nicotine dependence, the relationship between average daily cigarette consumption has only been investigated for its relationship to tobacco-free policy compliance in one previous research study; Russette et al. (2014) included average daily cigarette consumption as one of the variables in their study, which aimed to assess tobacco-free policy compliance. However, average daily cigarette consumption was only used as a descriptive variable to explore the differences between compliant and noncompliant smokers. What Russette et al. (2014) found in their sample of 60 smokers is that compliant smokers smoke an average of 9.9 (SD = 6.12) cigarettes per day and noncompliant smokers smoke an average of 9.1 (SD = 5.91) cigarettes per day; there was not a statistical difference between the two groups of smokers in their study. Thus, the current study was the first to explore the power of average daily cigarette consumption on compliance behaviors. Of all the variables tested (in their individual models), average daily cigarette consumption was one of the most significant predictors of tobacco-free policy compliance (β = .31, t = 6.95, p < .001). That is, the more cigarettes one smokes in a typical day, the less likely they are to comply with a tobacco-free policy.

Transitioning slightly to the role of cessation attempts, the previous studies reviewed for the other two physical factors (i.e., Lazuras et al., 2009; Russette et al.,

2014) did not include measures of cessation in their investigations. Thus, the current study was the first to investigate the relationship of cessation to tobacco-free policy compliance. Of all the physical variables tested, average number of cessation attempts in the last six months was the most significant predictor of tobacco-free policy compliance ($\beta = .59$, $t = 17.08$, $p < .001$); however, the direction of the relationship was opposite of what was expected. That is, the more people had tried to quit, the more likely they were to have smoked on campus. This is a surprising finding, and one can venture a few potential explanations.

First, despite the current study not finding support for stress and anxiety impacting compliance behaviors, research supports that stress and anxiety perpetuate smoking behaviors (Carton et al., 1994; Gilbert, 1995; Terracciano & Costa, 2004); these experiences are also particularly common on a college campus (Kish et al., 2005; MacGeorge et al., 2005). Therefore, those trying to quit may relapse while they are on campus (due to tensions from class or schoolwork) and may need to smoke while on campus. Related to average daily cigarette consumption, results from this study suggest that the more cigarettes one smokes in a day, the more likely they are to smoke on campus. Although the initial response for addressing this would be the idea that lowering cigarette consumption will increase compliance, on the basis of the findings related to the role of cessation attempts, reducing cigarette consumption will not immediately improve compliance behaviors. Instead, strategies aimed at reducing cigarette use (with a secondary goal of increasing compliance) may find lag time (which could include an increase in noncompliant behaviors) before there is an actual increase in compliance behaviors due to the time it takes a smoker to successfully quit smoking. This will be

explored in more depth in the *Practical Implications for Improving Tobacco-free Policy Compliance* section.

Social Factors. The final factor to be discussed in this section is the role of social norms in the context of tobacco-free policy compliance. The operationalization of social norms in the current study is very similar to Lazuras et al. (2009); the investigation of social norms was assessed through the dimension of normative influences. Like most of the factors investigated in the current study, the relationship of social norms has not been thoroughly investigated with regard to tobacco-free policy compliance behaviors. However, Lazuras et al. (2009) did include social norms as a factor in their model aiming to predict compliance; they found support for social norms as a significant predictor of compliance behaviors. Specifically, they asked about normative influences with regard to general smoking behaviors. The current study, however, asked about normative influences specifically with regard to compliance behaviors. Both studies, however, concluded that normative influence is a significant predictor of tobacco-free policy compliance. Results from the current study support that the more people perceive tobacco-free policy noncompliance as normal, the less compliant they are with the tobacco-free policy (β = -.22, t = -4.81, $p < .001$).

The relationship between social norms and tobacco-free policy compliance is significantly supported in the expected direction. Being the first to quantitatively investigate social norms in this way, our results suggest that creating an environment of perceived high compliance is critical to improving compliance behaviors on a college campus. Strategies for improving perceived social norms will be discussed in the *Practical Implications for Improving Tobacco-free Policy Compliance* section to follow.

Practical Implications for Improving Tobacco-free Policy Compliance

The primary goal of this study was to provide suggestions for improving tobacco-free policy compliance. This is critical for public health because when smoking is restricted, smoking prevalence, average daily cigarette consumption, and secondhand smoke exposure are reduced (Bauer et al., 2005; Chaloupka & Wechsler, 1995; Chapman et al., 1999; Fichtenberg & Glantz, 2002). Similarly, smoke-free environments are associated with an increase in cessation attempts (Farkas et al., 1999; Glasgow et al., 1997). Building on the results from this study, including from the exploration of how different variables relate to tobacco-free compliance and the results from the implemented campaign aimed at improving compliance, as well as the results from previous investigations aimed at increasing tobacco-free policy compliance, this final section will provide practical implications for improving tobacco-free policy compliance on college campuses.

To begin, the campaign employed in the current study used the TPB to create messages aimed at improving tobacco-free policy compliance. The five finalized messages were used on posters and yard signs that were placed in heavy traffic areas around UK's campus. After the ten week project, both the observational and survey data supported that the campaign was effective at improving compliance with UK's tobacco-free policy. There are a number of explanations for the success of the campaign. First, the posters and yard signs were endorsed by UK's 'UK Tobacco-free' logo, giving the impression that this was a University-funded effort (and to some extent that is true). Thus, the messages gave the impression that UK was stepping up enforcement to the tobacco-free policy. Consistent with previous qualitative investigations (e.g., Jancey et

al., 2014; Record, 2013; Schultz et al., 2011) and the results from the focus group investigation in the current study, there is a feeling on UK's campus that the tobacco-free policy is not enforced across the campus. Therefore, the messages infringed on that belief by creating the perception that the University was in fact still concerned with compliance behaviors on campus. This suggestion is consistent with results from Harris et al. (2009), which was a successful intervention aimed entirely at increasing the perception of enforcement. Including university branding on campaign materials aimed at increasing tobacco-free policy compliance behaviors may help enhance the credibility of the campaign.

A second reason the campaign was effective lies in the theoretical framework. All five of the final messages (a) addressed attitudes directed at tobacco-free policy compliance behaviors, (b) used pictures on the college campus to connect with social norms, and (c) had a statement encouraging behavioral control (i.e., the slogan 'Let's Clear the Air'). Thus, unlike previous intervention efforts that focused on one key compliance-related construct, such as efficacy (e.g., Fallin et al., 2013) or perceived enforcement (Harris et al., 2009), the intervention in the current study addressed multiple variables that can be targeted to improve tobacco-free policy compliance behaviors. This is important because compliance cannot be improved by addressing norms alone or efficacy/control alone; all relevant variables are needed to most effectively improve tobacco-free policy on college campuses. Thus, results from this study suggest that the variables of TPB do effectively address variables that are critical for improving tobacco-free policy compliance.

Although addressing attitudes, social norms, and behavioral control in the

messages did improve compliance, the messages did not significantly change attitudes or behavioral control perceptions of smokers. However, the messages did significantly improve perceived social norms regarding compliance behaviors on UK's campus. Of the three TPB variables, social norms is arguably the most important to target and attempt to improve. The results from the focus group data in this study, as well as the results from qualitative data in other explorations (Jancey et al., 2014; Record, 2013; Schultz et al., 2011), suggest that creating the perception of compliance as a norm is critical for improving tobacco-free policy compliance behaviors. In addition, normative beliefs (as an assessment of social norms) were a significant predictor of tobacco-free policy compliance behaviors. Many students don't comply because they don't think it matters and they think that everyone violates anyway. The undergraduate students with the highest level of exposure to the campaign messages had significant changes in social norm perceptions with regard to tobacco-free policy compliance behaviors on UK's campus. Thus, compliance can be improved through continued efforts aimed at contending perceived tobacco-free policy compliance norms on college campuses.

Results from the current study also contribute important implications with regard to assessment tools for tobacco-free policy compliance. Assessing compliance with tobacco-free policies is still being investigated; no one assessment tool has been deemed the standard measure. Fallin et al. (2012) created a tool for assessing compliance that centers on cigarette butt pick-up. Record (2013) and Record and Savage (Under review) tested self-report survey measures of tobacco-free policy compliance. Harris et al. (2009) used observational measures to assess compliance. For feasibility reasons, this study did not assess compliance via cigarette butt measures; instead, observational measures and

survey measured were both included to assess compliance. Both measures supported that the campaign was effective at improving tobacco-free policy compliance. The observational measures, although more time consuming, collected more detailed changes in smoking behaviors. The survey measures, although prone to social desirability response and not as detailed with change observations, were consistent with the observational measures. Thus, results from the current study support both measures for detecting change in tobacco-free policy compliance behaviors and assessing campaign effectiveness. Depending on the purpose of the project, either measure could be used for assessment of tobacco-free policy compliance.

