



rijksuniversiteit  
 groningen

campus fryslân

# *Investigating the most effective interventions to promote non-smoking behavior at universities*

Master Thesis | MSc Sustainable Entrepreneurship

University of Groningen | Campus Fryslân

June 12th, 2024 | Vienna, Austria

Romy Handana | S5494494

E-mail: r.l.handana@student.rug.nl

Supervisor: Dr. Berfu Ünal | University of Groningen

Co-Assesor: Sven Kilian | University of Groningen

## **Abstract**

This thesis delves into the realm of promoting non-smoking behavior within university environments, with a particular focus on the University of Groningen. By investigating six interventions and their effectiveness on students and staff, valuable insights are gained to identify best practices for implementation. Drawing on the focus theory of normative conduct, the research offers practical recommendations for university practitioners, policymakers, and educators to foster a culture of non-smoking behavior. By extending the findings to broader contexts, this study contributes to the collective effort to discourage smoking and promote healthier behaviors across diverse settings.

## Table of contents

Introduction.....	1
Theory .....	3
<i>Focus theory of normative conduct</i> .....	3
<i>Injunctive norms</i> .....	3
<i>Descriptive norms</i> .....	4
<i>(Mis)alignment of injunctive and descriptive norms</i> .....	4
<i>Anti-smoking interventions and norms</i> .....	5
<i>Guilt</i> .....	8
<i>Fear of punishment</i> .....	8
Methodology .....	10
<i>Case description</i> .....	10
<i>Procedure</i> .....	10
<i>Participants</i> .....	11
<i>Materials</i> .....	12
<i>Data analysis</i> .....	15
Results.....	16
<i>Smoking behavior on the RUG campuses</i> .....	16
<i>The perceived effectiveness of anti-smoking interventions on smoking behavior</i> .....	18
<i>The influence of perceived guilt induced by anti-smoking interventions on smoking behavior</i> .....	20
<i>The influence of perceived fear of punishment induced by anti-smoking interventions on smoking behavior</i> .....	23
<i>The perceived effectiveness of anti-smoking interventions in a clean environment and non-clean environment on smoking behavior</i> .....	26
<i>The perceived effectiveness of descriptive and injunctive smoking behavior</i> .....	29
Discussion.....	30
<i>Conclusion and discussion</i> .....	30
<i>Practical recommendations</i> .....	32
<i>Limitations and future research</i> .....	32
References.....	34
Appendix A: Clean versus non-clean environment .....	39

## Introduction

The world faces numerous environmental and social challenges, with tobacco emerging as a significant issue among these concerns (Marinello et al., 2020). Products containing tobacco are the reason for more than seven million deaths per year, which is one in ten deaths globally caused by smoking (World Health Organization, 2017). Moreover, tobacco products are the most littered item on the planet. Although the cultivation, harvesting and processing of tobacco are limited to specific areas of the world, the consumption and post-consumer waste are a problem that affects the entire planet (Mohajerani et al., 2020).

The Tobacco Atlas (2023) indicates that there are more than one billion smokers in the world, and that about 76% of every smoked cigarette is discarded on the ground. This is waste that can be found anywhere, which is often difficult to collect and even more complex to treat properly. Roughly six trillion cigarette butts pollute our oceans, rivers, city sidewalks, parks, soil and beaches every year, and this is expected to increase to nine trillion by 2025 due to further growth in the market (World Health Organization, 2022). The big problem associated with this waste, in addition to its lack of control, as it is freely dispersed in the environment, is that it is not biodegradable and that it contains and releases over 7000 toxic chemicals in the environment. Therefore, cigarette butts pose a critical problem in terms of toxic waste for the urban and aquatic life (Mohajerani et al., 2020).

Because of the critical health and environmental impact of smoking, several interventions have been introduced to reduce smoking amongst populations (Maas, 2021). These measures include the monitoring of tobacco use, the formulation of policies aimed at decreasing tobacco consumption, providing assistance for smoking cessation, and issuing warnings about associated risks (World Health Organization, 2017). Prominent interventions include smoke-free policies in public and private indoor and outdoor spaces. Some of those interventions especially focus on young people, by banning smoking in and around educational institutions. According to the World Health Organization, it has become a growing trend to abolish smoking at universities in the recent years among nations worldwide (World Health Organization, 2023).

Smoking among university students is a significant public health concern worldwide, transcending national boundaries, academic institutions, and fields of study (El Ansari & Stock, 2012). Research has shown that implementing a campus-wide smoking ban yields several benefits for college students, including a cleaner campus environment, protection for non-smokers, and opportunities for smokers to reduce their cigarette consumption (Leão et al., 2020). The introduction of smoke-free policies in

spaces used for educational purposes set the standard that smoking is not normal, and that children and young people should not smoke (Tsampi, 2020). This is especially prominent since young people are undergoing important development transitions, which may make them particularly vulnerable to sociocultural influences that shape health behavior (Lee et al., 2011).

In the Netherlands, outdoor areas of educational institutions are expected to be smoke-free since August 2020 (Boderie et al., 2021). According to the regulations set by the Dutch government, these educational institutions, including universities, are required to explicitly communicate and enforce a smoking ban on their premises. Additionally, they are obligated to oversee and ensure compliance with the smoking ban (NVWA, 2020). Although it may not be feasible to deploy anti-smoking monitors continuously, it is important to undertake sufficient measures such as signage, signaling, dissemination of information, and policy enforcement (Tsayem & Cavagnaro, 2013). However, universities and institutions of higher education frequently encounter challenges in effectively implementing campus-wide non-smoking policies (Hoger Onderwijs Persbureau, 2024).

While smoke-free policies are recognized as one of the most effective ways to eliminate exposure to secondhand smoke and reduce smoke rates, implementation does not automatically result in a smoke-free environment (Jancey et al., 2014). There has been little consideration on what interventions are effective in promoting non-smoking behavior (Fennell, 2012), especially in the domain of universities. Therefore, the research question of this study is: *Which interventions are most effective in promoting non-smoking behavior among students and staff of universities?*

## **Theory**

This section examines why smoke-free policies may not always achieve smoke-free environments. It utilizes the focus theory of normative conduct (Cialdini et al., 1991) to explore how social norms influence smoking behavior despite anti-smoking interventions. This section discusses the roles of injunctive and descriptive norms, their alignment or misalignment, and how these factors influence perceptions of guilt and fear of punishment in shaping smoking behavior.

### **Focus theory of normative conduct**

While anti-smoking interventions can be effective if adhered to, they are not consistently complied with (Jancey et al., 2014). Non-compliance with smoking bans can be explained by the focus theory of normative conduct (FTNC; Cialdini et al., 1991), where social norms play a central role. Social norms are defined as the rules of acceptable behavior within a group that establish the boundaries of permissible actions, promoting or discouraging the adoption of certain behaviors (Echeverria et al., 2015). In other words, social norms can be viewed in terms of social pressure and approval of others who are important to the individual (Ajzen, 2005). Social norms are crucial in shaping how individuals interpret and act in their social worlds (Smith et al., 2012). Identifying the specific ways in which social norms influence human behaviors is complex because various types of normative influences are hypothesized to exist, and norms can impact individuals at multiple organizational levels (e.g., as a group-level vs. individual-level phenomenon) (Phua, 2012). Nevertheless, two types of social norms dominate the psychological and public health literature: descriptive and injunctive norms (Cialdini et al., 1991; Fishbein & Ajzen, 2011). Injunctive and descriptive norms represent separate sources of motivation and have separate influences on behavior (Smith et al., 2012). When looking at smoking behavior, numerous studies highlight the substantial influence of descriptive and injunctive norms on smoking cessation (Byron et al., 2016).

### **Injunctive norms**

Injunctive norms reflect perceptions of what others approve or disapprove of and motivate action because of the social rewards and punishments associated with engaging, or not engaging, in the behavior (Smith et al., 2012). In short, injunctive norms are the behaviors (perceived as) commonly (dis)approved of. Injunctive norms lead an individual to internalize the beliefs or expectations of significant others, which in turn influences the individual's existing cognitions and modifies their behavioral intention (Li et al., 2018). They constitute the moral rules of the group (Cialdini et al., 1991). Not littering, speeding, and embezzling money are all injunctive norms in our society (Lindenberg et al., 2021). Injunctive norms in relation to smoking are defined as an individual's perception of what a social network believe people should or should not do, including perceived approval or disapproval of

smoking, acceptability and unacceptability of smoking, and also the perceived pressure to smoke or not smoke (East et al., 2021). Injunctive norms guide smoking behavior by indicating the most appropriate conduct, such as smoke-free policies endorsing non-smoking. The violation of rules prohibiting smoking behavior will generally be disapproved of, and as such these rules typically serve as injunctive norms (Lindenberg et al., 2021).

### **Descriptive norms**

Descriptive norms reflect perceptions of whether others actually engage in the normative behavior themselves and motivate action by informing individuals about what is likely to be effective or adaptive behavior in a specific context (Smith et al., 2012). Descriptive norms inspire behavior by demonstrating what is likely to be effective and adaptive in a given situation: “If everyone is doing or thinking or believing it, it must be a sensible thing to do or think or believe” (Cialdini et al., 1991, p.203). Such a presumption offers an information-processing advantage and a decisional shortcut when one is choosing how to behave. Examples are the most bought book, the very crowded restaurant next to an empty one and the behavior of others in traffic (Lindenberg et al., 2021). By simply registering what most others are doing and imitating their actions, one can usually choose efficiently and well (Cialdini et al., 1991). In relation to smoking, descriptive norms are defined as an individual’s perception of the smoking behavior of a social network (e.g. parents, siblings, close friends, peers). Descriptive norms influence smoking behavior by illustrating prevailing actions. For instance, in environments where smoking is common, it reinforces the perception that smoking is typical, thereby encouraging the behavior despite smoke-free policies (East et al., 2021). This is because others’ disregard for one norm reduces the likelihood of conforming to such norms (Keizer et al., 2011). Conversely, in settings where smoking is uncommon, individuals are more likely to comply with smoke-free policies as the norms are respected.

### **(Mis)alignment of injunctive and descriptive norms**

According to the FTNC, when injunctive norms (what most people approve of) and descriptive norms (what most people do) are aligned, behavior is most likely to occur (Cialdini et al., 1991). Conflicts arise in settings where a behavior is common but socially disapproved, signifying a discrepancy between descriptive and injunctive norms (Keizer et al., 2008). This misalignment is evident at university campuses, where despite the implementation of smoking bans, individuals continue to smoke (Hoger Onderwijs Persbureau, 2024). Smoke-free policies in universities act as regulatory measures, reshaping injunctive norms and signaling smoking's social unacceptability (Luís & Palma-Oliveira, 2016). Changes in smokers' perceptions regarding the acceptability of smoking (injunctive norms) can influence their smoking behavior (Baha & Le Faou, 2010). However, smoke-free policies and interventions are not

always effective in reaching the desired behavior (Jancey et al., 2014). Previous studies have investigated the effects of social norms on willingness to quit smoking and have shown mixed results (Chen et al., 2019). Some studies have suggested that injunctive norms significantly influence smoking cessation or smoking (Echeverria et al., 2015; Kim et al., 2015). However, other studies suggest that the injunctive norms failed to increase individuals' willingness to quit smoking (Eisenberg et al., 2014; Lazuras et al., 2012). As findings are inconclusive, it is interesting to explore the effectiveness of anti-smoking interventions on individuals' social norms.

### **Anti-smoking interventions and norms**

Anti-smoking interventions and smoking bans are public expressions of disapproval of smoking and a desire to protect vulnerable populations and non-smokers from exposure to smoke (Tsayem & Cavagnaro, 2013). Weyers (2010) captured the history of smoking bans in the Netherlands, characterized by a mix of self-regulations and regulations by the government. At the social level, these policies and regulations can be considered as norms that regulate smoking behavior. There are various anti-smoking interventions in place in university settings. Those measures are meant to foster injunctive norms against smoking, as they indicate what behavior is expected or (dis)approved in a certain location, contributing to the smokers' awareness of the social norm (Boderie et al., 2021).

### **Prohibition signs**

Prohibition signs are often used to enhance norm-conforming behavior in the public realm. These signs are an important tool for regulating behavior by clearly stating which rule applies in a particular context and thus implying what behavior is expected or approved (injunctive norm) (Keizer et al., 2011). They are commonly placed in a context where the behavior that is supposedly prohibited frequently occurs to make the norm particularly salient. 'No smoking' signs are characterized by their red circle with a diagonal slash through a black cigarette and smoke symbol (Sign Shed, 2023). This universally standardized design is instantly identifiable across the globe, clearly communicating the prohibition of smoking. Prohibition signs or 'no-smoking' signs are supposed to improve norm-conforming smoking behavior in public places, such as universities, because 'the pleasure of smoking is gone since it is forbidden' (Baha & Le Faou, 2010), leading to the denormalization of smoking in such areas. Evidence has shown that smoking-related cues, such as prohibition signs, can elicit craving in smokers, even at an unconscious level (Lü et al., 2022).

