# Effects of a Tailored Social Marketing Campaign Targeting Smoking Policy Compliance on Smoking-Related Behaviour on Campus

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## ABSTRACT

**Introduction.** Smoking represents a significant risk to Canadians. Young people in Canada have historically had the highest smoking prevalence of any other age group. Implementing smoking policies can be an effective strategy for post-secondary campuses to interrupt smoking trajectories and reduce the risk of campus citizens being exposed to second-hand smoke, however compliance can be a barrier to achieving these outcomes. This study examined the effects of a social marketing campaign on policy-non-compliance on a post-secondary campus in Ontario, Canada.

**Methods.** The 3-week campaign was implemented by students and focused on policy-compliance-related objectives. Six smoking sites were observed twice a day for one week before the campaign, and one week after the campaign was completed. 4 sites were designated smoking areas, as defined by the smoking policy at the institution. 2 sites were undesignated "hot-spots" where smoking was frequently observed to occur. A butt litter audit was completed before and after the campaign to determine if butt litter decreased after the campaign.

**Results.** At designated smoking sites, using the strict policy definition of the designated smoking sites, the proportion of observed behaviour that was non-compliant decreased in designated smoking areas (-0.079, 95% CI = 0.143, -0.0151, $p < .05$). Noncompliant behaviours also significantly decreased after the campaign using a more lenient measure of compliance (-0.102, 95% CI = -0.203, -0.001, $p < .05$). At undesignated hot spots, the average number of people using the areas to smoke decreased at both sites after the campaign. The proportion of all cigarettes which were disposed of correctly in receptacles was 75.5% before the campaign

and 77.4% after the campaign. It is unclear if second-hand smoke exposure was reduced for non-smoking pedestrians despite the overall reduction in non-compliant behaviours.

**Conclusions.** Implementing a student-led, social marketing campaign focussed on improving compliance was an effective strategy to improve compliance with smoking policy.

**Keywords:** Policy, smoking, young adults, post-secondary, social marketing

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*"It's a lesson I have learned over and over again, but it bears repeating: No one achieves anything alone" – Leslie Knope*

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# CHAPTER 1: INTRODUCTION

Despite a definitive body of evidence regarding the serious health, economic, and social risks of smoking tobacco and second-hand smoke, many Canadians continue to smoke. For example, 15% of Canadians are current cigarette smokers, with 11% still smoking daily (Statistics Canada, 2018). Perhaps most concerning is the continued high prevalence of smoking among young adults (ages 20-24). In the last 20 years, young adults have consistently had the highest smoking prevalence of any age group (Statistics Canada, 2016; Government of Canada, 2015; Government of Canada, 2016, Government of Canada, 2013). As a result, supporting young adults to quit smoking or to stay smoke-free has been identified as a strategy for reducing the tobacco industry's impact on the health and well-being of Canadians.

Preventing and disrupting smoking trajectories in young adulthood has enormous economic, social, and personal health benefits. For example, quitting before age 30 effectively eliminates smoking-related mortality risk (Dol et al., 2004) – returning the life expectancy to that of a never-smoker, improving their quantity and quality of life, reducing economic impact on the healthcare system, and reducing non-smokers' exposure to second-hand smoke.

Restrictive policies are highly effective in preventing and interrupting tobacco use patterns across all age groups. For example, restricting tobacco sales to minors reduces uptake of smoking among youth and young adults (Tutt et al., 2009). Policies such as smoking bans reduce tobacco use by making it hard to start/continue smoking, and reducing cues to smoke, and have additional benefits of protecting non-smokers from the harms of second-hand smoke (International Agency for Research on Cancer, 2009).

Tobacco and e-cigarette use are now federally and provincially banned in many public places, including schools, restaurants, and hospitals. Some worksites, including post-secondary campuses, have introduced smoking and vaping restrictions in their own policies, in addition to existing government legislation. Of note to policy makers, tobacco control policies on post-secondary campuses affect a large proportion of Canadian young adults who attend these settings. Given the importance of young adults quitting smoking, and interrupting smoking trajectories, it is clear that this should be an area of intense focus for policy makers and tobacco control advocates.

The effectiveness of tobacco control policies at reducing tobacco use and second-hand smoke exposure is contingent upon compliance with the policy. Compliance can be achieved through both formal (for example fines, tickets, and sanctions) and informal enforcement strategies (such as education, signs, and denormalization). While formal enforcement has been demonstrated to be effective, education and therefore changing social norms have been shown to be as effective in some cases as well (Wynne et al., 2018), and seems to be the preferred choice of most postsecondary institutions.

This study explores the effects of a comprehensive, multi-faceted social marketing campaign on compliance with a post-secondary institution's smoking policies. Under investigation is whether the campaign alters smokers' use of "designated" (official) smoking areas and unsanctioned smoking areas on campus, and how all campus citizens' exposure to second-hand smoke is impacted.

In the next chapter, the prevalence and consequences of tobacco use are examined with particular attention given to young adults. The history of tobacco control legislation and policies, especially post-secondary campus policies, is summarized. Finally, the rationale for and objectives of the current study are described.

# CHAPTER 2: LITERATURE REVIEW

## 2.1 Tobacco Use

### 2.1.1 General Population

#### *2.1.1.1 Prevalence of Tobacco Use*

Cigarette smoking is the single leading cause of preventable disease and premature death in Canada (Statistics Canada, 2016). This remains true even though Canada has seen a significant decrease in smoking prevalence in recent years, decreasing from 25% in 1999 (Government of Canada, 2013) to 15% in 2017 (Statistics Canada, 2018). In 2017, the Canadian Tobacco, Alcohol and Drugs Survey (CTADS) found that 15% of Canadians reported being current smokers of cigarettes, which, despite being an improvement over 1999, is a statistically significant increase from the 2015 prevalence rate of 13% (Statistics Canada, 2018). Among Canadians, 11% smoke daily, averaging 14 cigarettes per day (Statistics Canada, 2018).

Cigarette smoking prevalence varies across groups of people in Canada. For example, more men than women are smokers, with 17% of men and 13% of women reporting that they were current smokers in 2017 (Statistics Canada, 2018). Certain age groups are also more vulnerable. Young adults (ages 20-24) have had the highest smoking prevalence of any age group at 16-18% in recent history (Statistics Canada, 2018).

There are a number of other ways Canadians consume tobacco products outside of smoking cigarettes. 18% of Canadians 15 and older reported having used any tobacco product in

the last 30 days, including cigarettes, cigars, cigarillos, smokeless tobacco, water pipes (hookah), and pipes (Statistics Canada, 2018). Additionally, CTADS now includes data on "electronic cigarettes." A relatively new way to consume nicotine, electronic cigarettes, colloquially known as e-cigarettes or vapes, are battery-powered electronic devices that vapourize "e-juice", which is a liquid solution containing various flavorings, moisture-retaining solvents (like propylene glycol), and nicotine. These e-liquids can be flavored in any manner of the users' choosing, including fruit, dessert, and traditional tobacco flavours. There are two main types of e-cigarettes: pods and reservoir. Reservoir types (also known as "tanks") allow the user to customize and control the e-juice they use, including apparent management of nicotine levels. Pod types (for example, JUUL) are a newer, more convenient way to vape, but the e-juices are not customizable, and always contain nicotine. Pod e-cigarettes are the most popular e-cigarette product on the market, with JUUL cornering almost 70% of the US dollar market share for all types of e-cigarettes (Zaleski, 2018). CTAD data show that 3% of Canadians over the age of 15 had used an e-cigarette in the last 30 days and 15.4% had ever tried (Statistics Canada, 2018). Use of e-cigarettes is strongly predicted by age and gender**:** 29% of Canadian young adults have ever tried an e-cigarette, and youth (15-19) and young adults (20-25) are 3 times more likely to be current users (6%) than adults over the age of 25 (2%). Men are more likely to have tried e-cigarettes than women at 19% and 12% respectively (Statistics Canada, 2018). There is also evidence that use of e-cigarettes may trigger cigarette use (Hammond et al., 2017).

#### *2.1.1.2 Effects of Tobacco Use*

**2.1.1.2.1 Morbidity.** Smoking or being exposed to second-hand smoke increases the risk of disease and death, and there is no safe level of exposure (Canadian Medical Association, 1969; U.S. Department of Health and Human Services (USDHHS), 2014; USDHHS, 2010).

Nearly every organ in the body may be affected by cigarette smoke, whether by first-hand exposure to smoke drawn into the body (of the smoker) or by second-hand exposure to the smoke emanating from the burning cigarette or exhaled into the air (USDHHS, 2014). Causal links between tobacco smoking and cancer and disease risks were postulated as early as the 1920s, with definitive research emerging in the 1950s demonstrating a clear, causal link between smoking and lung cancer (Boyle, 1997). The Canadian Medical Association (CMA) made its first official statement about the risks of smoking in 1954 (Dunsmuir, 1998), followed in 1964, when Canada's Minister of National Health and Welfare addressed parliament and made a statement: "There is scientific evidence that cigarette smoking is a contributory cause of lung cancer and that it may also be associated with chronic bronchitis and coronary heart disease." In the same year, the Surgeon General of the U.S. Department of Health and Human Services released the first major report on the health consequences not only of smoking tobacco but also of being exposed to second-hand tobacco smoke. The report included assertions that cigarette smoking and exposure to second-hand smoke led to increased risk of developing cancers of the lung, larynx, and other body areas, as well as being implicated in the increased incidence of chronic bronchitis and pulmonary emphysema. Canada issued a similar report in 1969, briefing the House of Commons about the risks to health associated with smoking cigarettes (CMA, 1969).

Since then, researchers have continued to find links between disease and smoking, adding to an already definitive body of evidence about the risks of tobacco use and exposure to second-hand smoke. The Surgeon General's report from 2015, '*The Health Consequences of Smoking – 50 Years of Progress*', summarizes the innumerable consequences of tobacco use on both the individual and the country (USA), and adds to the already-long list of smoking-related diseases. Liver and colorectal cancers have been recently added to the list of cancers that may be caused by smoking**;** diabetes, rheumatoid arthritis, and ectopic pregnancy have all been added to the list of chronic diseases that are associated with smoking behaviour (USDHHS, 2015).

As noted, smoking-related illness is not limited to those who smoke cigarettes. Second-hand smoke can be equally damaging to health, with evidence suggesting that being exposed to second-hand smoke may increase the risk of sudden infant death syndrome (SIDS), low birth weight, coronary heart disease, and stroke (USDHHS, 2015).

Unlike cigarettes, e-cigarettes do not expose the user to dangerous tar. In that respect, e-cigarettes offer a harm reduction alternative for smoking. Safer, however, is not equivalent to safe. E-cigarettes have not been on the market long enough to determine the long-term health effects of primary or secondary exposure to the vapour, and toxicology research has shown that dangerous by-products, such as nicotine and heavy metals from the devices are found in the vapour (Putzhammer et al., 2016).

**2.1.1.2.2 Mortality.** Cigarettes are the only product on the market that, when used as intended, kill 2/3 of users prematurely (Banks, et al., 2015). In Canada, in 2012, it was estimated that approximately 45,464 deaths were attributable to smoking; roughly 125 deaths every day.

This represented approximately 20% of all deaths in Canada for that year, more than any other preventable cause of death including suicide, overdose, and accidents (The Conference Board of Canada, 2012). The 2012 report '*The Costs of Tobacco Use in Canada, 2012'* estimates that almost 600,000 potential years of life were lost due to smoking in 2012 alone. It is clear that smoking poses a massive health risk to individuals, and on such a large scale, the effects of this burden of disease on the economy are significant.

In Canada in 2012, it was estimated that smoking cost the country $16.2 billion dollars in direct (health care and law enforcement) and indirect (lost productivity and disability) costs (The Conference Board of Canada, 2012). It is important to note that, despite what is known about the prevalence and harms from any type of tobacco product, the costs report was generated using only data from cigarette smoking, and no other forms of tobacco consumption (i.e. cigars or smokeless tobacco).

### 2.1.2 Young Adults

#### *2.1.2.1 Prevalence*

Young adults have had the highest prevalence of smoking of any other age group since at least 1985 (Statistics Canada, 2016; Government of Canada 2015; Government of Canada, 2016, Government of Canada, 2013). As a result, in the 2012-2017 Federal Tobacco Control Strategy, the Government of Canada decided to focus some of their efforts on helping young adults to stop smoking (Government of Canada, 2014).

#### *2.1.2.2 Initiation and Susceptibility*

Young adulthood is a time of life during which individuals endure many transitions. As older youth and young adults—especially those entering college and university—launch new peer networks, acquire new freedoms and responsibilities, and move to new communities, they experience opportunities and pressures that may lead to tobacco uptake and escalation (Mushtag & Butt, 2016; Lawrence, Mollborn & Hummer, 2017). Young adults are also particularly susceptible to advertising, cue exposure, and promotional activities by tobacco companies such that social and environmental influences have been shown to be a significant cause of initiation of cigarette smoking in this population (USDHHS, 2012). As a result of life circumstances, socioenvironmental factors, and aggressive marketing tactics by the industry, youth and young adults are the most likely age groups to initiate smoking: virtually all daily smokers report smoking their first cigarette by the age of 26, with the vast majority starting in their late teens or early 20s (USDHHS, 2012). According to Bernat and colleagues, approximately 25% of smokers report they initiated smoking between the ages of 18 and 21 years (2012). Overall, these high rates of initiation among young adults highlight the need for interventions to prevent uptake of smoking.

Young adulthood is a critical time, not only in terms of smoking initiation but also escalation. Despite a popular misconception that addiction can only occur after long-term use of tobacco, smokers are very likely to develop nicotine dependence in young adulthood, shortly after beginning smoking (USDHHS, 2012). Many smokers will progress from “casual” non-daily smoking to daily, addicted smoking in young adulthood (Hammond et al., 2004; USDHHS, 2012) with peers, environmental influences, and popular culture all playing significant roles in

the continuation of smoking and the progression to daily smoking (Mendo et al., 2021; USDHHS, 2012). Fortunately, smokers who quit before the age of 30 reduce their lifetime risk of disease to that of a never-smoker (Dol et al., 2004). This finding implies that it is essential not only to *prevent* young adults from initiating smoking, but it is crucial that young adults are encouraged and supported to quit before the age of 30.

#### *2.1.2.3 Interrupting Smoking Trajectories.*

Strategies that address prevention and cessation, *specifically* for young adults, can significantly reduce the burden of tobacco in Canada by preventing uptake and interrupting smoking trajectories that may lead to addiction, disease, and premature death. To this end, a number of strategies have been proven to be effective for this population.

Mass media campaigns promoting cessation are one such strategy, with success being contingent upon being well-financed, sufficiently long (e.g., 5 years) and well-tailored to the young adult audience (U.S. Department of Health and Human Services, 2012). In comparison, institutional bans on smoking have also been shown to reduce smoking rates (International Agency for Research on Cancer, 2009). A recent Cochrane review determined that institutional smoking bans in University settings seemed to be an effective way to reduce the number of smokers at the institution (Frazer et al., 2016). With 50% of high school graduates in Canada enrolling in post-secondary education (Government of Canada, 2017b), effective campus policies have the potential to prevent or interrupt smoking trajectories in a broad swath of young adults. This tobacco control strategy is explored in detail in the next section.

## 2.2 Reducing Tobacco Use Through Policy

### 2.2.1 Overview

Since 1964, when Canada's Minister for National Health and Welfare, Judy LaMarsh, made a public statement about the health risks of smoking, and over half of Canadians reported being current smokers (Government of Canada, 2017a), Canada has taken action first through education, then through legislation and policy to reduce the prevalence of smoking, and finally through industry regulation. Policies that have been particularly effective include: restricting sales of tobacco based on minimum age requirements and retailer characteristics (Tutt et al., 2009); prohibitive pricing on tobacco products (International Agency for Research on Cancer, 2011), and restricting or prohibiting tobacco use (and more recently, vaping) (Frazer et al., 2016). Individually and together, these policies along with industry regulations (such as warnings on packaging and taxation levels) have been shown to make initiation of smoking harder through restriction of sales (Tutt et al., 2009), to make smoking less appealing by reducing ease and increasing cost of smoking, and to make cessation easier by reducing cues to smoke (International Agency for Research on Cancer, 2009). Tobacco control policies banning use also have spinoff benefits including reducing exposure to second-hand smoke and reducing cigarette litter (Government of Ontario, 2018b; Frazer et al., 2016).

The historical context of tobacco legislation and policies in Canada is summarized in section 2.2.2. Federal and provincial legislation, as well as community and organizational policies, are examined. The influence on young adults' tobacco use is highlighted.

### 2.2.2 Government Legislation

#### *2.2.2.1 Federal Laws*

In 1908, Canada passed the Tobacco Restraint Act, limiting tobacco sales to people who were 16 years of age or older and prohibited minors' purchase or possession of tobacco products (Dunsmuir, 1998; Cunningham, 1996a). The Act evolved over time until it was eventually replaced in 1988 by the Tobacco Sales to Young Persons Act, which increased the age requirements for sale, purchase, and possession of tobacco to 18 years of age (Dunsmuir, 1998). In 1971, John Munro introduced bill C-248 that would ban cigarette advertising altogether, and mandate that manufacturers add health warnings to their packaging. The bill was not passed, however, in 1972, tobacco companies announced that they would voluntarily create a guideline for advertising and packaging**.** They vowed not to advertise on radio or TV and offered to add health warnings to the labels of all cigarette packs. This agreement was amended in the 1980s to allow advertising in any medium except television (Cunningham, 1996a).