Findings from this study suggest multiple angles for increasing compliance with a university tobacco-free policy. First, campaigns aimed at increasing compliance, including the campaign from this study, have consistently been found to be effective at increasing tobacco-free policy compliance behaviors (e.g., Fallin et al., 2013; Harris et al., 2009). Carefully designed messages not only remind students that the university cares about the tobacco-free policy but also that they have the power to persuade noncompliant smokers to comply with the tobacco-free policy. Theoretical driven campaigns stand the greatest chance for causing positive impact on audiences (Maibach & Parrott, 1995). The current study supports the TPB as an effective model for designing campaign materials targeted at increasing tobacco-free policy compliance. Similar frameworks that include variables related to social norms, attitudes, and behaviors, such as the integrated behavioral model (Montaño, 2008) or the health belief model (Champion & Skinner, 2008), may also be important models to test in the context of tobacco-free policy compliance. Regardless of the guiding theoretical framework, campaign messages that

have been carefully designed, meaning that they are theory driven, have gone through manipulation checks, and have been focus group tested, stand the best chance at improving tobacco-free policy compliance.

Second, policy enforcement is critical. Creating an atmosphere of compliance as the norm is essential for reducing the misperception that there is no enforcement and that no one complies with the tobacco-free policy. Plaspohl et al. (2012) surveyed universities to explore enforcement strategies on college campuses across the country. They asked schools about whether or not they had implemented one of nine enforcement strategies for their tobacco-free policy (see Table 6. UK has incorporated all of the strategies except—according to the results from the social norms theme of the qualitative focus group data—number seven, the provision of consistent enforcement. More consistent enforcement is by no means an easy or cheap recommendation. Enforcement requires additional resources that many universities don't have to spare, such as personnel, money, and time. However, the harms of tobacco for both smokers and nonsmokers are well known and deadly. Therefore, prioritizing tobacco-free policy enforcement is important for protecting the public health of university faculty, staff, students, and visitors. Universities should invest as much as possible into the enforcement strategy of their tobacco-free campus policy.

Table 6. Tobacco-free Policy Enforcement Strategies

1. Develop tobacco policy that reflects best practices in prevention, cessation, control
2. Communicate tobacco policy to campus community on annual basis
3. Offer/promote prevention and education supporting nonuse/risks of tobacco
4. Offer/promote programs with evidence-based approaches to end tobacco use
5. Advocate inclusion of tobacco cessation products/services in student insurance plans
6. Provide comprehensive marketing/signage on campus for awareness of policy
7. Provide consistent enforcement of tobacco policy/practices on campus
8. Collaborate with external health entities/organizations to maintain healthy environment
9. Develop/maintain tobacco task force on campus to address ongoing needs/concerns

Note: Table from Plaspohl et al. (2012)

Third, compliance could be improved through strategies aimed at aiding smokers who are trying to quit smoking. Results from this study indicate some of the students who struggle most to comply with UK's tobacco-free policy are also the ones who have been trying to quit smoking. There are a number ways that universities could help students not

relapse on smoking cigarettes. For instance, the provision of cheaper cessation services, stress reducing services, and additional counseling could all help smokers trying to quit smoking achieve their goal. The provision of these resources would also need to be heavily advertised on campus so that students would know they were available. Although these recommendations may seem costly, the results from the current study suggest that compliance will significantly improve if smokers trying to quit smoking are able to stay on their path.

Another way to improve tobacco-free policy compliance is to target the significant theoretical predictors from the TPB. The TPB regression model suggests that dimension of behavioral evaluations (from the latent variable of attitude) and power (from the latent variable of behavioral control) are the most important to target for improving tobacco-free policy compliance. In addition, when just normative beliefs are examined (excluding descriptive and motivational beliefs from the latent variable of subjective norms) then social norms are also significant predictors of tobacco-free policy compliance. Improving behavioral evaluations is about educating people on the benefits of tobacco-free policies. This could be accomplished through an educational campaign aimed at demonstrating the public health benefits of tobacco-free policies with emphasis on tobacco-free compliance. The power dimension is essentially the efficacy dimension of the TPB. Improving efficacy is a fine line; if the goal is to improve compliance, then compliance efficacy interventions should not at all address quit efficacy. According to some focus group participants, messages about cessation services are often perceived as encouragement to quit all together; the focus group participants from the current study suggest that this could be upsetting and may even annoy some smokers enough to smoke

more while on campus. Intervention efforts aimed at increasing power should be aware of the strong potential boomerang effects. As previously discussed, increasing enforcement is the best strategy for improving the perceived normative beliefs of noncompliance on campus. In order to reduce any potential boomerang effects, messages should be theoretically informed and focus group tested.

Limitations

There are several limitations to the present study. First, many of the measures that were pre-tested for use in this study, such as the theoretical and compliance measures, were tested on UK undergraduate students. Thus, these measures have only been supported as reliable with UK undergraduates. Undergraduate students in other cities, states, regions, or countries may be more or less persuaded by factors that influenced UK undergraduates. For instance, undergraduates in warmer beach climates may not need an immediate cigarette after a stressful class for they have other channels of stress relief. Similarly, schools that have regular and significant cessation campaigns may be influencing their undergraduates with regard to tobacco differently than UK undergraduates have been influenced. Thus, the items on the measures used in the current study should be tested with other undergraduate populations.

Another limitation of the current study was that there was not a comparison school for this campaign dissemination. Without a comparable control, we cannot say for sure that the decrease in noncompliant behaviors was 100% due to the campaign efforts. For instance, it is possible that the state increased tobacco-free policy-related efforts during the same semester of the campaign (although there is no evidence that this occurred). Although a control group was not feasible for the current study, it would have

improved the design of the study.

A third limitation of this study is that the demographic of fraternity affiliation and of current residence (e.g., on or off campus) were not assessed. Previous research into tobacco-free policy compliance behaviors has found that members of Greek life are more likely to smoke on campus (Lazuras et al., 2009; Patterson et al., 2004; Wetter et al., 2004). Similarly, students who live on and off campus may experience different struggles with their tobacco-free policy compliance behaviors. Not asking these questions exclude important demographic characteristics that should be considered. Future research should include these items in their measures.

Another limitation of the current study was the weather. Unlike most Kentucky winters, the winter the campaign occurred was unseasonably cold. Although we anticipated that snow may persist through the first couple weeks of pre-intervention data collection, what actually happened was that the snow and cold weather continued through the entire campaign until the beginning of post-intervention data collection. Instead of the anticipated warming of the weather by the beginning of March, the weather did not begin warming up until into April. Although the weather remained fairly consistent through the eleven weeks of the project (that is, as consistent as weather can be over eleven weeks), the weather was still not typical for Lexington, KY. In general, when collecting observational data, such as the number of noncompliant smokers on campus, control is always going to be a challenge. It is possible that the same study re-implemented during a different a semester or in different weather may have different results.

The use of print-only messages is another limitation of this study. Although the campaign was found to be effective with only the use of posters and yard signs, the reach

of the print-based campaign strategy was limited. Different channels could have resulted in different levels of effectiveness—potentially increasing the effectiveness of the campaign. For instance, the messages being used on technology-based channels, such as social media sites or via e-mail, could have resulted in better campaign reach. Similarly, use of the University's televised station, newspaper, or radio station could also have produced different results from the ones found in the current study.

Directions for Future Research

There are numerous directions for future research that can build from the current investigation. First, the measures used in this study should be tested on undergraduate students at schools other than UK. The items found reliable in this study should be compared to results from samples of smokers on other campuses. Similarly, the intervention should be employed on other college campuses. The same messages could be used but the pictures should be changed to reflect places and students of the campus on which the campaign is being implemented. Results from future investigations modeled after the current study would continue to advance knowledge and understanding of tobacco-free policy compliance behaviors on college campuses.

Future research should look to build on the TPB results found in the current study. Fallin et al. (2013) called for more investigations of how attitudes and subjective norms impact tobacco-free policy compliance. Although this study contributes significantly to our understanding of their role, we still echo the call of Fallin et al. (2013) to continue testing the role of these constructs as well as the TPB model as a whole. In addition to continuing to explore the role of the TPB, exploring other theoretical models would be another direction for future research. Such models could include the integrated behavioral

model (Montaño, 2008) or the health belief model (Champion & Skinner, 2008). Future theoretical exploration would significantly aid our understanding of theoretical models that best explain tobacco-free policy compliance behaviors.

Another direction for future research includes continued exploration of best tools for assessing tobacco-free policy compliance. More research is still needed to support the most appropriate measures for investigating tobacco-free policy compliance. One assessment strategy not explored in this study is via air quality analysis. To date, no study has used air quality analysis as a means to investigate levels of compliance with tobacco-free policies. However, one investigation does support air quality as a tool for assessing outdoor tobacco smoke on the perimeters of a college campus (Cho et al., In press). Similarly, Fallin et al. (2012) is the only study to attempt a compliance measurement with cigarette butt counts. Future research could also benefit from additional measurement exploration with cigarette butt counts as a tool for assessing tobacco-free policy compliance. Similarly, the self-report measures and the observational measurement strategy used in the current study should also be used in future research to support validity of these methods.

Future research could also look to test the campaign across different channels. More technology-based channels, such as social media or e-mail, may increase the reach of the campaign messages. Use of the University's televised station, newspaper, or radio station would also be important channels for future research to explore. Although the print-based strategy used in the current study was supported as effective messaging for increasing compliance with the tobacco-free policy, other channels may result in even stronger effects.