### **Smoke-free generation signs**

In 2015, the “Smoke-free Generation” campaign was launched in the Netherlands, which received wide support from the public and as a result transformed into the “Smoke-free Generation Movement” (World Health Organization, 2023). The Dutch Cancer Society, Heart and Lung foundations initiated this movement with a mutual goal to realize a smoke-free generation by 2035 (Van Bladeren & Muller, 2018). More than 100 organizations, including universities, have adopted the movement and are creating environments that are smoke-free. The smoke-free generation signs in the Netherlands serve as a visual representation of the commitment to creating smoke-free environments and promoting tobacco control initiatives (Willemsen & Been, 2022). These signs, designed with a uniform look, are used to indicate indoor or outdoor areas as smoke-free zones, conveying the message of "Moving towards a Smoke-free Generation." The movement has heightened a negative perception of smoking (injunctive norm), as a study revealed that 75% of Dutch adults find it important that “our society dedicates to a Smoke-free Generation” (Willemsen & Been, 2022, p.3).

### **Blue line zones**

Formal regulation for smoking in outdoor areas in the Netherlands was absent until August 2020, when it was implemented specifically for smoke-free school and university campuses (Breunis et al., 2021). Designated smoke-free zones at various Dutch universities are often indicated with blue lines (Dannenburg et al., 2021). A smoke-free zone has the potential to denormalize and discourage smoking (injunctive norm), support smokers who want to quit and protect people from secondhand smoke (Breunis et al., 2021). The Erasmus University Rotterdam has marked the borders of the campus with blue lines on the ground next to the “Smoke-free campus” sign. Research conducted by the university revealed that the introduction of an outdoor smoke-free zone resulted in a 45% decrease in the number of smokers in the area (Boderie et al., 2021). The significance of the blue lines lies in their ability to provide clarity regarding the boundaries of the smoke-free campus, creating a visual reminder and reinforcing the message of a smoke-free environment (Dannenburg et al., 2021).

### **Facility support and monitoring**

Most Dutch universities and colleges believe that a smoking ban on campus is unenforceable (Hoger Onderwijs Persbureau, 2024). Despite widespread support for smoking bans, there are several challenges surrounding the implementation of a smoking policy on a university campus. Concerns are raised about the feasibility and cost of monitoring and enforcing the policy across the entire campus grounds, suggesting that without sufficient resources, enforcement may not be sustainable (Burns et al., 2014). However, campuses that have the means to utilize facility support have demonstrated successful results. For instance, Tilburg University is a frontrunner in monitoring its students' non-



smoking behavior due to consistent supervision by staff members (Tilburg University, 2022). Facility support and monitoring are meant to discourage smoking by establishing clear expectations and standards (injunctive norm) (East et al., 2021). According to Boderie and colleagues (2021), the majority of smokers react positively or neutrally when approached regarding smoking within non-smoking zones. Their study revealed that most smokers adjusted their behavior to adhere to the policy after being addressed.

### **Communication campaigns**

Communication campaigns are an important and influential part of national tobacco control campaigns designed to decrease and to prevent tobacco use among adults and teens (Cohen et al., 2007). Evidence shows that communication campaigns have achieved measurable results in reducing tobacco use among adults and teens (Bauer et al., 2000). Such campaigns use persuasive communication techniques to encourage smokers to quit by conveying brief messages on media platforms. It aims to change the acceptability of smoking in the population so that smoking abstinence becomes the accepted norm (Dono et al., 2020). Communication campaigns might attempt to influence attitudes by focusing on the unhealthy consequences of smoking or its negative characteristics (e.g. here is what a typical cigarette contains) (Cohen et al., 2007). Moreover, those campaigns might address an individual's social norms by focusing on what an important person (e.g. partner, friend, peers) thinks about smoking. Studies show that messaging about societal disapproval of smoking (injunctive norm) was found to be effective among adolescents (Dono et al., 2020).

The above-mentioned anti-smoking interventions serve to reinforce anti-smoking injunctive norms (Baha & Le Faou, 2010; Dannenburg et al., 2021; Willemsen & Been, 2022). These measures aim to denormalize smoking behavior and promote adherence to smoke-free policies (Breunis et al., 2021). There is a widespread belief in the effectiveness of injunctive norms for changing (smoking) behavior (Dono et al., 2020; Kredentser et al., 2012) but the question arises whether this reliance is justified and whether these norms are indeed perceived to be effective. Persuading individuals least committed to the norm (non-smokers) to adhere to smoke-free policies is the easiest (Gavrilets, 2020). However, targeting individuals most committed to the norm (smokers) may be the hardest to adhere to smoke-free policies but have the largest effect. Therefore, this study will be exploring the *perceptions of smokers* on the effectiveness of anti-smoking interventions. There is a focus on perceptions rather than actual behavior because the study follows Cialdini et al. (1991) in distinguishing between injunctive norms (which specify the *perception* of what is commonly approved/sanctioned) and descriptive norms (which specify the *perception* of what is commonly done). This leads to the following hypothesis:

**H1:** *Interventions enforcing injunctive norms against smoking are perceived as effective.*

There is limited research on the processes that explain the effectiveness of injunctive norms. Recent studies show that exposure to anti-smoking interventions evoke multiple negative emotions (guilt and/or fear) and that this increases the likelihood of making a quit attempt (Schoenaker et al., 2018).

By examining how these emotions influence smoking behavior, it becomes possible to understand the underlying mechanisms driving the power of injunctive norms.

### **Guilt**

But which processes explain how norms lead to changes in behavior? Emotions play a large role in the way people behave (Quiles et al., 2002). Behaviors that elicit rewards (e.g., pleasure and pride) will tend to be repeated, where those that incur punishment (e.g., guilt and shame) will not. It has been shown that compliance with injunctive norms is associated with feelings of pride, while non-compliance with personal norms is associated with feelings of guilt (Doran & Larsen, 2016). Studies have shown that the function of emotions such as guilt is to foster conformity to social norms and standards (Quiles et al., 2002). Guilt is essential in encouraging moral and reparative actions, particularly in response to injunctive norms. Injunctive norms signal the level of approval for a behavior based on a group's moral guidelines. Going against an injunctive norm is seen as breaking the group's moral code, often resulting in feelings of guilt. This guilt serves as a motivation to adhere to these norms to avoid further transgressions (Jacobson et al., 2021). Therefore, internalized norms that evoke feelings of guilt and embarrassment about smoking may be potent motivators of non-smoking behavior (Schoenaker et al., 2018). This leads to the following hypothesis:

**H2a:** *Acting against injunctive interventions against smoking will lead to feelings of guilt.*

### **Fear of punishment**

Punishment has been suggested as one of the most relevant explanations to understanding how selfish individuals self-organize and enforce cooperation or compliance to social norms in various settings (Cimpeanu & Han, 2020). In modern societies, sanctioning systems have been widely implemented in the hopes to enforcing laws. Injunctive norms can influence behavior through implied social rewards and punishments (Cialdini et al., 1991). However, injunctive norms relevant to the situation often do not spontaneously occur to actors; they must be made salient to influence behavior (Slaughter et al., 2020). Strong enforcement of codes makes norms salient, since it brings attention to the rules and the punishments associated with breaking those rules (Kallgren et al., 2000). Supervision and enforcement should be performed as giving warning or punishment for people who smoke in smoke-free spaces, in

accordance with the smoke-free law (Suarjana et al., 2020). Thus, interventions that indicate clear punishment, such as strict monitoring and enforcement of anti-smoking policies in public spaces including universities, can serve to make injunctive norms against smoking more salient and thus enforce fear of punishment (Boderie et al., 2021). This leads to the following hypothesis:

**H2b:** *Acting against injunctive interventions against smoking will lead to fear of punishment.*

### **Physical environment**

In a situation involving social interactions, people tend to search for cues indicating suitable conduct in a given situation (Danilov et al., 2021). The attributes of the physical environment can convey descriptive and injunctive norms about tobacco use (Mead et al., 2014). For instance, the presence of cues signaling that a norm has been broken in the presence of a sign reinforcing that norm creates an ambiguous situation. When it is ambiguous as to how one should act, Cialdini and colleagues (1991) suggest that people tend to copy the behavior of others. Thus, more people will tend to smoke in a smoke-free area if cues (e.g. cigarette butts) are present indicating that the norm is disregarded. This is the case at various Dutch universities, where cigarette butts and empty packages can be found all over the non-smoking area, including near non-smoking signs (Tsayem & Cavagnaro, 2013). The promotion of normative smoking behavior at Dutch universities is often supported by the presence of smoking prohibition signs on the campus. However, negative non-support cues such as the presence of cigarette butts around the signs have a negative impact on conforming to the norm and signal to other people that disrespect of the norm is tolerated (Keizer et al., 2011). Descriptive norms about smoking are significant predictors of smoking behavior, even after controlling for characteristics of the environment. Studies suggest that others' smoking behavior, more than other aspects of the environment, has a significant impact on an individual's formation of norms and behavior (Mead et al., 2014). This leads to the following hypothesis:

**H3:** *The more descriptive norms are aligned with injunctive norms against smoking, the stronger is the effect of interventions enforcing injunctive norms on non-smoking behavior.*

## Methodology

This section explains how the research question has been answered by collecting primary data based on a case study. Additionally, it provides an overview of how the data was analyzed.

### Case description

The case study focused on the University of Groningen (RUG) and its students and staff members who smoke as its target group. The RUG, like other stakeholders, faces significant challenges related to compliance, as it continues to contend with a considerable number of smokers on its campuses despite the prohibition (University of Groningen, 2024). Initiated by the Green Office of the RUG, the university has implemented or will soon implement a variety of new interventions aimed at promoting non-smoking behavior on campus. This study tested the perceived effectiveness of each intervention, distinguishing between 1) smoke-free generation signs, 2) prohibition signs RUG<sup>1</sup>, 3) general prohibition signs, 4) blue line zones, 5) facility support and monitoring and 6) communication campaigns. This study investigated the effectiveness of these measures in general, and in clean versus non-clean environments. A clean environment, in this case, is defined as an environment in which the ground *does not* contain cigarette butts and a non-clean environment is defined as an environment in which the ground *does* have cigarette butts. Photos were shown to participants to illustrate what is meant by a clean environment and non-clean environment. These can be found in Appendix A: Clean versus non-clean environment.

### Procedure

A structured online questionnaire was conducted at the campuses of the RUG. These campuses include Broerplein, GMW, Aletta Jacobshal, de Harmonie and campus Fryslân. The questionnaires were distributed among students and staff members of the RUG by student assistants of the Green Office, and through the RUG network of the researcher. The student assistants approached smokers at the campuses with a QR code that led to the questionnaire, and the researcher spread an anonymous link among students and staff members, which then circulated further through a snowball effect. The questionnaire was self-administered, and the inclusion criteria required participants to be smokers, as the study focused on analyzing the perceptions of *smoking* students and staff members on anti-smoking interventions to promote non-smoking behavior at universities. Participation was on a voluntary basis, and participants could withdraw their participation at any moment.

---

<sup>1</sup> Prohibition signs RUG: Specific signs made for the RUG to indicate that smoking is prohibited on its campuses.

The questionnaire comprised 7 sections including demographic information, self-reported smoking behavior on the RUG campuses, perceived effectiveness of the different anti-smoking interventions, the influence of perceived guilt and perceived fear of punishment induced by these interventions on smoking behavior, the perceived effectiveness of anti-smoking interventions in a clean environment and non-clean environment on smoking behavior, and the perceived effectiveness of descriptive and injunctive smoking behavior.

### **Participants**

In total, 110 responses to the survey were collected. However, 65 questionnaires were discarded because of the non-adherence to the instruction of completing the questionnaire. Most of those discarded responses withdrew participation after question 1 (“Are you a smoker?”), which only allows participants to continue the questionnaire in case they indicate that they are a smoker. Overall, 45 participants’ data were evaluated of which 100% is smoking: 40% identified as female, 49% identified as male, 7% as non-binary and 4% preferred not to say. Among the participants, 87% were students and 13% were staff members. Most of the participants were 24 years old (range 19 - 53 years). Detailed demographical characteristics of the study population are presented in Table 1.