In 1982, tobacco taxes began to increase at a rate that exceeded annual inflation in a bid to reduce the number of smokers in Canada and improve the health of the population. It was at this time that a dramatic decrease in smoking prevalence was noted, and the percentage of Canadians who smoke began to move even more steeply downward (Government of Canada, 2017a). The Non-Smokers Health Act (Bill C-207), which was passed in parliament in 1988, mandated that any federal workplace would be a smoke-free environment, and required passengers on airplanes, boats, and trains to not smoke unless in a designated room/area (Cunningham, 1996a; Government of Canada, 2018). It was also in 1988 that tobacco companies were legislated to provide one of four federally mandated health risk warnings on their packaging. In 1997, the federal Tobacco Act was enacted, replacing the Tobacco Sales to Young

Persons Act. The new Tobacco Act introduced regulations for tobacco manufacturers, addressing product quality, labelling, promotion, and enforcement (Department of Justice, 2018).

In 1998, the National Tobacco Control Strategy Steering Committee was formed to include federal, provincial, and territorial representation, as well as representatives from a number of health organizations. Together with the Advisory Committee on Population Health, this committee released a report that detailed a strategy to reduce tobacco use in Canada. The 1999 'New Directions for Tobacco Control in Canada—A National Strategy' report introduced three pillars of tobacco control: cessation for current smokers, prevention for future smokers, and protection of non-smokers from second-hand smoke (Advisory Committee on Population Health Working Group on Tobacco Control, 2001, Advisory Committee on Population Health Working Group on Tobacco Control, 2003).

These pillars, along with industry regulation as a fourth pillar, remain the core foundation for tobacco control today. E-cigarettes (vaping) have also been added to existing legislation. Thus, in 2018, The Tobacco and Vaping Products Act was legislated into effect. This Act replaces the previous "Tobacco Act" and includes alternative nicotine products and devices (such as nicotine liquid, nicotine salt, vapourizers, and e-cigarettes). This legislation addresses the increasing prevalence of vaping products, particularly among young people (Department of Justice, 2018).

#### *2.2.2.2 Smoke-free Ontario Legislation*

In 1994, Ontario introduced the Tobacco Control Act (TCA), which restricted tobacco sales to those 19 years of age or older, restricted the places where tobacco could be sold, dictated

a code for packaging tobacco products, and introduced significant regulations on smoking inside certain public areas (hospitals, schools, and banks, for example) (Government of Canada, 1994). In 2006, the Smoke-Free Ontario Act (SFOA) replaced the Tobacco Control Act. The new act was drawn up to ensure the protection of all Ontarians by continuing the restrictions dictated in the Tobacco Control Act, and by prohibiting smoking in any enclosed public area (Government of Ontario, 2018).

The Smoke-Free Ontario Act was amended a number of times before finally being replaced in 2018 with the "New" Smoke-Free Ontario Act. The new act includes legislation that replaces the Electronic Cigarettes Act (which had been passed in 2015) and protects Ontarians from both second-hand smoke and vapour (Government of Ontario, 2018). The 2018 Smoke-Free Ontario Act mandates strict regulations on tobacco in the areas of sale, supply, and promotion; it prohibits smoking and use of vapes; and it emphasizes enforcement (Government of Ontario, 2018). Table 1 presents a brief summary of each area as expressed in the Smoke-Free Ontario Act, last amended December 2018 (Government of Ontario, 2018).

Accompanying the legislation is the Smoke-Free Ontario Strategy (2018) which expands upon the Smoke-Free Ontario Act and addresses the same three major strategic priorities as the 1999 National Strategy: cessation, prevention, and protection. The strategy details how success of the legislation will be measured, with specific prevalence and economic outcomes to ensure that tobacco control efforts are sufficiently focussed and effective (Government of Ontario, 2018b).

#### *2.2.2.3 Municipal By-laws*

In addition to federal and provincial laws, municipal-level by-laws are also enacted by communities to address tobacco/e-cigarette use and protect residents and visitors from second-hand smoke and vapour. For example, in the Niagara Region, where the current study takes place, *Regional By-Law 112-2013* restricts smoking in a number of additional public areas including outside regional buildings, parks and playgrounds, sports/playing fields, and arenas (Regional Municipality of Niagara, 2013). The fine for those individuals who do not adhere by this by-law is currently $250 (Regional Municipality of Niagara, 2013).

### 2.2.3 Policies

#### *2.2.3.1 Worksites and Post-Secondary Campuses*

Smoking bans at worksites are, generally speaking, a way to protect non-smokers from second-hand smoke. There is a large body of research that concludes that smoke-free policies at worksites also lead to reduced smoking prevalence and overall reduced consumption of cigarettes (Hopkins, et al., 2010; International Agency for Research on Cancer, 2009). Businesses may also experience other, spinoff benefits, including reduced fire risk and therefore lower fire insurance premiums, reduced cleaning and maintenance costs, improved productivity

**Table 1**

*A Summary of the Smoke-Free Ontario Act*

| | |
|---|---|
| Sale, Supply, & Promotion | • Retailers may not sell tobacco or nicotine products to anyone under the age of 19.<br>• Retailers may not display tobacco or vaping products where a consumer may see or handle the product before purchasing.<br>• Retailers may not sell products that do not comply with federal packaging regulations. |
| Prohibition | • A person may not smoke or hold lighted tobacco products, or smoke or hold an activated e-cigarette in any restricted space, including enclosed public areas, enclosed workspaces, a school (defined by the *Education Act*), or any indoor common area.<br>• A person may not smoke tobacco or use an electronic cigarette in a car when there is a minor (under 16 years) present. |
| Enforcement | • Inspections of retailers may be performed at any time, in any place*, and without a warrant by Ministry-appointed inspectors, and fines issued based on compliance with the aforementioned restrictions.<br>• Inspectors may also assess compliance of employers to the Smoke-Free Ontario Act regulations as they pertain to smoke-free enclosed workspaces. |

from both smokers and non-smokers due to reduced absenteeism, and reduced health care costs for employees (International Agency for Research on Cancer, 2009).

Like legislation, workplace policies can be used to protect all staff, patrons and visitors from second-hand smoke and potentially encourage cessation by making smoking inconvenient and reducing cues to smoke (International Agency for Research on Cancer, 2009). With the prevalence of smoking greatest among young adults, and the uptake of vaping increasing most rapidly among older youth and young adults, policies at worksites where young adults are concentrated can play an important role in preventing uptake and escalation of smoking and vaping, and encourage cessation of all tobacco and nicotine use.

Campuses are an obvious setting for tobacco control targeting young adults. Campuses are not only worksites, but also home to a large number of young adults: Over 2 million students attended Canadian universities and colleges in 2015 (Statistics Canada, 2016). In 2014, among Canadians who were 25-34, 24% had a college degree, and 28% had a university degree, and that number was expected to continue to increase (Organisation for Economic Co-operation and Development, 2015). Exposure to smoke-free policies for all members of the post-secondary community is beneficial, but young adults stand to gain the most. Even accounting for smoking/vaping rates that are lower among university students than their college and non-student peers (Schwartz et al., 2010), the sheer volume of young adults who are students, and therefore the high number of smokers on post-secondary campuses means that the campus provides a good physical and social setting for preventing smoking and escalation, promoting cessation (Hammond, et al., 2004) and thus interrupting smoking trajectories that last from adolescence into adulthood.

## 2.3 Smoke-free Campus Policies

### 2.3.1 Effectiveness of and Support for Campus Policies

Widespread, 100% smoke-free campus policies are a modern development, particularly in Canada. The first smoke-free campus policy in Canada was introduced by Dalhousie University of Halifax, which enacted its policy in 2003 (Dalhousie University, 2003). Today, only about half of Ontario's 44 institutions have implemented comprehensive smoke-free policies, with 19 using some variation of a policy that utilizes designated smoking areas (Canadian Cancer Society, 2020; Simcoe Muskoka District Health Unit, 2020). Despite Dalhousie's early adoption of smoke-free policy, most of this progress occurred more than a decade later, in the late 2010s. In Ontario especially, policies that heavily restrict or totally ban smoking on campus were only introduced when Cannabis was legalized in 2018. Seeking to prohibit cannabis smoking on campus, many institutions chose to include tobacco, vaping, and cannabis in a single, inclusive policy.

Despite the relative novelty of smoke-free campus policies, preliminary research has shown that heavy restrictions or bans of smoking (and more recently vaping) are effective in reducing exposure to second-hand smoke and vapour for everyone on campus, and for reducing smoking rates among young adults attending these institutions (Lupton & Townsend, 2015; International Agency for Research on Cancer, 2009; Frazer et al., 2016). A study at Purdue University, for example, concluded that smoke-free campus policy contributed to a significant decrease in smoking prevalence among both students and staff. The policy was also credited with affecting favourable changes in smoking norms, educational attainment, and safer campus

environments (Niemeier et al., 2014). In another study, Wynne et al. (2018) found high rates of compliance with 100% smoke-free campus policies—higher, in fact, than compliance with policies allowing for designated smoking areas. This suggests that smoke-free campus policies are effectively reducing citizens' exposure to second-hand smoke and possibly reducing tobacco and e-cigarette use among young adults on post-secondary campuses.

In 2015, Lupton and Townsend conducted a systematic review and concluded that not only were smoke-free policies effective on post-secondary campuses, they were also supported by the majority of students (60%) and staff (70%). Indeed, many studies show a large majority of non-smokers and more than half of smokers favour restrictive policies that prioritize citizens' rights to clean, fresh air (Thompson et al., 2006). When implementing a 100% smoke-free hospital campus policy almost a decade ago, administrators from 84 acute care hospitals in Arkansas reported more support and less resistance from staff and patients than anticipated (Sheffer et al., 2009). In the same study, Sheffer et al. determined that most hospitals experienced no or minimal enforcement issues, with just 6 of the 84 campuses reporting significant challenges with enforcement.

### 2.3.2 Achieving Compliance

Policy compliance, a necessary factor in policy effectiveness, can be achieved through various forms of education and enforcement. Enforcement includes activities or strategies that are designed specifically to enhance compliance with the smoke-free policy. Formal enforcement measures may include strategies like fines, warnings, and formal discipline (such as sanctions on accounts or access to certain services for students and disciplinary notes for staff).

Formal enforcement has been shown to be effective in a variety of settings (Wynne et al., 2018). On post-secondary campuses, the stringency of formal enforcement by university personnel was inversely related to student smoking on campus (Jancey et al., 2014). Common strategies that fall under the formal enforcement category include having enforcement officers who have the authority to distribute fines, suspension, or expulsion (Wynne et al., 2018).

Alternative enforcement measures (including educative strategies), like signs, education, and social enforcement and accountability, are often used in conjunction with, or even in place of, formal enforcement. While relatively limited, the available research does suggest that alternative enforcement is effective, and in some cases, more effective than formal enforcement (Wynne et al., 2018). Alternative strategies supported by research include: static communication in campus' traditional and digital media channels (e.g., postering, webpage announcements, etc.) (e.g., Fallin et al., 2013); interactive distribution of cards and flyers to non-compliant smokers directing them to sanctioned smoking areas (e.g., Russette, Harris, Schuldberg, & Green, 2014); and other types of policy education and awareness campaigns (e.g., Wynne et al., 2018).

In general, social marketing campaigns using a variety of channels to educate all campus citizens about the policy and encourage compliance and social enforcement have been shown to be an effective way to improve compliance with smoke-free campus policies, even without formal measures (Wynne et al., 2018). However, despite the initial promise of social marketing campaigns to affect positive change on postsecondary campuses, many questions remain.

One area of particular concern is whether social marketing campaigns can produce compliance with a policy that prescribes designated smoking areas. Despite the relative success of 100%

smoke free campus policies in Canada, many Ontario institutions have chosen to adopt designated smoking area policies in lieu of a total ban on smoking. A 2020 study from Australian post-secondary campuses that closely mirrors the situation in Ontario found that the reasons for hesitancy around implementing a 100% smoke free policy included lack of resourcing for enforcement, pushing smokers (and litter) out to the boundary of the campus, and exposing pedestrians and other bystanders to second-hand smoke. For some, these decisions are made due to pushback from the student/staff community. For example, the belief that in the absence of adequate enforcement, smokers will simply smoke wherever they want, leaving litter and exposing campus citizens to second-hand smoke. Furthermore, some communities see 100% smoke free campus policy as victimization and stigmatization of smokers (Sendall et al., 2020). For the many Ontario institutions with policies that include designated smoking areas, it is imperative that compliance with the policy is high in order to minimize the risk of smokers using unsanctioned areas to smoke. Smoking in unsanctioned areas can put more campus citizens at risk of exposure to second-hand smoke, increase litter (since receptacles are absent), and create safety risks for smokers and property. If social marketing campaigns are effective in promoting compliance with these policies, the citizens' exposure to second-hand smoke may decrease, butt litter on campus may decrease, and tobacco should continue to be denormalized, which may lead to quit attempts among young adults at the institution. Understanding how to use social marketing campaigns to achieve these outcomes is a key piece of the puzzle: one that has not been studied.

## 2.4 Purpose

### 2.4.1 Overview

The purpose of this study is to investigate whether a comprehensive, multi-faceted social marketing campaign tailored to the specific needs of the institution and aimed at promoting the correct use of designated smoking areas on campus, impacts compliance with that institution's smoking policy. The institution's policy called for all smoking to occur only within one of 15 designated smoking areas. Accordingly, this study investigates whether there is a post-campaign increase in compliance with policy provisions related to correct use of Designated Smoking Areas (DSAs). This includes the lighting, smoking, and extinguishing of cigarettes/vapes within the boundaries of the DSA, and correct disposal of cigarette butts (thereby producing a decrease in cigarette butt litter in Designated Smoking Areas (DSAs).

Given that smoking routinely occurs in a number of non-sanctioned "hot-spots" on campus, this study also investigates changes in the use of these locations. For the purpose of the study, "smoking" includes the use of conventional cigarettes as well as e-cigarettes. Correspondingly, non-smoking indicates that neither type of product is used.

This study will examine and describe how smokers and non-smokers use DSAs and non-DSAs before and after a tailored social marketing campaign aimed at promoting the correct use of designated smoking areas.

### 2.4.2 Research Questions

Based on persistent informal observations that smokers tend to begin smoking/vaping before entering the designated smoking area and exit the designated area before extinguishing their cigarette or deactivating their e-cigarette, the following research questions will be addressed.

#### *2.4.2.1 Research Question 1*

After the campaign, compared to before it, at designated smoking areas, is there a decrease in:

a. non-compliant behaviour related to policy adherence in DSAs?

Where noncompliance is defined as:

- The proportion of smokers who light their cigarette/activate their device outside of the designated area
- The proportion of smokers who extinguish their cigarette/de-activate their device outside of the designated area
- The proportion of smokers who improperly dispose of butts

b. the presence of butt litter overall and between the primary and secondary boundaries?

#### *2.4.2.2 Research Question 2*

After the campaign, compared to before it, at unsanctioned smoking areas (non-DSAs) is there a decrease in:

a. non-compliant behaviour related to policy adherence?

b. the presence of cigarette butt litter?

#### *2.4.2.3 Research Question 3*

After the campaign, compared to before it, is there a possible reduction in the likelihood of Campus citizens being exposed to second-hand smoke in DSAs? In non-DSAs?

#### *2.4.2.4 Research Question 4*

*During the study period, what are the characteristics and behaviours of smokers who are observed: at the DSAs? at the non-DSAs?*

This question was answered by exploring three sub-questions:

- What type of tobacco products are individuals using on campus?
- How do these smokers behave?
- How do smokers and non-smokers interact with each other in the designated and undesignated smoking areas?

# CHAPTER 3: METHODOLOGY

## 3.1 Study Design

### 3.1.1 Overview

In order to answer the research questions, two separate but related observational studies were conducted. In Study 1, observation of smokers' and non-smokers' behaviours was completed in four designated smoking areas and two unsanctioned smoking "hot spots" on Brock's main campus both before and after implementation of a comprehensive social marketing campaign aimed at promoting the correct use of designated smoking areas on campus. In Study 2, cigarette litter was audited in the same six smoking areas both before and after the campaign. While the focus is on the degree to which *smokers'* behaviours reflect compliance with Brock's tobacco control policy, *non-smokers'* behaviours—specifically, their exposure to second-hand smoke—are also examined.

### 3.1.2 Study Setting

#### *3.1.2.1 Campus Characteristics*

The study was conducted at Brock University, a small, comprehensive university located in St. Catharines, Ontario, Canada. In 2017, Brock had approximately 19,000 students enrolled and employed over 1,500 staff/faculty. Brock is also home to a great number of community and athletic programs, which draw even more people to campus.

Despite a large number of community members who attend Brock each day, most of the Brock population is comprised of young adults. Over 80% of full-time students apply to Brock directly from high school (Brock University, 2017), qualifying most of them as young adults, and therefore putting them in the highest-risk age group for smoking behaviour.

#### *3.1.2.2 Campus Smoking Policy*

At the time of the study, Brock University had not yet transitioned to a 100% smoke-free campus policy but had plans to do so in the future. The same situation still exists today.

The institution's smoking and vaping policy limits smoking to 15 designated smoking areas on the main campus (see Appendix A and Appendix B for policy and smoking area maps). According to Brock's policy, smoking may not occur within 5 metres of a functional door or window, or within 9 metres of any air intake, vent, or loading dock. The designated smoking areas are designed to comply with these restrictions. Furthermore, each of these smoking areas has cigarette litter disposal containers (butt receptacles) to prevent littering of cigarette butts on campus. The smoking policy has been in place since 2016 with amendments in 2018 to prohibit vaping on campus outside of the designated areas.

On paper, Brock's smoking policy is compliant with and exceeds the requirements dictated by provincial legislation known as the Smoke-Free Ontario Act. Informal observations by Brock's Human Resources staff and grounds-keeping staff (as well as the researcher) reveal that policy non-compliance is frequent, with smoking in illicit locations on campus, incorrect use of designated areas, and improper disposal of butts. Information obtained from administrators indicates that despite these frequent occurrences, no routine education or enforcement occurs,

and reports of violations are typically addressed by adding educational signage to the offending location (e.g., a sign with a map of designated smoking areas on campus).