Another direction for future research is to explore the issues of multicollinearity found in the current study. Issues of multicollinearity were found between the psychological factor variables of stress, depression, and anxiety and the physical factor variables of nicotine dependence and daily cigarette use. Although an exploration of the relationships of each variable included in the psychological and physical factors was slightly beyond the scope of the current study, future research will want to explore and, when necessary, improve measures that are potentially leading to issues of multicollinearity in models aiming to predict tobacco-free policy compliance.

The final point for the discussion of future directions has to do with the selected violation areas for the observational data collection. As Figure 4 depicted, the selected location with the most observed tobacco-free policy violations (i.e., the back of Whitehall Classroom Building) was so different from the other locations that it emerged as a statistical outlier. Although observing tobacco-free policy violations in only one location would not capture the variability on campus or be representative of all the violation areas on campus, focusing on tobacco-free policy compliance in just this one area may significantly improve compliance behaviors across the University of Kentucky's campus. The back of Whitehall Classroom Building is very clearly the central violation area on the University of Kentucky's campus. This was not only supported in the time series analysis but this location also emerged as the most commonly discussed "accepted" violation area on campus during the focus group conversations. Future efforts aiming to increase tobacco-free policy compliance on the University of Kentucky's campus should target the noncompliant behaviors in the back of Whitehall Classroom Building. Results from the current study suggest that one of the best ways to improve compliance to UK's

tobacco-free policy would be by reducing the perceived norm of accepted tobacco-free policy noncompliance. Therefore, not only would targeting the back of Whitehall Classroom Building focus on the largest group of noncompliant smokers but it would also target the main area on campus that perpetuates the perceptions that the tobacco-free policy is not enforced and that no one complies with the tobacco-free policy.

Chapter Eight

Conclusion

Despite decades of tobacco-related research, cigarette smoking remains a serious health threat in the United States (CDC, 2009). The implementation of comprehensive tobacco-free policies is recommended to reduce cigarette use and improve public health (ACHA, 2012; ANR, 2014; CDC, 2011; IOM, 2007). As of October 2014, 1,478 colleges and universities in the United States had implemented 100% smoke-free campus policies; of these, 976 had implemented 100% tobacco-free policies (ANR, 2014). When smoking is restricted, smoking prevalence, average daily cigarette consumption, and secondhand smoke exposure are reduced (Bauer et al., 2005; Chaloupka & Wechsler, 1995; Chapman et al., 1999; Fichtenberg & Glantz, 2002). Similarly, smoke-free environments are associated with an increase in cessation attempts (Farkas et al., 1999; Glasgow et al., 1997). However, compliance with these policies remains a challenge (Hahn et al., 2012; Plaspohl et al., 2012). This is important because tobacco-free policies are only effective at reducing health risks if smokers comply with them.

In 2009, the University of Kentucky implemented a campus-wide tobacco-free policy. That is, the use of any tobacco product is prohibited anywhere on campus, including in parking garages, in University vehicles, and on sidewalks owned by the University. The current study suggests that 79% of undergraduate student smokers have smoked on campus at least once since the policy was implemented. Without interventions that increase smokers' willingness to comply with tobacco-free policies, the ability of tobacco-free policies to positively impact the health of both smokers (e.g., increased cessation) and non-smokers (e.g., reduced exposure to outdoor tobacco smoke) is

jeopardized.

Thus, the purpose of this study was to (a) investigate the individual level factors associated with tobacco-free policy compliance among college students and (b) design and evaluate a theory-based campaign to increase both individual-level (i.e., self-reported) and population-level (i.e., observed by researcher) compliance with a tobacco-free campus policy. The study was conducted in two phases. Phase One entailed the design and pilot-testing of theoretically-informed messages that were used in the campus-wide campaign. Phase Two implemented and tested the effects of the campus campaign on individual- and population-level compliance outcomes. Specifically, the study sought to (a) better understand factors associated with tobacco-free policy compliance behaviors among college student smokers; (b) develop theoretically appropriate messages aimed at improving tobacco-free policy compliance; and (c) increase college student smokers' self-reported level of compliance, and observed population-level measures of compliance with a tobacco-free campus policy.

Three individual level factors of policy compliance were investigated; these factors were psychological (i.e., stress, depression, anxiety, sensation seeking), physical (i.e., addiction, cessation), and social (i.e., social norms). All of these factors are known to be associated with smoking behaviors (Tyas & Pederson, 1998). However, only some of the factors emerged as significant predictors of tobacco-free policy compliance behaviors. These variables of physical addiction and perceived social norms were important factors associated with tobacco-free policy compliance.

The current study also sought to improve both individual and population level compliance with tobacco-free campus policies through development and testing of a

campus-wide campaign. According to the TPB, behavior change occurs when attitudes toward a behavior are favorable (e.g., policy compliance is perceived positively), social norms are perceived as positive (e.g., others approve of policy compliance), and behavioral control is high (e.g., ability to comply with the policy; Ajzen, 1991). To achieve changes in smokers' perceptions of these three behavioral constructs, the messages were created to target attitudes, social norm perceptions, and behavioral control, and underwent pre-testing with undergraduate focus groups. Although results support that the campaign was effective at improving both individual and population level compliance behaviors, the campaign only improved the TPB variable perceived norms and did not have an impact on the other TPB variables.

Results from this study offer best practice suggestions for improving college student smokers' willingness to comply with tobacco-free campus policies, particularly at southern and tobacco-belt located universities. The current study fills numerous gaps in the literature about our understanding of tobacco-free policy compliance behaviors on college campuses. This study also suggests ways in which universities can work to improve tobacco-free policy compliance behaviors on college campuses. In addition, the current study calls for numerous directions that future research can head in order to build on the findings of the current study, such as campaign implementation on other college campuses, tests of various measures of tobacco-free policy compliance, and applications of different theories for understanding tobacco-free policy compliance behaviors.

Increasing compliance with tobacco-free policies on college campuses is an important, yet challenging, task that should be prioritized by universities. The campaign materials tested and implemented in the current study have been supported as one way in

which universities can improve tobacco-free policy compliance on college campuses. When tobacco-free policies are adhered to, the health of university faculty, staff, students, and visitors—for both smokers and nonsmokers—improves.

Appendix A:

Phase One Survey for Focus Group Participants

Please answer the following questions in the ways that best describe you.

1. In the past 30 days, have you smoked any cigarettes, even a puff?

   __Yes __No

2. Have you smoked at least 100 cigarettes in your lifetime?

   __Yes __No

Please answer the following questions as best describes you.

3. How many cigarettes do you typically smoke in your average day?

   _____ cigarettes per day

4. In the last six months, have you tried to quit smoking?

   a. If yes, how many times have you tried to quit smoking for at least 24 hours? ____

5. How soon after you wake up do you smoke your first cigarette?

___ After 60 minutes, ___ 31-60 minutes, ___ 6-30 minutes, ___ Within 5 minutes

6. Do you find it difficult to refrain from smoking in places where it is forbidden; for example, in a church, at the library, in a cinema, etc.?

   __Yes __No

7. Which cigarette would you hate most to give up?

____ The first one in the morning, ____ All others

8. How many cigarettes per day do you smoke?

____ 10 or less, ____ 11-20, ____ 21-30, ____ 31 or more

9. Do you smoke more frequently during the first hours after waking than during the rest of the day?

   __Yes __No

10. Do you smoke if you are so ill that you are in bed most of the day?

    __Yes __No

Please answer the following questions as best describes you. Keep in mind that UK's tobacco-free campus policy covers all parking garages and all streets and sidewalks owned by the University.

11. Since UK implemented its campus-wide tobacco-free policy, have you smoked any cigarettes on campus?

5 = Frequently, 4 = Often, 3 = Occasionally, 2 = Rarely, 1 = Never

12. When you have smoked on campus, has anyone ever asked you to comply with UK's tobacco-free policy?
    ____ Yes ____ No

13. During your average week, how many times per week would you say you smoke cigarettes, cigars, or pipes on UK's campus? Please enter a number in the space below.

    _____ times per week

14. In the space provided below, please tell us, in detail, the reasons that you do or do not comply with UK's smoke-free policy.

_____

15. In the last 30 days, have you used any tobacco products other than cigarettes?

    ____ Yes ____ No

    a. Please check all the tobacco products you have used in the last 30 days.

___ Chew/Dip, ___ Cigar, ___ E-cigarette, ___ Hookah/Water Pipe, ___ Other (Specify)

Demographics

16. Age: _____

17. Ethnicity:

___ African American , ___ Asian , ___ Hispanic/Latino, ___ White, __ Other (Write in)

18. Gender:

_____ Male, _____ Female

19. Year in school:

_____ Freshman, _____ Sophomore, _____ Junior, _____ Senior

20. During your average work week (i.e., Monday-Friday), how many days are you on campus this semester?

____ 1, ____ 2, ____ 3, ____ 4, ____ 5

Appendix B:

Phase One Focus Group Protocol

[I will begin by informing participants that the session will be recorded and that they are not required to answer any question they are not comfortable answering. Participants will then be reminded of UK's tobacco-free policy: in 2009 the University of Kentucky implemented a tobacco-free campus policy. This means that on any campus property, such as streets, sidewalks, parking lots, parking garages, or in vehicles, tobacco products of any kind are not allowed.]

