MASTER THESIS

SOCIOLOGY: CONTEMPORARY SOCIAL PROBLEMS

The Impact of a Comprehensive Smoke-Free Policy on Psychiatric Inpatient Freedom and Nicotine Prescriptions: The Case of UMC Utrecht Hospital from a Sociological Perspective

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The Impact of a Comprehensive Smoke-Free Policy on Psychiatric Inpatient Freedom and Nicotine Prescriptions: The Case of UMC Utrecht Hospital from a Sociological Perspective

Abstract

The UMC Utrecht's Department of Psychiatry implemented the "Towards a Smoke-free Generation" policy in November 2020, following the Dutch National Prevention 2018 Agreement. This comprehensive smoke-free policy aimed to promote healthier lifestyles and reduce second-hand smoke's impact within hospital premises, extending the prohibition to the psychiatric unit's internal smoking areas.

The current study evaluates the impact of the policy on the inpatient population by analysing daily observations from electronic inpatient dossiers obtained via the clinical repository HIX, a Digital Health Services platform. The analysis covers two distinct periods: pre-implementation (July 1, 2017, to October 31, 2020), when indoor smoking was permitted, and post-implementation (November 1, 2020, to February 27, 2024) with the smoke-free area implemented.

Multilevel binary logistic regressions were conducted to assess the policy's influence, focusing on psychiatric freedom permits and prescribed nicotine replacements. The findings reveal a significant increase in non-limited psychiatric permits (green and yellow permits) during the first freedom assessment post-policy implementation. Moreover, the policy has driven changes throughout inpatients' hospitalisation in increasing the likelihood of smokers receiving limited permits (red and orange permits) and non-smokers obtaining non-limited permits (green and yellow permits). Additionally, the smoke-free policy has amplified the odds of smokers being prescribed nicotine replacements, indicative of its support for smoking cessation. Furthermore, the policy has been effective in reducing possible pressures from smokers on staff during potentially biased freedom assessments, thereby discouraging smoking as a coping mechanism.

Overall, the current research findings suggest that the smoke-free policy, alongside a freedom permit system, effectively promotes cessation prescriptions and addresses smoking behaviours and social beliefs. Therefore, contributing to a physically and mentally healthier psychiatric environment.

Ethical statement

The present thesis complies with the Code of Conduct for Health Research (the Gedragscode Gezondheidsonderzoek) and adheres to the General Data Protection Regulation (Algemene Verordening Gegevensbescherming), as well as the Medical Treatments Contracts Act (Wet op de Geneeskundige Behandelingsovereenkomst). Ultimately, it is done under the UMC Utrecht Hospital policy.

It has undergone two ethical reviews; approved by the Ethical Review Board of the Faculty of Social and Behavioural Sciences of Utrecht University (under number 24-0548) and assessed by the research coordinator of the Psychiatry Department of the UMC Utrecht Hospital as a non-WMO study.

1. Introduction

Throughout history, mental health care approaches have evolved significantly. Initially, institutionalisation dominated, with people with severe mental illness separated from the community and treated in specialized settings. This model prevailed in the 19th and early 20th centuries, leading to the rise of psychiatric hospitals, especially in high-income Western countries. However, a paradigm shift towards community integration and deinstitutionalisation followed, advocating for community-based and outpatient care. This shift reduced psychiatric hospital beds globally, favouring community support, social housing, and outpatient services (Mansell, 2006; Thornicroft & Bebbington, 1989).

The debate to lean towards one side of this dichotomy persists (Pillay, 2017; Thornicroft et al., 2016; Priebe et al., 2014; Segal & Moyles, 1979). Nowadays, modern psychiatric hospitals are no longer "total institutions" as described by Goffman in 1961. The new concept of institutionalisation rather aims to provide a structured, safe environment for treatment and monitoring (Chow & Priebe, 2013). In the 21st century, the global trend in mental health emphasises comprehensive approaches (European Commission, 2023), collaborative care for comorbid disorders (Unützer et al., 2020; Metse et al., 2014), recovery models (Slade et al., 2014) and shared decision-making (Fulford & Handa, 2021; Slade, 2017; Coulter et al., 2015). A shift aligned to placing the patient's voice at the forefront.

The crucial aspect in this context is whether all these models and trends will eventually be used or applied in policy. Governance networks are inherently complex, and those involved must navigate this complexity to address societal problems effectively. Uncertainty and lack of consensus on the nature of the issues, their appropriate causes and solutions directly impact the approach taken by social policies (Klijn & Koppenjan, 2016). A governance network can be compared to analogous situations in different contexts. Within the healthcare domain, there are situations where professionals may hold different perspectives. For example, the complexity can stem from the treatment approach or the uncertainty surrounding the nature of the patient's conditions. Even more so for complex cases, which often present comorbidities, leading healthcare professionals to possess multiple perspectives regarding the best course of treatment (Dumesnil et al., 2018).

Findings from different longitudinal studies reveal a strong relationship between having more than one mental health disorder concurrently, to the extent of stating that "an increased risk of comorbidity between mental disorders is the rule, not the exception" (Kessler et al., 2005; Plana-Ripoll et al., 2019). This rule is acknowledged as a bidirectional relationship, for people who suffer from substance use disorders (SUD) and other mental health disorders (Plana-Ripoll et al., 2019). This comorbid condition is referred to as dual disorder (DD). It is a combination of disorders such as depression, anxiety, attention-deficit hyperactivity, bipolar and schizophrenia disorders, for instance, and also SUDs such as tobacco, opioids, marijuana, and alcohol use disorders, among others (Kelly & Daley, 2013). However, the current study directs its attention to a specific type of SUD, the tobacco use disorder.

Although there has been a decline in tobacco consumption worldwide since the beginning of the 21st century, it is recognised as one of the most prevalent addictions. In the Netherlands, smokers aged 12 years or older decreased from 33.3% in 2001 to 17.9% in 2022 (CBS StatLine, 2023). Still, several studies found that smoking prevalence rates among individuals with DD remained elevated. Many have a prevalence of between two and four times higher compared to the general population (Office for Health Improvement and Disparities, 2024; Rajan et al., 2023; Heffner et al., 2011; Ziedonis et al., 2008).

The complexities discussed, along with attributed social benefits and beliefs to tobacco such as considering it as a condoned coping mechanism rather than a disorder hindered policy formulation for DD patients. This historical neglect added further complexity and exceptions were granted, such as permitting smoking in psychiatric clinics despite hospital-wide free-smoking areas.

Globally, there is a growing trend towards implementing free-smoking areas in psychiatric units. In November 2020, the UMC Utrecht Department of Psychiatry implemented the "Towards a Smoke-free Generation" policy following the National Prevention 2018 Agreement. This comprehensive policy aimed to encourage healthier habits and eliminate second-hand smoke within the hospital premises. However, it may have led to unintended consequences. Since its implementation in 2020, staff perceived a noticeable increment in non-limited psychiatric freedom permits, which was proposed as a possible line for future research (Van den Berg et al., 2024). According to the UMC Psychiatry Department, "freedom permits" refers to instances when a psychiatric inpatient temporarily leaves the ward for a brief period. Depending on the degree of

supervision necessary, there are various levels ranging from green (non-limited freedom permits), when inpatients are allowed to leave the ward without accompaniment (smoking is allowed), to red (limited freedom permits), when they are not permitted to leave the ward under any circumstances (smoking is prohibited).

In this sense, conceding more non-limited permits can be perceived in different ways, with both favourable and unfavourable reactions. From a negative point of view, concerns have been raised regarding the underlying causes of this phenomenon. These revolve around the possibility of using freedom permits to mitigate withdrawal symptomatology, a potential bias in mental health risk assessments or an influence exerted by smokers during such assessments. These concerns all stem from the inpatients' need to smoke, regardless of the intended functions pointed out in protocols. It would include potential risks if this were the case, as these inpatients might not be psychologically or emotionally prepared to use these non-limited permits. Risks include absconding, suicide, harm to others including carers, substance abuse, exploitation by others, physical deterioration and damage to the patient's reputation (Gerace et al., 2015).

Even though the policies' unintended consequences are not always negative, the increase in non-limited permits could signify a paradigm shift in line with deinstitutionalisation and its community-based approach. Smoke-free environments can promote a sociocultural change for patients, workers and institutions (Das & Prochaska, 2017). Nonetheless, relying solely on safe environments through these policies may prove insufficient. Addressing withdrawal symptoms in smoke-free areas, ideally with both pharmacotherapy and psychosocial interventions is crucial for overcoming addiction (Das & Prochaska, 2017; Williams & Foulds, 2007). However, tobacco dependence remains underestimated compared to other mental health disorders leading to insufficient diagnostic assessments, pharmacological prescriptions and psychosocial interventions for smokers with psychiatric disorders (Bernstein et al., 2013; Aubin et al., 2012; Thorndike et al., 2001).

Henceforth, the current research assesses the effect of the above-mentioned interrelated mechanisms moderated by the smoke-free policy on the complex inpatient population of the UMC Hospital. Comparing the period before and after the implementation of the policy between 1 July 2017 and 27 February 2024. In the subsequent paragraphs, the research questions are stated.