### 3.1.3 Social Marketing Campaign

#### *3.1.3.1 Smoke-free Campus Campaign: Provincial Template*

The Smoke-Free Campus campaign is a joint initiative of a number of Ontario organizations including public health units, Leave The Pack Behind, and the post-secondary campuses on which it runs. Ultimately aiming to promote 100% Smoke-Free Campus policies at all post-secondary institutions in Ontario, the Smoke-Free Campus campaign is coordinated across the province by means of a toolkit, a training webinar, and *ad hoc* communication among campus representatives and staff of the sponsoring organizations. At the campaign website (www.smokefreecampus.ca), people seeking to promote the campaign on their campus can access branded campaign materials and guidebooks. To unite and amplify efforts across the province, all campuses are encouraged to host the campaign at the same time in the third week of March and to include the "1 Day Stand" event in the middle of that week. Campuses can choose to extend the duration of the campaign if they wish.

Campuses are encouraged to promote four main messages. This includes two messages for students and two messages for administrators.

The messages for students are:

1) Everyone deserves to breathe clean air where they live, work, study, and play.

2) Addressing the commercial tobacco epidemic will not only save lives, but also the planet.

The messages for administrators are:

1) Students are targeted by the tobacco industry whose products kill up to two-thirds of long-term users.

2) Tobacco-free policies decrease costs for schools without impacting enrollment

While the messages are broad, each campus is encouraged to tailor the campaign to its own specific needs. In general, the campaign promotes implementation of and compliance with a smoke-free campus policy and encourages people to be smoke-free on the day of the 1 Day Stand. It generates awareness of the existing policy on campus through mixed-media advocacy and education.

#### *3.1.3.2 Smoke-free Campus Campaign Tailored to Brock*

Each campus tailors messages, materials, and delivery of the campaign to characteristics of its own campus, student body, policy, and desired outcomes (e.g., greater compliance, policy change, awareness, etc.). The campaign at Brock was aimed at raising awareness of and compliance with the existing policy, generating support for a 100% smoke-free policy, and encouraging everyone on Brock's campus to make Brock smoke-free for one day. Brock's Smoke-Free Campus campaign was active starting on March 4th and ending March 25th, 2019. The 1 Day Stand occurred on March 20th.

Under the guidance of mentors from Niagara Region Public Health, Leave The Pack Behind, Brock Human Resources, and Brock Student Wellness and Accessibility Services, and using campaign-branded materials and guidelines from the campaign website, Brock University students designed the social marketing campaign to include: awareness, educational, and promotional activities; distribution of educational/promotional materials and free incentives; and communication with members of the Brock community about the current policy and making Brock smoke-free for one day.

Students involved in the development of the campaign conducted a needs assessment before deciding on the focus of the campaign. During this process, students informally surveyed campus citizens and found that less than 40% knew where the smoking areas were on campus. Furthermore, students conducted a Facebook poll and found that 100% of respondents had noticed cigarette litter around campus. As a result, two additional key messages were prominently featured alongside the provincial key messages:

1) Please use designated smoking areas while smoking on campus

2) Dispose of butt litter appropriately using receptacles provided

Campaign materials were evidence-based and focus-tested to ensure their appeal and relevance to the target audience; mentors reviewed all materials for accuracy before they were implemented. Campaign materials and activities especially pertinent to this study included awareness-generating resources including posters, palm cards, YouTube videos, and social media advocacy on Facebook, Instagram, and Twitter that address the current Brock policy, as

well as any materials that address quitting smoking altogether (See Appendix H for examples of campaign materials).

### 3.1.4 Smoking Areas Under Investigation

#### *3.1.4.1 Selection of Smoking Areas*

Data were collected at six sites on Brock's main campus: four high-traffic designated smoking areas (approximately ¼ of the total number of designated areas) and two high-traffic, unsanctioned areas where smoking frequently occurs. These smoking areas were selected based on insight and recommendations from school administrators, groundskeepers and human resources staff; non-systematic observation of all designated smoking areas on campus to assess the volume of use; geographical location and physical characteristics; and informal feedback from students designing the social marketing campaign. Sites of various sizes and with different seating and shelter configurations, distances from walkways, and traffic patterns were selected. The site serving the International Building was specifically selected. More information about individual smoking areas can be found in Appendix C.

**3.1.4.1.1 Establishing Boundaries of Smoking Areas.** One might assume that boundaries for designated smoking areas would be evident given that they are included in Brock's smoking policy. In fact, specific areas and perimeters of designated smoking areas at Brock are not clearly defined in the written smoking policy or demarcated in the outdoor environment. Instead, Brock's 15 designated smoking areas on the main campus are generally indicated with a single sign, near which is typically a bench and a cigarette butt receptacle.

Therefore, for both the non-sanctioned smoking areas, and the designated smoking areas, it was necessary to establish boundaries within which smokers would be observed for data collection.

Boundaries for each site were imposed by the researcher based on the following criteria for each location. First, a "primary boundary" was established by mapping a 10-metre circumference from the sign indicating that an area is a designated smoking area. Pilot-testing of observation procedures with these researcher-defined boundaries immediately revealed that large numbers of individuals smoked beyond these perimeters and seemed to use naturally occurring barriers (such as walls, walkways, bushes, etc.) to guide where they located themselves. Accordingly, boundaries were re-established by the researcher based on consideration of the following factors, in order:

1. Policy and legislation: Boundaries delineated by official Brock University signage were used. In the absence of signs, compliance with policy strictures that a boundary may not exist within 5 metres of a door or window, or 9 metres of an air intake or loading bay was applied to establish primary boundaries.

2. Natural borders: A logical natural boundary (for example a wall, sidewalk, or lawn/garden) was used where signage was absent, and boundaries could not be extrapolated from written policy or legislation.

3. Observation: Where policy-based and natural borders were not available, a boundary was created using data from researcher observations, taking into consideration the usual movement of smokers, non-smokers, and the locations of seating, signs, and receptacles at the site.

Observations to establish boundaries took place from January 9 to 15, 2019. The four designated smoking areas were observed twice per day, 15 minutes each, for 5 days. The data collected included: observing and documenting the logical, natural borders where they were present; mapping how near to the "Designated Smoking Area" sign smokers located themselves; assessing the presence of doorways and air intakes that impact the location of boundaries; and patterns of pedestrian non-smokers who use the areas as a thoroughfare.

Two boundaries were extrapolated for each individual Designated Smoking Area location based on these measurements. The primary boundary represents the authenticated perimeter of the Designated Smoking Area (as described above). It is differentiated from the secondary boundary which represents the area just beyond the established primary boundary in which smokers were seen to be frequently smoking. Smokers were observed to purposively travel to the secondary location to smoke – possibly thinking they were using the designated smoking area correctly, but technically in violation of policy and legislation regulations.

Simultaneous with these observations of designated smoking areas, observations were also used to confirm the boundaries of the two identified unsanctioned "hot spots" (non-designated smoking areas) in which non-compliant smoking was occurring. The two selected sites were both located near doors, windows, air intake vents, or loading docks, representing a significant risk of reducing air quality outside and inside those areas and in violation of the written policy. Natural borders and researcher observation (as described above) were used to derive a primary border. A secondary boundary was not derived for unsanctioned smoking areas, since, by definition, *any* use of tobacco in unsanctioned smoking areas is noncompliant with policy. The boundaries of all six smoking areas under observation in the study vary in size

depending on the location. Maps detailing boundaries of each smoking area (both designated and unsanctioned) can be found in Appendix C.

## 3.2 Study 1

### 3.2.1 Overview

In Study 1, observation of smokers' and non-smokers' behaviours were completed in four designated smoking areas and two unsanctioned smoking "hot spots" on Brock's main campus. Observations took place both before and after implementation of the comprehensive social marketing campaign that was tailored to Brock's setting and policies and designed to promote correct use of designated smoking areas and generate support for a future smoke-free campus policy (see section 3.1.3).

### 3.2.2 Developing Observation Protocols

#### *3.2.2.1 Timing and Staffing for Observations*

It was expected that two observers would collect data about smokers' and non-smokers' use of/presence in smoking areas over a 30-minute span at various times of the day. To determine when, where and how best to collect these observational data at the selected smoking areas, a pilot-testing process was used. These pilot observations of smoking areas by the researcher and volunteers revealed that the volume of people using or passing through some smoking areas would make it unlikely that two observers would be able to accurately track behaviours of both smokers and non-smokers. In order to maintain a high level of accuracy in the

observations, three observers would have to be present during each data collection session: two to track smokers, and one to track non-smokers.

It was also determined through this pilot-testing process that observations could be limited to daytime hours. Observing smoking areas at night (e.g., after 9:00 PM) revealed that traffic into or through the areas was low or even nonexistent, and the safety of data collectors could possibly be compromised.

Also as a result of the pilot observations, it was determined that discretion was imperative. Smokers—and individuals who were not smoking—appeared very attuned to the presence of observers and seemed to alter their behaviour. To ensure observers could keep an unobtrusive profile at the data collection sites, inconspicuous vantage points were tested by the researcher in this pilot-testing phase. Consequently, it was the case that most observations took place from indoor locations from which the entire site was clearly visible. For one site, observations took place from an outdoor vantage point due to low visibility from any available indoor site. The observers were instructed not interact with anyone on-site.

Finally, the pilot observations were used to confirm that a 30-minute interval captured a sufficiently high volume of smokers and non-smokers. Longer intervals were not more productive than 30-minute observations due to overall traffic fluctuations between classes.

#### *3.2.2.2 Tracking Sheets for Observations*

The “Observational Data Collection Tool: Smoking” was created to track smoking behaviour. The tool was comprised of a checklist used to observe smoking behaviour and use of designated

and unsanctioned smoking areas (Figure 1) and a guided observation record. This tool can be found in Appendix D.

The "Observational Data Collection Tool: Non-Smoking" was used to track the behaviour of non-smokers. The tool was comprised of a tally of non-smoking behaviour (Figure 2), including a place to record the number of individuals who: pass through the area when a smoker is not present; pass through the area when a smoker is present; and stop or stay in the area as companions to smokers. Additionally, this tool included a guided observation record. It can be found in Appendix E.

Measures comprising the checklists were developed based on existing empirical literature. Pilot testing was used to refine precise wording, and presentation of measures in the recording sheets.

**Figure 1**

*Smokers' Use of Smoking Area Checklist*

| **Type of tobacco/nicotine product** | **Smoking/vaping initiated:** | **Smoking/vaping ceased:** | **Disposed of cigarette butt…** | **Most *smoking* time was spent…** | **Social Behaviour (select all that apply)** | **Physical Behaviour** *(select all that apply)* |
|---|---|---|---|---|---|---|
| ☐ Cigarette<br>☐ E-cigarette<br>☐ Other:<br>_____ | ☐ Outside of primary and secondary area<br>☐ Inside secondary area but outside primary area<br>☐ Inside primary area | ☐ Outside of primary and secondary area<br>☐ Inside secondary area but outside primary area<br>☐ Inside primary area | ☐ In the provided receptacle (DSA only)<br>☐ On the ground<br>☐ Other:<br>_____ | ☐ Inside the primary area<br>☐ Outside of the primary area | ☐ Talking on/using phone<br>☐ Socializing with other smokers<br>☐ Socializing with non-smokers<br>☐ Just out to smoke | ☐ Standing<br>☐ Sitting<br>☐ Pacing |

**Figure 2**

*Non-smokers' Use of Smoking Areas Checklist*

| Time | Pedestrian, No Smokers Present | Pedestrian, Smokers Present | Bystander, accompanying smoker(s) |
|---|---|---|---|
| 0-5 minutes | | | |
| 5-10 minutes | | | |
| 10-15 minutes | | | |
| 15-20 minutes | | | |
| 20-25 minutes | | | |
| 25-30 minutes | | | |

## 3.2.3 Measures

### *3.2.3.1 Product Type, Use, and Disposal*

**3.2.3.1.1 Product Type.** Categories for this variable are vape, cigarette, and other.

**3.2.3.1.2 Locations of Initiation and Termination of Use.** Observers note whether where an individual initiated and ended their tobacco/vape use: within the primary boundary of the designated smoking area; within the secondary boundary (but outside the primary boundary); or outside both boundaries. At unsanctioned smoking areas, all initiation/termination was considered to be outside both boundaries.

**3.2.3.1.3 Location of Active Use.** Whether an individual spent most of their time inside the primary area or outside of it was recorded. At unsanctioned areas, all product use was considered to be outside of the secondary boundary.

**3.2.3.1.4 Disposal of Butts.** Actions were categorized as disposing the butt in the receptacle provided, disposing of the butt on the ground, or other.

### *3.2.3.2 Behaviours and Interactions*

**3.2.3.2.1 Physical Behaviour.** Observers noted three physical behaviours smokers engaged in while smoking: sitting, pacing, or standing.

**3.2.3.2.2 Social Behaviour.** Observers noted the types of social behaviours smokers engaged in while smoking: socializing with smokers, socializing with non-smokers, just out to smoke, talking on/looking at phone. More than one selection could be made for each case.

**3.2.3.2.3 Presence of Non-Smoking Individuals.** Observers kept a tally of the number of pedestrians or bystanders that were present during observation periods depending on if there were smokers present or not (See Figure 3).

**3.2.3.2.4 Qualitative Appraisal of Contexts and Behaviours.** Observers were prompted to provide commentary on the observation session by means of these questions: "*How did non-compliant smokers behave as compared to compliant smokers?"* "*Comment on their general awareness of the policy for non-compliant smokers*", "*How did smokers accommodate or acknowledge non-smokers in the area?*", and "*How did the non-smokers seem to react to the smokers?*" Non-compliance/compliance were loosely defined to observers during training. A

formal, rigid definition was not provided as the label “non-compliant” may be value-laden and interfere with the observers’ ability to remain unbiased.

### 3.2.4 Procedures

#### *3.2.4.1 Engaging and Training Data Collectors*

**3.2.4.1.1 Engaging Data Collectors.** Twelve data collectors were recruited through word of mouth and classroom announcements at Brock University to complete data collection for both time points of the study: prior to and after the 3-week smoke free campus campaign. All data collectors were:

- in at least their second year of university study (with one exception, based on merit and experience);
- available for the mandatory 1.5-hour training session; and
- available for one complete week of daily observation sessions scheduled either in the morning, or in the afternoon.

Data collectors were paid a $300 stipend upon satisfactory completion of the training session and scheduled observations for both data collection periods. Those data collectors who were unable to continue to work after the first week of data collection were awarded a partial stipend for their service ($150). Additional observers were recruited to take their place before the second observation period.

**3.2.4.1.2 Training Data Collectors.** All data collectors (observers) were trained on Study 1 protocols in the weeks prior to data collection. Training occurred on a one-to-one basis

with the researcher and took approximately 1.5 hours. Upon completion of training, volunteers submitted the Volunteer Invoice (Appendix F) provided by Leave The Pack Behind to facilitate the dispensing of the stipend awarded at the end of the data collection period for the study.

Training addressed all aspects of the observational data protocol and the observer responsibilities while on site, including:

- a review of ethical considerations (such as confidentiality); education on Brock University's current smoking policy;
- specific details of the researcher-defined primary and secondary boundaries of smoking areas for the selected locations; correct/accurate use of data collection tools;
- and ways to mitigate bias (for example, the Hawthorne Effect), maintain objectivity, and avoid interaction with people on-site.

Training included: traditional, classroom-style training on University policy, study parameters, and administrative details/tasks; practical, hands-on training using the data collection tools; and on-site training (i.e., visiting each smoking area) to confirm knowledge of boundaries.

Upon completing their training, each observer received a quick reference guide, which included blank observation templates and maps of the sites. They were also given required materials for data collection, including tracking sheets and clipboards. Finally, observers were instructed to contact the researcher directly either by phone or by dropping by the Leave The Pack Behind offices if they needed additional tracking sheets, or if they had any questions or concerns during the data collection period.

The above-described training was provided for the observers who were hired for the post-campaign data collection. No additional training for the existing observers took place before the post-campaign data collection period. However, all observers met with the researcher immediately prior to the post-campaign observation period to confirm that they were still well-versed on protocols and to ensure they had the materials they needed. Additional quality assurance procedures are described below.

#### *3.2.4.2 Implementing Observation Protocol*

Pre-campaign observational data were collected from February 25 to March 1, 2019, and post-campaign data were collected from March 25 to March 29, 2019. All sites were observed twice per day, for 30 minutes, once in the morning between 8:45 am and 11:00 am, and once in the afternoon between 12:45 pm and 3:00 pm. Times were staggered to account for the likelihood that use of smoking areas (both designated and unsanctioned) may differ according to whether classes are in-session or breaking for class change.

Three observers were assigned to be present at each site for each observation session with two observers assigned to complete “Observational Data Collection Tool: Smoking” and one observer was assigned to complete “Observational Data Collection Tool: Non-Smoking”. This model was achieved except for one afternoon session in the post-campaign observation week where one person was sick and was not able to be replaced in time. For that session, one observer was tasked with completing the “Observational Data Collection Tool: Smoking” and the other completed the “Observational Data Collection Tool: Non-Smoking".

To ensure high quality of the data, the researcher conducted *in vivo* spot checks of observers at all data collection sites. In other words, each observer was visited by the researcher at least once, randomly, during each week of data collection. No unsatisfactory technique or other problematic behaviour was noted. Observers completed their observation checklists during the observation period, and completed their qualitative notes during the session or immediately after.

Within 24 hours of completion of each observation session, observers were required to bring their completed data collection tools to the researcher in the Leave The Pack Behind office to be reviewed to check for errors that could be remediated prior to the next data collection session. This prevented a number of data quality issues, including failure to write name or site on one of their forms.