[Transition: I would like to provide you with some important statistics about why tobacco-free policies are so important. For both users and nonusers, tobacco use is affiliated with numerous health-related conditions such as various cancers, respiratory illnesses, and heart-related diseases. Research has found that tobacco-free policies are associated with a decrease in cigarette use, a decrease in exposure to secondhand smoke, and an increase in quit attempts among smokers. Therefore, tobacco-free policies are an important public health policy. In order to increase compliance with UK's tobacco-free policy, I would like to share messages with you and get your responses about how effective you think the message would be at increasing compliance to our tobacco-free policy.]

For each message the following questions will be asked:

- What are you initial thoughts and reactions to this image? Why?
- How do you think smokers' will react to this message?
- What is the least effective part of this message?
- What could make this a more effective message?
- Overall, do you think this would be an effective message to place around campus to increase compliance with UK's tobacco-free policy?

Appendix C:

Individual Level Measurement Tool for Pre/Post-Intervention

(1 & 2 are qualifying questions; to be eligible to participate participants must answer yes to both questions. If a participant answers no to one question they will be thanked for their time and informed they are not eligible to participate.)

(Smoker Classification)
Please answer the following questions in the ways that best describe you.

1. Have you smoked at least 100 cigarettes in your lifetime?

__Yes __No

2. In the past 30 days, have you smoked any cigarettes?

__Yes __No

(Sensation Seeking)
Please indicate your level of agreement to the following statements.

7 = Strongly agree
6= Agree
5 = Somewhat agree
4 = Neither agree nor disagree
3 = Somewhat disagree
2 = Disagree
1 = Strongly disagree

3. I would like to explore strange places.
4. I would like to take off on a trip with no preplanned routes or timetables.
5. I like to do frightening things.
6. I would like to try bungee jumping.
7. I like wild parties.
8. I would like to have new and exciting experiences.
9. I get restless when I spend too much time at home.
10. I prefer friends who are excitingly unpredictable.

(Theory of Planned Behavior- Attitude)
Item selection in progress. Please answer the following questions as best describes you. Complying with the tobacco-free policy…

11. …is: Not good for the UK community 1 2 3 4 5 6 7 Good for the UK community
12. …does: Not benefit the UK community 1 2 3 4 5 6 7 Benefit the UK community
13. …does: Not benefit nonsmokers 1 2 3 4 5 6 7 Benefit nonsmokers
14. …is: Bad 1 2 3 4 5 6 7 Good
15. …is: Not beneficial 1 2 3 4 5 6 7 Beneficial
16. …does: Not improve the campus 1 2 3 4 5 6 7 Improve the campus

17. …is: Unpleasant 1 2 3 4 5 6 7 Pleasant
18. …does: Not help nonsmokers 1 2 3 4 5 6 7 Help nonsmokers
19. …is: Not important 1 2 3 4 5 6 7 Important
20. …does: Not matter 1 2 3 4 5 6 7 Matter
21. …is: Not understandable 1 2 3 4 5 6 7 Understandable
22. …does: Not make sense 1 2 3 4 5 6 7 Make sense
23. …is: Not required 1 2 3 4 5 6 7 Required
24. …does: Not help me 1 2 3 4 5 6 7 Help me

(Theory of Planned Behavior- Social Norms)
Item selection in progress. Please answer the following questions as best describes you.

25. My friends think I:

should not comply with UK's tobacco-free policy 1 2 3 4 5 6 7 should comply with UK's tobacco-free policy

26. My best friend thinks I:

should not comply with UK's tobacco-free policy 1 2 3 4 5 6 7 should comply with UK's tobacco-free policy

27. People who are important to me think I:

should not comply with UK's tobacco-free policy 1 2 3 4 5 6 7 should comply with UK's tobacco-free policy

28. People my age think I:

should not comply with UK's tobacco-free policy 1 2 3 4 5 6 7 should comply with UK's tobacco-free policy

29. My friends at UK who smoke comply with UK's tobacco-free policy.
    strongly disagree 1 2 3 4 5 6 7 strongly agree
30. My best friend at UK who smokes complies with UK's tobacco-free policy.
    strongly disagree 1 2 3 4 5 6 7 strongly agree
31. People who are important to me at UK who smoke comply with UK's tobacco-free policy.
    strongly disagree 1 2 3 4 5 6 7 strongly agree
32. People my age on campus who smoke comply with UK's tobacco-free policy.
    strongly disagree 1 2 3 4 5 6 7 strongly agree
33. I am motivated to do what my friends at UK who smoke want me to do.
    strongly disagree 1 2 3 4 5 6 7 strongly agree
34. I am motivated to do what my best friend at UK who smokes wants me to do.
    strongly disagree 1 2 3 4 5 6 7 strongly agree
35. I am motivated to do what people who are important to me at UK who smoke want me to do.
    strongly disagree 1 2 3 4 5 6 7 strongly agree

36. I am motivated to do what people my age who smoke want me to do.

strongly disagree 1 2 3 4 5 6 7 strongly agree

(Theory of Planned Behavior- Behavioral Control)
Item selection in progress. Please indicate your level of agreement to the following statements.

7 = Strongly agree
6= Agree
5 = Somewhat agree
4 = Neither agree nor disagree
3 = Somewhat disagree
2 = Disagree
1 = Strongly disagree

37. For me to not smoke on campus would be easy.
38. I have control over my ability to smoke or not to smoke on campus.
39. I can say no to smoking on campus.
40. I am in control of my tobacco-free policy compliance behaviors.
41. It is up to me whether or not I comply with the tobacco-free policy.
42. I could say no to smoking on campus, even if I am the only one in a group not smoking.
43. Even if my friends are smoking on campus, it is up to me whether or not I smoke on campus.
44. I can say no to smoking on campus, even if I felt left out of a group.
45. Even if other people are smoking on campus, it is up to me whether or not I smoke on campus.

(Theory of Planned Behavior- Behavioral Intention)
Please answer the following questions as best describes you.

7 = Strongly agree
6= Agree
5 = Somewhat agree
4 = Neither agree nor disagree
3 = Somewhat disagree
2 = Disagree
1 = Strongly disagree

46. I plan to comply with UK's tobacco-free policy.
47. I intend to comply with UK's tobacco-free policy.
48. I am going to comply with UK's tobacco-free policy.

(Stress)
Please answer the following questions as best describes you. Lately, I have…

7 = Strongly agree
6= Agree
5 = Somewhat agree
4 = Neither agree nor disagree
3 = Somewhat disagree
2 = Disagree
1 = Strongly disagree

49. …been intolerant of anything keeping me from getting on with what I want to do.
50. …felt rather touchy.
51. …found it difficult to relax.
52. …found myself getting agitated.
53. …felt that I am using a lot of nervous energy.
54. …found it hard to wind down.
55. …tended to over-react to situations.

(Depression)
Please answer the following questions as best describes you. Lately, I have…

7 = Strongly agree
6= Agree
5 = Somewhat agree
4 = Neither agree nor disagree
3 = Somewhat disagree
2 = Disagree
1 = Strongly disagree

56. …felt that life is meaningless.
57. …felt that I had nothing to look forward to.
58. …not been able to experience any positive feelings.
59. …been unable to become enthusiastic about anything.
60. …felt that I am not worth much as a person.
61. ….felt down-hearted and blue.
62. …found it difficult to work up the initiative to do things.

(Anxiety)
Please respond to the following questions as best describes you. Lately, I have…

7 = Strongly agree
6= Agree
5 = Somewhat agree
4 = Neither agree nor disagree
3 = Somewhat disagree
2 = Disagree
1 = Strongly disagree

63. …been aware of my heart beating in the absence of physical exertion.

64. …experienced breathing difficulty.
65. …experienced trembling.
66. …felt I was close to panic.
67. …felt scared without any good reason.
68. ….been worried about situations in which I might panic and make a fool of myself.
69. …been aware of the dryness of my mouth.

(Cessation & Nicotine Dependence)
Please answer the following questions as best describes you.

70. How many cigarettes do you typically smoke in your average day?
_____ cigarettes per day

71. In the last six months, have you tried to quit smoking?

    a. If yes, how many times have you tried to quit smoking for at least 24 hours?

_____

72. How soon after you wake up do you smoke your first cigarette?
____ After 60 minutes
____ 31-60 minutes
____ 6-30 minutes
____ Within 5 minutes

73. Do you find it difficult to refrain from smoking in places where it is forbidden, for example, in a church, at the library, in a cinema, etc.?
____ Yes
____ No

74. Which cigarette would you hate most to give up?
____ The first one in the morning
____ All others

75. Do you smoke more frequently during the first hours after waking than during the rest of the day?
____ Yes
____ No

76. Do you smoke if you are so ill that you are in bed most of the day?
____ Yes
____ No

(Compliance)
Please answer the following questions as best describes you.