Firstly, using retrospective data, one of the first objectives of this study is to quantitatively describe the individual characteristics (smoking status, number of diagnoses, gender, and age) of the mentioned cohort of inpatients to obtain an overall view of this population. Aiming to answer the following descriptive questions: *After the policy, during the initial assessment of freedom, has there been a rise in the number of non-limited freedom permits? Also, in inpatients with nicotine replacement prescriptions and smoke-related incidents?*

Secondly, a multilevel binary regression analysis is conducted to demonstrate that the relationships mentioned are substantial and not because of other preexisting differences between inpatients. The strength of a series of predictors, including the implementation of the policy as a moderating variable is tested over time, aiming to answer the following explanatory question: *To what extent does the impact of the smoke-free policy increase the overtime likelihood of obtaining non-limited psychiatric permits and prescribed nicotine replacements across inpatients' stay?*

Lastly, the study tackles the following policy question: *Based on the provided results, what measures can be considered to improve the current practices of the UMC Hospital in addressing tobacco use disorder among the psychiatric population?*

2. Theory

This section reviews the literature on the multifaceted concept of freedom, contextualizing within a psychiatric setting, the distinctions between freedom permits, leave of absence, and constraints on physician agency. Subsequently, the different hospital's psychiatric clinic approaches to implementing smoke-free policies are compared. Then the attention shifts to the impact of smoke-free policies on deconstructing the tobacco concept. Finally, previous literature evaluating smoke-free policies is applied to the studied psychiatric context.

2.1 Comprehensive Smoke-free Policy Impact on Inpatients' Freedom

Historically, there has been a long debate about the freedom of psychiatric patients, being influenced by disorders' impact on cognitive abilities and decision-making. Two main discussions arise: the fairness of compulsory admission and treatment, and whether a patient's freedom with DD is determined by addiction or agency. Nonetheless, this section does not aim to resolve these dilemmas. On the former, the present research takes a stance on conditions for compulsory medical care of the Dutch Compulsory Mental Healthcare Act or "WVGGZ" (see Art. 3:4 in the Appendix). To address the latter, freedom is acknowledged as "a function of how much choice a person is left by his or her overall context, human and natural" (Pettit, 2003). A function measured by both freedom of choice and rational agency. Freedom of choice implies the availability of a range of options and rational agency, the ability to act under one's intentions or will, even though we are not entirely rational beings (Schwab, 2006). Kelly (2006) identifies that the erosion of both with psychiatric disorders can occur due to various constraining and interconnected factors, which in the current population would be: (a) a range of different symptoms; (b) external forces, such as the mental health care systems and for example its "freedom permits"; and lastly (c) societal attitudes or norms towards people with mental health disorders.

Once freedom has been defined, for the sake of clarity and to avoid confusion, it is convenient to differentiate between "freedom permits" and "leave of absence". Both are legally established in the WVGGZ, as coercive interventions under the umbrella term "compulsory care" (see Art. 3:2 in the Appendix) and regulated by the responsible clinician in consultation with the patient and their relatives. The term "freedom permits"

refers to instances where an inpatient temporarily exits the ward for a specified duration, typically less than two hours for adults. These periods of freedom are designed to provide inpatients with brief breaks from the confines of the ward, facilitating activities such as short walks. Conversely, a "psychiatric leave of absence" refers to a longer departure from the ward, exceeding two hours. However, it is the first namely "freedom permits" that is relevant to the present research.

According to UMC psychiatric protocols, these freedom permits range from more to less freedom and are classified into four levels: green, yellow, orange, and red. On the one hand, non-limited permits include green and yellow permits. The green allows inpatients to leave the ward unaccompanied and smoke outside UMC's premises. Yellow is the next one, this requires accompaniment by medical personnel or family, but smoking is only allowed if accompanied by family to avoid second-hand smoke exposure for the staff. On the other hand, limited permits do not allow smoking under any circumstances. These include the orange permit, which allows inpatients to go outside only under staff supervision, and the red permit, which restricts inpatients to internal patios within the psychiatric unit.

The implementation of the comprehensive smoke-free policy at UMC brought about significant changes for smoking inpatients, as since the implementation they were no longer permitted to smoke within the hospital premises. The previous smoking policy allowed them to smoke in internal psychiatric unit areas, regardless of their permit level. Therefore, its implementation altered how smoking inpatients viewed freedom permits, now seeing them as opportunities to smoke rather than as breaks for a healthy lifestyle. Consequently, the policy indirectly impacted the UMC freedom permit protocol, as only green and yellow permits allow inpatients to leave the premises, thereby permitting smoking.

According to UMC protocols, psychiatric freedoms should be assessed upon patient admission with green permits generally granted, unless specific restrictions apply (Art. 2:1, 2020). Granting them would be aligned with contemporary approaches promoting patient well-being, supported by literature on psychosocial interventions, social inclusion and integration, and community-based approaches (World Health Organization, 2022; De Silva et al., 2013; Priebe et al., 2014; Segal & Moyles, 1979). Moreover, this shift in UMC's protocols would reflect an application of global mental health trends and represents a departure from Goffman's "total institution" concept (1961).

When exploring the reasons behind the increase in psychiatric freedom, it is crucial to recognise that this phenomenon cannot be attributed solely to hospital protocol changes or coincidental improvements in health. Instead, it may also be due to inpatients' need to go outside to smoke. This situation raises the following three potential mechanisms.

Firstly, as mentioned before, the protocol stipulates green permits upon admission, but in practice, it depends on the timing of the freedom assessment. Therefore, when assessments cannot be conducted, inpatients are encouraged to have limited permits. This is common, on a night shift to mitigate potential risks until the next permit assessment. When this occurred before the policy, inpatients accepted limited permits more readily as they could smoke on hospital grounds. However, since the policy, smokers may be more reluctant. Consequently, staff responsible for admissions may feel pressured to grant non-limited permits to avoid dissatisfaction.

A second scenario could involve granting non-limited permits to prevent nicotine withdrawal symptoms. Limited permits confine inpatients within the hospital premises without the possibility to smoke. Consequently, staff conducting freedom assessments may tolerate the individual to continue smoking rather than dealing simultaneously with nicotine withdrawal symptoms and other possible psychiatric symptoms. Perhaps unknowingly, the clinicians may be tolerating smoking as a condoned coping mechanism (see the next theory chapter).

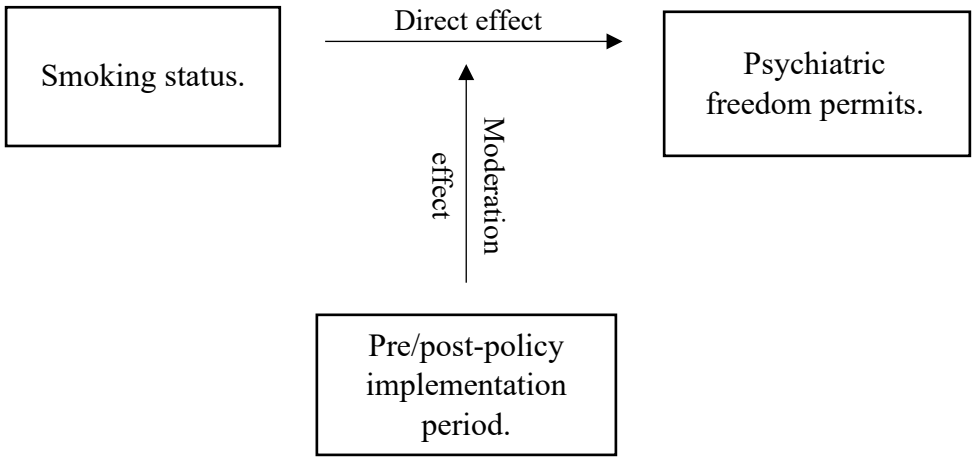
Moving to the next mechanism, a different type of constraint on freedom emerges, this time on the physician's agency rather than the inpatient's. Comparing the agency of inpatients to that of physicians, some may perceive the primary distinction as the presence of limitations in the former and the absence in the latter, but such a differentiation is not that accurate. Despite practitioners' decisions seeming autonomous and rational compared to those of inpatients, the heuristics and biases of human decision-making may undermine their independence and rationality. These biases stem from bounded cognition and can only be corrected if are identified as risks in decision-making processes (Schwab, 2006).

Following this line of argumentation, in protocols, decision trees are commonly utilized to guide managing the admission of smoking patients. Typically, medical practitioners ask about the patient's smoking behaviour during the intake and if necessary, at follow-up appointments. However, when this inquiry precedes the assessment for granting

freedom permits, a potential bias arises. In this context, it is important to clarify that the term "bias" does not imply prejudice but instead refers to specific patterns of thinking or mental shortcuts that lead to inaccurate decisions, which would not be based solely on objective criteria. Concretely, this type of bias can be categorised as anchoring bias. This bias occurs when individuals rely too heavily on the first piece of information encountered (the "anchor") when making decisions or assessments. In this scenario, asking about smoking behaviour before assessing the permit acts as an anchor, biasing the assessment. The smoke-free policy combined with the inpatients' necessity to have non-limited permits to smoke might favour the emergence of this bias.

These three mechanisms described above are what prompt a relationship between being a smoker and the psychiatric freedom permits, illustrated in Figure 1. Establishing a freedom gap between smokers and non-smokers during their hospitalisation.

Figure 1. Smoking-status-psy-permit relationship path model



By means of the above mechanisms, the following hypotheses are drawn:

H1. Inpatient smokers tend to have more non-limited freedoms compared to inpatient non-smokers.