## 3.3 Study 2

### 3.3.1 Overview

In Study 2, cigarette litter that had accumulated in a one-week period was audited, pre-campaign and post-campaign, in the four designated smoking areas and two unsanctioned smoking "hot spots". One week was selected as the prescribed time frame based on practical logistics and a number of observations from pilot-testing. Firstly, given that the time frame must be the same for both and pre-campaign and post-campaign assessments, extending the time frame beyond one week would coincide with Reading Week in the pre-campaign audit and the undergraduate exam period in the post-campaign audit. Given that traffic during these times may be inconsistent with "normal" in-term traffic, the audit would not represent the customary use of

the smoking areas. Secondly, there are occasional incidents where butt litter in receptacles catches fire and must be emptied. This would render the data for that site unusable. Allowing litter to accumulate for more than one week may increase the odds of this occurrence. Furthermore, when the cigarette litter gets wet or is left for a prolonged period, the paper wrappings may disintegrate, making accurate counts of individual butts impossible. By selecting a one-week period, there is a reduced risk of cigarette litter disintegrating.

### 3.3.2 Measures

#### *3.3.2.1 Presence of Litter*

The volume of cigarette butt litter that had accumulated in a one-week period was measured by counting the number of butts collected from the ground and/or the receptacles as described below.

#### *3.3.2.2 Distribution of Litter*

The distribution of cigarette butt litter that had accumulated in a one-week period was measured by determining the proportion of butts in receptacles versus on the ground. Distribution of ground litter was further quantified according to whether it was within the primary boundary or between the primary and secondary boundaries.

### 3.3.3 Procedures

#### *3.3.3.1 Butt Litter Collection Protocol*

On February 25, one week prior to the start of the campaign, to create a “clean” site, free of any pre-existing butt litter, the researcher attended each site to empty all butt litter receptacles and remove all butt litter from the ground within the area delimited by the secondary boundary. For the week that followed, (i.e., the week immediately before the social marketing campaign), Brock University grounds staff did not sweep, clean, or empty receptacles in the selected smoking areas. On March 4, the pre-campaign butt litter audit was conducted.

The protocol described above was repeated exactly for the post-campaign data collection period. Initial cleaning of the site occurred on March 25 and the audit took place on April 1.

On March 4 and April 1, after butt litter had accumulated for one week, the researcher and two trained assistants attended each site to conduct a butt litter audit. In order to ensure systematic collection of the cigarette litter, the following protocol was followed, in this order, at each site:

1. Butt litter receptacles at designated smoking areas were emptied into a labelled plastic bag, which was then sealed for transportation.
2. Butt litter was collected from the ground of the area within the primary boundary, placed in a labelled plastic bag, and sealed for transportation.
3. Butt litter was collected from the area between the primary and secondary boundaries, placed in a labelled plastic bag, and sealed for transportation.

Butt litter collected during the audits was transported to an off-site location where number of butts were counted. The butt litter audit process was documented using the form shown in Appendix G.

#### *3.3.3.2 Hiring and Training Assistants*

Two individuals were recruited from the pool of observers hired for Study 1 to assist the researcher in conducting the butt litter audit. These two assistants were paid an additional $50 stipend to conduct the butt litter study.

Training was conducted upon recruitment, and covered logistics related to equipment, personal safety, transport of litter, as well as study procedures (e.g., use of the data recording form). This training took approximately 30 minutes to complete.

## 3.4 Data Analyses

### 3.4.1 Preparing Data for Analyses

In Study 1, each observation session produced measures of smokers' actions from two observers. To prepare the data for analyses, tracking sheets of the two observers were merged into a single record. Any inter-observer differences in continuous measures (such as number of smokers present) were reconciled by calculating an average of the two numbers, or by using the existing value when only one value was available (such as when only 1 observer record was available).

### 3.4.2 Constructing Measures of Non-Compliance with Policy

Due to the absence of clearly marked boundaries in designated smoking areas, it is possible that some smokers unintentionally violate policy by smoking outside "primary" boundaries of the smoking area (i.e., boundaries that would align with provincial and campus

regulations if marked), but within the "secondary" boundaries that have come to be casually established as delimiters of the smoking area. To account for this possibility, two calculations were used to generate measures of non-compliance with policy. The two levels of non-compliance are identified as *primary noncompliance* and *secondary noncompliance*. Primary noncompliance is deemed to exist when initiation (lighting up) or termination (extinguishing) of smoking/vaping occurs outside of the authenticated primary boundary, including those who are outside the more liberal secondary border, or when failure to use butt receptacles occurs. Secondary noncompliance includes the same behaviours noted above but with initiation or termination of smoking/vaping occurring outside the secondary boundary only. Details of the specific behaviours that were used to construct measures of non-compliance are presented in Table 2. Measures of non-compliance are presented as proportions of the total number of observed behaviours.

### 3.4.3 Analyses to Answer the Research Questions

#### *3.4.3.1 Research Question 1*

After the campaign, compared to before it, at designated smoking areas (DSAs), is there a decrease in:

a. non-compliant behaviour related to policy adherence in DSAs?

b. the presence of butt litter overall and between the primary and secondary boundaries?

To answer the first part of this research question, two separate mixed effects linear models were constructed in R (R Core Team, 2012) with lme4 (Bates et al., 2015) on observations nested in

sites. Mixed effects modeling was chosen to account for the grouped nature of the panel data collected from each site, and the expected differences in the existing norms (arising from persistent differences in physical/geographic attributes of the sites, foot traffic, population using the site, the number of receptacles, and clarity of borders. Furthermore, the use of mixed effects for this dataset accounts for the violations in the assumption of independence of observations for linear models that arises with the use of repeated measures.

In the first model, secondary noncompliance was the dependent variable; pre/post time was entered into the model as the independent, fixed effect variable; location (i.e., the site at which the observations took place) was included in the model as a random effect (intercept only) to control for the expected differences between sites. Assumptions for this analysis included: linearity in the relationship between the dependent variable and predictors, absence of collinearity among predictors, homoscedasticity in the variances of the predictors, normality of residuals, and absence of influential data points. Visual inspection of residual plots in R did not reveal obvious deviations from normality or violation of the homoscedasticity assumption. P-values were obtained by likelihood ratio tests of the full model with the effect of the campaign (pre/post) against the model without the effect.

In the second model, this procedure was repeated exactly as written above for the primary noncompliance variable in place of the secondary noncompliance variable.

To answer research question 1b, descriptive statistics were used to examine the total volume of litter and the proportion of butts found on the ground (vs. in designated cigarette butt

receptacles) pre- and post-campaign. Location of ground litter (relative to primary and secondary borders) was also described. Data from Study 2 were used for these analyses.

**Table 2a**

*Definition and Construction of Measures of Secondary Noncompliance*

| **Secondary noncompliance**<br>Includes smoking behaviour (initiation or termination of smoking/vaping) that occurs outside not just the authenticated primary boundary, but the more liberal secondary border, and failure to use butt receptacles. | | |
|---|---|---|
| Observed Behaviour | Location of Occurrence | Construction of Noncompliance Measure |
| initiation of smoking/vaping | outside secondary boundary | $\frac{\text{\# initiations outside secondary boundary}}{\text{total initiations observed}}$ |
| termination of smoking/vaping | outside secondary boundary | $\frac{\text{\# terminations outside secondary boundary}}{\text{total terminations observed}}$ |
| disposal of butt/pod | on ground (vs in receptacle) | $\frac{\text{\# disposals on ground}}{\text{total butts disposed}}$ |
| | overall: | $\frac{\Sigma\text{ (initiations outside secondary border, terminations outside secondary border, ground disposals)}}{\text{total initiations, terminations, disposals}}$ |

**Table 2b**

*Definition and Construction of Measures of Primary Noncompliance*

| **Primary noncompliance** | | |
|---|---|---|
| Includes smoking behaviour (initiation or termination of smoking/vaping) that occurs outside the authenticated primary boundary, but within the secondary boundary, and failure to use butt receptacles. | | |
| Observed Behaviour | Location of Occurrence | Construction of Noncompliance Measure |
| initiation of smoking/vaping | outside primary boundary | $\frac{\text{\# initiations outside primary boundary}}{\text{total initiations observed}}$ |
| termination of smoking/vaping | outside primary boundary | $\frac{\text{\# terminations outside primary boundary}}{\text{total terminations observed}}$ |
| disposal of butt/pod | on ground (vs in receptacle) | $\frac{\text{\# disposals on ground}}{\text{total butts disposed}}$ |
| overall: | | $\frac{\Sigma\text{ (initiations outside primary border, terminations outside primary border, ground disposals)}}{\text{total initiations, terminations, disposals}}$ |

*Note.* Initiation noncompliance, termination noncompliance, and disposal noncompliance were measured per site, at each of the 10 pre-campaign and 10 post-campaign observation times.

#### *3.4.3.2 Research Question 2*

After the campaign, compared to before it, at unsanctioned smoking areas (non-DSAs), is there a decrease in:

a. non-compliant behaviour related to policy adherence?

b. the presence of butt litter?

To answer the first part of this research question, descriptive statistics were used to compare the total number of people smoking in non-designated areas before and after the campaign. Specifically, for each site, the number of people using it was summed across all observations, pre-campaign and post-campaign. These values were used to determine the proportion of change (both per site, and across both sites). Counting individuals as opposed to behaviours was chosen because any smoking behaviour in a non-DSA is considered delinquent.

To answer the second part of this research question, the volume of butt litter found in these areas was quantified before and after the campaign. Data from Study 2 were used for this.

#### *3.4.3.3 Research Question 3*

After the campaign, compared to before it, is there a possible reduction in the likelihood of campus citizens being exposed to second-hand smoke in designated smoking areas (DSAs) and in unsanctioned smoking hot spots (non-DSAs)?

To assess the possible reduction campus citizens' exposure to second-hand smoke the proportion of pedestrians who were potentially exposed to second-hand smoke as a result of passing near/thru a smoking area while a smoker was present was calculated as follows:

$$\frac{\text{\# non-smoking pedestrians walking within site boundary while smokers are present}}{\text{total number of non-smoking pedestrians walking within site boundary}}$$

For each DSA and non-DSA site, proportions obtained from the 10 pre-campaign observations were averaged to yield one score per site. The same was done for post-campaign observations. Pre- and post-campaign counts and proportions were compared.

To further assess the possible reduction in campus citizens' exposure to second-hand smoke the proportion of smokers who spent most of their smoking time within the primary boundary of the DSA (potentially further away from pedestrians) was calculated as follows:

$$\frac{\text{\# smokers identified as spending most of their time inside the primary boundary}}{\text{total number of smokers within the DSA delimited by the secondary boundary}}$$

Again, for each DSA, proportions obtained from the 10 pre-campaign observations were averaged to yield one score per site. The same was done for post-campaign observations. Pre- and post-campaign counts and proportions were compared.

#### *3.4.3.4 Research Question 4*

During the study period, what are the characteristics and behaviours of smokers who are observed at the designated smoking areas (DSAs) and unsanctioned smoking hot spots (non-DSAs)?

This question was answered by exploring three questions:

- What type of tobacco products are individuals using on campus?
- How do smokers behave?
- How do smokers and non-smokers interact with each other?

The proportions of individuals using each type of product (cigarettes, vapes, other) were calculated for each observation session at each site. These values were averaged over the 10 pre-campaign and 10-post-campaign observation times to yield a single pre-campaign and a single post-campaign score per site. A visual comparison of pre-/post-campaign scores was done.

A similar procedure was applied to appraise pre- and post-campaign social and physical behaviours of smokers at each of the sites. Social behaviours included: using a cell phone, socializing with smokers, socializing with non-smokers, and just out to smoke. Physical behaviours included: sitting, standing, or pacing. These values were averaged over the 10 pre-campaign and 10-post-campaign observation times to yield a single pre-campaign and a single post-campaign score per site. A visual comparison of pre-/post-campaign scores was done.

Finally, qualitative data collected by the trained observers in response to prompts such as *How did smokers accommodate or acknowledge non-smokers in the area*? were transcribed into

one document and coded by the researcher using principles of open and axial coding to generate themes.

# CHAPTER 4: RESULTS

## 4.1 Data Summary

Total number of behaviours (compliant, and noncompliant) observed, per site, per observation session, for Study 1, are presented in Table 3. The total number of smokers observed at each site, pre-campaign and post-campaign, are presented in Table 4

## 4.2 Results by Research Question

### 4.2.1 Results for Research Question 1a

*After the campaign, compared to before it, is there a decrease in non-compliant behaviour related to policy adherence in DSAs?*

Secondary noncompliance with policy was defined as initiating smoking/vaping outside of the secondary border of the designated smoking area, terminating smoking/vaping outside of the secondary border of the designated smoking area, and/or improperly disposing of a cigarette butt. The proportion of secondary policy-non-compliant behaviours were calculated as:

$$\frac{\Sigma \text{ (initiations outside secondary border, terminations outside secondary border, ground disposals)}}{\Sigma \text{ (total initiations, total terminations, total disposals)}}$$

Primary noncompliance with policy was defined the same ways as secondary noncompliance with policy except that the primary (not the secondary) border was the delimiting factor. The proportion of primary policy-non-compliant behaviours were calculated as:

$$\frac{\Sigma \text{ (initiations outside primary border, terminations outside primary border, ground disposals)}}{\Sigma \text{ (total initiations, terminations, disposals)}}$$

**Table 3**

*Total Number of Behaviours Observed, per Observation Session, for Study 1*

| Site | Pre-campaign observations | | | | | | | | | | Post-campaign observations | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mon | | Tues | | Wed | | Thu | | Fri | | Mon | | Tues | | Wed | | Thu | | Fri | |
| | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM |
| 1 | 19.0 | 20.0 | 19.0 | 18.0 | 24.0 | 34.5 | 19.0 | 46.0 | 24.0 | 26.0 | 12.5 | 34.0 | 29.5 | 44.5 | 18.0 | 39.0 | 18.5 | 28.5 | 39.0 | 23.0 |
| 2 | 12.0 | 17.0 | 12.0 | 2.0 | 26.0 | 10.0 | 19.0 | 40.5 | 19.0 | 4.0 | 15.0 | 17.0 | 4.0 | 6.0 | 19.5 | 21.0 | 20.0 | 50.0 | 5.5 | 5.0 |
| 3 | 2.0 | 8.0 | 0.0 | 7.0 | 7.0 | 4.0 | 8.0 | 22.0 | 8.0 | 2.0 | 3.0 | 2.0 | 4.0 | 7.0 | 9.0 | 6.0 | 2.0 | 15.0 | 5.0 | 6.0 |
| 4 | 15.0 | 36.0 | 13.0 | 46.0 | 9.0 | 30.5 | 7.0 | 21.0 | 14.0 | 9.0 | 15.0 | 22.0 | 9.5 | 21.5 | 3.0 | 17.5 | 30.0 | 21.0 | 13.0 | 20.0 |
| 5 | 0.0 | 9.0 | 8.0 | 10.0 | 0.0 | 3.5 | 0.0 | 6.0 | 4.0 | 12.0 | 1.0 | 2.0 | 0.0 | 16.5 | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 10.0 |
| 6 | 0.0 | 2.0 | 6.0 | 4.0 | 2.0 | 6.0 | 0.0 | 10.5 | 2.0 | 4.0 | 0.0 | 0.0 | 2.0 | 6.0 | 8.0 | 8.0 | 3.0 | 2.0 | 2.0 | 0.0 |

*Note.* Sites 1-4 are DSAs; sites 5 and 6 are non-DSAs. Values represent the average of two observers' counts and could be non-whole numbers if observers' counts were discrepant.

**Table 4**

*Total Number of Smokers Observed, per Observation Session, for Study 1*

| Site | Pre-campaign observations | | | | | | | | | | Post-campaign observations | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mon | | Tues | | Wed | | Thu | | Fri | | Mon | | Tues | | Wed | | Thu | | Fri | |
| | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM |
| 1 | 7.0 | 9.0 | 7.0 | 8.0 | 11.0 | 13.5 | 8.0 | 18.5 | 10.0 | 11.0 | 5.0 | 13.0 | 12.0 | 15.0 | 7.0 | 16.5 | 7.5 | 11.0 | 16.0 | 10.0 |
| 2 | 5.0 | 6.0 | 5.0 | 1.0 | 11.5 | 6.5 | 7.5 | 18.0 | 10.0 | 2.0 | 6.0 | 7.0 | 3.0 | 3.0 | 8.5 | 11.0 | 8.5 | 17.5 | 2.0 | 2.0 |
| 3 | 1.0 | 3.0 | 0.0 | 3.0 | 3.0 | 2.0 | 4.0 | 8.5 | 3.0 | 1.0 | 2.0 | 1.0 | 2.0 | 2.5 | 3.0 | 2.0 | 1.0 | 6.0 | 1.5 | 2.0 |
| 4 | 5.0 | 17.0 | 5.5 | 21.5 | 4.0 | 12.0 | 3.0 | 9.0 | 6.0 | 6.0 | 6.5 | 8.0 | 5.0 | 8.5 | 2.0 | 8.0 | 11.0 | 8.0 | 5.0 | 9.0 |
| 5 | 0.0 | 4.5 | 4.0 | 5.0 | 0.0 | 2.0 | 0.0 | 3.0 | 2.0 | 6.0 | 1.0 | 1.0 | 0.0 | 8.5 | 0.0 | 0.0 | 0.0 | 0.0 | 2.0 | 5.0 |
| 6 | 0.0 | 1.0 | 3.0 | 2.0 | 1.0 | 3.0 | 0.0 | 5.5 | 1.0 | 2.0 | 0.0 | 0.0 | 1.0 | 3.0 | 4.0 | 4.0 | 1.5 | 1.0 | 1.0 | 0.0 |

*Note.* Sites 1-4 are DSAs; sites 5 and 6 are non-DSAs. Values represent the average of two observers' counts and could be non-whole numbers if observers' counts were discrepant.

Changes in the proportion of secondary and primary policy-non-compliant behaviours are presented in Table 5 below. As shown in the table, secondary noncompliance with policy decreased at all designated smoking sites. Primary noncompliance with policy decreased at all designated smoking sites with the exception of site 2, where it increased by 8.3%.