77. UK's tobacco-free campus policy covers all parking garages and all streets and sidewalks owned by the University. Since UK implemented its campus-wide tobacco-free policy, have you smoked any cigarettes on campus?

5 = Frequently
4 = Often
3 = Occasionally
2 = Rarely
1 = Never

78. When you have smoked on campus, has anyone ever asked you to comply with UK's tobacco-free policy?

____ Yes ____ No

79. During your average week, how many times per week would you say you smoke cigarettes on UK's campus? Please enter a number in the space below.

_____ times per week

80. When you have smoked on campus, what areas do you usually smoke in? (Please check all that apply).

_____ Outside of the hospital
_____ Near the dorms
_____ Outside of classroom building
_____ Outside of the international buildings
_____ Near the student center
_____ On University sidewalks
_____ Other (please fill in)

81. In the space provided below, please tell us, in detail, reasons that you do or do not comply with UK's smoke-free policy.

_____
_____

82. In the last 30 days, have you used any tobacco products other than cigarettes?

____ Yes ____ No

b. Please check all the tobacco products you have used in the last 30 days.

____ Chew/Dip
____ Cigar
____ E-cigarette
____ Hookah/Water Pipe
____ Other (Please Specify)

<u>NEXT QUESTION FOR PRE-INTERVENTION ONLY</u>

83. If this e-mail address is not the best way of contacting you, please provide a different e-mail address.

_____

NEXT SECTION ONLY FOR POST-INTERVENTION

(Message Recall)

84. Have you seen this poster on campus? (Image added below.)

    c. How often in the last few weeks have you seen this poster? (This will be asked about each poster used during the campaign.)

4 = Frequently
3 = Often
2 = Occasionally
1 = Rarely

    d. If you have seen this poster, did the likelihood of your smoking on campus increase, decrease, or stay the same?

____ Increased ____ Decreased ____ Stayed the same

Demographics

85. Age:

86. Ethnicity:

___ African American, ___ Asian, ___ Hispanic/Latino, ___ White, ___ Other (Write in)

87. Gender:

_____ Male, _____ Female

88. Role on Campus:

_____ Freshman, _____ Sophomore, _____ Junior, _____ Senior

89. What state are you from? Please report the two-letter abbreviation.

_____

90. Would you consider your hometown to be rural, urban, or suburban?

___ Rural, ___ Urban, ___ Suburban, ___ Unsure

91. During your average work week (i.e., Monday-Friday), how many days are you on campus this semester?

____ 1, ____ 2, ____ 3, ____ 4, ____ 5

Appendix D:

Participant Home States

State Representation of Participants on Pre- and Post-intervention Surveys

Pre-intervention Survey (*n* = 479)			**Post-Intervention Survey (*n* = 290)**		
State	**N**	**%**	**State**	**N**	**%**
AK	1	0.21	AK	1	0.34
AZ	2	0.42	AZ	1	0.34
CA	8	1.67	CA	6	2.07
CO	1	0.21	FL	3	1.03
DE	2	0.42	GA	3	1.03
FL	4	0.84	IL	9	3.10
GA	6	1.25	IN	2	0.69
IL	19	3.97	KY	231	79.66
IN	2	0.42	MD	2	0.69
KY	367	76.62	MI	1	0.34
MD	4	0.84	MO	1	0.34
MI	2	0.42	NC	1	0.34
MO	2	0.42	NJ	3	1.03
NC	2	0.42	NY	4	1.38
NJ	3	0.63	OH	11	3.79
NY	7	1.46	PA	3	1.03
OH	22	4.59	SC	1	0.34
PA	7	1.46	TN	3	1.03
SC	1	0.21	VA	3	1.03
TN	9	1.88	WV	1	0.34
TX	1	0.21			
VA	5	1.04			
WV	2	0.42			

Appendix E:

'Other' Violation Locations When Smoking on Campus

Written in 'other' responses for item: *When you smoke on campus where do you smoke?*
(Duplicates have been removed and similar items have been grouped together.)

Fraternity houses
Around Gatton
*Limestone sidewalks
Tailgate area/stadium area
By Chem-Phys Building
In my car parked on campus/in parking garages or parking lots
Behind pence
Engineering Complex
Public roads/in the streets
Near libraries
Where not seen/unfrequented locations
Near State street
Everywhere I want
Near garbage dumpsters at least 100 ft. from main entrance to any building
Outside B&E
Walking from Dicky Hall to POT
*UK Paducah campus
*South Upper
Outside of Reynolds
When walking to the bars after drinking on campus
Outside the Fine Arts building
By Taylor Ed

*Technically not UK property and not covered by the policy

Appendix F:

Message Transitions

Note: Slogans were added post focus group conversation

Message 1.

Original CDC Campaign Message

First Adaptation

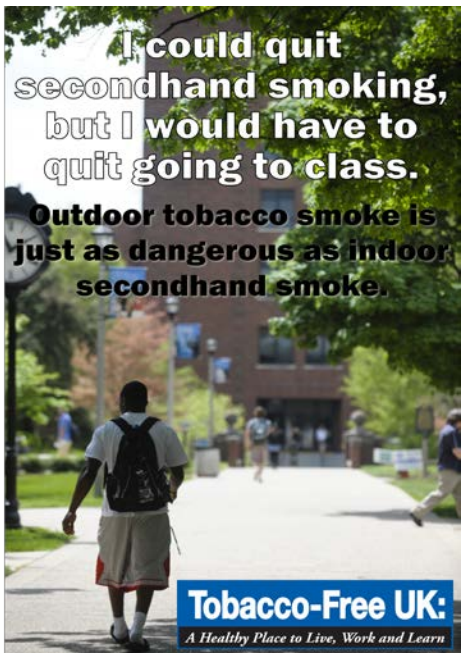
Message Taken to Focus Groups

Final Message Used in Campaign

Message 2.

Original CDC Campaign Message

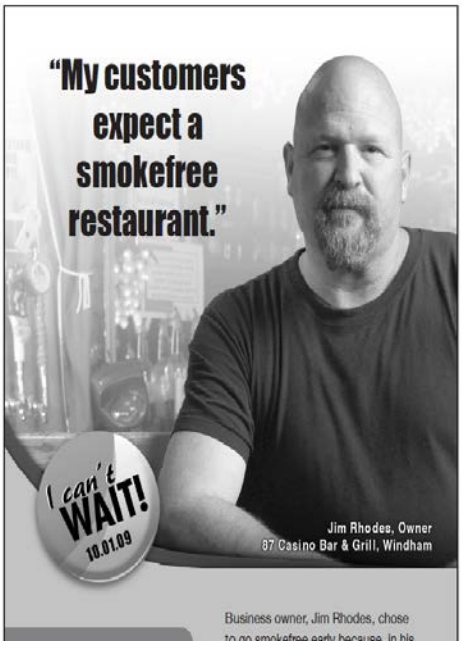
First Adaptation



Message Taken to Focus Groups

Final Message Used in Campaign

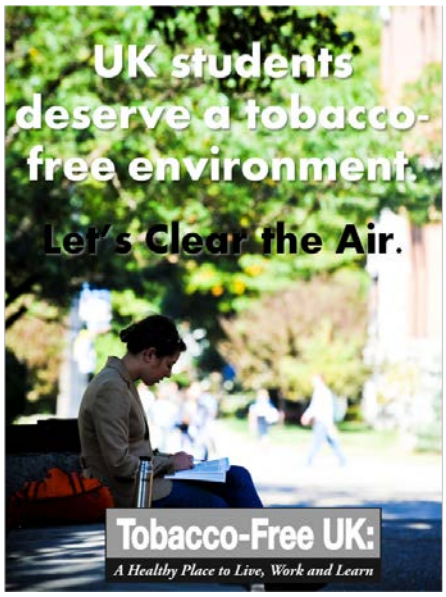
Message 3.



Original CDC Campaign Message

First Adaptation

Message Taken to Focus Groups



Final Message Used in Campaign

Message 4.

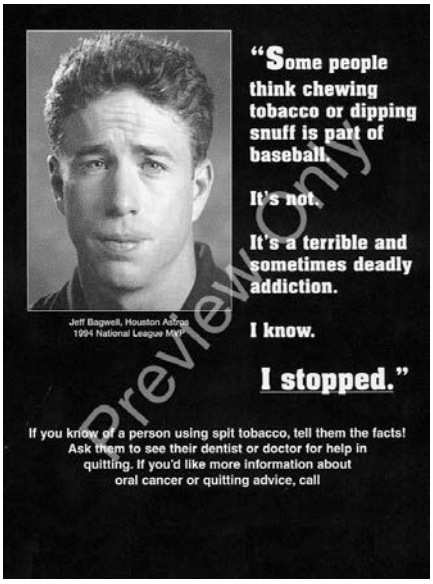
Original CDC Campaign Message

First Adaptation

Message Taken to Focus Groups

Final Message Used in Campaign

Message 5.



Original CDC Campaign Message

First Adaptation

Message A Taken to Focus Groups

Message B Taken to Focus Groups

(Message 5 con.)