H2. Post-policy inpatients have more probability of receiving non-limited permits compared to before implementation.

H3. Post-policy smokers have more probability of receiving non-limited permits compared to before implementation.

The emergence of this association, moderated by the policy, suggests a potential new approach to implementing comprehensive smoke-free policies in psychiatric clinics.

2.2 The Combined Smoke-free-dom-permit Approach

Three potential approaches emerge in implementing smoke-free policies in psychiatric settings without a similar protocol of freedom permits. The first scenario grants complete freedom to smokers to go outside the hospital premises. This approach is acknowledged as discriminatory because it perpetuates the socio-economic and health inequalities of smokers (Allen et al., 2014). Similarly in the second scenario, the policy allows for exceptions for smoking in designated internal areas. This scenario represents the tobacco policy previously implemented at the psychiatric clinic of UMC, before the current implementation and in addition, raises concerns about second-hand smoke exposure. Lastly, inpatients could be confined within the psychiatric unit, completely prohibiting them from smoking. This approach would only admit individuals who intend to quit smoking, potentially excluding smokers who wish to continue and are not motivated to quit, thereby discouraging them from seeking psychiatric admission.

These approaches contrast with the UMC's psychiatric setting, which has a protocol of freedom permits in place. Therefore, after the policy, a blend of strategies emerged, establishing a combined approach which will be referred to as smoke-free-dom-permit. This allows for a middle ground, ensuring a gradual and less disruptive implementation of smoking limitations depending on the type of permit granted. Potentially mitigating specific challenges encountered in previous studies when implementing comprehensive smoke-free policies in psychiatric inpatient settings (Ratschen et al., 2009).

Acknowledging the deeply unique nature of inpatient recovery as a transformation process to achieve a fulfilling and hopeful life despite illness-related constraints (Anthony, 1993). The non-linear recovery system (Slade et al., 2014) of freedom permits allows for continuous and manageable monitoring and evaluation of inpatients' behaviour and health status. Increasing dialogue between clinicians and inpatients during such assessments by emphasising a collaborative therapeutic relationship (Fulford & Handa, 2021; Slade, 2017). As their condition improves, more non-limited permits are granted with tailored personalised treatment and interventions with recovery-oriented approaches (Coulter et al., 2015; Leamy et al., 2011).

Despite these benefits, several precautions must be taken, as tobacco remains a socially accepted addiction, which until recently (DSM-5) was not classified as a substance use disorder (Shmulewitz, et al., 2022).

2.3 Comprehensive Smoke-free Policy Impact on Prescribed Nicotine Replacements: The Social Deconstruction of Tobacco

From a medical perspective, tobacco use is considered irrational behaviour, responsible for over 8 million deaths annually, making it a leading preventable cause of premature death worldwide (World Health Organization, 2023). Despite its acknowledged lethality, tobacco remains popular, particularly among psychiatric patients (Office for Health Improvement and Disparities, 2024; Rajan et al., 2023; Heffner et al., 2011; Ziedonis et al., 2008).

This popularity was partly triggered by the tobacco industry's marketing (Wellman et al., 2006). Advertisements such as the Frank Statement to Cigarette Smokers (1954) denied smoking's health risks. Meanwhile, other marketing strategies associated it as a cool and attractive behaviour linked to socialisation, identity, freedom, or success (Poland et al., 2006; Wakefield et al., 2002), and bolstered them with research on tobacco's perceived benefits. These included relaxing in stressful situations and enhancing cognitive function, serving as a coping mechanism for smokers seeking relaxation and concentration (Valentine & Sofuoglu, 2018; US Institute of Medicine, 2001; Schelling, 1992).

The tobacco industry promoted in society a self-medication approach without a medical professional's advice or supervision in an attempt to relieve perceived psychological or physical symptoms. Moreover, marketing was infiltrated through the medical community, being initially accepted by them and to some extent encouraged in some studies, especially in psychiatric populations (Wood et al., 2013; Baker et al., 2004). Since then, smoking has been considered a condoned coping mechanism (Revell & Wesnes, 1985) influenced by several misconceptions which have led to special allowances, such as permitting smoking within psychiatric units. However, research refutes these beliefs, showing that many individuals with DD regret initiating smoking (Hammond et al., 2006; Clarke et al., 2001; Zullino et al., 2000), tobacco treatment is effective among them, cessation does not negatively impact other substance use disorder treatments instead could be beneficial in treating other SUDs (Van den Brink, 2019; Baca & Yahne, 2009; Prochaska et al., 2004), and withdrawal symptoms are usually temporary and followed

by improved mood (Keizer et al., 2019). Pro-tobacco messages have perpetuated social norms falsely attributing benefits and hence rationalising tobacco use. These messages target specific groups, especially younger people who are more likely to start smoking (Wakefield et al., 2002), while older people find it harder to quit (Kviz et al., 1995). Research shows women are more likely than men to see smoking as a coping mechanism and a strong motivator (Pang et al., 2015).

Nonetheless, smoking persists as a coping mechanism, representing a self-medicative strategy that aligns with the reductionist and medicalised paradigm inherent within the biomedical model (Deacon, 2013; Wade & Halligan, 2004). This serves as an obstacle that hinders and discourages efforts to promote smoking cessation, leading to insufficient attention to other plausible explanations (Schroeder & Morris, 2010; Ziedonis et al., 2008). The empirical landscape suggests that individuals engage in smoking behaviour as a means to mitigate unpleasant feelings and symptoms stemming from both withdrawal symptoms and stressors (Wise, 1988), which partially justifies the high prevalence among the studied population (Benowitz, 1999; Dalack et al., 1998). In fact, research shows that smoking is probably a cause of stress in smokers (Parrott, 1999).

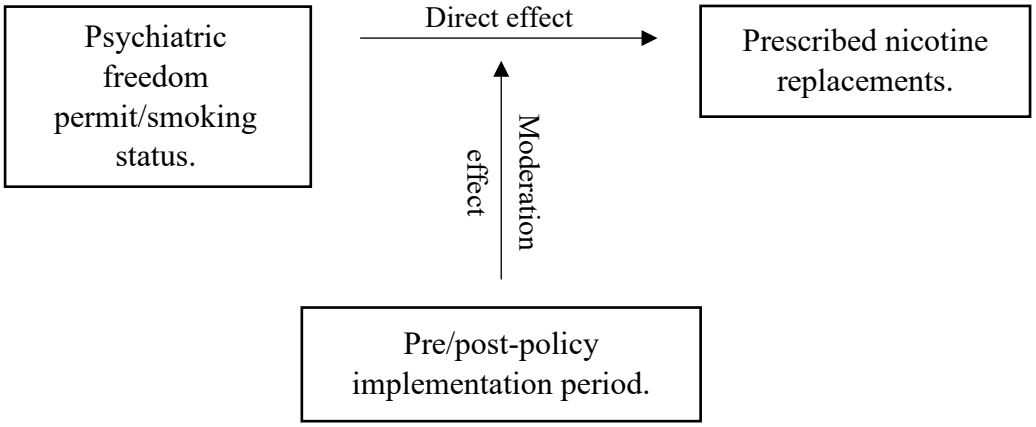
Fortunately, contemporary literature has exposed the tobacco industry's strategy, revealing the social construct of tobacco consumption (Poland et al., 2006; Ling & Glantz, 2002). Emerging literature has led to tobacco control policies that conflict with this social construct, making smoking socially unacceptable and fostering policy change. This social deconstruction of smoking, along with smoke-free policies, improves public health by encouraging smoking cessation and reducing smoking rates, especially among those with mental health disorders (US Office of the Surgeon General & Office on Smoking and Health, 2020; Hafez et al., 2019; Hammond et al., 2006; Netemeyer et al., 2005).

The comprehensive smoke-free policy implemented at UMC has led to improved practices in reducing tobacco consumption. Smokers requiring additional support to quit benefit from a combination of pharmacotherapy and psychosocial interventions (García-Gómez, 2019; Williams & Foulds, 2007). Interventions like motivational support and counselling (including 5Rs advice, motivational interviewing, or cognitive behavioural therapy) are employed for inpatients lacking motivation. If they remain unmotivated after these interventions, medical practitioners evaluate whether their condition is adequate to go outside the hospital to smoke. Those with no permission to smoke (orange and red permits) receive a treatment plan with prescribed nicotine replacement medications (such

as patches, lozenges, pills, bupropion, varenicline, or a combination), regardless of their motivation to quit smoking.

For these reasons, it is presumed that after the policy, there has been an increase in nicotine replacement prescriptions (see H4). In addition, the policy indirectly influences the protocol of freedoms, which in turn affects the prescription of nicotine replacements (see H5). These relationships are illustrated in Figure 2.

Figure 2. Psy-permit/smoking-status-prescriptions relationship path model



This leads to the following hypotheses:

H4. Post-policy smoking inpatients are more likely to receive nicotine replacements compared to inpatients pre-policy.

H5. Post-policy smoking inpatients who possess limited freedom permits have more probability of being prescribed nicotine replacements than those who possess greater freedom permits.

Despite shifts in tobacco's social construction, significant progress is still required. Social norms are resilient to change. By understanding this complexity, the chapter delves into the previous evaluations of smoke-free policies proposing a new relationship to assess its effectiveness.