Mixed effects linear modelling showed a secondary noncompliance estimate of -0.079 (95% CI = 0.143, -0.0151), $p < .05$), which represents a significant, approximate 7.9% decrease in noncompliance after the campaign. Using the same method, primary policy noncompliance also significantly decreased by about 10.2% after the campaign (-0.102, 95% CI = -0.203, -0.001, $p < .05$). See Table 6.

Table 7 details the percent change over time in each specific secondary non-compliant and each specific primary non-compliant smoking behaviour (initiating smoking/vaping, terminating smoking/vaping and disposing of cigarette butts), per site and overall.

### 4.2.2 Results for Research Question 1b

*After the campaign, compared to before it, in designated smoking areas, is there a decrease in the presence of cigarette butt litter?*

The proportion of total cigarette butts that were correctly disposed of in receptacles (versus thrown on ground) increased after the campaign from 75.5% to 77.4% overall. This measure was only possible at designated smoking sites due to the lack of receptacles in non-DSAs. The distribution of cigarette litter collected from designated areas before and after the campaign is summarized in Table 8.

**Table 5**

*Percent of Smoking Behaviours in Designated Smoking Areas that were Noncompliant with Policy, Before and After the Campaign (Per Site and Overall)*

| Site | Percent of smoking behaviours occurring outside secondary boundary | | | Percent of smoking behaviours occurring outside primary boundary | | |
|---|---|---|---|---|---|---|
| | Pre-campaign | Post-campaign | % Change | Pre-campaign | Post-campaign | % Change |
| Site 1 | 18.7 | 10.4 | -44.4 | 50.8 | 33.9 | -33.5 |
| Site 2 | 22.9 | 20.1 | -12.2 | 63.6 | 68.9 | +8.3 |
| Site 3 | 17.3 | 8.0 | -53.8 | 47.0 | 20.5 | -56.4 |
| Site 4 | 27.0 | 15.7 | -41.5 | 51.5 | 48.7 | -5.4 |
| Overall | 21.5 | 13.6 | -36.7 | 53.2 | 43.0 | -19.2 |

*Note.* Negative % change scores represent a (desired) decrease in noncompliance.

**Table 6**

*Mixed Effect Models of Noncompliance with Policy Before and After the Campaign*

| | Model 1: Secondary Noncompliance -- Unconditional model Estimate (95% confidence interval) | Model 2: Secondary Noncompliance -- Treatment effect model Estimate (95% confidence interval) | Model 3: Primary Noncompliance -- Unconditional model Estimate (95% confidence interval) | Model 4: Primary Noncompliance -- Treatment effect model Estimate (95% confidence interval) |
|---|---|---|---|---|
| Intercept | 0.175*** (0.125, 0.226) | 0.214*** (0.158, 0.272) | 0.481*** (0.329, 0.633) | 0.532*** (0.375, 0.689) |
| Treatment | --- | -0.079* (-0.143, -0.0151) | --- | -0.102* (-0.203, -0.001) |
| Random Variance Components | | | | |
| Site/location | .0004 | .001 | 0.012 | 0.012 |
| Residuals | .022 | .021 | 0.055 | 0.052 |
| ICC | .017 | .045 | 0.179 | 0.188 |
| AIC | -69.3 | -73.1 | 7.0 | 5.1 |
| BIC | -62.1 | -63.5 | 14.1 | 14.6 |

Significance Codes: *** $p<0.001$, * $p<0.05$; Policy compliance = 1, Policy noncompliance = 0.

**Table 7**

*Percent of Behaviours in Designated Smoking Areas that were Non-compliant with Policy, Before and After the Campaign (reported by behaviour)*

| Site | | Percent of smoking behaviours occurring outside secondary boundary | | Percent of smoking behaviours occurring outside primary boundary | | |
|---|---|---|---|---|---|---|
| | | Initiation | Cessation | Initiation | Cessation | Disposals |
| 1 | Pre | 7.1 | 5.7 | 51.7 | 34.2 | 32.8 |
| | Post | 8 | 1.2 | 41.9 | 16.6 | 15.2 |
| | % Change | 12.7 | -78.9 | -19.0 | -51.5 | -53.7 |
| 2 | Pre | 7.3 | 16.3 | 63.6 | 56.1 | 33.2 |
| | Post | 11.5 | 13.8 | 78.6 | 50.9 | 28.4 |
| | % Change | 57.5 | -15.3 | 23.6 | -9.3 | -14.5 |
| 3 | Pre | 8.9 | 15.6 | 48.1 | 38.1 | 16.5 |
| | Post | 6.7 | 4.7 | 28.7 | 4.7 | 7.6 |
| | % Change | -24.7 | -69.9 | -40.3 | -87.7 | -53.3 |
| 4 | Pre | 18.0 | 15.8 | 50.8 | 37.4 | 34.9 |
| | Post | 14.3 | 3.5 | 53.4 | 34.5 | 17.6 |
| | % Change | -20.6 | -77.8 | 5.1 | -7.6 | -49.9 |
| Overall | | | | | | |
| | Pre | 10.3 | 13.3 | 53.6 | 41.5 | 29.4 |
| | Post | 10.1 | 5.8 | 50.7 | 26.0 | 17.2 |
| | % Change | -1.9 | -56.4 | -5.4 | -35.7 | -41.5 |

*Note.* Negative % change scores represent a decrease in non-compliance.

**Table 8**

*Presence and Distribution of Cigarette Butt Litter in Designated Smoking Areas, Before and After the Campaign (Per Site and Overall)*

| Site | Pre-campaign | | | | | | | Post-campaign | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Total butts | In receptacle | | On ground in primary boundary | | On ground between boundaries | | Total butts | In receptacle | | On ground in primary boundary | | On ground between boundaries | |
| | *N* | *n* | *%* | *n* | *%* | *n* | *%* | *N* | *n* | *%* | *n* | *%* | *n* | *%* |
| 1 | 1,004 | 769 | 76.6 | 202 | 20.1 | 33 | 3.3 | 1,032 | 847 | 82.1 | 168 | 16.3 | 17 | 1.6 |
| 2 | 358 | 315 | 88.0 | 5 | 1.4 | 38 | 10.6 | 545 | 427 | 78.3 | 28 | 5.1 | 90 | 16.5 |
| 3 | 255 | 183 | 71.8 | 29 | 11.4 | 43 | 16.9 | 275 | 227 | 82.5 | 24 | 8.7 | 24 | 8.7 |
| 4 | 900 | 590 | 65.6 | 102 | 11.3 | 208 | 23.1 | 580 | 386 | 66.6 | 111 | 19.1 | 83 | 14.3 |
| Overall | 2,517 | 1,857 | 75.5 | 338 | 11.1 | 322 | 13.5 | 2,432 | 1,887 | 77.4 | 331 | 12.3 | 214 | 10.3 |

*Note.* Only cigarette litter disposed of in receptacle are considered compliant. All other locations are considered noncompliant.

### 4.2.3 Results for Research Question 2a

*After the campaign, compared to before it, is there a decrease in non-compliant behaviour related to policy adherence in non-DSAs?*

Policy non-compliant behaviour in non-DSAs was defined as any use of the unsanctioned area for smoking/vaping. After the campaign, there was a reduction in the average number of people observed to be using the unsanctioned area for smoking. Specifically, averaged over the 10 pre-campaign and 10 post-campaign observations times, the numbers of individuals smoking/vaping in the non-sanctioned areas were: 2.7 and 1.8 respectively for site 5, and 1.9 and 1.6 respectively for site 6.

### 4.2.4 Results for Research Question 2b

*After the campaign, compared to before it, in non-designated areas, is there a decrease in the presence of cigarette butt litter?*

The number of cigarette butts littered on the ground in the non-sanctioned areas were: 82 and 43 respectively for site 5, and 26 and 32 respectively for site 6.

### 4.2.5 Results for Research Question 3

*After the campaign, compared to before it, is there a possible reduction in the likelihood that campus citizens are exposed to second-hand smoke? In DSAs? In non-DSAs?*

Table 9 shows the average number of pedestrians using pathways or sidewalks near or through designated and non designated smoking areas before and after the campaign. Also

**Table 9**

*Proportion of Non-Smokers in Smoking Area, and Proportion of Smokers Staying within Primary Boundary of Designated Smoking Area, by Site, Before and After the Campaign*

| | Pre-campaign | | | | | | Post-campaign | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Pedestrians passing through the area | Pedestrians in area while someone is smoking | | Total Smokers In Area | Smokers Staying Inside Primary Boundary | | Pedestrians passing through the area | Pedestrians in area while someone is smoking | | Total smokers in area | Smokers staying inside primary boundary | |
| Site | *N* | *n* | *%* | *N* | *n* | *%* | *N* | *n* | *%* | *N* | *n* | *%* |
| 1 | 22.3 | 8.4 | 37.7 | 10.3 | 5.6 | 54.4 | 16.9 | 11.3 | 66.9 | 11.3 | 7.9 | 69.9 |
| 2 | 34.3 | 11.4 | 33.2 | 7.3 | 2.6 | 35.6 | 36.0 | 13.0 | 36.1 | 6.9 | 2.9 | 42.0 |
| 3 | 69.3 | 14.8 | 21.4 | 2.9 | 2.1 | 72.4 | 63.9 | 17.7 | 27.7 | 2.3 | 1.8 | 78.3 |
| 4 | 10.0 | 5.0 | 50.0 | 8.9 | 4.9 | 55.1 | 14.9 | 9.5 | 63.8 | 7.1 | 4.4 | 62.0 |
| Overall | 34.0 | 9.9 | 28.1 | 7.4 | 3.8 | 54.4 | 32.9 | 12.9 | 48.6 | 6.9 | 4.3 | 63.1 |
| 5 | 358.8 | 24.6 | 6.9 | 2.7 | . | . | 318.8 | 34.4 | 10.8 | 1.8 | . | . |
| 6 | 157.8 | 4.8 | 3.0 | 1.9 | . | . | 172.2 | 7.9 | 4.6 | 1.6 | . | . |
| Overall | 258.3 | 14.7 | 5.0 | 2.3 | . | . | 245.5 | 21.2 | 7.7 | 1.7 | . | . |

*Note*. Sites 1-4 are DSAs. Sites 5 and 6 are non-DSAs. Counts are the average of 10 pre-campaign and 10 post-campaign observations.

shown in Table 9 are the number and percent of pedestrians in the area while someone is smoking, the average number of smokers in the area, and the number and percent of smokers staying inside the primary boundary (for DSAs, only).

### 4.2.6 Results for Research Question 4

*During the study period, what are the characteristics and behaviours of smokers who are observed: at the DSAs? at the non-DSAs?*

This question was answered by exploring three questions:

- What type of tobacco products are individuals using on campus?
- How do these smokers behave?
- How do smokers and non-smokers interact with each other in the designated and undesignated smoking areas?

#### *4.2.6.1 What type of tobacco products are individuals using on campus?*

The majority of observed individuals were smoking traditional cigarettes. Smokers using e-cigarettes accounted for less than a quarter of total smokers before and after the campaign. A very small number of individuals were observed using some other type of tobacco product. The proportion of individuals using e-cigarettes in designated areas was lower than in non-designated areas. Data are summarized in Table 10.

#### *4.2.6.2 How do these smokers behave?*

**Table 10**

*Proportion of Smokers Using Cigarettes, Vapes or Another Product, by Site, Before and After the Campaign*

| Site | Pre-campaign | | | | | | | Post-campaign | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Average number of smokers at site | Proportion smoking cigarettes | | Proportion using vapes | | Proportion using other | | Average number of smokers at site | Proportion smoking cigarettes | | Proportion using vapes | | Proportion using other | |
| | *N* | *n* | *%* | *n* | *%* | *n* | *%* | *N* | *n* | *%* | *n* | *%* | *n* | *%* |
| 1 | 10.3 | 9.6 | 94.0 | 0.7 | 6.0 | 0 | 0 | 11.3 | 9.9 | 87.2 | 1.5 | 12.8 | 0 | 0 |
| 2 | 7.3 | 6.6 | 86.0 | 0.7 | 14.0 | 0 | 0 | 6.9 | 6.7 | 95.0 | 0.1 | 3.3 | 0.1 | 1.7 |
| 3 | 2.9 | 2.6 | 67.5 | 0.3 | 22.5 | 0 | 0 | 2.3 | 2.1 | 85.0 | 0.2 | 15.0 | 0 | 0 |
| 4 | 8.9 | 7.6 | 85.5 | 1.3 | 14.5 | 0 | 0 | 7.1 | 6.5 | 88.0 | 0.5 | 9.1 | 0.2 | 2.9 |
| 5 | 2.7 | 1.5 | 54.7 | 1.2 | 45.3 | 0 | 0 | 1.8 | 1.1 | 60.0 | 0.7 | 40.0 | 0 | 0 |
| 6 | 1.9 | 0.7 | 35.1 | 1.2 | 64.9 | 0 | 0 | 1.6 | 0.8 | 51.6 | 0.8 | 48.4 | 0 | 0 |
| Overall | 5.6 | 4.7 | 70.5 | 0.9 | 27.9 | 0 | 0 | 5.1 | 4.5 | 77.8 | 0.6 | 21.4 | 0.1 | 0.8 |

*Note*. Sites 1-4 are DSAs. Sites 5 and 6 are non-DSAs. Counts are the average of 10 pre-campaign and 10 post-campaign observations.

Social and physical behaviours that individuals engaged in while smoking are summarized in Tables 11a, 11b, and 12. Social behaviours individuals engaged in while smoking are summarized in Table 11a and 11b. Just smoking, socializing with other smokers, and using the phone were all relatively common social behaviours; socializing with non-smokers less so. Physical behaviour varied by site. Data are summarized in Table 12.

Finally, qualitative analysis of the observation notes revealed five major themes of about equal prominence in the data, summarized with quotes in Table 13. Themes were generated using the qualitative data collected by observers after each observation session, by site and time.

First, observers noted that the majority of non-smoking pedestrians who walked through the DSAs and non-DSAs did not tend to change their behaviour based on the presence of smokers. Whether the smoker was using a designated or non-designated area did not seem to impact their reaction. Secondly, people who were smoking did not seem to change their behaviour based on the presence of non-smoking pedestrians. Third, smokers seemed to change behaviour based on the presence of other smokers, particularly with delinquent behaviour in smoking areas and prolonged smoking time/increased # of cigarettes. Fourth, convenience and comfort of smoking areas also seemed to influence behaviour including increasing smoking time, number of cigarettes smoked, correct use of smoking areas, and use of non-designated areas. Finally, observers frequently commented that people who use e-cigarettes have vastly different smoking habit/behaviours than those who use traditional cigarettes. For example, vapers are more likely to be transient while vaping, with one observer writing, “Vapers are often times on the go and take a hit on their way to school/class.”.

**Table 11a**

*Proportion of Smokers Engaging in Social Behaviours, by Site and Overall, Pre-Campaign*

| | Pre-campaign | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Site | Total smokers | Using cell phone | | Socialising with smokers | | Socializing with non-smokers | | Just out to smoke | |
| | *N* | *n* | *%* | *n* | *%* | *n* | *%* | *n* | *%* |
| 1 | 10.3 | 2.6 | 25.2 | 3.3 | 32.0 | 0.9 | 8.7 | 4.5 | 43.7 |
| 2 | 7.3 | 1.3 | 17.8 | 4.8 | 65.8 | 0.7 | 9.6 | 1.4 | 19.2 |
| 3 | 2.9 | 0.8 | 27.6 | 0.5 | 17.2 | 0.1 | 3.4 | 1.8 | 62.1 |
| 4 | 8.9 | 2.8 | 31.5 | 2.1 | 23.6 | 1.2 | 13.5 | 4.2 | 47.2 |
| 5 | 2.7 | 0.2 | 7.4 | 0.7 | 25.9 | 0 | 0.0 | 1.9 | 70.4 |
| 6 | 1.9 | 0.1 | 5.3 | 0.4 | 21.1 | 0.4 | 21.1 | 0.7 | 36.8 |
| Overall | 5.7 | 1.3 | 19.1 | 2.0 | 30.9 | 0.6 | 9.4 | 2.4 | 46.6 |

*Note.* Values were generated using the average of 10 pre-campaign and 10 post-campaign observation.