<b>VARIABLES</b>	<b>Values</b>	<b>N</b>	<b>%</b>	<b>Mean</b>	<b>Range</b>	<b>Standard Deviation</b>
<b>SMOKER</b>	Yes	45	100			
<b>GENDER</b>	Female	18	48.9			
	Male	22	40.0			
	Non-binary	3	6.7			
	Prefer not to say	2	4.4			
<b>AGE</b>				25	53	34
<b>CURRENT ROLE AT THE RUG</b>	Student	39	86.7			
	Staff	6	13.3			
<b>COMPLETED EDUCATIONAL LEVEL</b>	High school	22	48.9			
	MBO	1	2.2			
	HBO bachelor	6	13.3			
	WO bachelor	8	17.8			
	HBO master	1	2.2			
	WO master	6	13.3			
	Doctor degree	1	2.2			
<b>FACULTY</b>	Economics & Business	2	4.6			
	Behavioral & Social Sciences	0	0.0			
	Region, Culture & Society	0	0.0			
	Arts	3	6.8			
	Medical Sciences	0	0.0			
	Law	13	29.6			
	Spatial Sciences	0	0.0			
	Science and Engineering	14	31.8			
	Philosophy	0	0.0			
	University College Groningen	1	2.3			
	Campus Fryslân	11	25.0			

Table 1. Demographic variables of the participants.

## Materials

The study assessed various aspects related to smoking behavior and anti-smoking interventions at the RUG campuses using single-item questions rated on a 5-point Likert scale. The following section presents each measure, along with the corresponding Likert scale utilized.

*Perceived smoking behavior on the RUG campuses.* This was measured by asking to what extent the participant thinks that smoking is common on the RUG campuses. A 5-point Likert scale was used (1= not common at all, 5 = extremely common). Higher means indicated higher perceived smoking behavior.

*Awareness of anti-smoking interventions on the RUG campuses.* This was measured by asking to what extent the participants are aware of anti-smoking interventions on the RUG campuses. A 5-point Likert scale was used (1= not aware at all, 5= extremely aware). Higher means indicated higher awareness.

*Perceived social disapproval of smoking behavior on the RUG campuses.* This was measured by asking a level of agreement to the statement: "Most people on campus disapprove of smoking behavior"? A 5-point Likert scale was used (1= strongly disagree, 5= strongly agree). Higher means indicated higher perceived social disapproval.

*Perceived effectiveness of anti-smoking interventions.* This was measured by asking to what extent the participant thinks that anti-smoking interventions will be effective to reduce smoking on campus. Participants gave their responses for each of the six interventions by using a 5-point Likert scale (1= not effective at all, 5= extremely effective). Higher means indicated higher perceived effectiveness.

*Perceived smoking behavior in a clean and non-clean environment.* This was measured by asking to what extent the participant thinks that people smoke in a clean and non-clean environment. A 5-point Likert scale was used (1= not at all, 5= very likely). Higher means indicated higher perceived smoking behavior.

*Perceived effectiveness of anti-smoking interventions in a clean environment and non-clean environment.* This was measured by asking to what extent the participant thinks that anti-smoking interventions will be effective to reduce smoking in a clean and non-clean environment. Participants gave their responses for each of the six interventions by using a 5-point Likert scale (1= not effective at all, 5= extremely effective). Higher means indicated higher perceived effectiveness.

*Perceived guilt induced by anti-smoking interventions on smoking behavior.* This was measured by asking to what extent the participant agrees with how strongly anti-smoking interventions lead to feelings of guilt. Participants gave their responses for each of the six interventions by using a 5-point Likert scale (1= strongly disagree, 5= strongly agree). Higher means indicated higher perceived guilt.

*Perceived own guilt induced by anti-smoking interventions on smoking behavior.* This was measured by asking to what extent the participant experiences feelings of guilt about their smoking habits after being exposed to anti-smoking interventions. Participants gave their responses for each of the six interventions by using a 5-point Likert scale (1= never, 5= always). Higher means indicated higher perceived own guilt.

*Perceived effectiveness of anti-smoking interventions in inducing guilt.* This was measured by asking to what extent the participant thinks that each intervention is effective in inducing guilt. Participants gave their responses for each of the six interventions by using a 5-point Likert scale (1= not effective at all, 5= extremely effective). Higher means indicated higher perceived effectiveness.

*Perceived importance for anti-smoking interventions to evoke feelings of guilt among smokers.* This was measured by asking to what extent the participant thinks that it is important for anti-smoking interventions to evoke feelings of guilt among smokers. A 5-point Likert scale was used (1= not important at all, 5= extremely important). Higher means indicated higher perceived importance.

*Perceived fear of punishment induced by anti-smoking interventions on smoking behavior.* This was measured by asking to what extent the participant agrees with how strongly anti-smoking interventions lead to fear of punishment. Participants gave their responses for each of the six interventions by using a 5-point Likert scale (1= strongly disagree, 5= strongly agree). Higher means indicated higher perceived fear of punishment.

*Perceived own fear of punishment induced by anti-smoking interventions on smoking behavior.* This was measured by asking to what extent the participant experiences fear of punishment about their own smoking habits after being exposed to anti-smoking interventions. Participants gave their responses for each of the six interventions by using a 5-point Likert scale (1= never, 5= always). Higher means indicated higher perceived own fear of punishment.

*Perceived effectiveness of anti-smoking interventions in inducing fear of punishment.* This was measured by asking to what extent the participant thinks that the intervention is effective in inducing fear of punishment. Participants gave their responses for each of the six interventions by using a 5-point Likert scale (1= not effective at all, 5= extremely effective). Higher means indicated higher perceived effectiveness.

*Perceived importance for anti-smoking interventions to evoke feelings of guilt among smokers.* This was measured by asking to what extent the participant thinks that it is important for anti-smoking interventions to evoke fear of punishment of guilt among smokers. A 5-point Likert scale was used (1= not important at all, 5= extremely important). Higher means indicated higher perceived importance.



*Perceived effectiveness of descriptive and injunctive smoking behavior on the RUG campuses.* This was measured by asking about descriptive and injunctive smoking behavior on the RUG campuses and how this affects the behavior of the participant. A 5-point Likert scale was used (1= strongly disagree, 5= strongly agree). Higher means indicated higher perceived effectiveness.

### **Data analysis**

The initial concept involved comparing the anti-smoking interventions and assessing their effectiveness both before and after the implementation of these. However, since not all the interventions have yet been implemented, the focus has shifted to perceptions. Therefore, rather than performing regression analyses, this study will focus only on descriptive statistics. Data were entered and analyzed using Qualtrics and SPSS version 29. All statistical tests were two-tailed and maintained a significance level ( $\alpha \leq 0.05$  and a confidence interval  $\geq 95\%$ ).

## Results

This section presents the main results of this study. The results can be described in six themes that address self-reported smoking behavior on the RUG campuses, perceived effectiveness of the different anti-smoking interventions, the influence of perceived guilt and perceived fear of punishment induced by these interventions on smoking behavior, the perceived effectiveness of anti-smoking interventions in a clean environment and non-clean environment on smoking behavior, and the perceived effectiveness of descriptive and injunctive smoking behavior.

### Smoking behavior on the RUG campuses

The participants indicated to smoke most often in front of the following campuses: Broerplein (17.78%), Aletta Jacobshal (17.78%), De Harmonie (22.22%), Campus Fryslân (22.22%) and other (20%). Among “other”, the participants mentioned University College Groningen, Heymans, Roling, Nijenborgh and Kapteynborg. The various RUG campuses with smoking prevalence are displayed in Figure 1.

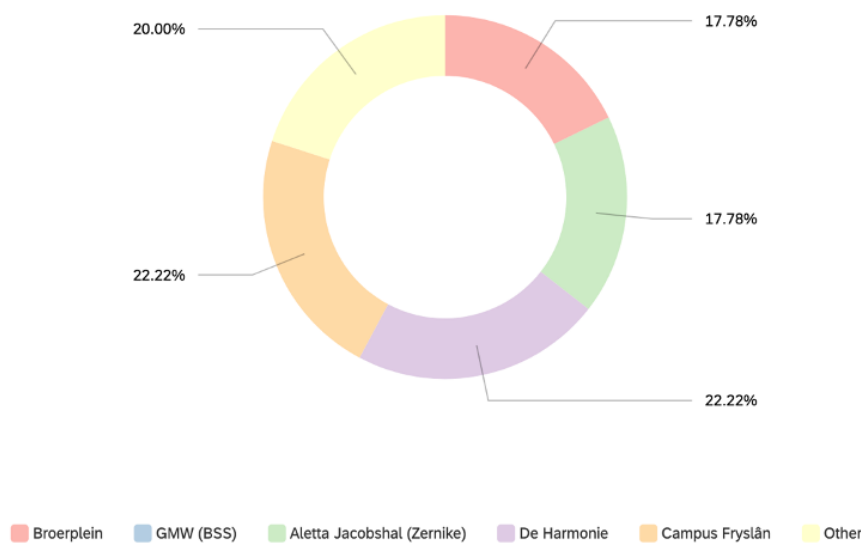


Figure 1: RUG campuses with smoking prevalence.

The participants were asked how common they think that smoking behavior is among students and staff members on the RUG campuses. The perception of commonality of smoking on the RUG campuses is displayed in Figure 2. This figure shows that most participants find smoking on the RUG campuses to be moderately common ( $M= 3.09$ ,  $SD=1.08$ ).

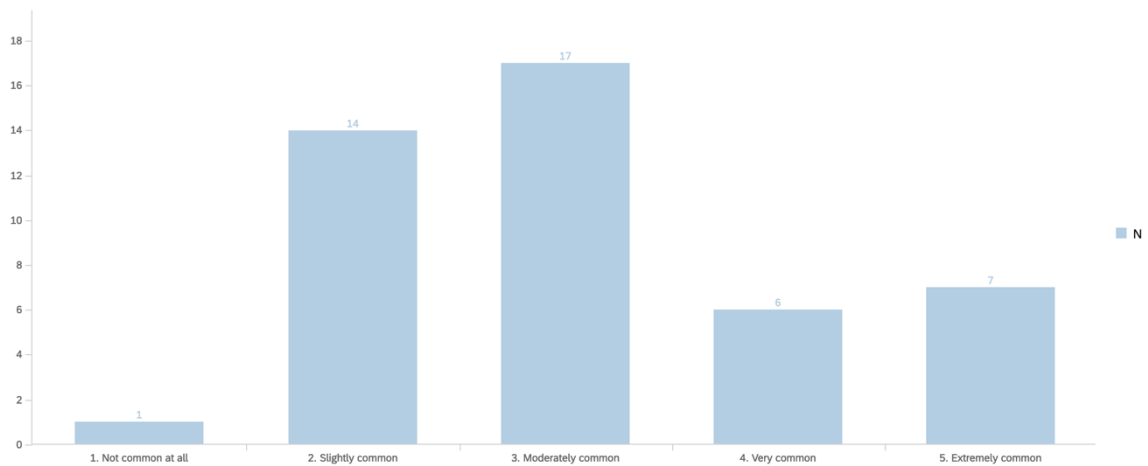


Figure 2: Participants' perception of commonality of smoking on the RUG campuses.

In addition to smoking commonality, the participants were asked to what extent they agree with the statement: "Most people on campus disapprove of smoking behavior". A significant difference was observed in response to this statement. Although most of the participants (40%) were neutral, 24.4% agreed with the statement whereas 28.9% disagreed, indicating a moderate level of agreement ( $M=2.82$ ,  $SD=0.88$ ) among the participants regarding social norms and smoking disapproval within the university community, as presented in Figure 3.

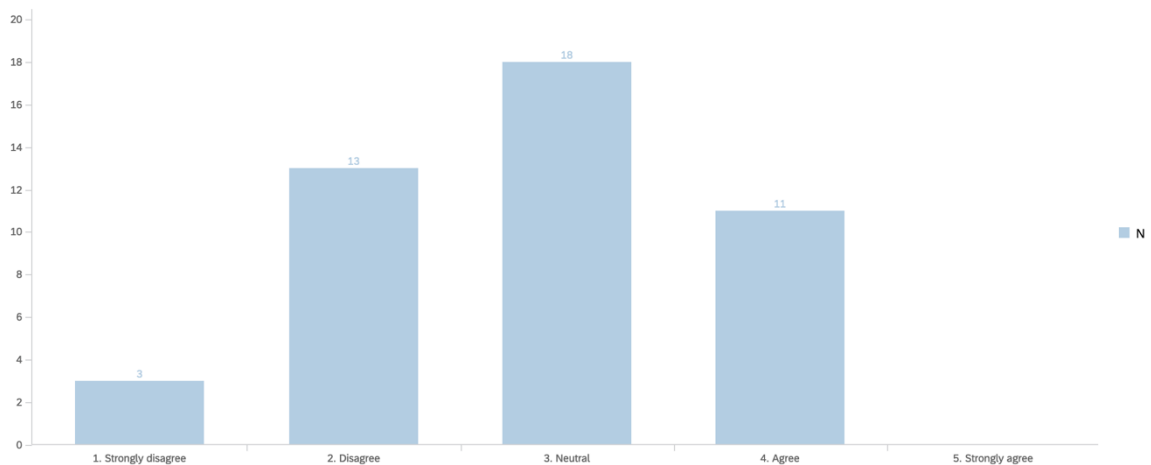


Figure 3: Participants' perception on the statement: "Most people on campus disapprove of smoking behavior".