2.4 Smoke-related Incidents and a Comprehensive Smoke-free Policy in a Psychiatric Setting

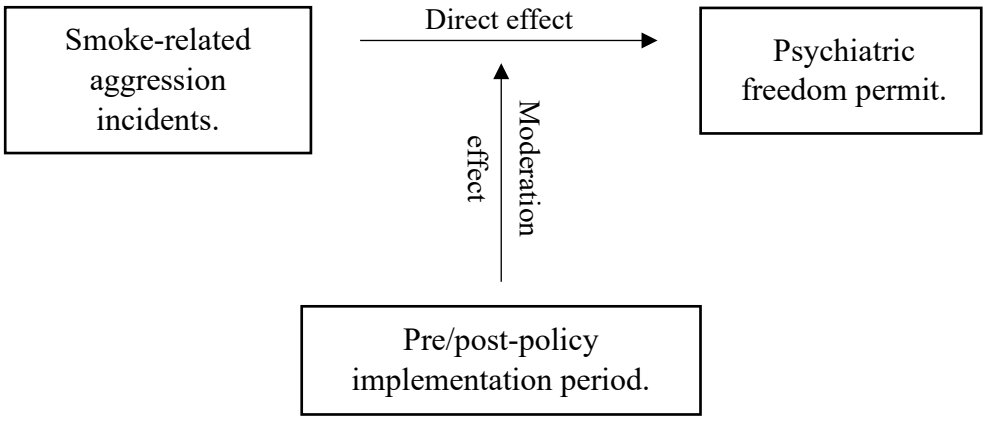
Previous evaluations of these policies in psychiatric units have primarily focused on their impact on incidents without considering any freedom protocol. Research indicates that

smoking prohibitions are not related to increasing aggression episodes in hospitals or smoke-free wards (Neven et al., 2019; Spaducci et al., 2018). This subsection goes beyond such evaluations, as in the early stages of significant change, either social, cultural or political, there is often resistance and reluctance in society, in line with the theory of social inertia (Grant et al., 2014). Based on this theory, the present research also assesses the establishment of the smoke-free-dom-permit approach to see whether a relationship with tobacco-related incidents appears.

After a tobacco-related incident, permits are reassessed to decide if the inpatient's freedom should be reduced. Serious incidents may lead to limited permits and conversely, inpatients without incidents may receive more freedom permits, always considering other health factors (see H9).

However, the policy particularly impacts smokers, as previously discussed, staff might grant greater freedom permits to prevent tobacco withdrawal symptoms, potentially endorsing smoking as a coping mechanism. Consequently, after a tobacco-related incident that involved symptoms like anger, frustration, and irritability, which are associated with both tobacco withdrawal and aggression (Hughes, 2007), staff might consider preventing them when reassessing freedoms. If inpatients exert pressure to smoke in this scenario, staff might be inclined to prevent future tobacco-related incidents by granting non-limited permits. This could involve a minimal reduction in permits or even inaction, allowing the inpatient to smoke (refer to H7 below).

Figure 3. Smoke-incident-psy-permit relationship path model



This leads to the following hypotheses:

H6. When inpatients have smoke-related incidents, they are more likely to have limited freedom permits.

H7. When smoke-related incidents are done post-policy, inpatients are more likely to receive non-limited freedom permits compared to pre-policy.

3. Methodology

3.1 Research Design and Population

The electronic patient dossiers (EPD) obtained from HIX; a clinical data repository utilised at UMC Utrecht, serve as the data source for the present research. The collaboration with the Psydata Department of the UMC has been vital for the collection and extraction of HIX data, as they possess the necessary authorisation to access the data in its RAW format. During the data transformation, automated text recognition techniques using machine learning were employed, alongside a pseudonymisation of patient information enabling the dataset for research analysis.

This clinical repository's longitudinal and ongoing collection data nature, often described as always-on nature (Salganik, 2018), allows inpatient records to be structured as panel data. Given this structure, a multilevel model analysis is appropriate as it can account for the nested nature of the data (daily observations nested within patients). Considering both within-patient variability over time and between-patient differences.

This dataset differs from typical datasets where a single case represents a patient. Instead, each inpatient has multiple observations that reflect their evolving condition on a day-to-day basis. These daily observations are recorded in the patient's digital records at HIX from admission to discharge. An example of these can be for example a change in the freedom permits; for instance, on day "x" an inpatient may have permit "a", and on day "y", the same inpatient may have permit "b". Variables such as this are characterised by variation throughout the hospital stay and are classified as time-varying factors (see Table 2). However, there are also variables with time-invariant data, obtained on patient's admission (see Table 1).

This panel dataset enables an evaluation of the smoke-free policy impact on the entire psychiatric adult population, including both voluntary and involuntary admissions. Inpatients under 18 years were excluded to ensure that laws prohibiting smoking did not influence the analysis. The dataset includes all adult patients admitted to UMC Hospital from July 1, 2017, to February 27, 2024, covering approximately six and a half years. This retrospective dataset spans three years and four months before and after policy implementation. Until October 31, 2020, inpatients could smoke inside the psychiatric department. However, from November 2020 onward, due to the implementation of the

smoke-free policy, smoking within the hospital premises was prohibited. These cohorts are analysed in subsequent sections to address the research questions effectively.

3.2 Operationalisation and Initial Tests

Inpatient data from HIX is collected when new observations about their condition occur, usually during psychiatric consultations and when on-duty nurses observe relevant information. Initially, this dataset only captured these specific observations. However, to utilise the dataset as panel data, all the implicit information between these observations was necessary. Implicit data spans from the day of one observation (x) to the day before the next change in observation (x+2); the day in between (x+1) is data that has not changed since the previous observation (x), hence implicit data. Using Python (see coding in the data package), the dataset was restructured accordingly. However, this method did not apply to all variables, as an incident on the day (x) does not imply an incident on the following implicit day (x+1). Therefore, for incident variables, implicit data was restructured as 0 to indicate no occurrence. This restructuring process expanded the dataset from 10,189 to 68,396 observations

Following this, regression assumptions were assessed to ensure the reliability of the analysis. Initially, all variables showed correlation coefficients below 0.8, indicating no issues with multicollinearity in the models. Linearity for continuous variables was confirmed next. Outliers were identified in smoke-related aggression incidents, non-smoke-related aggression incidents and the number of diagnoses at admission. While the first two variables were retained in their original form due to their importance and legitimate observations, the number of diagnoses underwent recoding. Further details on this recoding are provided in the subsequent section.

The treatments applied to the variables listed in Tables 1 and 2 are detailed below. It is important to note that dependent variables were recoded as dummy variables for analysis purposes. If necessary, see the data package for the syntax used for the following treatments.

3.2.1 Pre/post-policy implementation period.

This variable indicates the date when each inpatient's observation was uploaded into HIX. It discerns whether these observations occurred before or after the policy. Dates up to and including October 31, 2020, were designated as before the smoke-free policy

implementation (0), while dates from November 1, 2020, onwards were coded as after the policy (1).

Besides that, inpatients admitted before July 1, 2017, and discharged after were excluded. Similarly, no inpatients admitted before February 27, 2024, who had not been discharged before this date were included.

3.2.2 Smoking status at admission.

It describes whether inpatients are identified as either non-smokers (0) or smokers (1). In the initial dataset, quit attempts were treated as another category of the "smoking status" variable. These were treated as "smokers" and recoded accordingly.

3.2.3 Psychiatric freedom permits.

For the analysis, green and yellow permits, allowing smoking were recoded as non-limited psychiatric permits (1). Conversely, orange and red, prohibiting smoking, were recoded as limited psychiatric permits (0).

3.2.4 Prescribed nicotine replacements.

This variable indicates whether nicotine substitute replacements were prescribed (1) or not (0). Substitutes include patches, lozenges, pills, bupropion, varenicline or a combination. This variable is also a dummy but did not require recoding, as it was directly coded in a binary format.

3.2.5 Smoke-related aggression incidents.

This scale-measured variable describes the number of tobacco-related incidents per daily observation. Verbal aggression is included as an incident. Incidents were recorded when the words "tobacco", "smoked" "smoking", "nicotine", "smokes", "cigarette", and "smoking policy" appeared in the HIX description.

3.2.6 The number of diagnoses.

This scale variable ranges from 0 to 8 mental health diagnoses. Inpatients with 0 diagnoses do not indicate system errors or missing information in HIX, rather, their condition does not meet DSM criteria, such as psychiatric crises. Moreover, smoking status was not considered a diagnosis in the initial dataset. Therefore, smokers were

recoded with one more diagnosis, as tobacco use disorder is recognized by the DSM (Substance-Related and Addictive Disorders, 2022).

To prevent skewed results, inpatients with 7 and 8 diagnoses, identified as outliers, were combined with those having 6 diagnoses and categorized as having 6 or more diagnoses.

3.2.7 Gender and age at the admission.

The former variable was recoded as a dummy variable, where 0 men and 1 represents women. The latter variable was maintained in a continuous scale format.

3.3 Data Limitations

During data processing, several limitations emerged that require attention. In the smoking status variable, a significant number of missing values were present, posing challenges for analysis. Consequently, inpatients with missing values across all daily observations were excluded, removing 846 inpatients (31.9% of the initial population). Additionally, some inpatients had missing values within their observations, initially unknown upon admission but later updated. To address this, missing values were recoded based on available information from other observations of the same inpatient, affecting 586 observations across 299 inpatients. In smoke-related incidents, a single non-smoker was identified. Since the variable was intended only for smokers, this inpatient was removed from the dataset.