Final Message Used in Campaign

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CURRICULUM VITAE

Rachael A. Record, PhD
College of Communication & Information
University of Kentucky

EDUCATION

Ph.D., Communication (December, 2014), University of Kentucky
Dissertation: Increasing Compliance with a Tobacco-free Policy via a Campus Campaign
Advisor: Dr. Don Helme
Committee: Dr. Nancy G. Harrington, Dr. Matthew Savage, Dr. Ellen J. Hahn
Successfully Defended: September 10, 2014

M.A., Communication (August, 2011), University of Kentucky
Thesis: Cultivating Miracle Perceptions: Cultivation Theory and Medical Dramas
Advisor: Dr. Nancy G. Harrington
Committee: Dr. Deborah Chung & Dr. Don Helme

B.A., Communication (May 2009), SUNY University at Buffalo
Major in Communication, *Minor* in English
Advisors: Dr. Lance S. Rintamaki & Dr. Tom Feeley

CERTIFICATES

Applied Statistics, University of Kentucky, Awarded Spring 2013
Health Communication, University of Kentucky, Awarded Fall 2010

ACADEMIC APPOINTMENTS

June 2014-Present	*Editorial Assistant*, Communication Yearbook; Editor: Dr. Elisia Cohen, College of Communication & Information, University of Kentucky
August 2013-Present	*Graduate Teaching Assistant*, College of Communication & Information, University of Kentucky
June 2013-May 2014	*Graduate Research Assistant*, Dr. Elisia Cohen, College of Communication & Information, University of Kentucky
July 2012-June 2013	*Graduate Research Assistant*, Dr. Kang Namkoong, Community Communication Research Group, College of Agriculture, University of Kentucky
Aug 2011-May 2012	*Adjunct Faculty*, College of Communication and Media Studies, Georgetown College

May 2010-June 2012 *Graduate Research Assistant*, Dr. Ellen J. Hahn, Kentucky Center for Smoke-free Policy, College of Nursing, University of Kentucky

Aug 2009-May 2010 *Graduate Teaching Assistant*, College of Communication & Information, University of Kentucky

HONORS/AWARDS

2014 Graduate Research Fellow, University of Kentucky

2014 College of Communication & Information nominee for the University of Kentucky *Jeffrey Graduate Fellowship for Tobacco Research*

2014 *Carozza Graduate Fellowship for Excellence in Health Communication*, University of Kentucky ($500)

2013 Graduate Research Fellow, University of Kentucky

2013 Paper Presented on the Panel of Top Papers in Instructional Communication, International Communication Association

2013 College of Communication & Information nominee for the University of Kentucky *Jeffrey Graduate Fellowship for Tobacco Research*

2012 Phil Palmgreen Fellowship for Excellence in Graduate Health Communication Campaign Research ($500)

2012 Top Student Paper, Kentucky Communication Association

2012 Honorable Mention Poster, Kentucky Conference on Health Communication

2012 Top Student Poster, Southern Nursing Research Society Annual Meeting

2011 Top Mass Media Paper, *It's not a medical miracle, but it's a great thesis: Cultivation theory and medical dramas*, University of Kentucky Graduate Symposium

2010 Top Student Paper, Kentucky Communication Association

DISSERTATION FUNDING

Poster and yard sign printing ($1,000), Department of Public Safety & Campus Services, University of Kentucky

Incentives for online survey participation ($800), College of Communication & Information, University of Kentucky

UNFUNDED GRANT PROPOSALS

Increasing Understanding and Compliance to Tobacco-free Policies via a Campus Poster Campaign (NIH Pre-doctoral Fellowship). PI: **Rachael A. Record**, Sponsors: Dr.'s Ellen J. Hahn and Nancy G. Harrington, National Institute on Drug Abuse. Submitted for second review: April 8, 2013 (requested $72,865).

Doctoral Dissertation Research Improvement Grant: Increasing Compliance to Outdoor Tobacco-free Policies (NSF). PI: Dr. Don Helme, Co-I: **R. A. Record**, Decision, Risk and Management Sciences. Submission date: January 18th, 2013 (requested $13,500).

GRANT EXPERIENCE (FUNDED & UNFUNDED)

The Rural Cancer Prevention Research Center: R01 Competing Renewal, grant FUNDED 2014-2019 by National Center for Chronic Disease Prevention and Health Promotion. PI: Rick Crosby, Co-Is: E. Cohen, R. Vanderpool. Role: **Proposal Contributor (research plan development and application writer)**

The Rural Cancer Prevention Center (RCPC) will provide a cancer prevention research infrastructure in the under-served area of rural KY Appalachia. The Center will engage the communities of this area in ongoing efforts directed toward reducing cancer incidence and mortality rates.

Community-based Participatory Campaign to Increase Environmental Awareness, unfunded2013 Environmental Education Regional grant proposal to the Environmental Protection Agency. Co-PIs: Seungahn Nah, Kang Namkoong, Co-I: S. Van Stee, Project Manager: **R.A. Record**. Role: **Proposal Contributor (research plan development and application writer) and pilot data collection**

Using the community-based participatory campaign model, this project aimed to increase environmental awareness among rural community members. Enrolled participants would have engaged in self-education of environmental importance via blogging activities.

An Intervention for Promoting Smoke-free Policy in Rural Kentucky, R01HL086450, grant FUNDED 2007-2012 by National Heart, Lung, and Blood Institute. PI: Ellen J. Hahn, Co-Is: M. K. Rayens, C. Riker, K. Lee, B. Casey ($3.17 million total cost). Role: **Research Assistant**

This was a five year randomized control trial across 30 rural Kentucky counties. Treatment counties were assigned a *Kentucky Center for Smoke-free Policy*

advocate to aid with preparing and implementing local smoke-free policies. All counties were surveyed annually to assess coalition activity and policy readiness.

Community-based Participatory Campaign Communication, unfunded 2012 Kentucky Agriculture Experiment Station Project proposal to the University of Kentucky, College of Agriculture. Co-PIs: Seungahn Nah, Kang Namkoong, Co-I: S. Van Stee, Project Manager: **R. A. Record**. Role: **Proposal Contributor (research plan development and application writer) and pilot data collection**

Participant would have been recruited from one of four rural Kentucky high schools. Using a community-based participatory campaign communication model, this project aimed to reduce tobacco use among middle and high school students.

Health Literacy Centered Media Campaign, unfunded 2011 R01 grant proposal to the National Institute of Health. PI: Ellen J. Hahn, Co-Is: K. Butler, S. Noar, M. K. Rayens. Project Manager: **R.A. Record**. Role: **Proposal Contributor (research plan development and application writer)**

The goal of this five year randomized control trial was to assess the role of health literacy in tobacco use, use of emerging tobacco products, and policy implementation. Four rural Kentucky counties were selected for study involvement.

Smoke-free Policies in Mongolia, unfunded 2011 grant proposal to the National Institute of Health. PI: Ellen J. Hahn, Co-I: K. Lee. Role: **Proposal Contributor (research plan development and application writer)**

With collaboration of tobacco-free partners in Mongolia, this project aimed to aid with the implementation of smoke-free policies in Mongolia. Assessment strategies included survey and air quality measures.

Rural Media Tobacco Prevention Project: Year 2 Evaluation, 2010-2011 FUNDED contract with Kentucky Youth Advocates through grant from American Legacy Foundation. PI: Ellen J. Hahn ($9,700). Role: **Research Assistant**

This study assessed rural media reporting of tobacco, including cessation, policy, use, and emerging products (to name a few categories). Newspaper articles from all rural Kentucky papers related to health were analyzed for relevance to tobacco.

Test Your Home and Win: A Radon Reduction and Community Mobilization Project, FUNDED contract 2010-2011 with Kentucky Radon Program through grant from Environmental Protection Agency. PI: Ellen J. Hahn ($50,000). Role: **Data Analysis**

Kentucky has one of the highest radon rates in the nation. In efforts to increase awareness of the harms of radon, this projected incentivized home radon

screening by having participants enroll in the study in exchange for an opportunity to win free radon testing.

An Intervention for Promoting Smoke-free Policy in Rural Kentucky: Competing Renewal, unfunded 2010 R01 grant proposal to the National Heart, Lung, and Blood Institute. PI: Ellen J. Hahn, CoIs: M. K. Rayens, C. Riker, L. Hall, B. Casey. Role: **Proposal Contributor (research plan development and application writer) and pilot data collection**

As an extension of the five year randomized control trial across 30 rural Kentucky counties, this study sought to continue working with the counties that hadn't yet passed smoke-free polices on smoke-free policies. For the counties that had implemented smoke-free policies, they would, first, assess policy compliance and, second, be transitioned into efforts for implementation of bike path creation policies in the rural community.

FRESH: Freedom from Radon and Smoking in the Home, 2010 internally FUNDED pilot study. PI: Ellen J. Hahn, Co-Is: S. Kercsmar, M. K. Rayens. Role: **Data Analysis**

Kentucky has one of the highest radon rates in the nation. In efforts to increase awareness of the harms of radon, this projected incentivized home radon screening by having participants enroll in the study in exchange for free radon in-home test kits. Participants completed knowledge assessments and qualitative phone interviews about their attitudes toward radon testing.