### The perceived effectiveness of anti-smoking interventions on smoking behavior

In terms of their awareness of interventions aimed at promoting non-smoking behavior on the RUG campuses, most participants demonstrated a moderate to high level of awareness ( $M= 3.20$ ,  $SD= 1.24$ ). The effect that these interventions have had on smoking behavior varied, with most participants (51%) indicating that the interventions have not at all decreased their smoking behavior ( $M= 1.76$ ,  $SD=0.99$ ). Figure 4 illustrates the participants' awareness of anti-smoking interventions on the RUG campuses, while Figure 5 depicts the reduction in their smoking behavior attributed to these interventions.

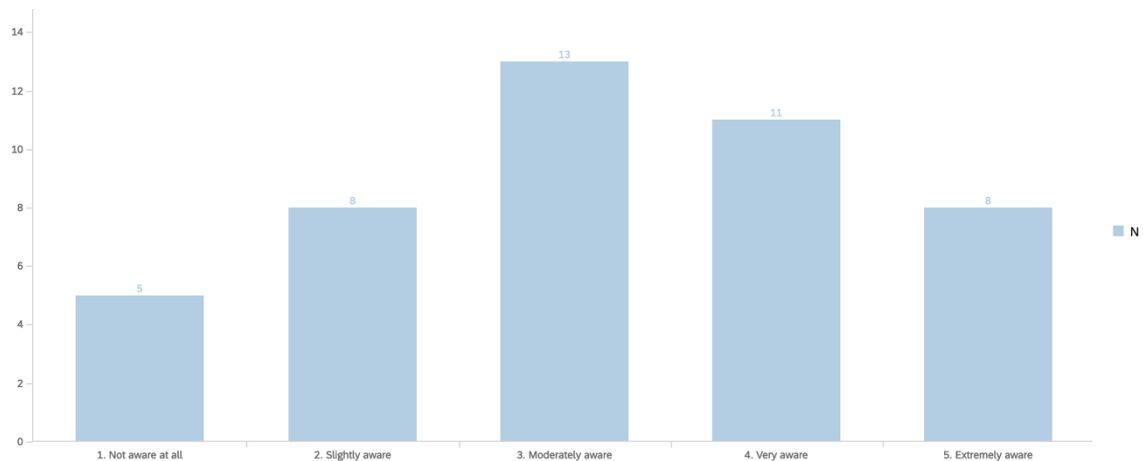


Figure 4: Participants' awareness of anti-smoking interventions at the RUG campuses.

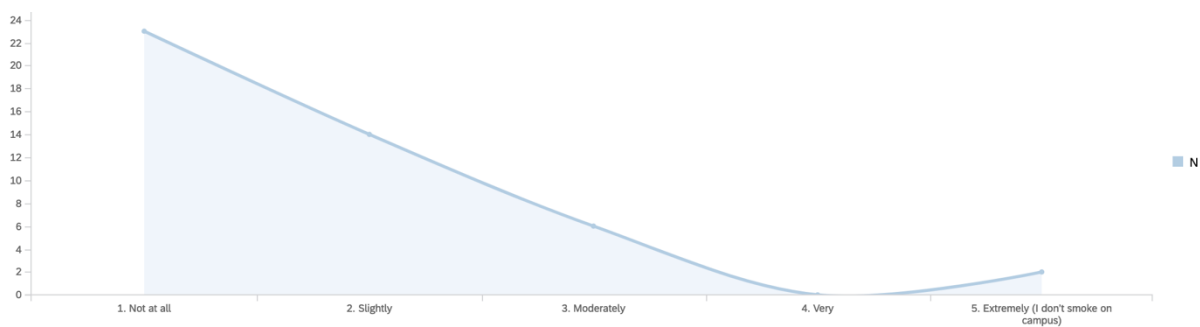


Figure 5: Self-reported decrease in smoking behavior due to anti-smoking interventions.

Subsequently, the participants were asked to evaluate the effectiveness of anti-smoking interventions in reducing smoking on the RUG campuses. The participants ranked the effectiveness of anti-smoking interventions in general first, followed by individual evaluations of each anti-smoking intervention. In Table 2 below, seven variables are shown and described according to their number of cases (N), mean (M), and standard variation (SD). To compare the seven variables and evaluate whether they were significantly different, a T-test was performed. Visual inspection of the means would reveal that the lowest mean is for the perceived effectiveness of smoke-free generation signs, and the highest mean is for the perceived effectiveness of facility support and monitoring. This means that smoke-free

generation signs are perceived as the least effective in reducing smoking on the RUG campuses, and facility support and monitoring as the most effective in reducing smoking on the RUG campuses. Figure 6 displays each anti-smoking intervention from (perceived as) most effective to least effective in reducing smoking on the RUG campuses.

	N	M	SD
Perceived effectiveness - General anti-smoking interventions	45	2.05	.776
Perceived effectiveness - RUG prohibition sign	45	2.20	1.100
Perceived effectiveness - Blue line zone	45	2.16	1.278
Perceived effectiveness - Communication campaign	45	2.02	1.097
Perceived effectiveness - Smoke-free generation sign	45	1.73	.889
Perceived effectiveness - General prohibition sign	45	2.64	1.131
Perceived effectiveness - Facility support & monitoring	45	3.07	1.286

Table 2: Participants' perceived effectiveness of anti-smoking interventions on average.

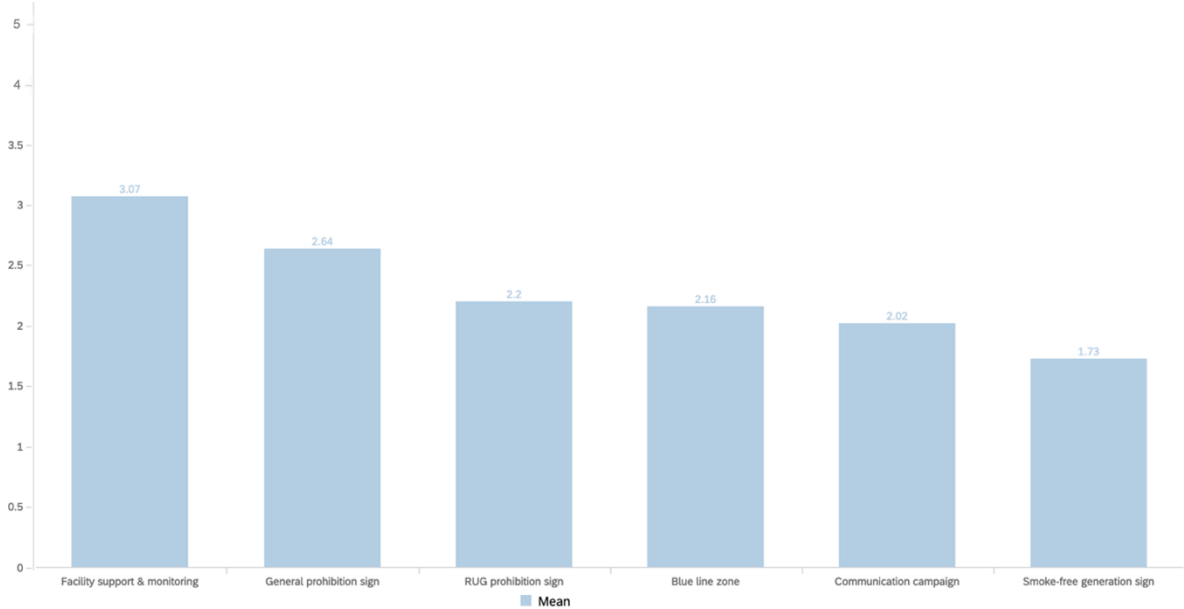


Figure 6: Participants' perceived effectiveness of each anti-smoking intervention on average.

These results partially support Hypothesis 1 (H1). Although certain interventions, such as facility support and monitoring, are perceived as relatively more effective, the overall perceived effectiveness of anti-smoking interventions ranges from low to moderate. Furthermore, most participants express that these interventions have not significantly diminished their smoking behavior, implying that they may not have been perceived as effective enough to induce changes in smoking habits thus far.

### The influence of perceived guilt induced by anti-smoking interventions on smoking behavior

The participants were asked to assess the degree to which anti-smoking interventions evoke feelings of guilt among smokers. Figure 7 displays to what extent the participants think that each anti-smoking intervention induces guilt among smokers. On average, participants neither agree nor disagree that facility support, general prohibition signs, RUG prohibition signs, smoke-free generation signs, and blue line zones induce guilt among smokers. Conversely, with communication campaigns, participants somewhat disagree that these would induce guilt among smokers. Facility support and monitoring are perceived to be associated with the highest feelings of guilt (yet still neutral), while communication campaigns are associated with the lowest feelings of guilt.

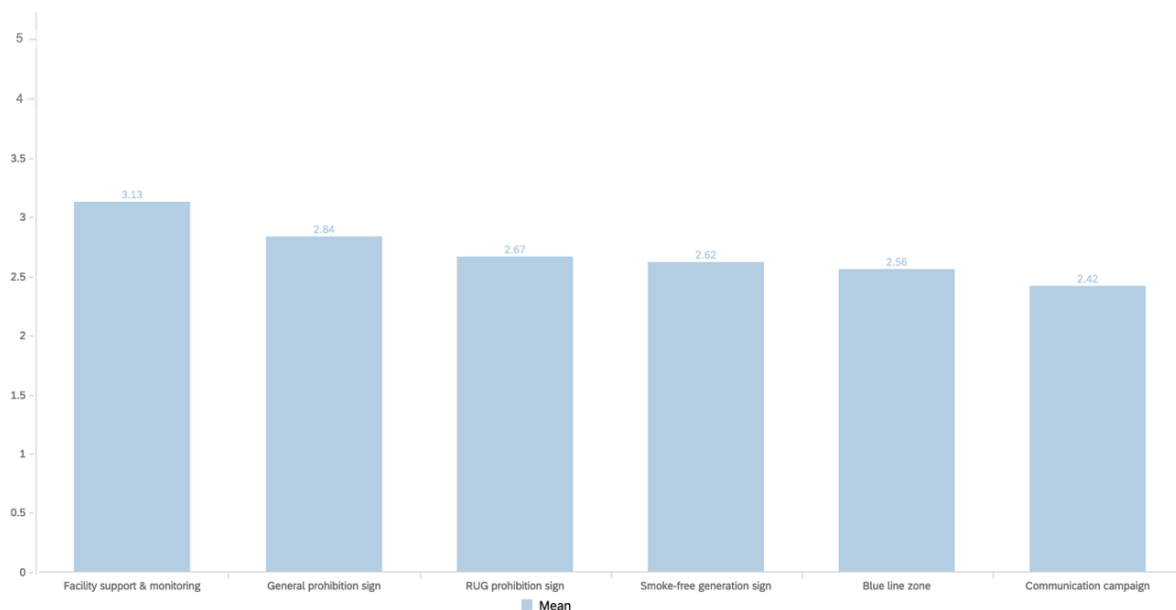


Figure 7: Participants' perception on anti-smoking interventions inducing other smokers' guilt.

Subsequently, the participants were asked to rate how often they experience feelings of guilt about their own smoking habits after exposure to anti-smoking interventions. Figure 8 displays how often the participants experience feelings of guilt when exposed to each anti-smoking intervention. On average, participants' own feelings of guilt were below the midpoint of the scale for all interventions. This implies that participants sometimes experience guilt about smoking when they encounter each intervention. Facility support and monitoring were associated with the highest perceived guilt

(sometimes/about half of the time), while communication campaigns were associated with the lowest perceived guilt.