**Table 11b**

*Proportion of Smokers Engaging in Social Behaviours, by Site and Overall, Post-Campaign*

| | Post-campaign | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Site | Total smokers | Using cell phone | | Socialising with smokers | | Socializing with non-smokers | | Just out to smoke | |
| | *N* | *n* | *%* | *n* | *%* | *n* | *%* | *n* | *%* |
| 1 | 11.3 | 3.9 | 34.5 | 4 | 35.4 | 1.2 | 10.6 | 4.7 | 41.6 |
| 2 | 6.9 | 1 | 14.5 | 5 | 72.5 | 0.5 | 7.2 | 1.3 | 18.8 |
| 3 | 2.3 | 0.7 | 30.4 | 0.5 | 21.7 | 0.1 | 4.3 | 1.5 | 65.2 |
| 4 | 7.1 | 3 | 42.3 | 2.1 | 29.6 | 0.5 | 7.0 | 3.5 | 49.3 |
| 5 | 1.8 | 0.5 | 27.8 | 1 | 55.6 | 0.3 | 16.7 | 0.6 | 33.3 |
| 6 | 1.6 | 0.3 | 18.8 | 0.4 | 25.0 | 0.2 | 12.5 | 0.8 | 50.0 |
| Overall | 5.2 | 1.6 | 28.0 | 2.2 | 40.0 | 0.5 | 9.7 | 2.1 | 43.0 |

*Note.* Values were generated using the average of 10 pre-campaign and 10 post-campaign observations

**Table 12**

*Proportion of Smokers Engaging in Physical Behaviours, by Site and Overall*

| Site | Pre-Campaign | | | | | | | Post-Campaign | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Total smokers | Standing | | Sitting | | Pacing | | Total smokers | Standing | | Sitting | | Pacing | |
| | *N* | *n* | *%* | *n* | *%* | *n* | *%* | *N* | *n* | *%* | *n* | *%* | *n* | *%* |
| **1** | 10.3 | 8.8 | 85.4 | 0.8 | 7.8 | 2.5 | 24.3 | 11.3 | 8.8 | 77.9 | 2.0 | 17.7 | 1.9 | 16.8 |
| **2** | 7.3 | 6.3 | 86.3 | 0.1 | 1.4 | 1.5 | 20.5 | 6.9 | 6.4 | 92.8 | 0.1 | 1.4 | 1.1 | 15.9 |
| **3** | 2.9 | 2.6 | 89.7 | 0.2 | 6.9 | 0.4 | 13.8 | 2.3 | 1.9 | 82.6 | 0.6 | 26.1 | 0.2 | 8.7 |
| **4** | 8.9 | 6.1 | 68.5 | 2.1 | 23.6 | 1.2 | 13.5 | 7.1 | 3.9 | 54.9 | 2.8 | 39.4 | 1.0 | 14.1 |
| **5** | 2.7 | 1.8 | 66.7 | 0.2 | 7.4 | 0.7 | 25.9 | 1.8 | 1.0 | 55.6 | 0.3 | 16.7 | 0.9 | 50.0 |
| **6** | 1.9 | 0.8 | 42.1 | 0.0 | 0.0 | 1.2 | 63.2 | 1.6 | 0.7 | 43.8 | 0.0 | 0.0 | 0.8 | 50.0 |
| **Overall** | 5.7 | 4.4 | 73.1 | 0.6 | 7.8 | 1.3 | 26.9 | 5.2 | 3.8 | 67.9 | 1.0 | 16.9 | 1.0 | 25.9 |

*Note.* Values were generated using the average of 10 pre-campaign and 10 post-campaign observations

**Table 13**

*Qualitative Themes from Observer Records for Smokers and Non-Smokers*

| Themes | Example quote(s) |
|---|---|
| Theme 1: Smokers generally do not change their behaviour based on the presence of non-smokers, regardless of smoking location | "Smokers didn't bother smoking towards the wall but smoking out in the open towards non-smokers (they knew it was a non-DSA)." |
| Theme 2: Pedestrians do not always avoid smokers, however, when they do, seem to do so regardless of whether they are in a designated area or not. | "No one reacted to the smoker, nor did they react to the smoker who was outside the DSA." |
| Theme 3: Smokers are susceptible to changing behaviour based on the presence of other smokers, particularly with delinquent behaviour in smoking areas and prolonged smoking time/increased # of cigarettes | "When smokers friends came out for a smoke the guy lit another to keep him company"<br>"Most people used the butt receptacle until one person threw it on the ground, and then 3 or 4 did the same thing." |

| Themes | Example quote(s) |
| --- | --- |
| Theme 4: Comfort of smoking areas is a major influencer of behaviour including smoking time, number of cigarettes smoked, and correct use of smoking areas and use of non-designated areas. | "Seems like there are more smokers here because there is shelter from the snow so it is ideal. Lots of receptacles and big smoking area could also be the reason for more smokers."<br>"Smokers hid from the wind in secondary area near doors but returned to DSA to dispose of cigarette." |
| Theme 5: Vapers and smokers have very different smoking patterns and behaviours | "Vaping occurs while students are rushing into the school."<br>"One individual vaping walked right past the DSA." |

# CHAPTER 5: DISCUSSION

## 5.1 Campaign Effectiveness

Heavy restrictions or bans of smoking are effective in reducing exposure to second-hand smoke for everyone on campus, and for reducing smoking rates among young adults attending these institutions (Lupton & Townsend, 2015; International Agency for Research on Cancer, 2009; Frazer et al., 2016). Using observation and a butt litter audit, this study investigated whether a comprehensive, multi-faceted social marketing campaign tailored to the specific needs of the institution and aimed at promoting the correct use of designated smoking areas on campus, impacted compliance with that institution's smoking policy. Compliance included the lighting, smoking, and extinguishing of cigarettes/vapes within the boundaries of the official Designated Smoking Areas (DSAs), correct disposal of cigarette butts, and not smoking in non-sanctioned "hot-spots" on campus.

### 5.1.1 Compliance Outcomes

The results of the observational study and butt litter audit conducted here suggest that non-compliant smoking/vaping behaviour on campus decreased after the campaign. In other words, incidence of smoking/vaping behaviours that occurred outside of the authenticated primary boundaries of the designated smoking areas, use of non-sanctioned locations for smoking, as well as noncompliant disposal of cigarette butts, decreased after the campaign.

In reference to the authenticated primary boundaries of designated smoking areas, it was determined that the overall proportion of smoking behaviours that were non-compliant decreased by approximately one-fifth when pre-campaign rates were compared to post-campaign rates. Similar findings were obtained when a more lenient delineation of DSA boundaries was used. (Like many other Ontario institutions, Brock's smoking policy restricts smoking to designated smoking areas, but does not explicitly mark the borders of these areas. In recognition of this ambiguity, observations and analyses based on a secondary, more lenient boundary were also used to assess the effectiveness of the campaign.) The omnibus measure of noncompliance using these secondary boundaries showed that the proportion of non-compliant behaviours decreased by more than one-third, from 21.5% to 13.6% of all observed behaviours.

The omnibus measure of compliance included 3 separate observational measures: where smoking behaviours were initiated; where smoking behaviours were terminated; and how cigarette butts were disposed. Based on these individual measures, the campaign appeared to influence where people extinguished their cigarettes and disposed of the butts, but not where they lit their cigarette and started smoking. After the campaign, compared to before it, more smokers extinguished their cigarettes while still inside the DSA. This is true regardless of whether the primary or secondary boundary was used to assess this behaviour. Likewise, there were fewer cases of cigarette butts being tossed on the ground after the campaign relative to before it. This latter finding is not entirely corroborated by the butt litter audit, which showed nearly equal proportions of butts were collected from the ground both before and after the campaign. There are extenuating factors that might explain the discrepancy across the two studies. One such factor may be potential disturbances in the ground litter at the sites—for

example, if the weather was very windy, or if snow was cleared from the site in advance of the pre-campaign data collection for the litter audit. Acknowledging possible discrepancies between the audit and the observational measures, the observed decreases in non-compliant extinguishing of cigarettes and littering, but not in the lighting of cigarettes, might not be surprising given that the campaign placed considerable emphasis on convincing smokers to use the butt receptacles. The littering messages would have a stronger influence on stopping, than starting smoking because, in order to use the receptacles, smokers would necessarily conclude their smoking within the DSA.

Finally, in terms of the campaign's potential effect on smokers' use of unsanctioned smoking hot spots on campus, there appeared to be a positive effect. From pre-campaign to post-campaign, the average number of smokers present at the non-designated areas on campus went from 2.7 to 1.8 smokers at one of them, and from 1.9 to 1.6 smokers at the other. At one of the unsanctioned hot spots for smoking, butt litter was virtually unchanged, but at the other, it was cut in half.

### 5.1.2 Exposure to Second-Hand Smoke

One of the primary reasons that smoke-free policies in any form are implemented is to reduce exposure to second-hand smoke. The policy at the institution studied specifically states, "The purpose of this Policy is to provide protection from environmental (second-hand) tobacco smoke by prohibiting smoking except in the established outdoor designated smoking areas". In support of this policy goal, the campaign included messages encouraging smokers to keep all smoking behaviours within (the primary boundaries of) the designated smoking area since this would limit locations where other campus citizens might be exposed to smoke. After the

campaign, the proportion of smokers spending most of their smoking time inside the primary boundary of the DSAs increased. Thus, it appears that a campaign with messages encouraging smokers to remain within the boundaries of DSAs may reduce campus citizens' exposure to second-hand smoke.

Interestingly, the number of pedestrians who passed by or through the smoking areas remained stable across pre- and post-campaign observations, there was a post-campaign increase at all sites in the proportion of smokers present when pedestrians were passing within or near the site. This contradicts the suggestion that campus citizens' second-hand smoke exposure can be reduced by having smokers remain within the boundaries of DSAs, and instead suggests that the proportion of campus citizens who are potentially being exposed to second-hand smoke may be greater after the campaign in designated areas. One possible explanation of this phenomenon comes from the observation that, after the campaign, more smokers were spending most of their actively-smoking time within the primary boundary and were in closer proximity to one another than they were before the campaign. Qualitative data from this study suggest that, when in closer proximity to other smokers, smokers were more likely to smoke more cigarettes and smoke for longer periods. This is congruent with the literature about smoking behaviour in young adults (Mendo, et al., 2021). As a result of people smoking for longer periods of time, the likelihood that a smoker is present at the same time as a pedestrian using the area for another reason (e.g. as a thoroughfare) is increased. This raises the question of whether increasing compliance with a designated smoking area policy actually reduces the likelihood that campus citizens will be exposed to second-hand smoke.

Contributing to this question are additional qualitative findings from this study suggesting that non-smokers do not necessarily change their behaviour—for example, walk further away from a DSA—based on the presence of second-hand smoke. Although the campaign included messages showing campus citizens where DSAs were, it appears it did not necessarily influence non-smokers to avoid the smoking areas. Therefore, compliant change in smokers' behaviours actually increased other citizen's risk of exposure to second-hand smoke as noted above. Overall, these findings may raise the uncomfortable possibility that implementing designated smoking area policies may not be very effective at minimizing second-hand smoke exposure if non-smokers are using the areas for other reasons.

### 5.1.3 Atypical Designated Smoking Areas

This study included observation of a designated smoking area that was somewhat atypical relative to the others. Specifically, the site was located on an ancillary campus, where most students were international, and attended classes together in a scheduling format that kept cohorts of students together for class rotation and breaks. The campaign was least successful at this site. While qualitative observations did hint at smokers moving closer to the designated smoking area after the campaign, the proportion of people who were deemed to be compliant at that site decreased. Examining breakdown of compliant versus non-compliant behaviours showed that non-compliant termination of smoking and disposal of butts at this site did decrease, however non-compliant initiation of smoking (outside DSA boundaries) almost doubled with well over half of smokers (57.5%) engaging in this non-compliant behaviour. Considering that many institutions have physical locations and/or cohorts of students whose features set them apart from the more typical campus community, it is worth discussing the unique characteristics

of this site in order to understand how policy-makers and health promoters may improve smokefree campus campaign in the future.

Locations that are not directly in proximity to the main campus may have an effect on the reach and effect of the campaign at that site. For example, when campaign events are held on the main campus, they may not be easily accessible for students with classes in ancillary buildings. Furthermore, it is possible that the campaign is not sufficiently tailored to the unique student population at secondary campus locations, resulting in poor uptake of the programming. In the current study, the campaign messaging related to disposing of cigarettes properly (e.g., "dispose of cigarette butts in the receptacles provided") may have been more straightforward than those campaign messages regarding the boundaries and rules about the designated smoking areas. If smokers using this particular site had limited exposure to the campaign materials, either because they were not on main campus, or because they did not feel like the campaign applied to them, it is likely that they would pick up, if anything, the simplest imperative. In this case, it was the correct disposal of cigarette butts. Providing materials tailored to the characteristics of unique student cohorts, and ensuring the campaign reaches non-contiguous campus locations may be necessary to ensure the campaign's efficacy with the entire student population.

Notwithstanding the discussion above, it should also be noted that the DSA at this secondary campus location was, itself, quite unique. Specifically, it was very small, set far away from buildings, and lacking in any form of shelter. Rates of non-compliance at this site were high before the campaign and remained high after it.

## 5.3 Limitations

This study has limitations that should be considered. First, with additional resourcing, studying additional sites could have improved the quality, power, and meaning of the analyses. The institution where the study was conducted has 17 DSAs, 7 of which are designated for the use of students in the on-campus residences. This study was resourced to study only 4 of the remaining 10 DSAs. By expanding the study to include all non-residential DSAs, a larger sample would be included, facilitating increased statistical power. Moreover, studying all sites may offer additional opportunity to explore nuance between sites, as well as enhance generalizability by including sites with unique characteristics, the importance of which is highlighted by the atypical finding in this study from a small, unsheltered site. Furthermore, data were only collected in one season (Winter). It may be useful to collect data at other times of the school year. For example, if the campaign was implemented in the summer, willingness to comply with policy may have improved with more favourable weather conditions.

Secondly, data collectors were undergraduate students who may have had less skill and knowledge than data collectors drawn from a graduate student or professional pool. This limitation was minimized by carefully selecting high-achieving students with research experience and performing *in vivo* spot checks to ensure that the quality of the data collected was high, and by performing reviews of the completed data collection tools after each observation session (and litter audits) to ensure completion and accuracy. Furthermore, by having three observers at each site for every observation, accountability was further ensured through accountability to one another, as well as through the determination of an average value between observers.

In addition to potential limitations of their inexperience, all of the observers were aware of the campaign, and may have had an interest in it succeeding. The observers were not known to smoke and therefore may have held implicit biases that could have led them to judge smoking behaviours more harshly—i.e., as non-compliant. Bias was mitigated by choosing strictly objective measures that left little room for subjective interpretation (e.g., presenting clearly defined boundaries in training sessions, assessing knowledge of these boundaries prior to data collection and providing tracking sheets with check box options and non-value-laden language, i.e., avoiding language like "correct" or "incorrect" use of DSAs, and instead using objective locations of use.

Thirdly, in any observational study, the potential for observer bias exists. This was addressed using a rotational approach to observer assignments, using different people, at different sites, at different times a day to minimize the effect of observer bias on the results. The results of the study indicate that observations were probably fairly objective. For example, there was not a uniform reduction in non-compliance across sites; at one designated site some measures of non-compliance actually increased. This was true for the observational study and for the butt litter audit.

Finally, environmental unpredictability due to seasonal weather (wind and snow, for example), may have affected the reliability of the butt litter audit. Due to many of the designated smoking areas being common thoroughfares for students, the clearing of snow may have been necessary to provide safe passage. Furthermore, for the sites that are not shielded from wind, cigarette butts may have blown outside of the collection areas, thereby systematically altering the data across sites. Both data collection time points were conducted in the winter season, and

during observation times, the temperature and presence of precipitation (snow) was relatively stable, however, weather, including wind, was not monitored outside of those times, and therefore could have affected the butt litter audit without impacting the observational study.

## 5.4 Strengths

This study has a number of noteworthy strengths. First, by using a mixed methods study design, the results of the two studies could be examined holistically, and results triangulated to generate a better understanding of the effect of the campaign. By collecting different types of data to answer the research questions, conclusions could be drawn based on the way those findings interacted with one another in addition to their usefulness as a single finding.

Second, in the literature, previous work has analysed the effectiveness of similar campaigns, however, the analyses did not account for site differences (Harris et al., 2009). This study is unique in that it employs the use of linear mixed-effect modelling to examine noncompliance, therefore accounting for the differences between the sites.

Finally, the methodology of this study was tailored to the context of this particular institution, informed by extensive observational groundwork in advance of the study protocol being finalized. One particular characteristic of this work, the development of a primary and secondary boundary, proved to be a very important strength of the study. The effect of the campaign on compliance with the strict primary boundary was smaller than with the more lenient secondary boundary (there was an approximate one-fifth reduction in non-compliance with the primary boundary compared to a one-third reduction in non-compliance with the secondary boundary). The secondary boundary was designed to account for smokers who may think they

are complying with policy, but because the boundaries are not clearly defined, are still non-compliant. The results suggest that the campaign may have been effective at encouraging people to comply with policy, even if policy borders were unclear. The discrepancy between the two measures in this study highlights the influence of researcher-imposed boundaries on measures of compliance to explore campaign effectiveness, particularly when borders are not visually apparent at study sites. Had the primary boundary been solely utilized, the campaign would have seemed less effective than it may have been in reality. Furthermore, having two measures of noncompliance facilitated the exploration of the nuances of campaign success relative to compliance, and had a single, strict policy border been imposed, that nuance would have been lost.

## 5.5 Future Research

While the study assessed the effectiveness of a social marketing campaign tailored to enhance greater compliance with a campus tobacco control policy, it also revealed that inclusion of activities that provide education about the boundaries of designated smoking areas – not just locations of them – may have been beneficial. Future research should explore whether the presence of a clear, visible boundary positively affects compliance. During the pre-testing and training period of this study, lines were drawn on the ground in chalk, delineating the smoking area for the data collectors. It became clear immediately, however, that the chalk outlines also affected people's smoking behaviour, with many of them taking notice of the lines and altering their behaviour. This strategy should be examined for its potential to improve policy compliance where obvious structural or physical policy borders do not exist either as a temporary part of a campaign or as a permanent fixture of the campus policy.

Based on the finding that the campaign was less effective at a campus location that was separated from the main campus and serving a unique cohort of students, future research should likely include an exploration of the needs of students who have classes in buildings that are detached from campus, or who represent atypical cohorts themselves. This would be a necessary next step toward understanding how to engage unique communities on campus with any health-related campaign.

Related to this was the serendipitous finding that vapers and smokers behaved in different ways – perhaps warranting different approaches to promoting policy compliance. Vaping is growing in popularity among youth and young adults (Hammond et al., 2020). Traditional approaches to policy education may not be as effective for people who vape considering that they likely do not perceive themselves to be smokers (Barbeau et al., 2013) or consider vapour to be offensive or dangerous to others. Future research might attend specifically to how campaign messages impact vapers, and whether messages need to be tailored specifically to them. A qualitative phenomenological/ethnographical analysis of vapers' perception of smoking policy and how it relates to them, or a specific exploration of vapers' adherence to policy could also shed light on how campaigns can be used to enhance vapers' compliance with campus policies.