Another limitation to consider is potential bias in data extraction. The current dataset relies on staff for data upload to the clinical repository. If details were omitted, particularly for tobacco-related incidents, it is impossible to confirm if incidents are tobacco-related. Outliers in incident variables support this concern, but verification is not feasible due to the extensive data volume.

Additionally, errors could have occurred during the automated text recognition process used for data extraction from HIX. This method depends on identifying specific words, which could lead to inaccuracies. To mitigate these issues, the “smoking status” variable was treated as constant throughout the hospital stay.

3.4 The Analysis Strategy

Firstly, two descriptive statistics tables (Table 1 and Table 2) summarize the dataset, providing insights into the central tendency, dispersion, distribution, and variability of each variable.

Next, binary logistic regressions employing a multilevel model analysis are conducted to address the research objectives. The goal is not to predict the odds of an event (e.g., permit freedom) at a single moment during a patient's stay, but across all days of hospitalisation, considering that daily observations (level 1 units) are nested within inpatients (level 2 units). The hypothesis testing strategy is as follows:

An initial intercept-only model (M_0) assesses non-independence within inpatients on various outcome variables. The first model (M_1) includes the main predictor and the moderator variable identified in the theoretical framework (Figures 1, 2, 3). Control variables are added in the second model (M_2) to validate identified relationships. A third model (M_3) examines the moderating effect by introducing an interaction term. In all models, the random intercept (patient ID) is included to account for individual variations.

4. Results

4.1 Initial Descriptive Statistics

After data treatment, the final dataset consisted of 1,801 hospitalised patients (N) and 68,396 daily observations throughout their stay. Both are shown respectively in Tables 1 and 2. The descriptive statistics presented are grouped according to the nature of the variables in this dataset, classified into "time-varying factors" and "time-invariant factors". On the one hand, Table 1 shows time-invariant factors that imply constant characteristics for each patient during their stay.

Table 1. Descriptive statistics of time-invariant factors

	N	Min	Max	Mean	S.D.
Pre/post-policy implementation period.	1,801	0	1	.499167	-
Smoking status at admission.	1,801	0	1	.747362	-
The number of diagnoses at admission.	1,801	0	6	2.3315	1.094
Gender at admission.	1,801	0	1	.4986	-
Age at the admission.	1,801	18	90	40.19	16.110
Psychiatric freedom permit at admission.	1,801	0	1	.39533	-
Prescribed nicotine replacements.	1,347	0	1	.19079	-
Number of smoke-related incidents.	1,347	0	3	.04305	.23995

Source: Own elaboration based on data from HIX, UMC Utrecht.

The population studied from 1/07/2017 to 27/02/2024 is described in the following paragraphs. First, it is worth mentioning that for the variables "prescribed nicotine replacements" and "number of smoke-related incidents", only smokers and their stays are shown, as these variables are intrinsic to smokers. This resulted in 1,347 smokers with 52,094 daily observations (see Table 2).

The proportion of gender shows a nearly equal representation of both, with no gender imbalance (mean=.50, min=0, max=1). Regarding age at admission, it spanned from 18 to 90 years with considerable variability but clustered around 40 years old (mean=40.19, min=18, max=90, SD=16.110). Observing smoking status, there was a majority (75%) of smokers within this psychiatric population (mean=.747, min=0, max=1). Concerning diagnoses, data reveals a mean of 2.33 diagnoses (min=0, max=6, SD=1.094), indicating that these inpatients on average had co-occurring disorders. Approximately 43,6% of the

population had exactly 2 diagnoses, but most ranged between 1 and 3 (mean±SD). Concerning the type of freedom permit received upon admission (mean=.39, min=0, max=1), 39.5% of inpatients were granted non-limited freedom permits. Lastly, the smoking intrinsic variables, showed that 19.1% of smokers received nicotine prescriptions throughout their stay (mean=.19, min=0, max=1) and 3.6% of inpatients had smoke-related incidents, specifically 49 inpatients (mean=.19, min=0, max=3).

On the other hand, in the following Table 2, time-varying factors are shown. These factors represent the inpatients' daily observations or updates in HIX throughout their stay. These vary between different inpatients, as illustrated in Table 1, and fluctuate over time throughout their psychiatric stay.

Table 2. Descriptive statistics of time-varying factors

	Daily observations	Min	Max	Mean	S.D.
Hospitalisation days between periods.	68,396	0	1	.477732	
Psychiatric freedom permit.	68,396	0	1	.745321	-
Prescribed nicotine replacements.	52,094	0	1	.178600	-
Number of smoke-related incidents.	52,094	0	3	.001938	.04972

Source: Own elaboration based on data from HIX, UMC Utrecht.

When looking at the data in Table 2, the first thing to note is that there were 68,396 daily observations during the period under study. This represents the total number of days of all patients' hospitalisations, from admission to discharge, during the period under study.

Firstly, concerning freedom permits, 75% of the patients' stay was with a non-limited permit (mean=.75, min=0, max=1). Specifically, the most used permit was green on approximately 60.8% of the days. This was followed by red with 21.7%, yellow with 13.8%, and orange with 3.7%.

Regarding nicotine replacement prescriptions, among these 6 and a half years, smokers had 17.9% of days with prescriptions (mean=.18, min=0, max=1).

Tobacco-related incidents occurred on 89 days, exhibiting minimal variability (mean=.0019, min=0, max=1, SD=.04972), they. More specifically, only 79 were counted as 1 incident, 8 days as 2 incidents and lastly, 2 days with 3 incidents.

4.1.1 Descriptive differences between periods

This subsection compares the statistically significant ($p<.05$) descriptives of both periods (see Tables 6, 7, 8, 9, and 10 in Appendix B), excluding smoke-related incidents and age variables ($p>.05$). Table 1 shows an equal distribution of inpatients before (1/07/2017 to 31/10/2020) and after the policy implementation (1/11/2020 to 27/02/2024). This means half were hospitalised before the policy and the other half occurred after, with no significant skew towards either period (mean=.499167, min =0, max=1). In Table 2, it can be seen the length of the stay of these patients, illustrated as daily observations. The duration of hospitalisation in post-policy was reduced (-8.4%), indicating that, on average, inpatients during post-policy stayed fewer days in the hospital (mean=.47, min=0, max=1). It is noteworthy to know that the following variables do not vary throughout patients' stay to mitigate any bias related to duration of stay. The time-varying variables are examined in the subsequent results section.

In the case of the gender distribution between periods, while Table 1 indicates an overall equal distribution, during post-policy admissions, there was a relative increase (15.05%) in the number of women and a decrease (-13.43 %) in the number of men (see Table 6 in Appendix B). Regarding diagnoses in Table 7, significant decreases were observed in categories 0 (-59,95%), 3 (-34.16%), 4 (-37.66%), 5 (-22.20%), and 6 (-9.16%). Conversely, categories 1 (19.30%) and 2 (32.56%) showed increases in their relative distribution. Concerning smoking status at admission in Table 8, non-smokers increased (18.34%), while smokers decreased (-5.82%) in their proportions compared to pre-policy.

Regarding the type of freedom permit received upon admission in Table 9, there was a relative increase (51.89%) in non-limited inpatients compared to pre-policy. Conversely, there was a decrease (-23.94 %) inpatients granted limited. Lastly, Table 10 shows a comparison between periods for the prescription of nicotine replacements with a reduction (-22.06%) in smokers who did not receive replacements and an increase (557.58%) in smokers who did receive them.

4.2 Binary Regression Using Multilevel Model Analysis

In the present section, four different tables are shown to test the existence of a series of hypotheses among the UMC psychiatric population. Multilevel modelling is appropriate for analysing these relationships, considering daily observations (as a level 1 identifier) nested within inpatients (as a level 2 identifier).

It is important to remark that the random intercept variance across all models remained significant highlighting the importance of accounting for inpatient-level differences in the analysis. This finding reveals that while the included predictors explain part of the variability, other individual differences between inpatients not included in the models likely play a significant role in predicting both outcomes.

Table 3 shows the results of the analysis of Figure 1. A multilevel model using binary logistic regression was conducted to evaluate the influence of several factors on the probability of inpatients obtaining either a limited or non-limited freedom permit. As outlined above, the final model contained six independent variables, including an interaction term (smoking status, the policy implementation period, diagnoses, gender, and age).

Table 3. Binary logistic regression on obtaining non-limited psychiatric freedom permits (see Figure 1)

	M_0: Intercept-only		M_1		M_2		M_3	
	Coef. (S.E.)	Exp(B)	Coef. (S.E.)	Exp(B)	Coef. (S.E.)	Exp(B)	Coef. (S.E.)	Exp(B)
Fixed part:								
Intercept	1.977***(.0580)	7.218	2.014***(.1225)	7.494	2.304***(.2193)	10.010	2.021***(.2330)	7.543
Smoking status at admission (smoker)			.084(.1268)	1.088	.200(.1422)	1.222	.583***(.1733)	1.792
Policy period (post-policy)			-.199*(.0949)	.819	-.210*(.0953)	.811	.390*(.1817)	1.478
Diagnoses at admission					-.104(.0585)	.901	-.107(.0590)	.899
Gender at admission (woman)					.070(.1183)	1.072	.057(.1194)	1.059
Age at the admission					-.004(.0036)	.996	-.004(.0037)	.996
Interaction *(smoking status x policy period)*							-.822***(.2094)	.439
Random part:								
Random intercept (patients-ID) $\sigma^2_{\mu_{0j}}$	4.898***(.208)		4.958***(.213)		4.967***(.213)		5.057***(.219)	
Deviance (-2LL)	361,642.703		361,642.703		361,835.362		361,835.362	

p<.05: *, p<.01: **, p<.001: *** Source: Own elaboration based on data from HIX, UMC Utrecht. N: 68,396.