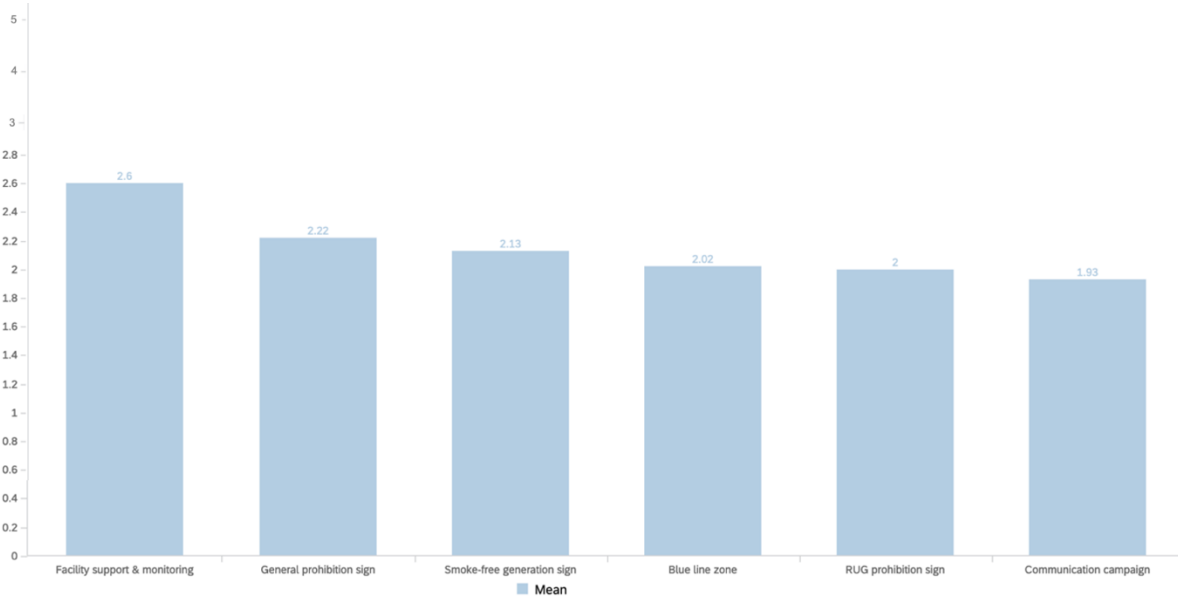


Figure 8: Participants' perception on anti-smoking interventions inducing own guilt.

Moreover, the participants were asked to rate each anti-smoking intervention on effectiveness related to inducing guilt. Figure 9 displays the perceived effectiveness of each anti-smoking intervention in inducing guilt among smokers. On average, participants perceived facility support and monitoring as moderately effective in inducing guilt among smokers, whereas the rest—smoke-free generation signs, general prohibition signs, RUG prohibition signs, communication signs, and blue line zones—were perceived as slightly effective. Facility support and monitoring were therefore perceived as the most effective in inducing guilt among smokers, and blue line zones as the least effective.

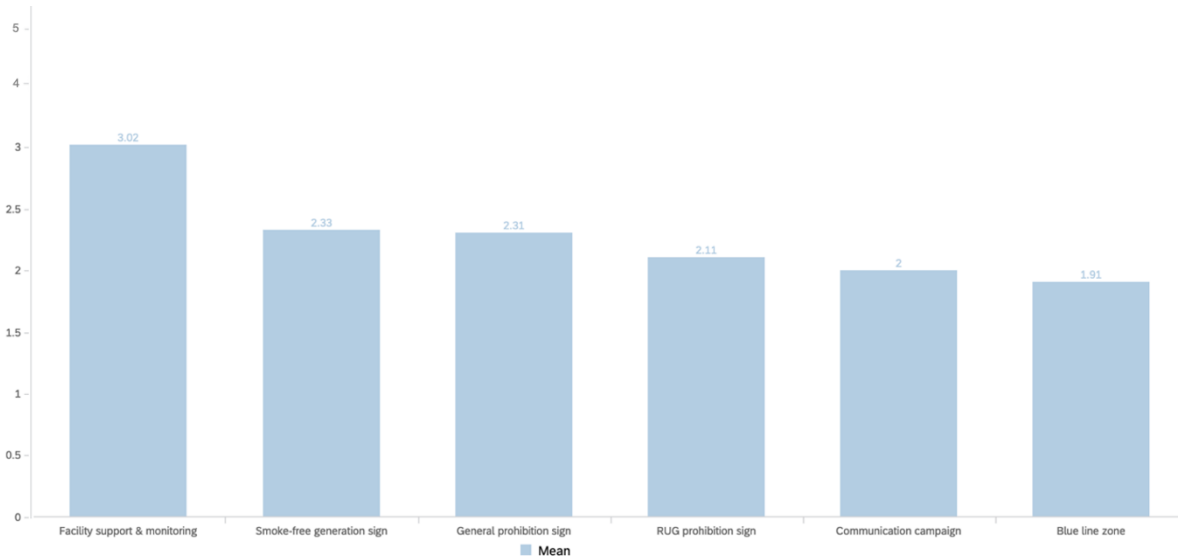


Figure 9: Participants' perception on effectiveness of each anti-smoking intervention in inducing guilt among smokers.

Lastly, the participants were queried about the importance of anti-smoking interventions evoking feelings of guilt among smokers. Although perceptions varied, most participants (28.9%) found it not important at all that anti-smoking interventions induce feelings of guilt among smokers. On average, the participants find it slightly to moderately important that anti-smoking interventions evoke feelings of guilt among smokers ( $M = 2.60, SD = 1.34$ ). This is presented in Figure 10.

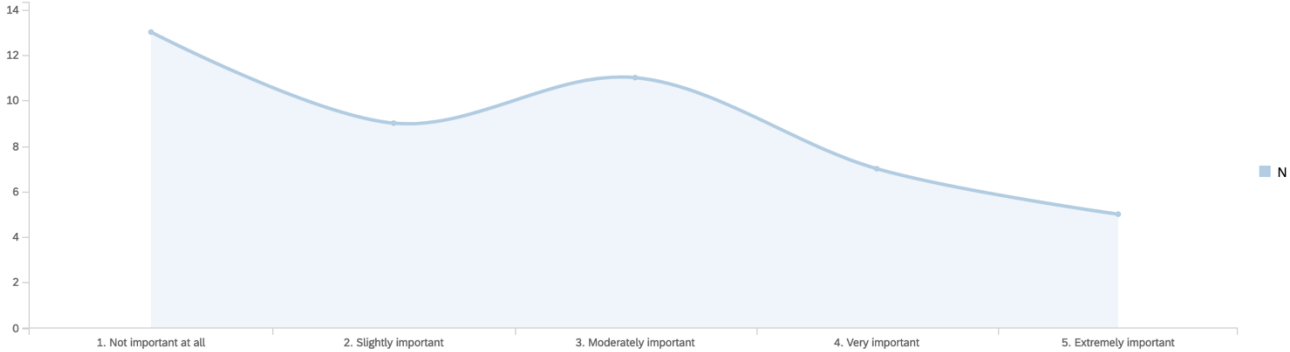


Figure 10: Participants' perception on importance of anti-smoking interventions evoking feelings of guilt among smokers.

The results reject Hypothesis 2a (H2a). The interventions generally do not lead to strong feelings of guilt among smokers. Most interventions are perceived as only slightly effective in inducing guilt, and the importance of guilt induction is rated relatively low by participants. Therefore, the results suggests that the anti-smoking interventions do not significantly lead to feelings of guilt among smokers.



### The influence of perceived fear of punishment induced by anti-smoking interventions on smoking behavior

The participants were asked to assess the degree to which anti-smoking interventions evoke fear of punishment among smokers. Figure 11 displays to what extent the participants think that each anti-smoking intervention leads to fear of punishment among smokers. On average, participants somewhat agreed that facility support and monitoring induce fear of punishment. With general prohibition signs and RUG prohibition signs, participants neither agreed nor disagreed, perceiving these interventions as neutral in inducing fear of punishment among smokers. Conversely, with blue line zones, smoke-free generation signs, and communication campaigns, participants somewhat disagreed, perceiving these interventions as unlikely to induce fear of punishment among smokers. Facility support and monitoring were perceived to be associated with the highest fear of punishment, while communication campaigns were perceived to be associated with the lowest fear of punishment.

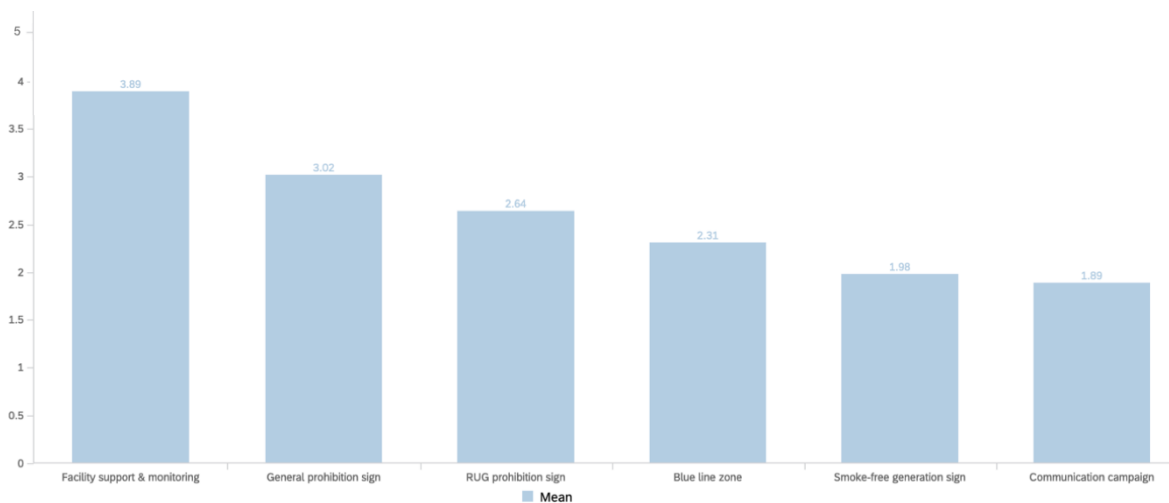


Figure 11: Participants' perception on anti-smoking interventions inducing fear of punishment for smoking.

Subsequently, participants were asked to rate how often they experience fear of punishment about their own smoking habits after exposure to anti-smoking interventions. Figure 12 displays how often the participants experience fear of punishment when exposed to each anti-smoking intervention. On average, participants' own fear of punishment was perceived to be below the midpoint of the scale for all interventions. With facility support and monitoring, participants perceived fear of punishment about half the time when they smoke. For the rest—general prohibition signs, RUG prohibition signs, blue line zones, smoke-free generation signs, and communication campaigns—participants sometimes perceived fear of punishment when smoking upon seeing those interventions. Facility support and

monitoring were perceived to be associated with the highest fear of punishment, while communication campaigns were perceived to be associated with the lowest fear of punishment.

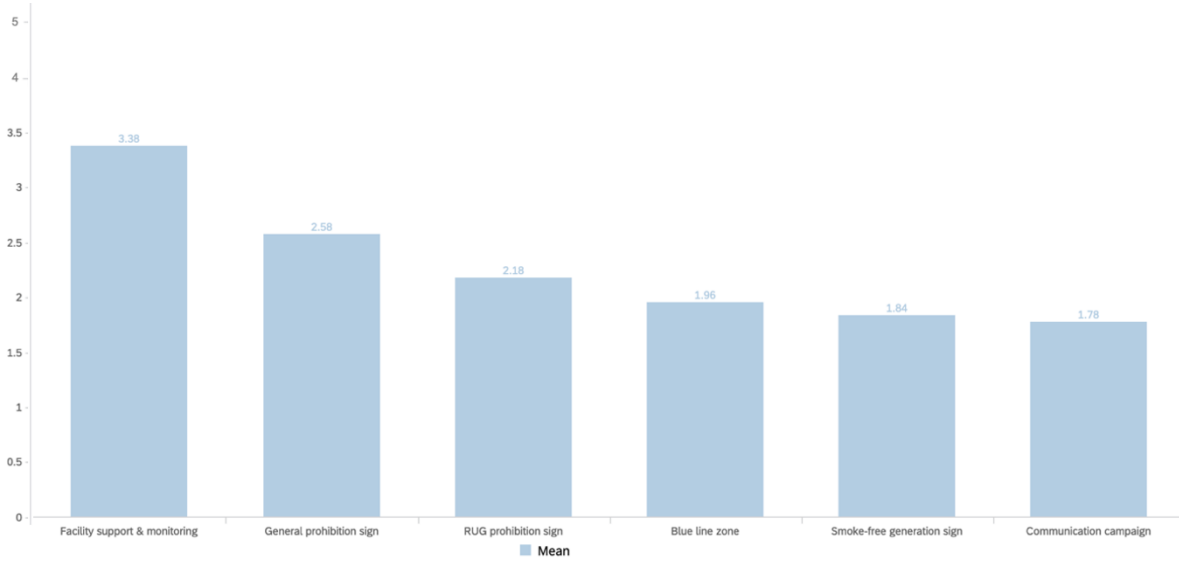


Figure 12: Participants' perception on anti-smoking interventions inducing own fear of punishment.