Despite being a clear objective of the smoking policy, second-hand smoke exposure did not necessarily decrease after the study despite increased compliance due to the unexpected finding that pedestrians were more likely to be using areas in proximity to, or within, designated smoking areas at the same time as a smoker after the campaign. In relation to the qualitative finding that smokers smoke more and for longer when in the presence of other smokers, further exploration of changes in smoking behaviour when policy pushes smokers together in a

designated area is needed. Furthermore, investigation into how this may affect cessation outcomes is especially important in this population, as quitting before the age of 30 can reduce a smoker's lifetime risk of disease to that of a never-smoker (Dol et al., 2004).

Finally, additional longitudinal research is needed to understand whether the change in compliance that was achieved after the campaign was sustained in the weeks and months after the campaign.

## 5.6 Implications

The results of this study have a number of important implications for future campaigns as well as for policy at Brock and beyond. Despite being specifically tailored to the Brock University context, this study has generalizability to the Ontario post-secondary context. Many campuses in Ontario have smoking policies that mirror the policy in place at Brock during the campaign, therefore this study may provide important learnings for them as well.

The campaign being examined in this study had limited funding. Funding came primarily from Leave the Pack Behind and Brock University, and there was a significant time investment from staff and faculty at Brock to plan and implement the campaign. A longer campaign period, or increasing the quantity of printed materials may have improved the effectiveness of the campaign on policy compliance. Even with a significant investment of funding or resources, it is unclear whether an educational campaign alone is sufficient to achieve a larger increase in policy compliance, as demonstrated by Wynne and colleagues, (2019).

In a similar study at an American post-secondary institution, compliance with smoking policy improved from 33% to 54% after a campaign. In that study, in addition to using similar tactics to the campaign for this study, the authors delineated boundaries of smoking areas by marking the ground with paint (Harris et al., 2009). The authors propose that this was a significant factor in the success of their campaign. This should be taken under consideration when planning campaigns such as the one examined here. Clearly defining borders as part of a campaign may lead to an increase in campaign efficacy due to the increased visibility of policy-non-compliance and a reduction in ambiguity for smokers who wish to comply.

Furthermore, a strong focus on tailoring for sub-populations is likely well worth the investment. If available, based on the findings of this study, additional resourcing to support targeted interventions and translation services for international students, for example, may be required to achieve a more desirable outcome.

Additionally, this study also highlighted the need for specific tailoring of campaigns to people who use e-cigarettes. The discrepancy in behaviour between traditional cigarette users and e-cigarette users (vapers) was unexpected. The campaign included universal messaging about using smoking areas and butt receptacles. It did not specifically target vapers, but included them in the category “smokers”, as is written in the Brock smoking policy. In the study, vapers represented a large proportion of all smokers in non-DSAs, and a small proportion of all smokers in DSAs. While this has not been thoroughly explored in the literature and was not a focus of this study, it does potentially represent an interesting phenomenon. This discrepancy could indicate that the existing smoking policy does not clearly apply to vapers, that vapers do not identify as smokers, or that vapers may have different social norms/motivations to comply, or not comply,

with policy. This was exemplified by the specific behaviours of people who were vaping as noted in the qualitative data. One observer in a non-DSA wrote, “Vapers did not stay under stairs, they were more out in the open, but cigarette smokers stayed under the stairs.”

Furthermore, the qualitative data suggests that e-cigarette users likely have different behavioural tendencies/preferences than smokers. For example, one observer wrote, “Vaping occurred while students are rushing into the school.” This qualitative observation may partially explain why e-cigarette users were much more prevalent at the observed non-DSAs, as comfort (e.g., seating and overhead cover) may be less important to them than it is for people who use traditional cigarettes because they are on the move.

In future, campaign leaders should consider creating specifically tailored content for people who vape on campus, and consider including them as a distinct group when designing key messages and defining outcomes. Indeed, it may be that an entirely separate campaign would be better suited to addressing non-compliant vaping on campus.

While compliance is the goal of many of these campaigns, this study highlighted the possibility that increasing compliance may not reduce campus citizens’ exposure to second-hand smoke due to smokers potentially smoking more and for longer due to being in closer proximity to other smokers. In response to this finding, campaigns may choose to include more education to the general campus community about the harms of second-hand smoke and encourage them to avoid the areas on campus which are designated for smoking.

For policymakers, there are a number of findings of interest. Firstly, that comfort is seemingly important and may influence people’s willingness to comply with policy holds

interesting implications. By adding overhead cover, seating, and/or more convenient litter receptacles, policy-makers and administrators may be able to further improve baseline compliance with smoking policy. As discussed above, however, it is possible that improving compliance may not equate to achieving the intended outcome of the policy, which is to reduce the risk of campus citizens being exposed to second-hand smoke, because smokers are smoking more, for longer, when in close proximity to other smokers. Furthermore, that observation that smokers are smoking more and for longer after the campaign could be an indication that smokers may be less likely to quit smoking because there are frequent social prompts and increased use which can lead to increased nicotine dependence (Zhao, et al., 2009). This is an especially important consideration for post-secondary campuses, as quitting before the age of 30 leads to better health outcomes (Dol et al., 2004).

## 5.7 Conclusion

Understanding the effectiveness of a peer-led campaign aimed at increasing compliance is important because the effectiveness of tobacco control policies at reducing tobacco use and second-hand smoke exposure is contingent upon compliance with that policy. Education and generating awareness of policy have been shown to be effective in some cases (Wynne et al., 2018), and this seems to be the preferred choice of most postsecondary institutions in place of more formal enforcement strategies. This study is unique in that it specifically explores the effect of a peer-led social marketing campaign on a post-secondary campus on both observed policy compliance and the presence of smoking-related ground litter. The results of this study have important implications on the use of these types of campaigns in post-secondary environments, as well as potential implications on smoking policy development for these institutions.

Despite the success of the campaign in reducing non-compliance with the smoking policy, it is unclear whether a campaign is enough to drastically improve policy compliance. It is also important to note that, while increasing policy compliance was expected to reduce potential exposure to second-hand smoke for campus citizens, the inverse may be true.

Campaigns to improve policy compliance should consider: adding ground markings to delineate designated areas; tailoring resources to harder-to-reach populations; and adding messaging around the potential harms of second-hand smoke to encourage campus citizens to avoid designated smoking areas except for smoking.

Policy makers, on the other hand, must decide to apply interim solutions, like adding seating and wind shelter or increasing formal enforcement, or change the policy to better reflect the evidence in order to protect campus citizens from the harms of second-hand smoke and promote reduction and cessation behaviours.

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# APPENDICES

## Appendix A: Brock University's Smoking and Vaping Policy

Brock University

### SMOKING AND VAPING POLICY

**PURPOSE**

The purpose of this Policy is to

a) provide protection from environmental (second-hand) smoke and vapour by prohibiting smoking and vaping of tobacco, nicotine or related products except in the established outdoor designated smoking areas and prohibiting all smoking and vaping of recreational cannabis;

b) foster health and wellness by restricting the consumption, promotion, advertising and sale of smoking and vaping related products;

c) recognize the permitted burning of traditional medicines during Traditional Aboriginal Ceremonies; and

d) communicate restrictions on smoking, vaping, and tobacco, nicotine and cannabis.

**SCOPE**

This Policy applies to Brock University employees, students, and visitors, ("Campus Community Members"), on all Brock owned, leased or licensed property. The University shall require all student organizations, tenants, licensees, contractors and other users of University space to comply with this Policy. All events, including conferences hosted on property owned, leased, or licensed by Brock University located on or off campus are subject to this Policy.

This policy will be interpreted in accordance with the Ontario Human Rights Code, as amended from time to time. Community members may seek accommodation under the applicable University policy or process.

**POLICY STATEMENT**

Brock University is committed to providing a healthy campus environment by limiting exposure to second-hand smoke and vapour and restricting the consumption, promotion, advertising and sale of related products.



The University will support reduction and cessation of smoking and vaping through education and information regarding the resources available to faculty, staff and students, as applicable.

**Burning of Traditional Medicines by Indigenous Persons**

Brock University acknowledges and understands that some Traditional Aboriginal Ceremonies involve the use of traditional medicines including tobacco, cedar, sage, and sweet grass. Once the traditional medicines have been ignited to burn, the act of the ceremony falls under applicable legislation. Health, Safety and Wellness requires notification prior to the burning of the medicines to be able to respond and put safety measures and accommodations into place.

**Restrictions**

Smoking and vaping of tobacco, nicotine or related products at Brock University and in University owned vehicles is prohibited except in outdoor designated smoking areas (DSAs) which are specifically identified by signage. DSAs are selected by Health, Safety & Wellness in consultation with the University's Joint Health and Safety Committees (JHSC) and approved by the Vice-President Administration. DSA locations must comply with all applicable legislative restrictions and will be reviewed at least every two years.

The University will put in place outdoor smoke and vapour-free corridors where it deems practicable.

Smoking and vaping recreational cannabis is prohibited on campus, including in vehicles and any DSAs.

**Promotion, Advertising and Sale of Products**

The promotion, advertising, and sale of tobacco, cannabis, electronic smoking or vapour products and/or related paraphernalia is prohibited in any buildings owned, leased or licensed by Brock University.

Brock University will not enter into contractual agreements with tobacco, cannabis, electronic smoking, vapour products and/or related paraphernalia companies or companies that promote tobacco, cannabis, electronic smoking, vapour products and/or related paraphernalia. Academic research is exempt from this prohibition.

Corporate tobacco, cannabis, electronic smoking, vapour products and/or related paraphernalia sponsorship of events or groups in buildings owned, leased or licensed by Brock University is not permitted.

**Responsibilities**

Campus Community Members are responsible for complying with this policy and are encouraged to politely communicate this policy to those observed not complying with the policy. Any unresolved compliance may be reported to Campus Security Services.

Campus Security Services will report non-compliance complaints to:

- Health Safety and Wellness for employees;
- Student Services for students;
- Residence Services for residence students; or
- Appropriate Project Manager for contractors

for appropriate follow up.

Supervisors will ensure their employees are aware of the policy and address as appropriate any non-compliance of the policy within their respective area, which is brought to their attention.

## DEFINITIONS

**Smoking** is defined as inhaling, exhaling, burning, or holding lighted tobacco or cannabis or using an electronic cigarette or other apparatus used to smoke or heat tobacco, nicotine or cannabis products.

**Vaping** is defined as the use of any electronic device which creates an aerosol or vapour, in any manner or in any form.

**Cannabis,** for the purposes of this policy, shall refer specifically to dried weed and/or any other form of cannabis product which may be smoked or vaped.

## COMPLIANCE AND REPORTING

Brock University has a community-based security environment, which makes it the responsibility of everyone associated with the University to uphold and communicate this Policy.



The responsibility for implementing and interpreting this Policy rests with Human Resources and Vice-President Administration.

Procedures for addressing violations are outlined in the Designated Smoking Area Locations & Non-Compliance Procedures document.

| | |
|---|---|
| Policy owner: | Vice-President, Administration |
| Authorized by: | Board of Trustees, Human Resources Committee |
| Accepted by: | Senior Administrative Council |
| Effective date: | November 2018 |
| Next review: | November 2020 |
| Revision history: | June 2005 (*Tobacco and Smoking Policy*)<br>Revised December 2015 (*Tobacco and Smoking Policy*)<br>Revised October 2018 by Executive Committee (*Smoking and Vaping Policy)* |
| Related documents: | Cannabis Control Act 2017<br>Smoke Free Ontario Act 2017<br>Student Code of Conduct<br>Residence Community Standard<br>Designated Smoking Area Locations & Non-Compliance Procedures<br>Smudging Ceremonies on Campus Bulletin<br>Employment Accommodation Policy<br>Accessibility Policy |

# Appendix B: Brock University's Designated Smoking Area Policy

Brock University

## Designated Smoking Area Locations & Non-Compliance Procedures

The Smoking and Vaping Policy, which is located on the University Secretariat webpage under University Policies prohibits smoking and vaping at Brock University and in University owned vehicles with the exception of outdoor **Designated Smoking Areas (DSA)**.

The policy also prohibits the smoking and vaping of recreational cannabis on campus, including in vehicles and any DSAs.


### What is a Designated Smoking Area?

These are areas where smoking is permitted that were selected to adhere to the Policy and are located 5 meters away from building entranceways and operable windows, and 9 meters away from air intake vents, loading docks and flammable or combustible materials. The DSAs and their locations are reviewed at least every two years.

Signage indicating the location of these DSAs is installed around the campus.

### Current DSAs

DSAs are located at the 1812 Sir Isaac Brock Way Campus, the Marilyn I. Walker School of Fine and Performing Arts (MWS) and at Rodman Hall. The Hamilton Campus does not have a DSA, however smoking is permitted off the property on the city sidewalks.

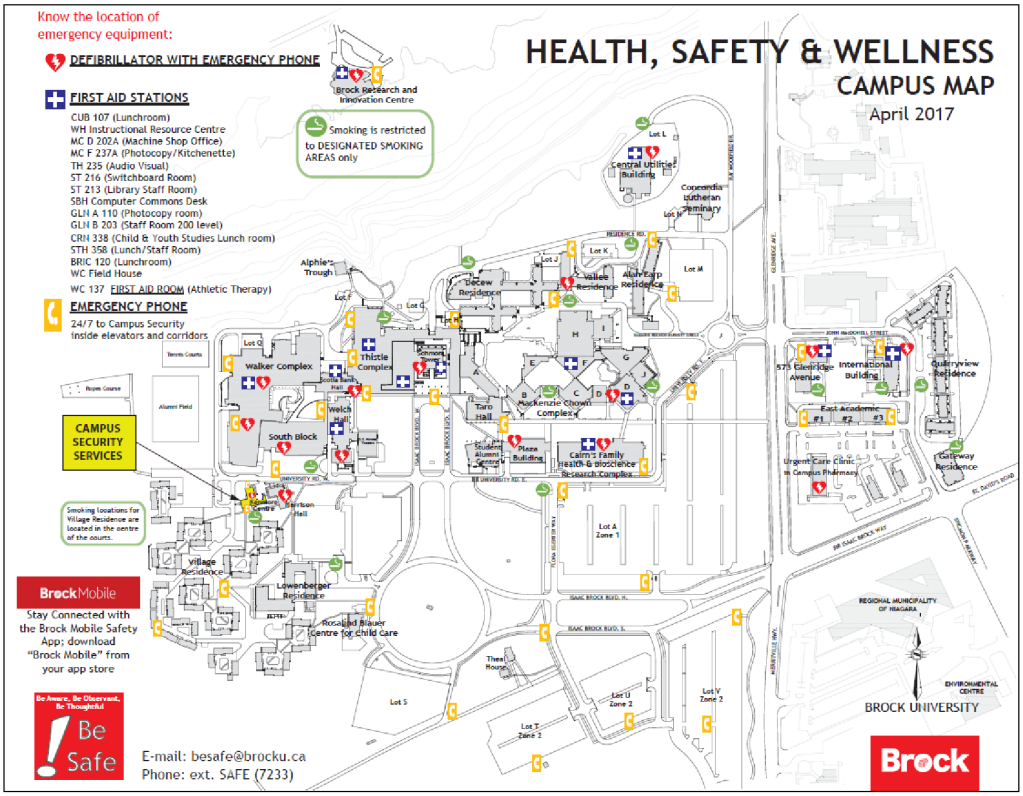
The DSA locations are listed below:

- Village Residence – centre of the courts
- Lowenberger Residence – Northeast exit beside Lot B
- Kenmore Centre – outside South entrance
- South Block – Southeast corner
- Thistle Complex – Northeast corner
- Plaza Building – across University Rd. at the North end of Flora Egerter Way
- Mackenzie Chown – between B and C blocks, and outside J block South entrance
- Decew Residence – North side of building across Residence Road
- Vallee Residence – South of building, in the gazebo
- Alan Earp Residence – North entrance across road, by the garden near Lot K
- Central Utilities Building – North side of the Central Utilities Building, beside Ray Woodfield Dr.
- 573 Glenridge Avenue – outside East entrance, Southeast corner of building
- International Building – outside Southwest entrance, beside walkway
- Quarryview Residence – across the sidewalks surrounding the buildings
- Gateway Residence – Northeast corner
- MWS – Northeast side of the building
- Rodman Hall – East of front entrance

A map of these locations can be found below:

Brock University

Designated Smoking Area Locations &
Non-Compliance Procedures



# Appendix C: Smoking Area Maps

## Designated Areas

Note: Areas shaded green represent the “designated” primary area. Areas shaded orange represent the surrounding secondary area. Red markings indicate permanent butt litter receptacles.

*Mackenzie Chown B and C Block Designated Area (Site 1)*

Summary of site characteristics:

This site had multiple receptacles located within the primary boundary as well as plentiful permanent seating and overhead cover. Pedestrian traffic tended to flow directly through and adjacent to the site as students travelled between buildings.

*International building Designated Area (Site 2)*

Summary of site characteristics:

This site had one receptacle which was located within the primary boundary. There was limited seating (a small bench) and no shelter from the elements. Pedestrian traffic flowed directly beside the site as the primary path for ingress and egress from the building. A high volume of smokers at this site often forced smokers to stand in the walk way.

*Thistle/Market Designated Area (Site 3)*

Summary of site characteristics:

This site was accessible from a large, multi-use cafeteria/study hall. It had multiple receptacles located within the primary boundary, however there were also 2 receptacles that were located outside of the primary area (not marked). There was plentiful permanent seating and overhead cover, however there were also picnic tables and benches outside of the boundary of the primary area.

*Mackenzie Chown J-block Designated Area (Site 4)*

Summary of site characteristics:

This site had multiple receptacles located within the primary boundary, as well as permanent seating and overhead cover. Pedestrian traffic tended to flow from the parking lot into the school, passing through the secondary area.

**Unsanctioned Areas**

Note: Areas shaded orange indicate the primary area which represents the location from which data were collected.

*Thistle Tim Hortons Unsanctioned Area (Site 5)*

Summary of site characteristics:

This undesignated site had no official seating but did have a retaining wall that many campus citizens sat/leaned on. There is overhead cover underneath the stairs. This is a high-volume location for pedestrian traffic as students travel between buildings.