Reaching Low Income Smokers through a Collaboration with County Extension Agents, grant FUNDED 2008-2009 by College of Public Health HEEL Program. Co-PIs: Ellen J. Hahn, Karen Butler, CoI: M. K. Rayens ($74,861). Role: **Data Analysis & Manuscript Writing**

The HEEL project first met with rural community members to discuss intervention strategies that would be effective in the community. Next, the recommended strategies were implemented as a campaign aimed at increasing cessation attempts among rural smokers.

REFEREED PUBLICATIONS

9. Nah, S., Namkoong, K., Van Stee, S. K., & **Record, R. A.** (In press). Unveiling the effects of citizen journalism on social capital. *Journalism and Mass Communication Educator*.

8. Beckner, B., & **Record, R. A.** (In press). Influence of coach communication on female athletes' body image and health choices. *Health Communication.*

7. Cho, H., Lee, K., Hwang, Y., Richardson, P., Sidney, H., Teeters, E., **Record, R**., Riker, C., & Hahn, E. (2014). Outdoor tobacco smoke exposure at the perimeter of a

tobacco-free university. *Air & Waste Management Association, 64*(8), 863-866. doi:10.1080/10962247.2014.896295

6. Butler, K. M., Begley, K., Riker, C., Gokun, Y., Anderson, D., Adkins, S., **Record, R.**, & Hahn, E. (2014). Smoke-free coalition cohesiveness in rural tobacco-growing communities. *Journal of Community Health, 39*(3), 592-598. doi:10.1007/s10900-013-9804-8

5. Butler, K. M., Rayens, M. K., Adkins, S., **Record, R.**, Langley, R., Derifield, S., McGinn, C., Murray, D. & Hahh, E. J. (2014). Culturally-specific smoking cessation outreach intervention in a rural community. *Public Health Nursing, 31*(1), 44-54. doi:10.1111/phn.12066

4. Frisby, B. N., Limperos, A. M., **Record, R. A.**, Downs, E., & Kercsmar, S. C. (2013). Students' perceptions of social presence: Rhetorical goals and relational goals across three mediated instructional designs. *Journal of Online Learning and Teaching, 9*(4), 468-480.

3. Hahn, E.J., Miller, R.T., Rayens, M.K., Fallin, A., **Record, R.**, McNary, L., Tennen, P., & Cross, A. (2013). Training rural journalists in tobacco control. *Journal of the Kentucky Medical Association, 111*, 5-14.

2. Butler, K. M., Hedgecock, S., **Record, R. A.**, Derifield, S., McGinn, C., Murray, D. & Hahh, E. J. (2012). An Evidence-based cessation strategy using rural smokers' experiences with tobacco. *Nursing Clinics of North America, 47*(1), 31-43. doi:10.1016/j.cnur.2011.10.008

1. Hahn, E. J., Fallin, A., Darville, A., Kercsmar, S. E., McCann, M., & **Record, R. A.** (2012). The three 'Ts' of adopting tobacco-free policies on college Campuses. *Nursing Clinics of North America, 47*(1), 109-117. doi:10.1016/j.cnur.2011.11.002

BOOK CHAPTER PUBLICATIONS

1. Helme, D., Savage, M., & **Record, R. A.** (2015). Campaigns and interventions. In N. G. Harrington (Ed.) *Health communication: Theory, method, and application*. New York, NY: Routledge.

PAMPHLET PUBLICATIONS

1. Hahn, E. J., Johnson, J. D., Kercsmar, S., Robertson, H., Riker, C., Wagner, K., **Record, R.**, & McGee J. (2011). *Secondhand Smoke and Smoke-free Policy: Quick Facts.* Published by the Kentucky Center for Smoke-free Policy.

MANUSCRIPTS UNDER REVIEW

12. Cohen, E. L., Scott, A., **Record, R. A.**, Shaunfield, S., Jones, C., & Collins, T. (Under second review). Using communication to manage uncertainty about cervical cancer guideline adherence among Appalachian women. *Journal of Applied Communication.*

11. **Record, R. A.**, & Harrington, N. G. (Under second review). Exposure to medical dramas and perception of medical miracles. *Southern Communication Journal.*

10. **Record, R. A.**, Shaunfield, S., Scott, A., Cohen, E. L., Jones, C., & Collins, T. (Under review). Appalachian women's lay epistemology of breast cancer screening guidelines. *Qualitative Health Research.*

9. **Record, R. A.**, Staricek, N., & Pavelek, M. (Under review). The markings in your stall: A content analysis of bathroom graffiti in college area bars. *Visual Communication Quarterly*.

8. **Record, R. A.**, & Savage, M. W. (Under review). Developing a theoretical measure of compliance with university tobacco-free policies. *Tobacco Control*.

7. **Record, R. A.** (Under review). Improvements to and utilization of the risk behavior diagnostic scale. *Communication Research Reports.*

6. McDonald, J. D., McDonald, G. W., Kuehl, P. J., Holmes, T., Kracko, D., **Record, R. A.**, & Hahn, E. J. (Under review). E-cigarette aerosol characteristics and perceived risk. *American Journal of Health Promotion.*

5. Riker, C., Butler, K. M., Ricks, J., **Record, R. A.**, Begley, K., Anderson, D., & Hahn, E. J. (Under review). Effective media messages for rural smoke-free policy. *Health Promotion Practice*.

4. Limperos, A. M., Downs, E., **Record, R. A.**, Frisby, B. N., & Downs, E. (Under review). Instruction and technology: Understanding the impact of modality on perceived and actual learning in a simulated online class. *Cognition and Instruction*.

3. Namkoong, K., Nah, S., Van Stee, S. K., & **Record, R. A.** (Under review). Diffusion of social media campaign effects: Moderating roles of social capital in anti-smoking campaign communication. *Health Communication.*

2. Namkoong, K., Nah, S., **Record, R. A.**, & Van Stee, S. K. (Under review). Communication, reasoning, and planned behaviors: Pathways to anti-smoking intention in a social media campaign. *Journal of Health Communication.*

1. Nah, S., Namkoong, K., Van Stee, S. K., & **Record, R. A**. (Under review). Citizens as opinion leaders: Exploring the effects of citizen journalism on opinion leadership. *Leadership Quarterly.*

COMPETITIVE CONFERENCE PAPER/POSTER PRESENTATIONS

28. **Record, R. A.,** Staricek, N., & Pavelek, M. (accepted for presentation November 2014). *The markings in your stall: A content analysis of bathroom graffiti in college-area bars.* Paper to be presented at the National Communication Association Conference, Visual Communication Division: Chicago, IL.

27. **Record, R. A.**, & Savage, M. W. (accepted for presentation November 2014). *Developing a measure of compliance to university tobacco-free policies*. Paper to be presented at the National Communication Association Conference, Health Communication Division: Chicago, IL.

26. Beckner, B., **Record, R. A.,** & Kiernicki, K. (accepted for presentation November 2014). *How coach communication affects body image and health choices of female college varsity athletes*. Paper to be presented at the National Communication Association Conference, Health Communication Division: Chicago, IL.

25. Namkoong, K., Nah, S., Van Stee, S. K., & **Record, R. A.** (2014, August). *Diffusion of social media campaign effects: Moderating roles of social capital in anti-smoking campaign communication*. Paper presented at the Association for Education in Journalism and Mass Communication, Communication Technology Division: Montréal, Canada.

24. Cohen, E. L., Scott, A., **Record, R. A.**, Shaunfield, S., Jones, C., & Collins, T. (2014, May). *Using communication to manage uncertainty about cervical cancer guideline adherence among Appalachian women*. Paper to be presented at the International Communication Association Conference, Health Communication Division: Seattle, WA.

23. **Record, R. A.**, Shaunfield, S., Scott, A., Cohen, E. L., Jones, C., & Collins, T. (2014, April). *Appalachian women's lay epistemology of breast cancer screening guidelines.* Paper to be presented at the Kentucky Conference on Health Communication: Lexington, KY.

22. Nah, S., Namkoong, K., **Record, R. A.**, & Van Stee, S. K. (2013, August). *Citizen journalism and civic participation: Theory of reasoned action and its mediating effects.* Poster presented at the Association for Education and Journalism in Mass Communication Conference, Political Communication Interest Group Division: Washington, D.C.

21. Nah, S., Namkoong, K., Van Stee, S. K., & **Record, R. A.** (2013, August). *Making journalism work by citizens: Unveiling the effects of citizen journalism on social capital.*

Paper presented at the Association for Education and Journalism in Mass Communication Conference, Civic and Citizen Journalism Interest Group Division: Washington, D.C.

20. Namkoong, K., Nah, S., **Record, R. A.**, & Van Stee, S. K. (2013, August). *Modeling a Participatory Campaign Communication: Communication Mediation and Anti-smoking Behavioral Intention.* Paper presented at the Association for Education and Journalism in Mass Communication Conference, Communication Theory and Methodology Division: Washington, D.C.

19. Nah, S., Namkoong, K., Van Stee, S. K., & **Record, R. A.** (2013, August). *Citizens as opinion leaders: Exploring the effects of citizen journalism on opinion leadership.* Poster presented at the Association for Education and Journalism in Mass Communication Conference, Mass Communication & Society Division: Washington, D.C.