Firstly, the intercept-only model (M_0) shows significantly positive log odds (B=1.977, Exp(B)=7.218, p<.001) of obtaining a non-limited freedom permit. This indicates a high baseline probability when no predictors are included, suggesting there was clustering in the data. In general, the unconditional probability of an inpatient receiving a non-limited permit was 87,8% (7.218/(1+7.218)).

When examining the effects in M_1 and M_2, the policy variable was negatively and significantly associated with obtaining a non-limited freedom permit (B=-0.199, Exp(B)=0.819, p<.05), similarly in M_2 (B=-0.210, Exp(B)=0.811, p<.05). This association indicates that post-policy inpatients were less likely to obtain a non-limited freedom permit compared to inpatients hospitalised pre-policy. Therefore, hypothesis H2 (*post-policy inpatients have more probability of receiving non-limited permits compared to before implementation*) can be rejected. On the other hand, smoking status, although not significant (B=0.084, Exp(B)=1.088, p>.05) increased the strength when the controls were added (B=0.200, Exp(B)=1.222, p>.05). Since the effect of smoking status at admission is not statistically significant, is not possible to confidently accept the hypothesis H1 (*inpatient smokers tend to have more non-limited freedoms compared to inpatient non-smokers*) of Figure 1 without considering the interaction effect. Nonetheless, when the interaction term is included in M_3, it demonstrates that the effect of smoking status on obtaining a non-limited freedom permit is moderated by the policy implementation period (B=-.822, Exp(B)=.439, p<.001), providing evidence to support H1 only before the policy.

Overall, the above results show that being a non-smoker during the pre-policy period had the lowest odds of obtaining a non-limited freedom permit (Baseline log odds=2.018). On the other hand, smokers during the pre-policy, had the highest log odds of both periods, indicating they were the most likely to obtain a non-limited freedom permit (2.018+.583= 2.601).

Moving on to the next period, smokers had lower log odds post-policy than pre-policy, indicating a significant reduction in the likelihood of obtaining a non-limited freedom permit due to the policy effect (2.018+.583+.389-.822=2.17). On the other hand, non-smokers had the second-highest log odds (2.018+.389=2.407). The remaining hypothesis H3 (*post-policy smokers have more probability of receiving non-limited permits compared to before implementation*) can also be rejected since smokers during pre-policy had the largest log odds (2.601) compared to post-policy (2.17).

Next, Table 4 is an extension of the above table to test the relationships in Figure 3. In this case, all the variables used in Table 3 are included. Moreover, a new smoking-related incident variable and a new interaction are added to assess their influence on the probability of inpatients obtaining a non-limited freedom permit. This new interaction is

cross-level, as the smoke-related incidents vary between daily observations and inpatients.

It should be noted that from now on, the remaining two regressions only include smokers' daily observations (52,094) since only they can do either smoke-related incidents or receive nicotine replacement prescriptions.

Table 4. Binary logistic regression of smokers on obtaining non-limited psychiatric freedom permits (see Figure 3)

	M_1		M_2	
	Coef. (S.E.)	Exp(B)	Coef. (S.E.)	Exp(B)
Fixed part:				
Intercept	2.597***(.2675)	13.424	2.596***(.2675)	13.413
Policy period (post-policy)	-.425***(.1104)	.654	-.426***(.1104)	.653
Number of smoke-related incidents	-1.007***(.2905)	.365	-1.218*(.5000)	.296
Diagnoses at admission	-.120(.0658)	.887	-.120(.0657)	.887
Gender at admission (woman)	-.060(.1371)	.941	-.060(.1371)	.941
Age at the admission	-.001(.0042)	.999	-.001(.0042)	.999
Interaction cross-level *(smoke-related incident x policy period)*			.321(.6180)	1.378
Random part:				
Random intercept (patients-ID) $\sigma^2_{\mu_{0j}}$	4.950***(.250)		4.949***(.250)	
Random slope (Smoke-related aggression incidents) $\sigma^2_{\beta_{0j}}$	.602(.634)		.632(.682)	
Deviance (-2LL)	274,938.040		274,935.020	

p<.05: *, p<.01: **, p<.001: *** Source: Own elaboration based on data from HIX, UMC Utrecht. N: 52,094.

Since Table 4 is an extension of Table 3, the intercept-only model and its interpretation can be seen in Table 3. M_1 differs from Table 3 in that both the fixed effect and the random slopes for the smoke-related incidents are added. Although the smoke-related incidents random slope was not significant (B=.602, p>.05), it was significant when looking at the fixed effect (B=-1.007, Exp(B)=.365, p<.001). This indicates that increasing smoke-related incidents were associated with a significantly lower likelihood of obtaining a non-limited freedom permit. Thus, we can conclude that hypothesis H6 of Figure 3 (*when inpatients have smoke-related incidents, they are more likely to have limited freedom permits.*) is accepted. Regarding the random slope, the non-significant effect suggests that there is no significant variation across inpatients. In other words, the impact of smoke-related aggression incidents is relatively consistent across different inpatients.

After considering the cross-level interaction in M_2, the positive and non-significant coefficient (B=.321, Exp(B)=1.378, p>.05) suggests that the relationship between smoke-related incidents and the likelihood of obtaining a non-limited freedom permit is

consistent across both periods. Therefore, H7 (when smoke-related incidents are done post-policy, inpatients are more likely to receive non-limited freedom permits compared to pre-policy) must be rejected.

Table 5 presents the results testing the relationships illustrated in Figure 2. In this case, a second multilevel model using binary logistic regression was carried out to assess the impact of six factors (psychiatric freedom permit, the policy implementation period, diagnoses, gender, age and an interaction term) on the likelihood of inpatients being prescribed nicotine replacements.

Table 5. Binary logistic regression of smokers on obtaining prescribed nicotine replacements (see Figure 2)

	M_0: Intercept-only		M_1		M_2		M_3	
	Coef. (S.E.)	Exp(B)	Coef. (S.E.)	Exp(B)	Coef. (S.E.)	Exp(B)	Coef. (S.E.)	Exp(B)
Fixed part:								
Intercept	-4.051***(.1430)	.017	-7.977***(.3172)	.0003	-8.056***(.7288)	.0003	-8.386***(.7416)	.0002
Psychiatric freedom permit (non-limited permit)			.620***(.0985)	1.859	.627***(.0988)	1.872	1.058***(.2055)	2.880
Policy period (post-policy)			5.445***(.3305)	.231.613	5.801***(.3510)	330.474	6.239***(.3983)	512.191
Diagnoses at admission					.611***(.1659)	.1.842	.603***(.1658)	1.828
Gender at admission (woman)					-1.233***(.3526)	.292	-1.232***(.3519)	.292
Age at the admission					-.031**(.0110)	.969	-.031**(.0110)	.970
Interaction *(Psychiatric freedom permit x Policy period)*							-.563*(.2344)	.570
Random part:								
Random intercept (patients-ID) $\sigma^2_{\mu_{0j}}$	18.157***(.867)		19.778***(.1.083)		19.361***(1.077)		19.335***(1.074)	
Deviance (-2LL)	396,812.088		438,240.511		444,524.854		444,989.902	

p<.05: *, p<.01: **, p<.001: *** Source: Own elaboration based on data from HIX, UMC Utrecht. N: 52,094.

In this case, the intercept-only model shows significantly negative log odds (B=-4.051, Exp(B)=.017, p<.001) of being prescribed nicotine replacements, indicating a low baseline probability when no predictors were included (1.7%).

When control variables were added in M_2, both psychiatric permits (B=.627, Exp(B)=1.872, p<.001) and policy periods (B=5.801, Exp(B)=330.474, p<.001), remained significant and with considerable explanatory power. Indicating the acceptance

of H4 of Figure 2 (*post-policy smoking inpatients are more likely to receive nicotine replacements compared to inpatients pre-policy*).

When the interaction effect was included (M_3), a significant and negative coefficient appeared (B=-.563, Exp(B)=.570, p<.05), suggesting that the influence of psychiatric freedom permits on the prescription of nicotine replacements was subjected to moderation.

The other control variables remained all significant. From more to less explanatory power, gender indicated that women were less likely to be prescribed nicotine replacements compared to men (B=-1.233, Exp(B)=0.292, p<.001). Followed by the number of diagnoses, suggesting that as more diagnoses there are increasing odds of receiving prescriptions (B=.603, Exp(B)=1.828, p<.001). Finally, age, although a weak predictor, is still significant (B=-.031, Exp(B)=1.828, p<.001), implying that as more age, the less are the odds of receiving prescriptions.