Moreover, the participants were asked to rate each anti-smoking intervention on effectiveness related to inducing fear of punishment for smoking. Figure 13 displays the perceived effectiveness of each anti-smoking intervention in inducing fear of punishment among smokers. On average, participants perceived facility support and monitoring as moderately to very effective in inducing fear of punishment among smokers. General prohibition signs were perceived as moderately effective, whereas the rest—smoke-free generation signs, RUG prohibition signs, communication signs, and blue line zones—were perceived as slightly effective. Therefore, facility support and monitoring were perceived as the most effective in inducing fear of punishment among smokers, while blue line zones were perceived as the least effective.

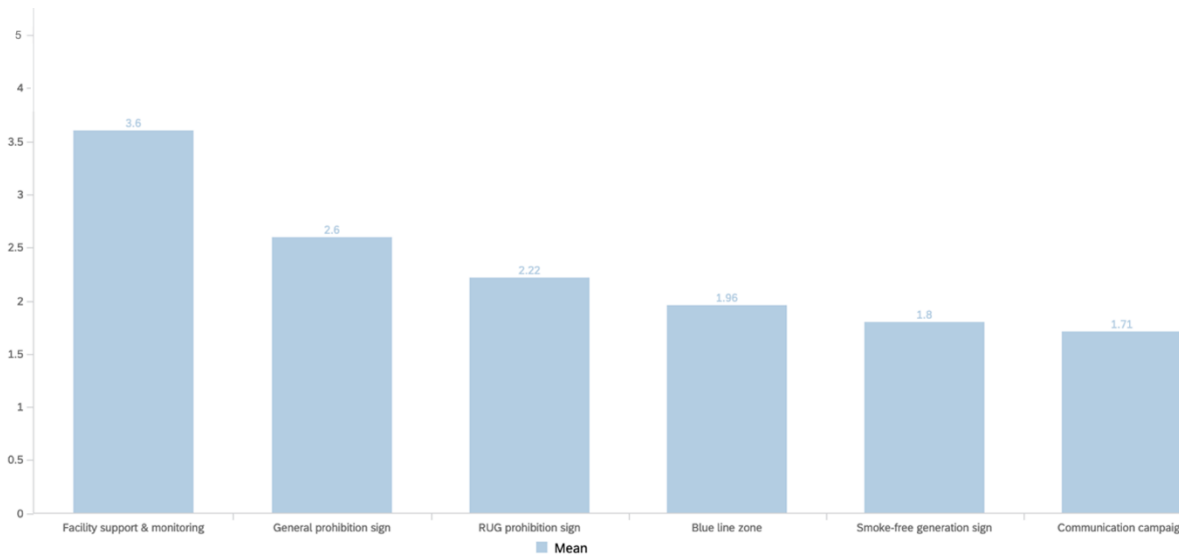


Figure 13: Participants' perception on effectiveness of each anti-smoking intervention in inducing fear of punishment among smokers.

Lastly, the participants were queried about the importance of anti-smoking interventions inducing fear of punishment among smokers. Although perceptions varied, most participants (31.1%) found it moderately important that anti-smoking interventions induce fear of punishment among smokers. On average, the participants find it slightly to moderately important that anti-smoking interventions induce fear of punishment among smokers ( $M = 2.67$ ,  $SD = 1.12$ ). This is presented in Figure 14.

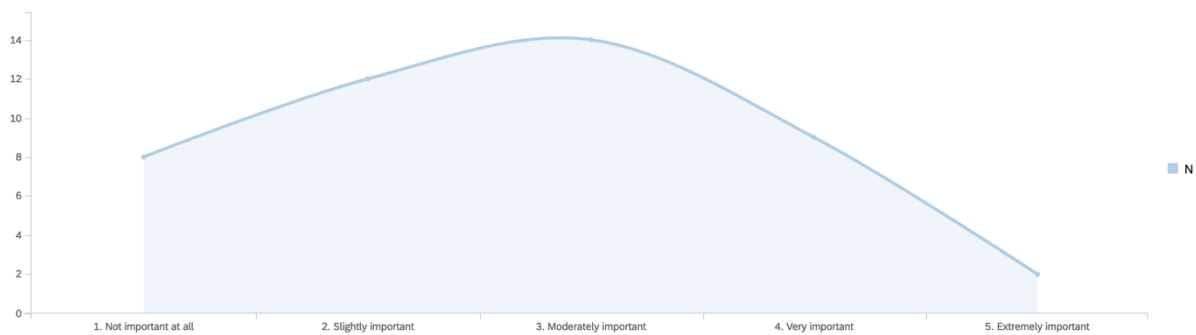


Figure 14: Participants' perception on importance of anti-smoking interventions evoking fear of punishment among smokers.

The results partially support Hypothesis 2b (H2b). The results indicate that facility support and monitoring do lead to some level of fear of punishment among smokers and are perceived as effective in doing so. However, other interventions such as general prohibition signs, RUG prohibition signs, smoke-free generation signs, communication campaigns, and blue line zones are less effective in inducing fear of punishment.

### The perceived effectiveness of anti-smoking interventions in a clean environment and non-clean environment on smoking behavior

The participants were asked to assess the likelihood of people smoking in a clean environment versus in a non-clean environment. Figure 15 showcases to what extent the participants think that people smoke in a clean environment. Although most of the participants (55.6%) gave a neutral response, there is an equal division of unlikelihood and likelihood to smoke in a clean environment, indicating a moderate tendency to perceive smoking in a clean environment as neutral among the participants ( $M= 3.0, SD= 0.67$ ).

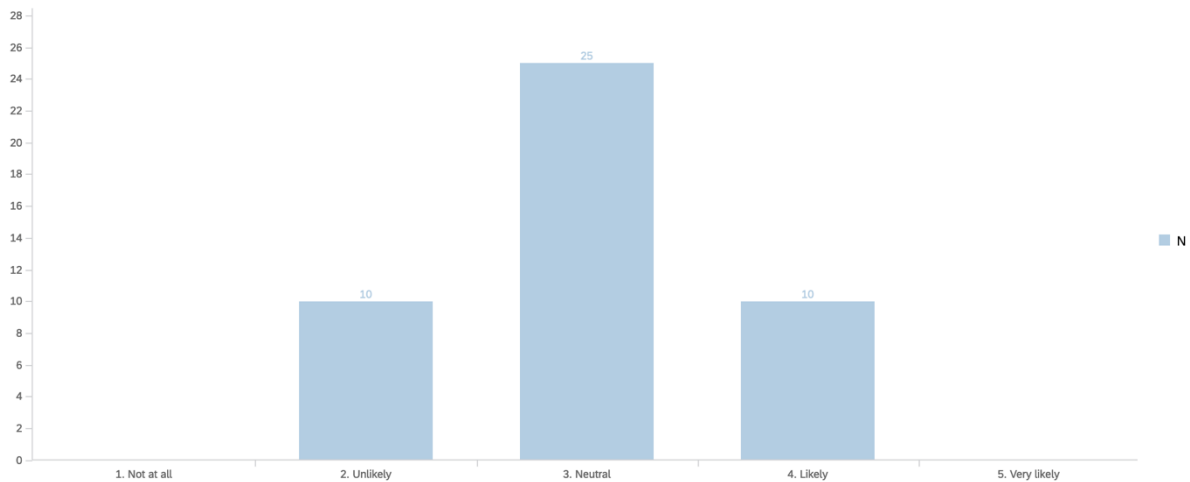


Figure 15: Participants' perception of likelihood to smoke in a clean environment.

Regarding the likelihood of people smoking in a non-clean environment, the participants provided different perspectives. Figure 16 displays to what extent the participants think that people smoke in a non-clean environment. Most of the participants (46.7%) thought it to be likely for people to smoke in a non-clean environment, and 42.2% even perceived it to be very likely ( $M= 4.31, SD= 0.66$ ).

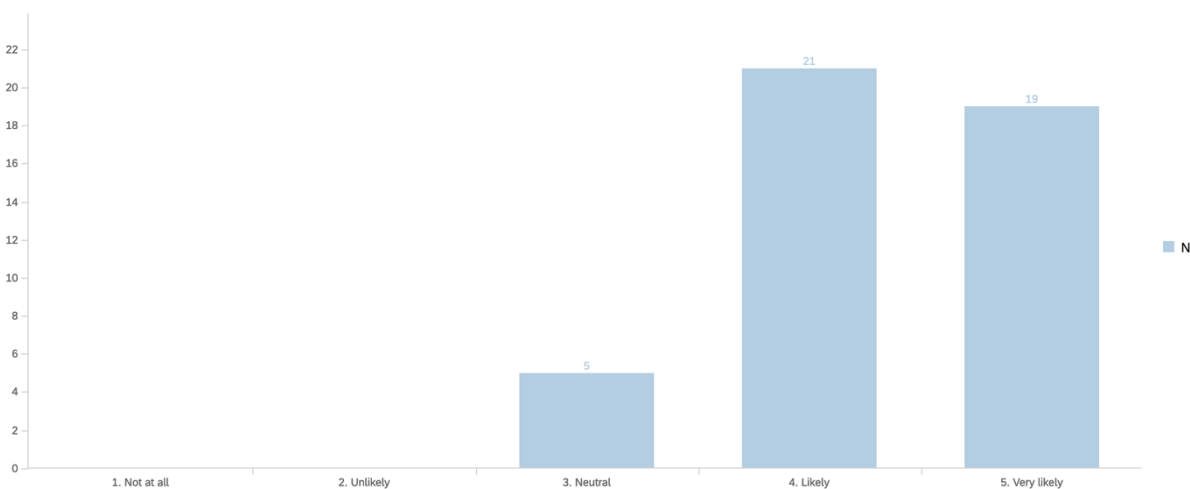


Figure 16: Participants' perception of likelihood to smoke in a non-clean environment.

Subsequently, participants were queried about the likelihood of people smoking in a clean environment when anti-smoking interventions are in place. Figure 17 displays to what extent the participants on average perceive people to smoke in a clean environment with each separate anti-smoking intervention. On average, participants perceive people to be neutral regarding smoking in a clean environment with communication campaigns, smoke-free generation signs, RUG prohibition signs, general prohibition signs, and blue line zones in place. Conversely, facility support and monitoring were perceived to make people less likely to smoke in a clean environment. In a clean environment, communication campaigns were perceived as the intervention where people are the most likely to smoke, while facility support and monitoring were perceived as the intervention where people are the least likely to smoke.

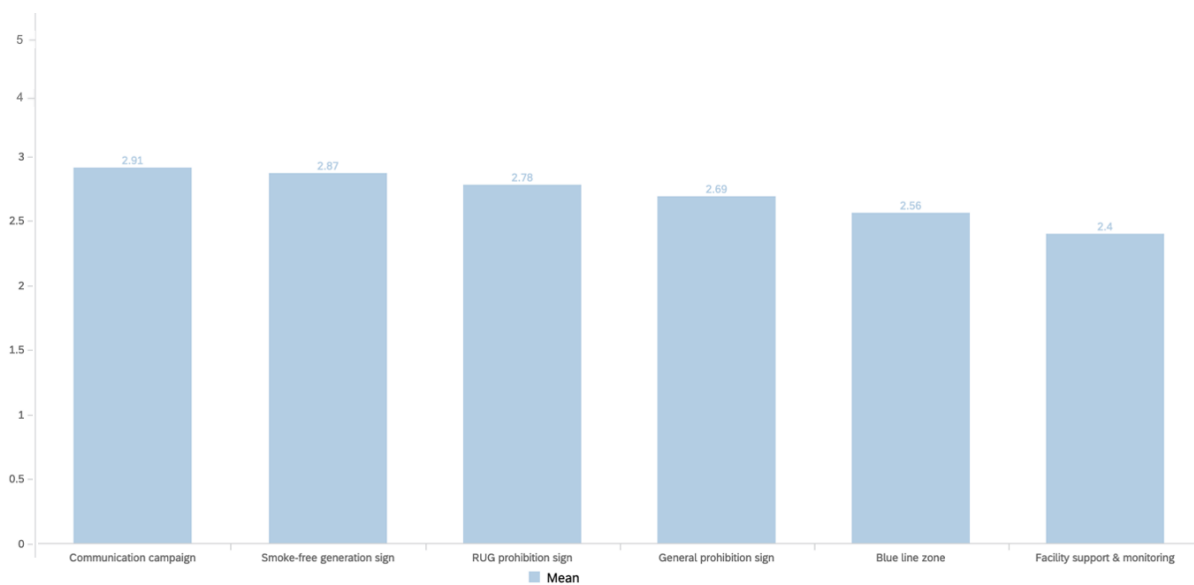
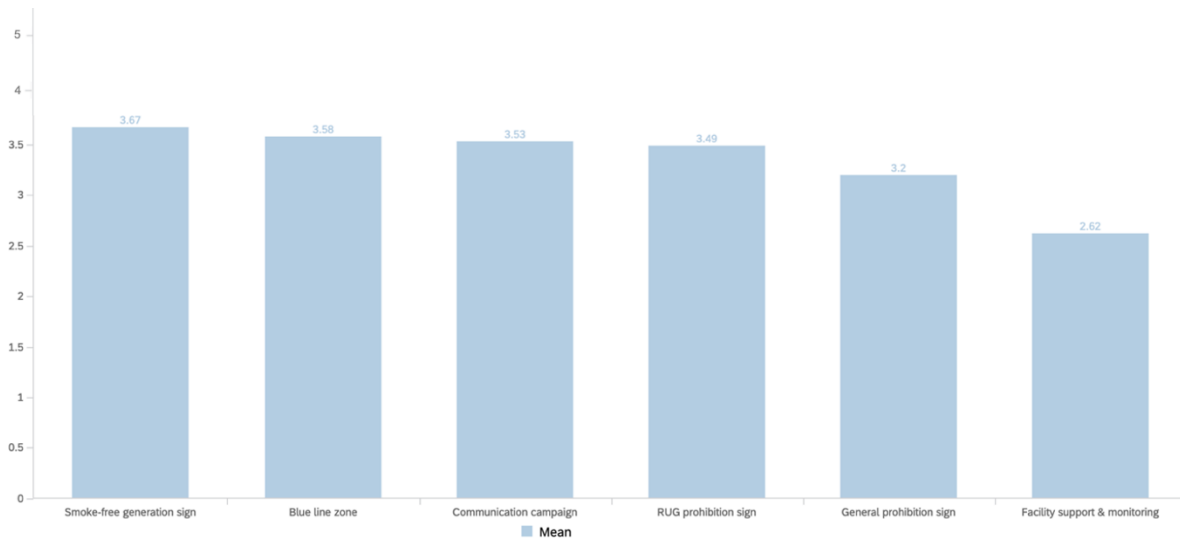


Figure 17: Participants' perception on likelihood to smoke in a clean environment with anti-smoking interventions on average.