*Cairns loading bay Unsanctioned Area (Site 6)*

Summary of site characteristics:

This undesignated site had no permanent seating nor overhead cover of any kind. This location is a high-traffic pedestrian area where students walk from the student lots into the school.

**Appendix D: Observational Data Collection Tool: Smokers**

## Observational Data Collection Tool – Smoking

| | | | |
|---|---|---|---|
| Name: | | | |
| Location: | *i.e. International Building* | ☐ DSA | ☐Non-DSA |
| Date: | | | |
| Time Start: | | | |
| Time End: | | | |

| Time In/Out | Type of tobacco/nicotine product | Smoking/vaping initiated: | Smoking/vaping ceased: | Disposed of cigarette butt… | Most *smoking* time was spent… | Social Behaviour (select all that apply) | Physical Behaviour *(select all that apply)* |
|---|---|---|---|---|---|---|---|
| in _____<br>out _____ | ☐ Cigarette<br>☐ E-cigarette<br>☐ Other: _____ | ☐ Outside of primary and secondary area<br>☐ Inside secondary area but outside primary area<br>☐ Inside primary area | ☐ Outside of primary and secondary area<br>☐ Inside secondary area but outside primary area<br>☐ Inside primary area | ☐ In the provided receptacle (DSA only)<br>☐ On the ground<br>☐ Other: _____ | ☐ Inside the primary area<br>☐ Outside of the primary area | ☐ Talking on/using phone<br>☐ Socializing with other smokers<br>☐ Socializing with non-smokers<br>☐ Just out to smoke | ☐ Standing<br>☐ Sitting<br>☐ Pacing |
| in _____<br>out _____ | ☐ Cigarette<br>☐ E-cigarette<br>☐ Other: _____ | ☐ Outside of primary and secondary area<br>☐ Inside secondary area but outside primary area<br>☐ Inside primary area | ☐ Outside of primary and secondary area<br>☐ Inside secondary area but outside primary area<br>☐ Inside primary area | ☐ In the provided receptacle (DSA only)<br>☐ On the ground<br>☐ Other: _____ | ☐ Inside the primary area<br>☐ Outside of the primary area | ☐ Talking on/using phone<br>☐ Socializing with other smokers<br>☐ Socializing with non-smokers<br>☐ Just out to smoke | ☐ Standing<br>☐ Sitting<br>☐ Pacing |

# Observational Data Collection Tool – Smoking

| | | | |
|---|---|---|---|
| Name: | | | |
| Location: | *i.e. International Building* | ☐ DSA | ☐ Non-DSA |
| Date: | | | |
| Time Start: | | ☐ Morning | ☐ Afternoon |
| Time End: | | | |

Please comment on your observations today:

| |
|---|
| |
| |
| |
| |
| |
| |
| |
| |

Questions to guide your comments:

"How did non-compliant smokers behave as compared to compliant smokers? Comment on their general awareness of the policy for non-compliant smokers"

"How did smokers accommodate or acknowledge non-smokers in the area?"

"How did the non-smokers seem to react to the smokers?"

"Was there anything unusual about your observations today? Explain."

"How did you feel about smokers' behaviour during this observation? How about non-smokers?"

## Appendix E: Observational Data Collection Tool: Non-Smokers

Observational Data Collection Tool – Non-Smoking

| | | | |
|---|---|---|---|
| Name: | | | |
| Location: | *i.e. International Building* | ☐ DSA | ☐Non-DSA |
| Date: | | | |
| Time Start: | | | |
| Time End: | | | |

| Time | Pedestrian, No Smokers Present | Pedestrian, Smokers Present | Bystander, accompanying smoker(s) |
|---|---|---|---|
| 0-5 minutes | | | |
| 5-10 minutes | | | |
| 10-15 minutes | | | |
| 15-20 minutes | | | |
| 20-25 minutes | | | |
| 25-30 minutes | | | |

# Observational Data Collection Tool – Non-Smoking

| | | | |
|---|---|---|---|
| Name: | | | |
| Location: | *i.e. International Building* | ☐ DSA | ☐ Non-DSA |
| Date: | | | |
| Time Start: | | ☐ Morning | ☐ Afternoon |
| Time End: | | | |

Please comment on your observations today:

| |
|---|
| |
| |
| |
| |
| |
| |
| |
| |

Questions to guide your comments:

"How did non-smokers react to smokers? Comment on their general awareness of people smoking where they shouldn't be"

"How did non-smokers acknowledge or accommodate smokers Did smokers seem to be considerate of non-smoker pedestrians?"

"Was there anything unusual about your observations today? Explain."

"How did you feel about smokers' behaviour during this observation? How about non-smokers? Did anything surprise you?"

# Appendix F: Volunteer Invoice

## INVOICE

Date: 02-12-2019
Invoice #: 2019-001
Re: RESEARCH

**Name:**
**Address**
**City:**
**Postal Code:**
**Phone:**
**SIN#:**

**Bill To:**
Leave the Pack Behind | Brock University
Attn.: Haley Turnbull
1812 Sir Isaac Brock Way
St. Catharines, ON L2S 3A1

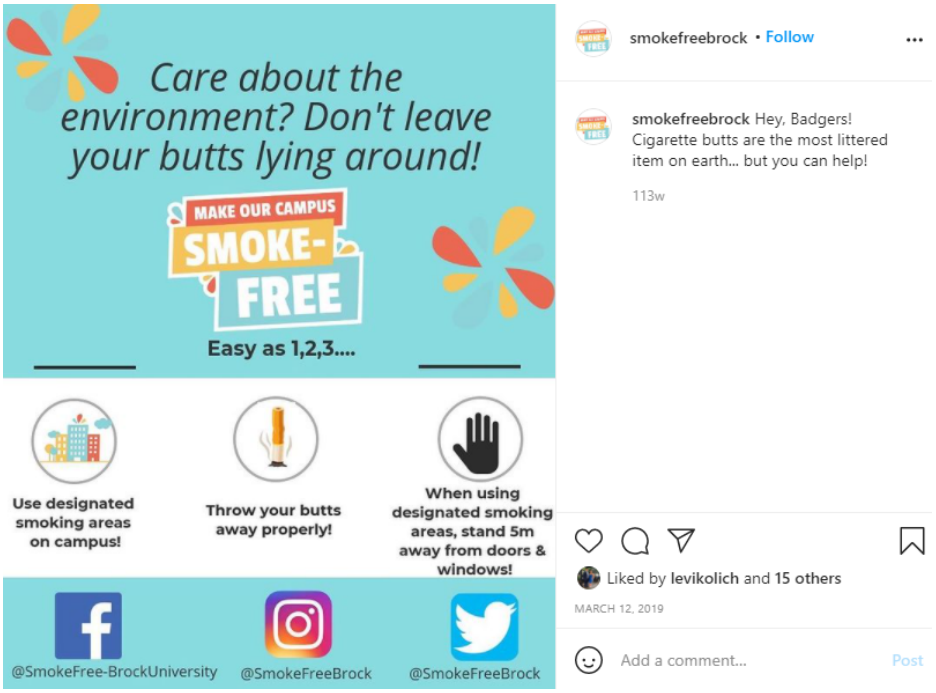
| DESCRIPTION | AMOUNT |
|---|---|
| Date: February-March 2019<br><br>To support a Master's thesis student, volunteers commit to attending a 1.5 hour training and completing 10 hours of observation for the week of February 25 - March 1, and 10 hours during the week of March 25 – 29. | 300.00 |
| **Total** | 300.00 |

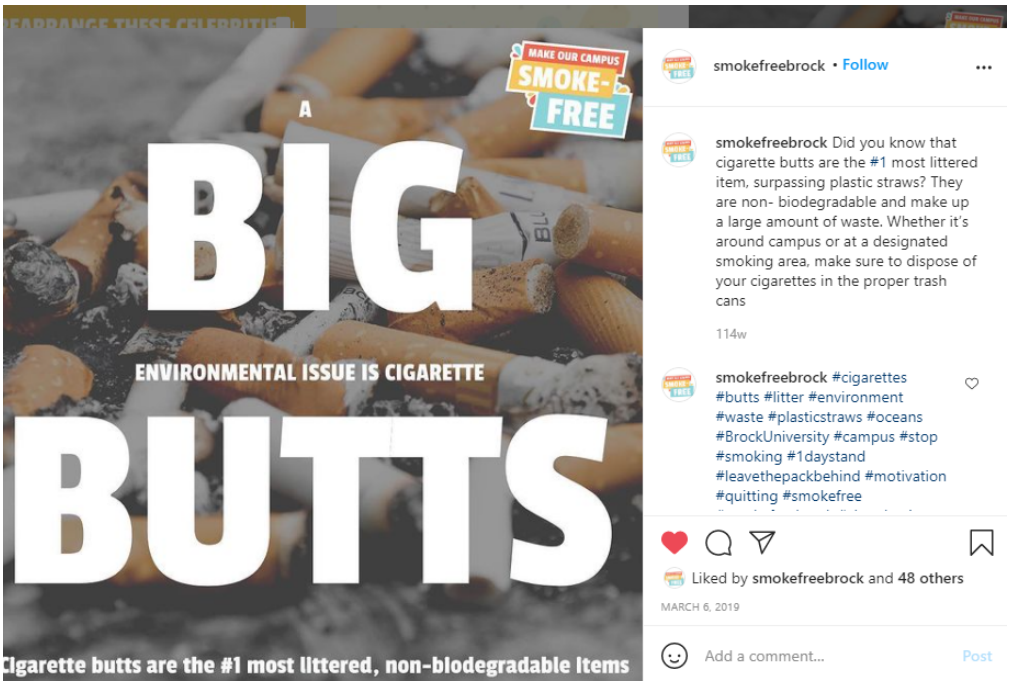
# Appendix G: Butt Litter Audit Form

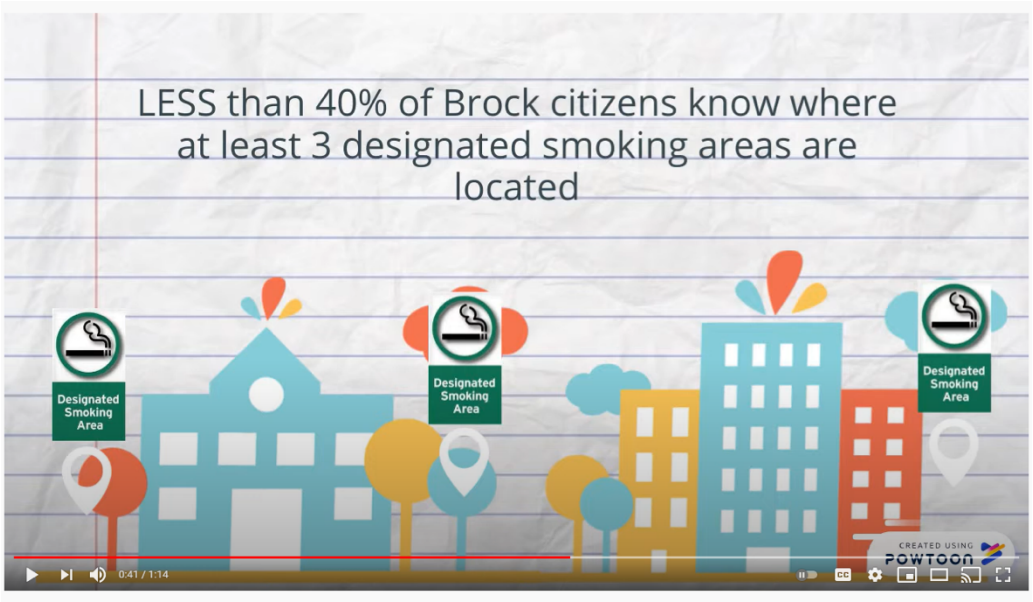
## Butt Litter Audit Form

| | | |
|---|---|---|
| Name: | | |
| Location: *i.e. International Building* | ☐ DSA | ☐Non-DSA |
| Date: | | |
| Time Start: | | |
| Time End: | | |
| Weather: | Precipitation (Check all that apply): | ☐ Active snowfall<br>☐ Rain<br>☐ Snow on ground<br>☐ No precipitation |
| | Wind: | ☐ Very windy<br>☐ Slightly windy<br>☐ Not windy |
| | Temperature: °C | ☐ Sunny<br>☐ Overcast/Cloudy |
| Butts collected from (check when complete): | ☐ Primary Area | ☐ (DSA Only) Receptacle<br>☐ (DSA Only) Secondary Area |
| Were people smoking in the area when you arrived? | ☐ No | ☐ Yes → How many? _____ |
| Total butts collected in Primary Area: | | |
| Total butts collected in Secondary Area: | | |
| Total butts collected from Receptacle: | | |
| Total butts collected: | | |

# Appendix H: Campaign Resources



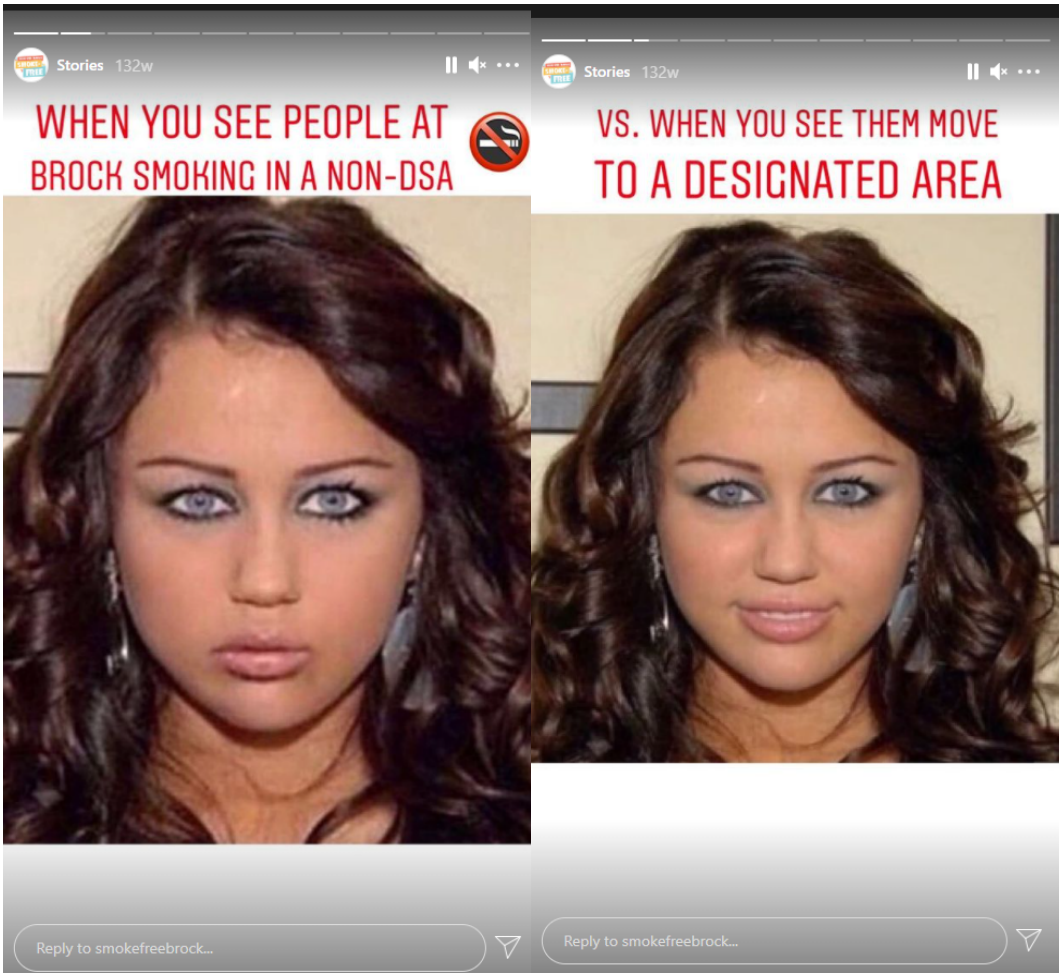




LESS than 40% of Brock citizens know where at least 3 designated smoking areas are located
Designated Smoking Area
Designated Smoking Area
Designated Smoking Area
0:41 / 1:14
CREATED USING
POWTOON


Smoke Free Campus - Brock University
15 March 2019 ·
Not ready to quit ❓ That's okay ❗ You can still help Brock by smoking in a designated smoking area ‼️
Visit the Link for more information and where to find the designated smoking areas on campus:
https://brocku.ca/.../sites/57/Designated-Smoking-Areas.pdf
MAKE OUR CAMPUS
SMOKE-
FREE
ALL of Brock's Designated Smoking Areas have ashtrays.
Thank you for using them!


Care about the environment? Don't leave your butts lying around!
MAKE OUR CAMPUS
SMOKE-
FREE
Easy as 1,2,3....
Use designated smoking areas on campus!
Throw your butts away properly!
When using designated smoking areas, stand 5m away from doors & windows!
@SmokeFree-BrockUniversity
@SmokeFreeBrock
@SmokeFreeBrock


Are you smoking in a DSA?
What is a DSA? DSA is a "Designated Smoking Area"
Smoking is prohibited inside buildings, vehicles and in most public areas of Brock University.
The only locations where smoking is permitted on campus is in the Designated Smoking Areas (DSA).
To review a copy of Brock University's Tobacco and Smoking Policy, please visit:
http://brocku.ca/university-secretariat/policies/human-resources on the University Secretariat webpage
#1DayStand
Smoking is restricted to DESIGNATED SMOKING AREAS only
Smoking locations for Village Residence are located in the centre of the courts.
MAKE OUR CAMPUS SMOKE-FREE
BROCK UNIVERSITY
Brock


Stories 132w
WHEN YOU SEE PEOPLE AT
BROCK SMOKING IN A NON-DSA
Reply to smokefreebrock...
Stories 132w
VS. WHEN YOU SEE THEM MOVE
TO A DESIGNATED AREA
Reply to smokefreebrock...