Based on the above results, pre-policy smokers with non-limited freedom permits (-8.386+1.058=-7.328) had higher odds of being prescribed nicotine replacements compared to those with limited permits (Baseline log odds=-8.386). Post-policy, all smokers regardless of their psychiatric permit were more likely to have prescriptions. However, despite this increased probability of prescribing replacements for both groups, smokers with limited freedom still had less likelihood of receiving them (-8.386+6.239=-2.147) than those with non-limited permits (-8.386+1.058+6.239- .563=-1.652), refusing H5 (*post-policy smoking inpatients who possess limited freedom permits have more probability of being prescribed nicotine replacements than those who possess greater freedom permits*).

5. Discussion

The current study aimed to assess the impact of the UMC Hospital's comprehensive smoke-free policy by comparing the cohorts of psychiatric admitted inpatients before and after the policy. In general, the results indicated that the smoke-free policy significantly affected the likelihood of obtaining both psychiatric freedom permits and prescribed nicotine replacements.

By addressing the descriptive questions, the findings demonstrated that in both periods inpatients generally received more limited permits (orange and red) upon admission. However, after the policy, non-limited permits (green and yellow) increased, while limited permits decreased, narrowing the difference. Indeed, most of the days of inpatients' stays were with non-limited permits. These findings are aligned with hospital protocols and suggest Goffman's "total institutions" concept is outdated, and more contemporary conceptions should be used (Chow & Priebe, 2013). Furthermore, this finding corroborates the perception of an increase in non-limited permits, as noted by staff in previous studies (Van den Berg et al., 2024). Additionally, since the policy, there has been an increase in nicotine replacement prescriptions, despite fewer smokers compared to pre-policy. Lastly, there were no significant differences in smoke-related incidents between the two periods.

When evaluating the impact of the policy on obtaining non-limited psychiatric permits throughout patients' stays, the findings indicated that pre-policy smokers had the highest probability of obtaining non-limited freedom permits compared to non-smokers (both before and after the policy). However, the most relevant is that the results confirm the comprehensive smoke-free policy as a catalyst for change in receiving non-limited permits, particularly for smokers. Specifically, the policy effect decreased the likelihood of smokers obtaining these permits to the extent that non-smokers surpassed them in probability.

Furthermore, although tobacco-related incidents were extremely rare, increasing smoke-related incidents were associated significantly with the obtention of limited permits. Moreover, the policy did not significantly affect the number of smoke-related incidents during patients' stays. These incidents did not change post-implementation or over time. This finding supports previous studies indicating that such policies do not increase incidents (Neven et al., 2019; Spaducci et al., 2018).

Considering these findings, the proposed mechanisms to justify a potential increase in non-limited permits post-policy are rejected. However, surprisingly, they are more likely to be true during pre-policy, as smokers in this period had the highest probability of obtaining non-limited permits. Therefore, during pre-policy, it is presumed that more non-limited permits were granted for smoking outside because smoking was allowed inside. Although paradoxical, it is possible that freedom evaluators had a similar aim as the smoke-free policy, protecting non-smokers from second-hand smoke. From this supposition, the policy would have relieved freedom assessors from granting extra non-limited permits to avoid indoor smoking. Contrasting to pre-policy, post-policy decisions in freedom assessments could be aligned with their conscious effort to aid all patients, including smokers. Furthermore, for those who were not sufficiently aware of smoking as a condoned coping mechanism, the institution's stance in applying the policy strengthens the social tobacco deconstruction. In addition, it encourages proactive attitudes, as by granting limited permissions to smokers, smoking is proactively prevented.

Therefore, the situations explained suggest three mechanisms during the pre-policy period. First, there are higher odds in pre-policy that evaluators were more susceptible to pressures. Similarly, smokers might have had higher probabilities of obtaining non-limited permits because staff tolerated smoking as a coping mechanism rather than addressing nicotine withdrawal concurrently. Lastly, there is a higher likelihood that the anchoring bias exists before the policy. When assessing freedoms, the concern about too many indoor smokers may have anchored assessors' decisions on whether smokers were in a proper condition to go outside to smoke.

Considering that post-policy non-smokers have a higher probability of receiving non-limited permits. It is widely known how beneficial increased freedom permits can be for supporting social inclusion, in line with deinstitutionalisation and its community-based approach (World Health Organization, 2022; Priebe et al., 2014; Segal & Moyles, 1979). However, for inpatients with tobacco use disorder, reducing rights and freedoms may be one of the first steps in addiction awareness and deconstructing the social perception of tobacco. This paternalism is considered legitimate and ethical if used to prevent harm and danger (Chow & Priebe, 2013; Sine, 2008).

Although it may seem that inpatients' freedoms are reduced, some argue otherwise (Schmidt, 2021), and their reasoning applies to the UMC's smoke-free policy. Firstly, the

policy enhances interpersonal freedom by reducing non-smokers' exposure to second-hand smoke, thereby improving overall freedom within the psychiatric clinic. Secondly, the argument that limited permits reduce inpatient freedom is less valid when considering long-term freedom. Smoking diminishes future freedom due to addiction, which reduces volitional autonomy and life expectancy. Lastly, public health concerns outweigh the momentary freedom of individuals, as smoking is a leading cause of preventable death. Therefore, granting limited permits addresses tobacco use disorder as a genuine chronic disorder (Campion et al., 2008), similar to inpatients with other SUDs such as opioids, marijuana, and alcohol. Thus, smokers are also protected, which is crucial in psychiatric settings, where smoking prevalence is high (Office for Health Improvement and Disparities, 2024; Rajan et al., 2023; Heffner et al., 2011; Ziedonis et al., 2008), concretely in this study 75% of the population were smokers.

The objective of the second part of the exploratory question was to determine whether the policy led to an increase in pharmacological prescriptions within this smoking psychiatric population. The results showed that the policy increased the prescription of nicotine replacements. Indicating that the smoke-free policy drives change by encouraging nicotine replacement prescriptions and reshaping the social perception of smoking as a negative behaviour. In contrast to prior research on smoke-free policies, which reported no increasing nicotine replacement therapies within psychiatric settings (Hollen et al., 2010). This suggests a bidirectional relationship between the social deconstruction of smoking and smoke-free policies, aligning with previous literature (US Office of the Surgeon General & Office on Smoking and Health, 2020; Hafez et al., 2019; Hammond et al., 2006; Netemeyer et al., 2005). In this sense, the effect of the policy in increasing prescriptions affects staff shaping their perception of smoking cessation in psychiatric inpatients, in line with research (Keizer et al., 2019; Van den Brink, 2019; Baca & Yahne, 2009; Prochaska et al., 2004).

Surprisingly, in both periods, inpatients with limited permits were less likely to receive prescriptions than those with non-limited permits. This suggests that inpatients with limited permits may have lower awareness and motivation to quit smoking, leading to a reduced likelihood of receiving prescriptions. Furthermore, a similar lack of motivation happens when being a woman and ageing, as it decreases the likelihood of receiving nicotine replacements. In terms of gender, women are more likely to use smoking as a coping mechanism compared to men (Pang et al., 2015), which could explain this

decrease. Regarding age, the chronic nature of addiction, where cessation becomes increasingly challenging over time, may play a significant role (Kviz et al., 1995).

Lastly, a higher number of diagnosed disorders tends to increase the possibility of receiving more prescriptions. This suggests that comorbidities in a psychiatric setting can result in higher odds of being prescribed nicotine replacements. Treating tobacco use disorder alongside other SUDs has been shown to lead to better outcomes, although careful monitoring for potential adverse reactions to multiple treatments is essential (Van den Brink, 2019; Baca & Yahne, 2009; Prochaska et al., 2004).

Overall, the smoke-free policy at UMC Hospital has effectively promoted smoking cessation and addressed smoking-related behaviours and social attitudes within psychiatric settings. It has played a significant role in diminishing self-medication practices, reducing its use as a coping mechanism, and highlighting tobacco use disorder as a critical chronic disorder. Implementing comprehensive smoke-free policies alongside a system of freedom permits, known as the smoke-free-dom-permit approach, ensures a gradual and less disruptive implementation of smoking prohibitions in psychiatric units. This approach supports a more bearable experience for inpatients, aligning with comprehensive recovery-focused and shared decision-making approaches (European Commission, 2023; Slade, 2017; Coulter et al., 2015; Slade et al., 2014). An approach that works as long as there is continuous monitoring and personalised management of inpatients' needs, behaviour, and health conditions to determine who can benefit from greater privileges without compromising their health and safety.

5.1 Limitations

Throughout the current study, several limitations were encountered, which are necessary to discuss (see also data limitations in the Methodology section). Firstly, the current study is limited to one single clinical centre. Although it involves longitudinal data throughout time, generalisations to other hospitals may not be entirely appropriate because of the particularities of the hospital under study. For future research, it would be interesting to see whether this is also the case in other psychiatric units.

It is also important to note that although the policy was found to significantly increase nicotine prescribing, this does not imply actual usage. During data extraction, it was found that this information was not systematically recorded in the clinical repository.

Consequently, it was not possible to determine whether nicotine substitutes were being used and the variable was limited to prescriptions. Further research should not only measure the pharmacological usage but also assess the influence of the number of psychosocial interventions and other recovery practices aimed at reducing tobacco use disorder.

6. Policy advice

Tobacco use disorder remains a significant challenge in psychiatric settings, where the prevalence of smoking is notably high. Effective management of this disorder is crucial not only for the physical health of inpatients but also for their mental well-being.