Similarly, participants were queried about the likelihood of people smoking in a non-clean environment when anti-smoking interventions are in place. Figure 18 displays to what extent the participants on average think that people smoke in a non-clean environment with each separate anti-smoking intervention. On average, participants indicated that with smoke-free generation signs, blue line zones, and communication campaigns, they perceive people to be likely to smoke in a non-clean environment with anti-smoking interventions in place. Conversely, with RUG prohibition signs, general prohibition signs, and facility support, participants perceive people to be neutral regarding smoking in a non-clean environment. In a non-clean environment, smoke-free generation signs were perceived as the intervention where people are the most likely to smoke, while facility support and monitoring were perceived as the intervention where people are the least likely to smoke.



*Figure 18: Participants' perception on likelihood to smoke in a non-clean environment with anti-smoking interventions on average.*

The results support Hypothesis 3 (H3). In clean environments where the descriptive norm is neutral, injunctive norms such as facility support and monitoring effectively reduce smoking, indicating that alignment enhances effectiveness. Conversely, in non-clean environments where the descriptive norm favors smoking, these interventions are less effective, demonstrating that misalignment weakens their impact. Thus, the data confirms that the more aligned the descriptive norms are with the injunctive norms, the stronger the effect of anti-smoking interventions.

### The perceived effectiveness of descriptive and injunctive smoking behavior

In the last section, participants were asked to express their level of agreement or disagreement with various statements concerning smoking behavior. In Table 3 below, seven statements are shown and described according to whether they are based on injunctive or descriptive norms, their number of cases (N), mean (M), and standard variation (SD). Visual inspection of the means would reveal that the lowest mean is for “Communication campaigns about smoking would reduce my smoking behavior”, and the highest mean is for “Seeing other people smoke at the campus makes me smoke there too”. This suggests that communication campaigns are perceived as having the least impact on reducing smoking behavior on campus, whereas observing others smoke is perceived as the predominant influence encouraging smoking on campus.

	IN/DN	N	M	SD
Seeing other people smoke at the campus makes me smoke there too.	DN	45	3.73	1.04
I smoke more at the campus when I see others smoke.	DN	45	3.44	1.24
I smoke more at the university premises when I see that the ground is covered with cigarette butts.	DN	45	3.02	1.09
Other people not following anti-smoking rules and regulations at the campus would make me not following them either.	DN and IN in conflict	45	3.62	1.06
Seeing signs that bans smoking at the campus would make me stop smoking there.	IN	45	2.60	1.08
Having strict regulations that bans smoking at the campus would reduce my smoking behavior.	IN	45	3.07	1.25
Communication campaigns about smoking at the campus would reduce my smoking behavior.	IN	45	2.36	1.20

Table 3: Participants' level of agreement on statements related to smoking behavior.

## Discussion

This section concludes and discusses the main findings regarding the effectiveness of six anti-smoking interventions that promote non-smoking behavior based on the previously outlined theory, the focus theory of normative conduct (Cialdini et al., 1991). In addition, practical recommendations, limitations and future research are discussed.

### Conclusion and discussion

This study investigated the following research question: *“Which interventions are most effective in promoting non-smoking behavior among students and staff of universities?”*. For this purpose, a questionnaire was shared among students and staff members at the RUG in order to determine which intervention is perceived as the most effective in encouraging non-smoking behavior at its university campuses.

The study revealed that participants perceived smoking as moderately common on RUG campuses, despite high awareness of anti-smoking interventions. Most participants indicated that these interventions had not significantly altered their smoking behavior, highlighting a discrepancy between the intended impact and perceived effectiveness of these measures. This aligns with existing literature suggesting that smoke-free policies in educational settings often struggle to reduce smoking rates, as students and staff continue to smoke despite these policies (Hoger Onderwijs Persbureau, 2024).

In evaluating the effectiveness of anti-smoking interventions, the study found that certain measures, such as facility support and monitoring, were perceived as moderately to highly effective, while the overall effectiveness remained low to moderate. Within the hierarchy of perceived intervention effectiveness, communication campaigns were rated the least effective, followed by signage interventions, including blue line zones, smoke-free generation signs, RUG prohibition signs, and general prohibition signs (in the respective order). Strict regulations, particularly facility support and monitoring, were regarded as the most effective in promoting non-smoking behavior on the RUG campus.

Moreover, the interventions were perceived as more effective in clean environments where neutral descriptive norms prevailed, and less effective in non-clean environments where smoking was more common. This supports Keizer and colleagues (2011), who argue that visible cues, such as cigarette butts, undermine norms and suggest that norm violations are acceptable. The perceived likelihood of



smoking remained high in non-clean environments, despite anti-smoking interventions, underscoring the importance of aligning descriptive and injunctive norms to enhance intervention impact.

Furthermore, the study explored participants' perceptions of anti-smoking interventions' ability to induce feelings of guilt and fear of punishment. While some interventions were associated with higher levels of fear of punishment, overall, participants did not believe these measures significantly induced guilt. This contrasts with Schoenaker and colleagues (2018), who found guilt to be a motivator for behavior change among smokers. On the other hand, facility support and monitoring were perceived as likely to induce fear of punishment, aligning with Borderie and colleagues (2021), who suggest that clear enforcement of anti-smoking policies can make injunctive norms against smoking more salient.

Additionally, a significant proportion of participants did not perceive widespread peer disapproval of smoking, despite legal regulations. This discordance between legal and social norms underscores the influence of social dynamics within the campus environment. According to the focus theory of normative conduct (Cialdini et al., 1991), behavior is influenced by the alignment of injunctive norms (what people approve of) and descriptive norms (what people actually do). The persistence of smoking on campus, coupled with perceived social acceptance, thus normalizes smoking behavior among individuals. This was even reported as the primary motivation for continued smoking among participants, who claimed that observing others smoking on campus would increase their smoking behavior there too. These findings aligns with Mead and colleagues (2014), who suggest that others' smoking behavior significantly influences individual norms and subsequent behavior.

To conclude, this study highlights the complexities and challenges in promoting non-smoking behavior within university settings. Despite high awareness of anti-smoking interventions, the perceived commonality of smoking on RUG campuses indicates a gap between awareness and behavioral change. The findings suggest that while certain interventions, such as facility support and monitoring, are seen as more effective, overall effectiveness is hindered by environmental context and social norms. Effective anti-smoking strategies should therefore consider the alignment of injunctive and descriptive norms, address the visible cues that undermine these norms, and potentially increase the focus on strict regulations and monitoring to enhance their impact. Furthermore, the role of social dynamics and peer influence is crucial, emphasizing the need for interventions that not only promote individual behavior change but also shift the broader social acceptance of smoking. These insights can inform the development of more targeted and impactful anti-smoking interventions, ultimately contributing to healthier university environments.

### **Practical recommendations**

This study offers guidance for university practitioners seeking to promote non-smoking behavior among students and staff. By examining six anti-smoking interventions, it provides insight into effective strategies for universities. Managers, policymakers, and educators in universities are encouraged to implement a mix of interventions targeting both injunctive and descriptive norms. Specifically, enhancing facility support and monitoring can bolster injunctive norms by imposing warnings and penalties (e.g., fines) to deter smoking. Regular campus clean-ups are also recommended to reinforce descriptive norms by maintaining a smoke-free environment that aligns with accepted behavioral standards. Implementing these strategies can cultivate an environment supportive of non-smoking behaviors among community members. These insights are particularly valuable to the Green Office of the University of Groningen, actively working to reduce smoking across RUG campuses. Moreover, it extends the potential impact to various other contexts where smoking is prevalent, fostering a collective effort to discourage smoking and promote healthier behaviors across diverse settings.

### **Limitations and future research**

There are several limitations within this study, which lead to areas for future research. Firstly, the study's focus on anti-smoking interventions at RUG campuses among *smoking* students and staff limits its applicability to a specific target group and organization. More questionnaire responses would have been collected if people outside of the target group were also able to respond to it, giving a larger data set. The study focused on a specific university setting, which may limit the generalizability of the findings to other contexts. Future research across different universities or other contexts could offer insights into the effectiveness of anti-smoking interventions in diverse settings.

Secondly, the use of a self-administered questionnaire may have introduced response bias, potentially affecting the accuracy of the data collected. In hindsight, alternative data collection methods, such as interviews or focus groups, could have provided richer insights into the perceptions of participants regarding anti-smoking interventions. Additionally, the study's sample size and demographic characteristics may have influenced the results, suggesting the need for caution when interpreting the findings. Future research could diversify data collection to explore anti-smoking intervention effectiveness more in depth.

Lastly, another limitation of this study is the shift in focus from comparative evaluation of the interventions to the assessment of perceptions. Originally, the study aimed to compare the effectiveness of different interventions by evaluating outcomes before and after their implementation. However, delays in implementing the interventions prevented this comparison. Consequently, the

study relied on descriptive data and perceptions of planned interventions rather than empirical evidence of their actual impact. This reliance on perceptions may not accurately reflect the interventions' effectiveness in practice. Future research should implement interventions and conduct rigorous comparative analyses to determine their real-world efficacy. Addressing these gaps can advance our understanding of effective strategies for tobacco control and smoking cessation in educational institutions and beyond.

## References

- Ajzen, I. (2005). *Attitudes, personality and behaviour*. McGraw-hill education (UK).
- Baha, M., & Le Faou, A. L. (2010). Smokers' reasons for quitting in an anti-smoking social context. *Public health, 124*(4), 225-231.
- Bauer, U. E., Johnson, T. M., Hopkins, R. S., & Brooks, R. G. (2000). Changes in youth cigarette use and intentions following implementation of a tobacco control program: findings from the Florida Youth Tobacco Survey, 1998-2000. *Jama, 284*(6), 723-728.
- Boderie, N. W., Breunis, L. J., Biney, I., Borsboom, J., Ter Braake, J. G., Koolen, L., ... & Been, J. V. (2021). Smokers' responses to being addressed when smoking in an outdoor voluntary smoke-free zone: An observational study. *Tobacco Prevention & Cessation, 7*.
- Breunis, L. J., Bebek, M., Dereci, N., de Kroon, M. L., Radó, M. K., & Been, J. V. (2021). Impact of an Inner-City Smoke-Free Zone on Outdoor Smoking Patterns: A Before-After Study. *Nicotine and Tobacco Research, 23*(12), 2075-2083.
- Burns, S., Bowser, N., Smith, J., Jancey, J., & Crawford, G. (2014). An exploratory study of smokers' and stakeholders' expectations of the implementation of a smoke-free policy in a university setting. *Health Promotion Journal of Australia, 25*(2), 129-135.
- Byron, M. J., Cohen, J. E., Frattaroli, S., Gittelsohn, J., & Jernigan, D. H. (2016). Using the theory of normative social behavior to understand compliance with a smoke-free law in a middle-income country. *Health education research, 31*(6), 738-748.
- Chen, H., Cao, N., Gao, L., Xie, R., Li, X., & Li, W. (2019). Comparing of the effects of perceived injunctive and descriptive norms on the willingness to quit smoking among Chinese low-rate and regular smokers. *Asian Journal of Social Psychology, 22*(4), 401-406.
- Cialdini, R. B., Kallgren, C. A., & Reno, R. R. (1991). A focus theory of normative conduct: A theoretical refinement and reevaluation of the role of norms in human behavior. In *Advances in experimental social psychology* (Vol. 24, pp. 201-234). Academic Press.
- Cimpeanu, T., & Han, T. A. (2020, May). Fear of punishment promotes the emergence of cooperation and enhanced social welfare in social dilemmas. In *Proceedings of the 19th International Conference on Autonomous Agents and MultiAgent Systems* (pp. 1819-1821).
- Cohen, E. L., Shumate, M. D., & Gold, A. (2007). Anti-smoking media campaign messages: Theory and practice. *Health communication, 22*(2), 91-102.
- Danilov, A., Khalmetski, K., & Sliwka, D. (2021). Descriptive norms and guilt aversion. *Journal of Economic Behavior & Organization, 191*, 293-311.
- Dannenburg, M., Waldschlager, C., de Bie, P., van der Lugt, L., & Maters, E. (2021). *The butt in the drain: the unwanted side-effects of a smoke-free campus*. Wageningen University & Research.