18. **Record, R. A.** (2013, June). *Improvements to and utilization of the risk behavior diagnostic scale to increase outdoor tobacco-free policy compliance*. Paper presented at the International Communication Association Conference, Health Communication Division: London, UK.

17. **Record, R. A.** (2013, June). *Meta-analysis of genre-specific cultivation studies*. Paper presented at the International Communication Association Conference, Mass Communication Division: London, UK.

16. Limperos, A. M., **Record, R. A.,** & Frisby, B. N. (2013, June). *Instruction and technology: Understanding the impact of modality on perceived and actual learning in a simulated online class.* Paper presented in the **top paper panel in instructional communication** at the International Communication Association Conference, Instructional Communication Division: London, UK.

15. **Record, R. A.** (2013, April). *Critique and development of the risk behavior diagnostic scale*. Paper presented at the Applied Communication Division, Southern States Communication Association Conference: Louisville, KY.

14. **Record, R. A.** (2013, April). *Noncompliance to the University of Kentucky's Tobacco-free Policy.* Poster presented at the University of Kentucky Center for Clinical and Translational Science Conference: Lexington, KY.

13. **Record, R. A.** (2013, March). *A pilot investigation of tobacco-free policy noncompliance.* Poster presented at the D.C. Health Communication Conference: Fairfax, VA.

12. **Record, R. A.** (2012, September). *Understanding compliance to university smoke-free policies.* **Top student paper** presented at the Kentucky Communication Association Conference: Carrollton, KY.

11. Begley, K., Adkins, S., Hahn, E. J., **Record, R. A.,** & Riker, C. (2012, August). *Coalition cohesiveness in tobacco growing communities*. Poster presented at the National Conference on Tobacco or Health: Kansas City, MO.

10. Riker, C., Ricks, J., Kostygina, G., **Record, R. A.,** & Hahn, E. J. (2012, August). *Effective media messages and channels for rural smoke-free policy.* Paper presented at the National Conference on Tobacco or Health: Kansas City, MO.

9. **Record, R. A.** & Harrington, N. G. (2012, May). *Exposure to medical dramas and perception of medical miracles.* Paper presented at the International Communication Association Conference, Mass Media Division: Phoenix, AZ.
8. **Record, R. A.**, Hopkins, E., Kercsmar, S., & Hahn, E. J. (2012, April). *Media channels to promote tobacco control in rural communities.* **Honorable Mention poster** presented at the Kentucky Conference on Health Communication: Lexington, KY.

7. Kolpek. J. K., Lee., E., **Record, R. A**., Casanave, L., Riker, C., & Hahn, E. J. (2012, February). *Favorability of rural print media and stage-based, tailored interventions for smoke-free policy*. Poster presented at the Southern Nursing Research Society: New Orleans, LA.

6. Richardson, P., Lee, K., Cho, H., Sidney, H., Teeters, E., **Record, R**. **A.**, Riker, C., & Hahn, E. (2012, February). *Outdoor Tobacco Smoke Exposure at the Perimeter of a Tobacco-free University*. **Top student poster** presented at the Southern Nursing Research Society: New Orleans, LA.

5. **Record, R. A.** (2011, September). *Genre-specific learning: A cultivation perspective on genre-specific television exposure.* Paper presented at the Kentucky Communication Association Conference: Lake Barkley, Kentucky

4. Butler, K. M., **Record, R. A.**, Kercsmar, S. E., Hedgecock, S., Derifield, S., McGinn, C., Adkins, S. Rayens, M. K, Murray, D. & Hahh, E. J. (2011, September). *Health literacy as an essential component of a smoking cessation outreach strategy for rural adults*. Paper presented at the Kentucky Health Literacy Conference: Bowling Green, KY.

3. Butler, K. M., Hedgecock, S., Derifield, S., McGinn, C., **Record, R. A.,** Adkins, S., Rayens, M. K., & Hahn, E. J. (2011, April). *A culturally sensitive smoking cessation outreach strategy for rural adults.* Poster presented at the UK Center for Clinical and Translational Science Conference: Lexington, KY.

2. **Record, R. A.** (2010, September). *Research designs in message design research*. **Top student paper** presented at the Kentucky Communication Association Conference: Prestonsburg, KY.

1. Rintamaki, L. S., Hogan, T. P., Lagoe, C., & **Record, R. A.** (2010, April). *Patient-preferred social support for HIV treatment adherence*. Paper presented at the Biennial Kentucky Conference on Health Communication: Lexington, KY.

INVITED SPEAKER

2012 Kentucky Center for Smoke-free Policy Spring Conference, *Effective No- and Low-cost Media Messaging*: Lexington, KY.

PROGRAM DEVELOPMENT

2014 *Professional Program in Health Communication Sciences*, Online MS degree, University of Kentucky (to be submitted Summer 2015); Proposal Assistant to Director Dr. Elisia Cohen

TEACHING EXPERIENCE

Georgetown College

- Comm 115- Instructor of Record, *Professional Communication* (Fall 2011-Spring 2012)

University of Kentucky

- CJT 772- Curriculum development, *Integrated Media Strategies in Healthcare*
- Com 572- Instructor of Record, *Health Campaigns & Communities* ([Scheduled] Spring 2014)
- Com 471- Instructor of Record, *Intro. to Health Communication* (Fall 2014-[Scheduled] Spring 2015)
- Com 453- Instructor of Record, *Digital and Mass Media Literacy* (Fall 2014-[Scheduled] Spring 2015)
- Com 365- Instructor of Record, *Research Methods* ([Scheduled] Spring 2014)
- Com 315- Co-Instructor, *Understanding Workplace Comm.* (Fall 2013-Spring 2014)
- Com 252- Instructor of Record, *Interpersonal Communication* (Fall 2013)
- Com 249- Instructor of Record, *Mass Media & Culture* (Spring 2014)
- Com 101- Assistant to Instructor, *Intro. to Communication* (Fall 2009-Spring 2010)

University of Kentucky Guest Lectures

- Com 525- Organizational Health Communication, *Tobacco-free Policies: An Organizational Responsibility*
- Com 449- A Social Cognitive Approach to Mass Communication, *Violence in the Media*

- Com 351- Communication Theory, *Constructivism & Elaboration Likelihood Model*
- Com 351- Communication Theory, *Cultivation Theory & Agenda Setting*
- Com 351- Communication Theory, *Advancements in Cultivation Theory*
- Com 315- Understanding Workplace Communication, *Tobacco-free Policies: An Organizational Responsibility*
- Com 315- Understanding Workplace Communication, *Organizational Responsibility to Protect Health*
- CIS 111- Composition & Communication II, *Digital Media Projects* (2 lectures)
- CIS 110- Composition & Communication I, *Ignite Speeches* (3 lectures)

PROFESSIONAL SERVICE

2014 Reviewer, *Health Communication*

2014 Poster Awards Selection Committee, *Kentucky Conference on Health Communication*

2014 Volunteer, *Kentucky Conference on Health Communication*

2014 Reviewer, *Communication Yearbook*

2013 Reviewer, Mass Communication Division, *International Communication Association Conference*

2013 Reviewer, Health Communication Division, *International Communication Association Conference*

2013 Abstract Reviewer, *Kentucky Conference on Health Communication*

2013 Volunteer, *Southern States Communication Association Conference*

2013 Reviewer, Student Section, *National Communication Association Conference*

2012 Reviewer, Mass Communication Division, *International Communication Association Conference*

2012 Reviewer, Health Communication Division, *International Communication Association Conference*

2012 Abstract Reviewer, *Society for Public Health Education Annual Meeting*

2012 Reviewer, Student Section, *National Communication Association Conference*

2012 Volunteer, *Kentucky Conference on Health Communication*

2011 Abstract Reviewer, *Kentucky Conference on Health Communication*

2010 Volunteer, *Kentucky Conference on Health Communication*

2009 Volunteer, *National Communication Association Conference*

DEPARTMENT SERVICE

College of Communication & Information, University of Kentucky

2013- Present *Undergraduate Advising for Potential Majors*, Department of Communication

These responsibilities include attending information meetings, meeting with potential majors, and answering questions about the undergraduate major.

2009- Present *Fundraising Committee Chair*, Communication Graduate Student Association (CGSA), Department of Communication

These responsibilities include an annual presentation to the Student Government Association to request additional funding for the year, organizing of t-shirt sales, and execution of any additional fundraising events put on by the CGSA.

October 2013 *Judge*, Bluegrass Invitational Forensics Tournament

These responsibilities included judging the rounds of After Dinner, Extemporaneous, Impromptu, and Persuasive speaking. Each round involved the evaluation and ranking of five to six presenters.

MEMBERSHIPS

2011 - Present International Communication Association
Health Communication Division
Mass Communication Division

2010 - Present Health Communication Research Collaborative, University of Kentucky

2009 - Present National Communication Association
Applied Communication Division
Health Communication Division
Mass Communication Division

2012 - 2013 Southern States Communication Association

2010 - 2013 Kentucky Communication Association