The UMC hospital has already implemented a comprehensive approach to support its psychiatric population with tobacco use disorder. This includes specialised training for healthcare professionals in tailored interventions to assist them through this process. Smoking cessation is consistently addressed during consultations to assess readiness, provide ongoing support, and emphasise its importance. Additionally, tailored psychosocial interventions such as motivational support and counselling are offered, which may include 5Rs advice, motivational interviewing, or cognitive behavioural therapy. Regarding pharmacological interventions, smokers who want to quit are prescribed replacements and those with orange and red permits are prescribed regardless of their motivation during hospitalisation.

After discharge, coordination between inpatient and outpatient services is crucial for addiction management and preventing relapses. Evidence indicates that in the absence of post-discharge support, smoking habits are likely to revert to pre-admission levels within two weeks (Prochaska et al., 2006).

From 2020, Dutch health insurers should have exempted frontline smoking cessation programs from the “own risk” excess. However, insurers can reconsider this measure if the financial impact proves to be greater than anticipated, as stated in the National Prevention Agreement. The Smoke-free Generation movement advocates for healthcare professionals in mental health and addiction treatment to initiate pilot projects, aiming to assist psychiatric patients in quitting smoking (Ministry of Health Welfare and Sport, 2019). However, there is currently no specific governmental policy designed for them. Currently, although Dutch health insurance typically covers one program per year including 12-week medication treatment with psychosocial interventions, it remains insufficient for the psychiatric population.

Despite research showing the need for specific treatments, there are still no policies in place to address their needs. On the one hand, research supports proactive multimodal (utilising combined pharmacological and psychosocial support) with longer duration and

greater intensity immediately upon discharge (Metse et al., 2014; Lemmens et al., 2008). Some found sustained tobacco-free success adding six additional months to the first three of nicotine replacement therapy (Horst et al., 2005).

On the other hand, implementing collaborative strategies to address the management of DD in mental health care has achieved greater prolonged abstinence (Metse et al., 2014). Furthermore, to enhance both outpatient and clinical practices, research indicates that breaking down the stages involved in smoking cessation programs allows for a more flexible and tailored approach to treating psychiatric populations (Hall et al., 2006).

Such staged interventions are easily applicable to the smoke-free-dom-permit approach, as both involve monitoring psychiatric inpatients for personalised management of their needs. Regarding the system of permits, the current research found that inpatients with limited permits were less likely to receive prescriptions for nicotine replacement. Therefore, adapting interventions to enhance motivation for inpatients with limited permits would be appropriate. Research indicates that including desirable incentives within interventions can increase motivation for smoking cessation (Renaud & Halpern, 2010). Accordingly, linking these interventions to permits could boost motivation to adhere to treatment and, consequently, improve their condition. Furthermore, research involving psychiatric patients indicated higher motivation to quit smoking upon exposure to messages emphasising the mental health benefits of cessation compared to those emphasising physical benefits (Steinberg et al.., 2024).

A similar lower probability of receiving prescriptions was observed with women and older inpatients, suggesting the need for the adoption of specific strategies incorporating gender and elderly perspectives. To enhance the motivation of these underrepresented groups and, ultimately, lead them to success in their cessation efforts.

To further enhance outcomes, efforts could focus on increasing the frequency of assessments for smoking cessation processes and meticulously documenting inpatient progress in digital dossiers.

As long as future research makes the most of these advances and decisions in governance networks are built on them, there is a promising future in finally tailoring the needs of patients with dual disorders thereby reducing the smoking prevalence of this population, increasing their life expectancy.

Appendices

Appendix A. (unofficial translations of selected articles of the WVGGZ)

Article 2:1

1. The care provider and the medical director offer sufficient possibilities for voluntary care, so as to avoid compulsory care as much as possible.

2. Compulsory care can only be considered as a measure of last resort, in case there are no possibilities for voluntary care anymore.

3. During the preparation, issuance, implementation, implementation, modification and termination of a crisis measure, authorisation to continue the crisis measure or care authorisation, compulsory care, including compulsory care in outpatient circumstances, proportionality, subsidiarity, effectiveness and safety assessed.

4. When preparing, issuing, implementing, amending and terminating a crisis measure, authorisation to continue the crisis measure or care authorisation, the conditions necessary to promote the participation of the person concerned in social life are taken into account.

5. During the preparation, implementation, modification and termination of a crisis measure, authorization to continue the crisis measure or care authorization, the wishes and preferences of the person concerned with regard to care are recorded.

6. The wishes and preferences of the person concerned with regard to compulsory care will be honoured, unless:

a. the person concerned is not capable of making a reasonable assessment of his or her interests in this regard, or
b. there is an acute danger to the life of the person concerned or there is a significant risk to another person of danger to life, serious physical injury, serious psychological, material, immaterial or financial damage, serious neglect or social loss, or of being seriously harmed in his development, or the general safety of persons or property is at risk.

7. The family, the immediate relatives of the person concerned and the general practitioner are involved as much as possible in the preparation, implementation, modification and termination of a crisis measure, authorization to continue the crisis measure or care authorization.

8. During the preparation, issuance, implementation, modification and termination of compulsory care, the possible adverse long-term effects of the compulsory care for the person concerned are taken into account in the assessment of subsidiarity, proportionality, effectiveness and safety and, if possible, with relevant experts discussed.

9. When preparing, issuing, implementing, changing and terminating compulsory care for children and young people, additional due care requirements are imposed, if necessary, and the possible adverse long-term effects of compulsory care on the physical and mental development of the person concerned and participation to society involved in the assessment of subsidiarity, proportionality, effectiveness and safety and, if possible, discussed with relevant experts.

Article 3:2

1. Care includes the care provided by a healthcare provider to the person concerned, which may consist of treatment, care, nursing, treatment, guidance, protection, security, and compulsory care as referred to in the second paragraph.

2. Compulsory care consists of:

a) providing fluids, nutrition and medication, as well as carrying out medical check-ups or other medical procedures and therapeutic measures, for the treatment of a mental disorder, or as a result of that disorder, for the treatment of a somatic condition;
b) limiting the freedom of movement;
c) containment;
d) carrying out supervision over the individual concerned;
e) examining clothing or body;
f) searching the housing or staying space for behaviour-modifying substances and dangerous objects;
g) checking for the presence of behaviour-modifying substances;
h) setting limits on the freedom to organize one's life, which results in the individual concerned having to do so or to omit something, such as the use of means of communication;
i) limiting the right to receive visitors;
j) admitting to an accommodation
k) depriving the individual concerned of his freedom by moving him to a place suitable for a temporary stay.

Appendix B. Descriptive crosstabs

Table 6. Differences in gender between policy periods

		Before the policy implementation	After the policy implementation	Total
Gender at admission	Man	484 (53.6%)	419 (46.4%)	903 (50.14%)
	Woman	418 (46.5%)	480 (53.5%)	898 (49.86%)
	Total	902 (50.1%)	899 (49.9%)	1,801 (100%)

Chi-Square tests statistically significant (p<.01) Source: Own elaboration based on data from HIX, UMC Utrecht. N: 1,801.

Table 7. Differences in diagnoses between policy periods

		Before the policy implementation	After the policy implementation	Total
The number of diagnoses at admission	0	20 (71.4%)	8 (28.6%)	28 (1.55%)
	1	156 (45.6%)	186 (54.4%)	342 (18.99%)
	2	337 (43%)	447 (57%)	784 (43.53%)
	3	237 (60.3%)	156 (39.7%)	393 (21.82%)
	4	114 (61.6%)	71 (38.4%)	185 (10.27%)
	5	27 (56.3%)	21 (43.8%)	48 (2.66%)
	6	11 (52.4%)	10 (47.6%)	21 (1.17%)
	Total	902 (50.1%)	899 (49.9%)	1,801 (100%)

Chi-Square tests statistically significant (p<.001) Source: Own elaboration based on data from HIX, UMC Utrecht. N: 1,801.

Table 8. Differences in smoking status between policy periods

		Before the policy implementation	After the policy implementation	Total
Smoking status at admission	Non-smoker	208 (45.8%)	246 (54.2%)	454 (25.21%)
	Smoker	694 (51.5%)	653 (48.5%)	1347 (74.79%)
	Total	902 (50.1%)	899 (49.9%)	1,801 (100%)

Chi-Square tests statistically significant (p<.05) Source: Own elaboration based on data from HIX, UMC Utrecht. N: 1,801.

Table 9. Differences in smoking status between policy periods

		Before the policy implementation	After the policy implementation	Total
Psychiatric freedom permit at admission	Limited permits (orange and red)	619 (56.8%)	470 (43.2%)	1089 (60.5%)
	Non-limited permits (green and yellow)	283 (39.7%)	429 (60.3%)	712 (39.5%)
	Total	902 (50.1%)	899 (49.9%)	1,801 (100%)

Chi-Square tests statistically significant (p<.001) Source: Own elaboration based on data from HIX, UMC Utrecht. N: 1,801.

Table 10. Prescription compared in pre-policy and post-policy periods

		Before the policy implementation	After the policy implementation	Total
Prescribed nicotine replacements	No nicotine replacement prescribed	660 (60.6%)	430 (39.4%)	1,090 (80.92%)
	Nicotine replacement prescribed	34 (13.2%)	223 (86.8%)	257 (19.08%)
	Total	694 (51.5%)	653 (48.5%)	1,347 (100%)

Chi-Square tests statistically significant (p<.001) Source: Own elaboration based on data from HIX, UMC Utrecht. N: 1,347.

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