- Dono, J., Miller, C., Ettridge, K., & Wilson, C. (2020). The role of social norms in the relationship between anti-smoking advertising campaigns and smoking cessation: a scoping review. *Health education research*, 35(3), 179-194.
- Doran, R., & Larsen, S. (2016). The relative importance of social and personal norms in explaining intentions to choose eco-friendly travel options. *International Journal of Tourism Research*, 18(2), 159-166.
- East, K., McNeill, A., Thrasher, J. F., & Hitchman, S. C. (2021). Social norms as a predictor of smoking uptake among youth: a systematic review, meta-analysis and meta-regression of prospective cohort studies. *Addiction*, 116(11), 2953-2967.
- Echeverría, S. E., Gundersen, D. A., Manderski, M. T., & Delnevo, C. D. (2015). Social norms and its correlates as a pathway to smoking among young Latino adults. *Social science & medicine*, 124, 187-195.
- Eisenberg, M. E., Toumbourou, J. W., Catalano, R. F., & Hemphill, S. A. (2014). Social norms in the development of adolescent substance use: A longitudinal analysis of the International Youth Development Study. *Journal of Youth and Adolescence*, 43, 1486-1497.
- El Ansari, W., & Stock, C. (2012). Factors associated with smoking, quit attempts and attitudes towards total smoking bans at university: a questionnaire of seven universities in England, Wales and Northern Ireland. *Asian Pacific Journal of Cancer Prevention*, 13(2), 705-714.
- Fennell, R. (2012). Should college campuses become tobacco free without an enforcement plan?. *Journal of American College Health*, 60(7), 491-494.
- Fishbein, M., & Ajzen, I. (2011). *Predicting and changing behavior: The reasoned action approach*. Psychology press.
- Gavrilets, S. (2020). The dynamics of injunctive social norms. *Evolutionary Human Sciences*, 2, e60.
- George, T. (March 24, 2023). *What is quantitative observation? Definition & examples*. Retrieved from: <https://www.scribbr.com/methodology/quantitative-observation/>
- Goldstein, N. J., Cialdini, R. B., & Griskevicius, V. (2008). A room with a viewpoint: Using social norms to motivate environmental conservation in hotels. *Journal of consumer Research*, 35(3), 472-482.
- Hassan, M. (January 6, 2024). *Descriptive research design – types, methods and examples*. Retrieved from: <https://researchmethod.net/descriptive-research-design/>
- Hoger Onderwijs Persbureau. (February 28, 2024). *Rookverbod op campus: handhaven lukt niet, zeggen instellingen*. Retrieved from: <https://www.erasmusmagazine.nl/2024/02/28/rookverbod-op-campus-handhaven-lukt-niet-zeggen-instellingen/>
- Jacobson, R. P., Jacobson, K. J., & Reid, A. E. (2021). Guilt enhances the persuasive effects of injunctive but not descriptive social norms. *Social Psychological and Personality Science*, 12(6), 868-876.

- Jancey, J., Bowser, N., Burns, S., Crawford, G., Portsmouth, L., & Smith, J. (2014). No smoking here: examining reasons for noncompliance with a smoke-free policy in a large university. *nicotine & tobacco research, 16*(7), 976-983.
- Kallgren, C. A., Reno, R. R., & Cialdini, R. B. (2000). A focus theory of normative conduct: When norms do and do not affect behavior. *Personality and social psychology bulletin, 26*(8), 1002-1012.
- Keizer, K., Lindenberg, S., & Steg, L. (2008). The spreading of disorder. *science, 322*(5908), 1681-1685.
- Keizer, K., Lindenberg, S., & Steg, L. (2011). The reversal effect of prohibition signs. *Group processes & intergroup relations, 14*(5), 681-688.
- Kim, S. S., Kim, S. H., Fang, H., Kwon, S., Shelley, D., & Ziedonis, D. (2015). A culturally adapted smoking cessation intervention for Korean Americans: a mediating effect of perceived family norm toward quitting. *Journal of Immigrant and Minority Health, 17*, 1120-1129.
- Kredentser, M. S., Fabrigar, L. R., Smith, S. M., & Fulton, K. (2012). Following what people think we should do versus what people actually do: Elaboration as a moderator of the impact of descriptive and injunctive norms. *Social Psychological and Personality Science, 3*(3), 341-347.
- Lazuras, L., Chatzipolychroni, E., Rodafinos, A., & Eiser, J. R. (2012). Social cognitive predictors of smoking cessation intentions among smoker employees: The roles of anticipated regret and social norms. *Addictive behaviors, 37*(3), 339-341.
- Leão, T., Perelman, J., Clancy, L., Mlinarić, M., Kinnunen, J. M., Nuyts, P. A., Mélard, N., Rimpelä, A., Lorant, V., & Kunst, A. E. (2020). Economic evaluation of five tobacco control policies across seven European countries. *Nicotine and Tobacco Research, 22*(7), 1202-1209.
- Lee, J. G., Ranney, L. M., & Goldstein, A. O. (2011). Cigarette butts near building entrances: what is the impact of smoke-free college campus policies?. *Tobacco control.*
- Li, W., Gao, L., Chen, H., Cao, N., & Sun, B. (2018). Prediction of injunctive and descriptive norms for willingness to quit smoking: The mediating role of smoking risk perception. *Journal of Substance Use, 23*(3), 274-279.
- Lindenberg, S., Six, F., & Keizer, K. (2021). Social contagion and goal framing: The sustainability of rule compliance. *The Cambridge handbook of compliance, 422-437.*
- Lü, W., Wu, Q., Liu, Y., Wang, Y., Wei, Z., Li, Y., ... & Zhang, X. (2022). No smoking signs with strong smoking symbols induce weak cravings: an fMRI and EEG study. *NeuroImage, 252*, 119019.
- Luís, S., & Palma-Oliveira, J. (2016). Public policy and social norms: The case of a nationwide smoking ban among college students. *Psychology, Public Policy, and Law, 22*(1), 22.
- Maas, A. (2021). *The influence and change in smoking ban acceptance amongst university employees* (Bachelor's thesis, University of Twente).
- Marinello, S., Lolli, F., Gamberini, R., & Rimini, B. (2020). A second life for cigarette butts? A review of recycling solutions. *Journal of hazardous materials, 384*, 121245.

- Mead, E. L., Rimal, R. N., Ferrence, R., & Cohen, J. E. (2014). Understanding the sources of normative influence on behavior: The example of tobacco. *Social science & medicine*, *115*, 139-143.
- Mohajerani, A., Qun Hui, S., Shen, C., Suntovski, J., Rodwell, G., Kurmus, H., ... & Rahman, M. T. (2020). Implementation of recycling cigarette butts in lightweight bricks and a proposal for ending the littering of cigarette butts in our cities. *Materials*, *13*(18), 4023.
- Nederlandse Voedsel-en Warenautoriteit. (2020). *Rookverbod op schoolpleinen*. Retrieved from: <https://www.nvwa.nl/onderwerpen/roken-en-tabak/rookverbod/rookverbod-op-schoolpleinen#anker-1-wat-moet-de-onderwijsinstelling-doen>
- Phua, J. J. (2013). The reference group perspective for smoking cessation: an examination of the influence of social norms and social identification with reference groups on smoking cessation self-efficacy. *Psychology of Addictive Behaviors*, *27*(1), 102.
- Quiles, Z. N., Kinnunen, T., & Bybee, J. (2002). Aspects of guilt and self-reported substance use in adolescence. *Journal of Drug Education*, *32*(4), 343-362.
- Schoenaker, D. A., Brennan, E., Wakefield, M. A., & Durkin, S. J. (2018). Anti-smoking social norms are associated with increased cessation behaviours among lower and higher socioeconomic status smokers: A population-based cohort study. *PloS one*, *13*(12), e0208950.
- Sign Shed. (November 21, 2023). *What is a no smoking sign?* Retrieved from: <https://www.thesignshed.co.uk/blogs/safetysheep/what-is-a-no-smoking-sign>
- Slaughter, J. E., Cooper, D. A., & Gilliland, S. W. (2020). Good apples in good barrels: Conscientious people are more responsive to code enforcement. *Journal of occupational and organizational psychology*, *93*(4), 834-860.
- Smith, J. R., Louis, W. R., Terry, D. J., Greenaway, K. H., Clarke, M. R., & Cheng, X. (2012). Congruent or conflicted? The impact of injunctive and descriptive norms on environmental intentions. *Journal of environmental psychology*, *32*(4), 353-361.
- Suarjana, K., Astuti, P. A. S., Artawan Eka Putra, I. W. G., Duana, M. K., Mulyawan, K. H., Chalidyanto, D., ... & Wahyuni, C. U. (2020). Implementation of smoke-free law in Denpasar Bali: Between compliance and social norms of smoking. *Journal of Public Health Research*, *9*(3), jphr-2020.
- Tilburg University. (July, 2022). *Roken op campusterrein nu ook volgens de wet verboden*. Retrieved from: <https://www.tilburguniversity.edu/nl/actueel/nieuws/meer-nieuws/rookvrije-campus>
- Tobacco Atlas. (2023). *Current smoking prevalence*. Retrieved from: <https://tobaccoatlas.org/challenges/prevalence/>
- Tsampi, K. (2020). Novel Smoke-free Zones and the Right to Respect for Private Life under Article 8 of the European Convention on Human Rights (on the occasion of the Dutch Decree of 22 June 2020, amending the Tobacco and Smokers' Order introducing the obligation to impose, designate and enforce a smoking ban in the areas belonging to buildings and facilities used for education). *Europe des Droits & Libertés/Europe of Rights & Liberties*, *2020*(2), 381-398.

- Tsayem, M. T., & Cavagnaro, E. (2013). Encouraging normative smoking behaviour. *Research in Hospitality Management*, 3(1), 59-67.
- University of Groningen. (2024). *UG Smoke-free*. Retrieved from: <https://www.rug.nl/about-ug/policy-and-strategy/rug-rookvrij/>
- Van Bladeren, F., & Muller, G. (2018). Toward a Smoke-free Generation: the Dutch strategy.
- Weyers, H. (2010). Smoking bans in the Netherlands: a mix of self-regulation and regulation by government. *Legisprudence*, 4(3), 327-342.
- Willemsen, M. C., & Been, J. V. (2022). Accelerating tobacco control at the national level with the Smoke-free Generation movement in the Netherlands. *npj Primary Care Respiratory Medicine*, 32(1), 58.
- World Health Organization. (2017). *WHO report on the global tobacco epidemic, 2017: Monitoring tobacco use and prevention policies*. Retrieved from <https://apps.who.int/iris/bitstream/handle/10665/255874/9789241512824-eng.pdf;jsessionid=9F286598276E70CA72C329E583705D01?sequence=1>
- World Health Organization. (May 31, 2022). *WHO Raises alarm on tobacco industry environmental impact*. Retrieved from: <https://www.who.int/news/item/31-05-2022-who-raises-alarm-on-tobacco-industry-environmental-impact>
- World Health Organization. (2023). *Smoke-free universities (national legislation)*. Retrieved from: <https://www.who.int/data/gho/data/indicators/indicator-details/GHO/gho-tobacco-control-protect-smoke-free-public-places-universities>
- World Health Organization. (July 31, 2023). *The Netherlands at the forefront of tobacco control*. Retrieved from: <https://www.who.int/europe/news/item/31-07-2023-the-netherlands-at-the-forefront-of-tobacco-control>



## Appendix A: Clean versus non-clean environment

Clean versus non-clean campuses, with and without anti-smoking interventions:

