Lisa Strada, Simone Korteling, Mark Vergeer, Nadine van Gelder,
Thomas Martinelli, Bethany Hipple Walters, Pieter Oomen

Trimbos instituut

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Medicinal use of non-prescribed cannabis: motives for use, perceived effectiveness, and barriers to treatment

MEDUSA project

Final report

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Netherlands Institute of
Mental Health and Addiction

Colofon

Project leader
Lisa Strada, PhD

Project co-initiator
Pieter Oomen, PhD

Co-authors
Simone Korteling, Mark Vergeer, Nadine van Gelder, Thomas Martinelli, Bethany Hipple Walters

Trimbos Institute

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Preface and author contributions

The MEDUSA research project represents over two years of dedicated work, driven by a shared commitment to understanding and improving access to prescribed cannabis in the Netherlands. This final report is the result of a collaborative effort to shed light on the experiences of individuals using non-prescribed cannabis for medicinal purposes.

The study was funded by Bedrocan International B.V. The funder had no role in the study design, collection, analysis, and interpretation of data, or writing of the report. This ensured the independence and integrity of the research, allowing our work to remain objective, unbiased, and focused solely on contributing to the growing body of knowledge in this field.

The project benefited from the expertise of a multidisciplinary research team. Simone Korteling conducted the data analysis presented in Chapter 1. Mark Vergeer provided methodological guidance for the quantitative components of the study, particularly in Chapter 1, and programmed the questionnaire used in that chapter. Nadine van Gelder and Thomas Martinelli carried out the coding and thematic analysis for Chapter 2. Nadine also conducted interviews for that chapter. Bethany Hipple Walters offered methodological expertise in qualitative research, guiding the approach taken in Chapter 2 and reviewing the themes for external validation.

The remaining work across all four chapters was undertaken by Lisa Strada and Pieter Oomen, who co-designed the overall study. Lisa developed the tools for Chapters 1 to 3, conducted interviews for Chapter 2, contributed to the data analysis in Chapter 1 and 2, analysed the data in Chapter 4, and wrote the final report with input from all authors. Pieter analysed the data and wrote the report for Chapter 3, and contributed to Chapters 1 and 4.

We would also like to acknowledge and thank a number of colleagues for their contributions to various aspects of this project. Nathalie Dekker and Robin Jansen helped adapt the questionnaire into plain language, Joris Staal and Sander Rigter supported the dissemination of the questionnaire, Lavinia Stegeman conducted a number of interviews, Sander Rigter and Iza Murading assisted with the registration of cannabis samples, and Maud Groothuizen provided extensive administrative support throughout the study.

Finally, we extend our sincere gratitude to the advisory board of the MEDUSA project for their thoughtful and invaluable contributions. Their expertise and guidance played a crucial role in shaping the research and ensuring its relevance to clinical practice and public health policy. The advisory board included:

Tom Decorte, PhD – Professor, Department of Criminology, Criminal Law and Social Law, Ghent University, Belgium

Albert Batalla, MD, PhD – Psychiatrist and researcher, University Medical Center (UMC) Utrecht, the Netherlands

Frédérique Bawin, PhD – Researcher, Department of Criminology, Criminal Law and Social Law, Ghent University, Belgium

Alex Fraser – Crohn's patient, medical cannabis advocate turned professional, working as Patient Access Lead with Grow Pharma, United Kingdom

Melissa Eikmann – Pharmacist, Transvaal Apotheek, the Netherlands

We hope this report will serve as a valuable resource for researchers, healthcare professionals, policymakers, and patient communities, contributing to a more equitable and informed approach to prescribed cannabis use.

Lisa Strada, PhD
Trimbos Institute

Summary

Rationale

Medical cannabis has been available by prescription in the Netherlands for over twenty years. Despite this, more than 90% of people who report using cannabis for medicinal purposes do so without a prescription. Instead, they self-medicate with cannabis products from unregulated sources, such as coffeeshops, home cultivation, and illegal dealers. From a public health perspective, this is concerning. Unregulated cannabis products may contain harmful contaminants, and the cannabinoid content is often unknown. In addition, without professional medical guidance, individuals miss out on crucial oversight that could help mitigate potential health risks. Identifying the barriers that limit access to prescribed cannabis is essential. Doing so will support the development of targeted interventions and policies to reduce these barriers and ensure patients have access to safe, effective cannabis-based medicines.

Aims

The overall aim of the MEDUSA study was to gain insight for the first time into the population of people who use non-prescribed cannabis-based products for medicinal purposes in the Netherlands, and to identify factors that impact access to treatment with prescribed cannabis. The study was divided into four work packages corresponding to four chapters in this report. Chapter 1 provides comprehensive insight for the first time into the characteristics, behaviours and motivations of individuals in the Netherlands who use non-prescribed cannabis for medicinal purposes. Chapter 2 explores barriers to treatment with prescribed cannabis from the perspectives of people using non-prescribed cannabis for medicinal purposes. Chapter 3 maps the tetrahydrocannabinol (THC) and cannabidiol (CBD) content of non-prescribed cannabis products that people use for medicinal purposes and assesses users' knowledge of the cannabinoid content of these products. Chapter 4 compares the characteristics of patients using prescribed cannabis with those of individuals using non-prescribed cannabis for medicinal purposes.

Study design

MEDUSA was an observational, cross-sectional study utilizing both quantitative and qualitative research methods. Data collection methods included an online questionnaire, in-depth individual interviews, chemical analysis of cannabis samples, and a comparison to secondary data. Recruitment for the online questionnaire took place between January and April 2023 through Facebook advertisements, a post on the Trimbos Institute's website and its monthly newsletter, and leaflets distributed in coffeeshops. Participants who completed the questionnaire were subsequently invited to take part in the interviews and to submit cannabis samples for analysis. Interviews were conducted online via Microsoft Teams and lasted approximately 45 minutes. Cannabis samples were submitted via pre-paid envelops and analysed in a laboratory to determine the cannabinoid content.

Study population

Individuals were eligible to participate if they were 18 years or older, resident in the Netherlands, and self-identified as current users of non-prescribed cannabis-based products to alleviate

physical or mental health symptoms. Those who used only prescribed cannabis or only used commercial CBD products were excluded from the study. Individuals using both non-prescribed and prescribed cannabis were eligible to participate.

Findings

Chapter 1. Questionnaire on the characteristics and behaviours of people using non-prescribed cannabis for therapeutic purposes

Data was collected from 1059 individuals in the Netherlands through an online questionnaire designed to provide comprehensive insight into the characteristics, behaviours and motivations of those using non-prescribed cannabis for medicinal purposes. The majority of participants were male (59.4%) with a mean age of 45 years. Most obtained their non-prescribed cannabis from coffeeshops, primarily used herbal cannabis, and typically consumed it by smoking it with tobacco. Participants had typically used cannabis medicinally for ten years, with the vast majority reporting (near)-daily use. More than half reported not knowing the THC or CBD content of the cannabis they were using for medicinal purposes. Cannabis was used to manage a wide range of health conditions, most commonly chronic pain, sleep disorders, ADHD/ADD, and various mental health conditions such as anxiety and depression. Notably, three-quarters of participants reported using cannabis to manage multiple health conditions, indicating a high degree of comorbidity.

Participants generally reported substantial therapeutic benefits, estimating an average symptom and quality of life improvement of around 88%. Many indicated that cannabis allowed them to reduce or discontinue prescription medications. Compared to prescription medications, cannabis was often seen as more effective and associated with fewer side effects. However, concerns about using unregulated cannabis were common, including worries about contaminants, stigma, the illegal status of cannabis, and financial burden. Finally, while more than half of participants had discussed their medicinal use of cannabis with a physician, only about a third had requested a prescription, fewer than 10% had received prescribed cannabis, and even fewer were currently using it. The main reasons for using non-prescribed instead of prescribed cannabis were the perceived better quality, lower cost, and greater convenience. Among the small group who had used both prescribed and non-prescribed cannabis, most found the non-prescribed cannabis more effective for symptom relief and more pleasant to use.

Chapter 2. Interviews on barriers to accessing prescribed cannabis

Interviews were conducted with 33 individuals to explore barriers to accessing prescribed cannabis from the perspectives of those using non-prescribed cannabis for medicinal purposes. Thematic analysis identified key barriers aligned with the five dimensions of a patient-centred access to care framework: Affordability, Availability, Approachability, Appropriates, and Acceptability.

(i) Perceived high cost (Affordability): Participants frequently cited the high cost of prescribed cannabis, the lack of health insurance coverage, and often-limited personal financial resources as major barriers. Many resorted to cheaper alternatives from unregulated sources or even reported sacrificing basic needs, such as groceries, to afford their medicine.
(ii) Limited number of prescribing physicians (Availability): Participants reported difficulties in finding physicians who were willing or able to prescribe cannabis. They believed that many physicians lacked sufficient knowledge about prescribed cannabis or felt constrained by restrictive medical guidelines.

(iii) Lack of accessible and reliable information (Approachability): Participants described difficulties in finding clear, accurate, and easily accessible information about prescribed cannabis. In the absence of trustworthy official sources, many turned to informal sources and online communities, which often provided incomplete or misleading information about prescribed cannabis.
(iv) Poor fit between the services and patient needs (Appropriateness): Concerns were raised about the poor fit between prescribed cannabis products and patients' therapeutic needs. Specific issues included a limited product range, low THC content, and the irradiation of cannabis, all of which led to doubts about its effectiveness. Some participants also worried that physicians would not engage them sufficiently in shared decision-making about treatment options, making them hesitant to pursue treatment.
(v) Stigma surrounding cannabis use (Acceptability): The stigma associated with cannabis deterred many from seeking a prescription. Participants felt uncomfortable and feared being judged as recreational users or 'drug users' by healthcare professionals. Others were concerned that having cannabis documented in their medical record could lead to discrimination or exclusion from other forms of essential care.

Chapter 3. Lab-analysed and self-reported potency of non-prescribed medicinal cannabis

Participants were invited to submit samples of the non-prescribed cannabis they used for medicinal purposes. These samples were analysed to determine their THC and CBD content, and participants' knowledge of the cannabinoid composition was assessed. A total of 62 cannabis samples were included in the analysis. Results need to be interpreted with caution due to the limited number of samples and selection bias, as most submitted samples were home-grown.

The analysis revealed significant discrepancies between participants' perceptions and the actual cannabinoid content of their cannabis. Most samples - particularly herbal cannabis - contained around 10-20% THC and less than 1% CBD. More than half of participants did not know the THC or CBD content of their samples. Participants who did provide estimates typically overestimated the potency of their samples. The median self-reported THC content was 19.5%, compared to a lab-analysed median of 12.6%. For CBD, participants estimated a median of 3.0%, while laboratory results showed just 0.1%. This means that, on average, self-reported THC levels were 120% higher than measured values, and CBD estimates were even more inaccurate. These findings suggest that most participants lack accurate information about the potency of the cannabis they use for therapeutic purposes. This knowledge gap may have implications for safety, efficacy, and dosing.

Chapter 4. Comparison of users of prescribed cannabis versus non-prescribed cannabis

A qualitative comparative analysis was conducted to examine differences between individuals using prescribed versus non-prescribed cannabis for medicinal purposes. Data from Chapter 1 was compared to secondary data from an independent study involving patients using prescribed cannabis in the Netherlands. Findings need to be interpreted with caution due to methodological differences between the studies, including variations in survey formats and recruitment strategies.

The analysis identified both similarities and differences between the two groups. Individuals using prescribed cannabis were generally older and had higher levels of education compared to non-prescribed users. While most non-prescribed users smoked herbal cannabis with tobacco, prescribed cannabis users were more likely to use sublingual oils. The use of less harmful

consumption methods in the prescribed group may reflect existing regulations, which prohibit smoking prescribed cannabis and recommend vaporizers, oils or tea as alternatives. Chronic pain was the most frequently reported condition in both groups. However, non-prescribed users also frequently reported using cannabis to manage other conditions, such as sleep disorders, ADHD/ADD, and mental health conditions such as depression, post-traumatic stress disorder, and anxiety. This suggests that barriers to accessing prescribed cannabis could partially stem from its limited availability for conditions other than chronic pain. Both groups reported substantial symptom relief and improved quality of life. However, they also shared concerns about the significant financial burden associated with the medicinal use of cannabis.

Conclusions

The MEDUSA study identified significant barriers to accessing prescribed cannabis in the Netherlands, despite its legal availability for over two decades. Key obstacles include the perceived high cost of prescribed cannabis products, a shortage of physicians willing to prescribe it, insufficient access to reliable information, a mismatch between existing services and patient needs, and the ongoing stigma surrounding cannabis use. Comparative findings also revealed notable differences between users of prescribed and non-prescribed cannabis in terms of demographics, medical conditions and use patterns, highlighting inequities in access to prescribed cannabis.

Given the potential health risks associated with the use of unregulated cannabis, including the absence of medical oversight, ensuring access to safe, effective, and affordable medicinal cannabis is in the interest of public health. The findings of this study underscore the urgent need for policy reforms and targeted interventions to reduce access barriers. Key recommendations include: (i) Health insurance coverage for prescribed cannabis, especially for socioeconomically vulnerable individuals, to promote healthcare equity. (ii) Education and training for physicians to improve their knowledge, reduce stigma, and increase willingness to prescribe cannabis. (iii) Clear prescribing guidelines to support clinical decision-making. (iv) A broader range of cannabis products to better meet diverse therapeutic needs. (v) Improved information provision through trusted, official sources to support informed decision-making.

Pharmaceutical-grade cannabis, when provided through the healthcare system, offers clear harm reduction benefits. It enables physician oversight of indications, dosing, and side effect management, while ensuring product quality and reducing exposure to contaminants. Moreover, prescribed cannabis is regulated for use via less harmful consumption methods, such as vaporization, oil or tea, further supporting harm reduction. Ultimately, a patient-centred approach – one that integrates the experiences, needs and voices of patients into clinical practice and policy development – is essential to ensure that prescribed cannabis effectively meets the needs of those who use rely on it for therapeutic purposes.

Chapter 1.
Medicinal use of non-prescribed cannabis: patterns of use, motives for use, perceived effectiveness and barriers to treatment

Analysis of a questionnaire

Medicinal use of non-prescribed cannabis: patterns of use, motives for use, perceived effectiveness and barriers to treatment

Introduction

Medical cannabis has been available in the Netherlands for over twenty years and can be prescribed if regular treatment is not effective enough or has too many side effects.(1) Physicians are not bound to a list of medical conditions, which means they can prescribe it to patients with any health issues if they deem it appropriate.(1) Yet the vast majority of people in the Netherlands who report using cannabis for medicinal purposes does not have a prescription for cannabis. In 2020, a survey in a representative sample of the Dutch adult general population showed that 92.7% of medicinal users used non-prescribed cannabis, 4.7% used prescribed cannabis, and 2.6% used both prescribed and non-prescribed cannabis. Based on this survey, it is estimated that approximately 460,000 adults in the Netherlands use non-prescribed cannabis for medicinal purposes.(2)

This raises the question why so many people self-medicate with non-prescribed cannabis in a country where prescribed cannabis is available. From a public health perspective, self-medication with cannabis is concerning as individuals use unregulated products, which potentially contain harmful contaminants.(3,4) Moreover, these individuals don't benefit from the supervision of a healthcare professional, who can provide guidance on dosage and use, monitor treatment outcomes, and help mitigate potential health risks and harms. It is important to understand what factors impact access to treatment in order to develop interventions and policies that reduce barriers and ensure access to a safe and effective medicine. The first key step is identifying the characteristics of the population of people who use cannabis medicinally outside of the healthcare system.

In this study, medicinal use of cannabis is defined as the use of cannabis-based products to alleviate self-reported physical or mental health symptoms. Prescribed cannabis refers to cannabis-based medicines prescribed by a physician, while non-prescribed cannabis denotes cannabis-based products that are not obtained through medical prescription. For the remainder of the paper, we use the term cannabis to refer to cannabis-based products.

Aims

The aim of this study is to provide comprehensive insight for the first time into the characteristics, behaviours and motivations of individuals in the Netherlands who use non-prescribed cannabis for medicinal purposes. By exploring demographic factors, patterns of use, motives for use, and barriers to treatment, this study seeks to inform the development of policies and interventions aimed at improving safe access to treatment with prescribed cannabis.

Methods

The present study used a cross-sectional online survey design with a convenience sample of individuals who self-reported current use of cannabis for medicinal purposes. The study was granted an exemption from ethics from the Medical-Ethical Review Committee METC NedMec (22-912/DB).

Questionnaire development

The questionnaire was developed based on other surveys on the medicinal use of cannabis.(5–7) Drafts were developed in an iterative process with researchers who are experts in the field as well as people with lived experience of using cannabis for medicinal purposes. People with lived experience were identified through the researchers' professional networks. Key topics of interest that were not addressed by previous surveys were identified. Moreover, nuances were added to the questionnaire to better capture the reality of people's medicinal use of cannabis. For example, we allowed participants to indicate the use of multiple cannabis products instead of just one. The questionnaire was piloted with five individuals, including medicinal users of cannabis. It demonstrated good comprehensibility, acceptability, and relevance. Final adjustments were made based on their feedback. The final questionnaire included the following key domains: 1. Source of cannabis, 2. Patterns of use, 3. Concurrent recreational use, 4. Motives for use (conditions/symptoms), 5. Patient-reported outcomes (PRO's), 6. Costs and concerns, 7. Barriers to treatment with prescribed cannabis, 8. Experiences with prescribed cannabis. The full questionnaire is available in Appendix A. The average completion time for participants was 14 minutes.

Recruitment and data collection

The online questionnaire was programmed using Jambo Software (version 3.2) and was freely accessible to anyone who obtained the link to the questionnaire. The online questionnaire was active for 3 months (19 January to 19 April 2023). It was promoted through Facebook advertisements, a post on the Trimbos Institute's website and its monthly newsletter, and leaflets in ten coffeeshops. In addition to that, numerous online news sources picked up on the study and reposted the URL to the questionnaire, including general news outlets, cannabis-related websites, health-related websites, and various cannabis and non-cannabis related patient and consumer groups. After completing the questionnaire, participants could enter a lottery for a chance to win one of ten prizes of 200 Euro each.

Eligibility criteria were being age 18 or older, being resident in the Netherlands, and self-identifying as a current user of non-prescribed cannabis-based products to ease physical or mental health symptoms. Exclusion criteria were exclusive use of prescribed cannabis and exclusive use of commercial CBD products. We excluded commercial CBD products because of the lack of scientific evidence for their effectiveness and because they contain much less CBD than approved CBD-medications.(8,9) People using both non-prescribed and prescribed cannabis were not excluded from participation.

Statistical analyses

Data analyses were performed using descriptive statistics in R software (version 4.4.1). No imputation was performed for missing data. The number of responses varied for some items due to routing in the questionnaire. Items primarily used predefined response categories unless otherwise indicated. Responses to open-ended items were coded into categories using content analysis.

Results

Participants

Of the 1633 individuals who gave informed consent, 521 were excluded from the study as they did not meet the eligibility criteria. Most of these did not use cannabis products for physical or mental health symptoms (n=320) or only used non-prescribed CBD products (n=103). Data was excluded for a further 53 participants: three participants did not complete the demographic questions, two provided non-serious responses, eleven took part twice (their second questionnaire entry was removed), two indicated that they only used prescribed cannabis, and thirty-five dropped out before the final survey item. Demographic characteristics of individuals who were excluded from the study were similar to those of people included to the study. The final data set consists of 1059 participants.

Participant characteristics

Most participants became aware of the questionnaire via Facebook (67.5%, n=715) and other social media (14.8%, n=157). Other recruitment sources were websites about cannabis (5.9%, n=63), non-cannabis related websites (4.3%, n=46), participants' personal network (3.7%, n=39), cannabis social clubs[1] (0.4%, n=4), coffeeshops (0.4%, n=4), and other sources[2] (2.9%, n=31). Participants' mean age was 45.1 years (SD=14.9, range 18-82) and the largest age category was 50-59 years old (see Figure 1). The majority was male (59.4%, n=629), most had attained an upper secondary or vocational secondary education[3] (41.5%, n=439) and were unfit for work or disabled (39.1%, n=414).

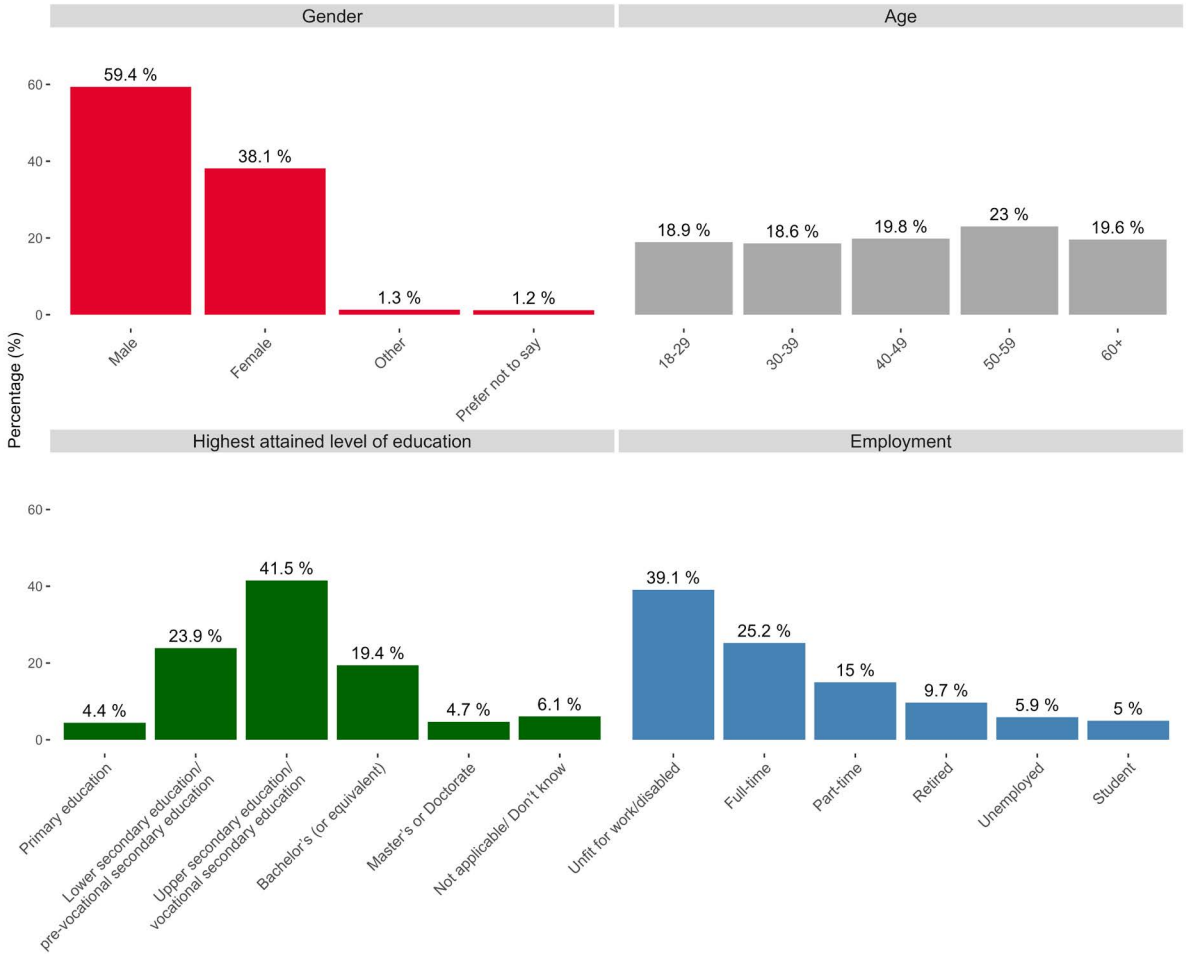
The vast majority of participants (94.5%, n=1001) used only non-prescribed cannabis for medicinal purposes. A few (5.5%, n=58) used both prescribed and non-prescribed cannabis medicinally. These proportions are similar to those found in the general population survey, in which around 95% of medicinal cannabis users used non-prescribed cannabis (2), suggesting that our sample is a good representation of the broader population in this regard.

1 Cannabis Social Club was defined as a non-profit organization in which cannabis is grown and distributed to its members.

2 Responses in the open-response field 'other sources' were coded and a new category was generated if 50 or more participants gave similar answers. Two new categories were added: 'non-cannabis related website' and 'personal network'.

3 Equivalent in the Dutch educational system (in Table 1 from left to right): Basisonderwijs; VMBO, MBO1, praktijkonderwijs, onderbouw HAVO/VWO; HAVO, VWO, MBO; HBO, WO Bachelor; WO Master, Doctoraat.

Figure 1. Demographic characteristics of the MEDUSA sample (N=1059)

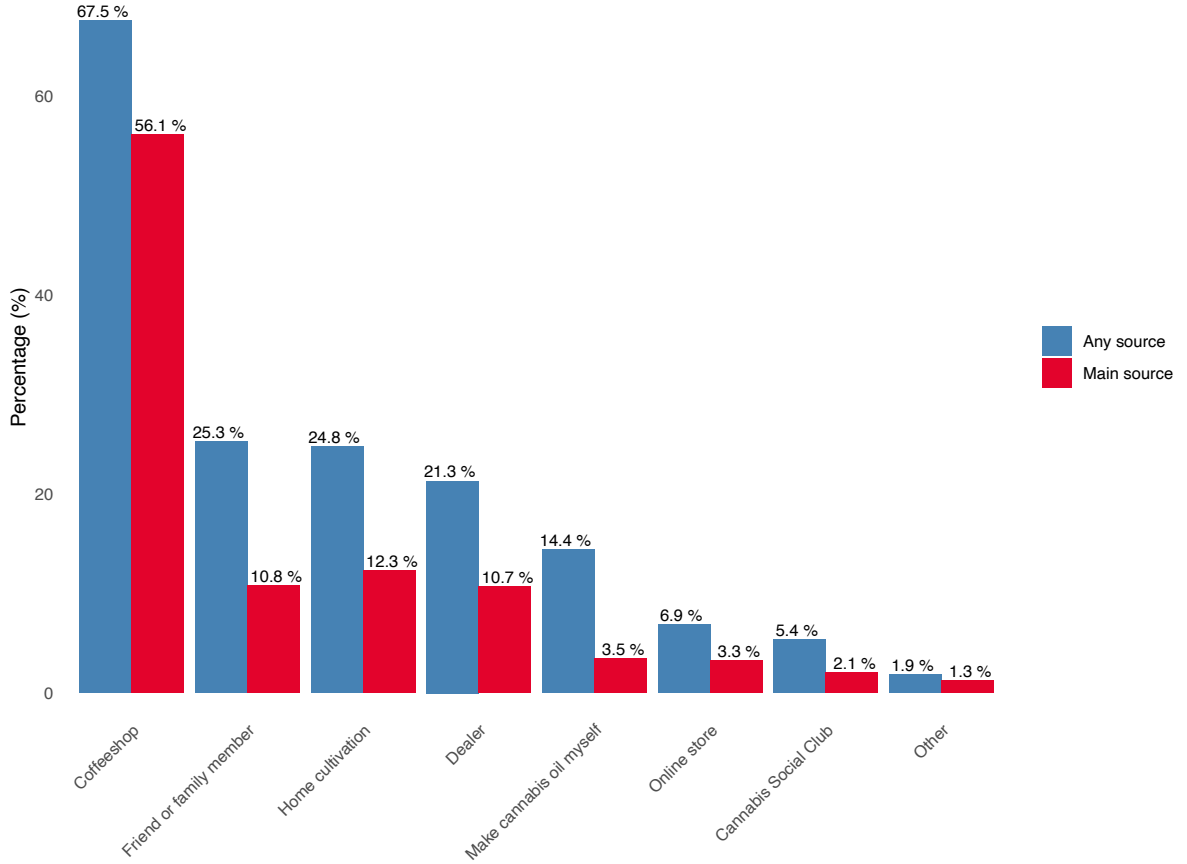


1. Cannabis source

Participants were asked where they obtained non-prescribed cannabis for medicinal purposes. They could indicate all sources they used (up to six sources) and were then asked to specify which one they used the most.

Most participants obtained their non-prescribed cannabis at least some of the time from coffeeshops (67.5%), followed by friends or family (25.3%), home cultivation (24.8%), and dealers (21.3%). Fewer participants made cannabis oil themselves or obtained their cannabis from cannabis social clubs, online stores or other sources (see Figure 2). More than half of the participants indicated that coffeeshops were their main source of cannabis (56.1%). About half of participants (53.1%) obtained their non-prescribed cannabis from one source, 31.6% from two sources, and 15.3% from three sources or more.

Figure 2. Any and main source of non–prescribed cannabis for medicinal purposes (N=1059)



2. Patterns of use

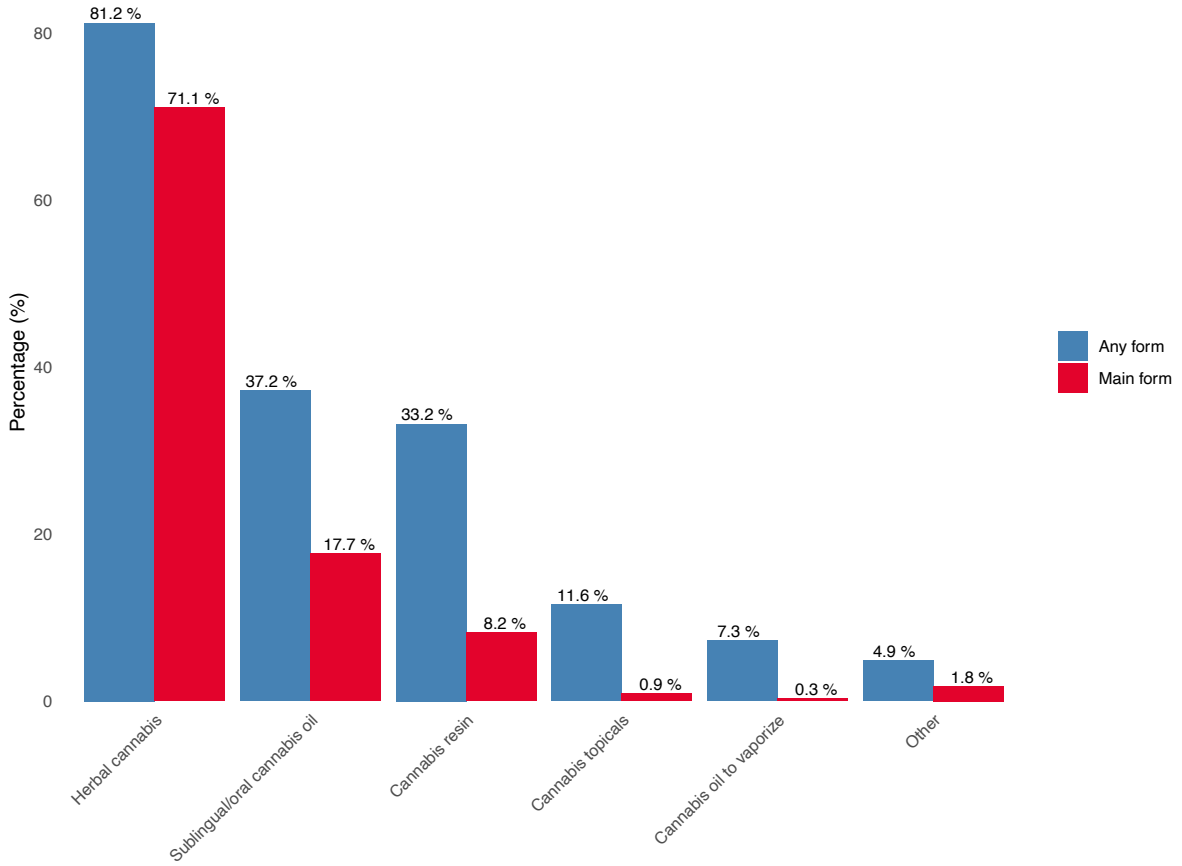
In this part of the survey, we assessed the patterns of use of non-prescribed cannabis for medicinal purposes. Survey items included the forms of cannabis used, knowledge and perceptions of the THC and CBD content of cannabis, frequency of use, routes of administration, and the duration of medicinal use.

2.1 Cannabis forms

Participants were asked to indicate all forms of cannabis (up to six forms) that they use for medicinal purposes and which one they use the most.

Most participants used non-prescribed cannabis at least some of the time in the form of herbal cannabis (81.2%), followed by sublingual/oral oil (37.2%) and cannabis resin (33.2%). Fewer participants vaporized cannabis oil or used cannabis topicals or other forms (see Figure 3). Almost three quarter of participants indicated that herbal cannabis was their main form of cannabis for medicinal use (71.1%). About half of participants (48.6%) used one form of cannabis, 34.7% used two forms of cannabis, and 16.7% used three forms of cannabis or more.

Figure 3. Any and main form of non–prescribed cannabis for medicinal purposes (N=1059)

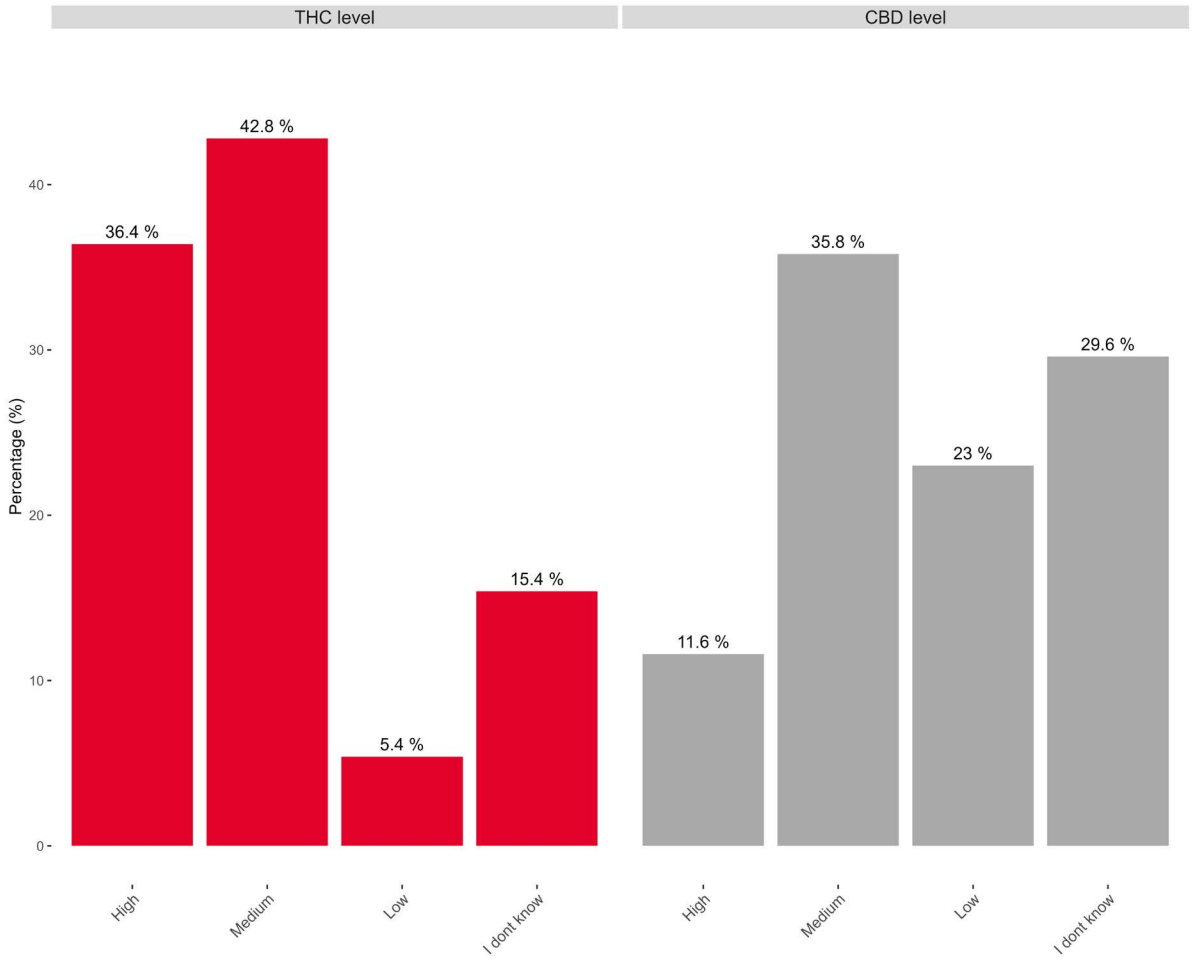


2.2 Perceived THC and CBD content of cannabis

Participants were asked about the tetrahydrocannabinol (THC) and cannabidiol (CBD) content of the non-prescribed cannabis product that they use the most for medicinal purposes.

Cannabis is often sold or described as high, medium or low THC, especially in the absence of precise information about the THC/CBD concentration. We asked participants to estimate the level of THC and CBD in their cannabis – whether they believed it to be 'high', 'medium' or 'low'. These levels were intentionally left undefined by specific THC/CBD concentration ranges, allowing participants to share their perceptions without being influenced by predetermined categories. Most participants indicated that they used cannabis with a medium or high level of THC (42.8% and 36.4% of participants, respectively) and a medium or low level of CBD (35.8% and 23.0%, respectively). Around 15% of participants reported not knowing the THC level of their medicinal cannabis and 30% reported not knowing its CBD level (see Figure 4).

Figure 4. Estimated THC and CBD levels in cannabis used for medicinal purposes (N=1059)



We also looked at combinations of reported THC and CBD levels. Most participants reported using cannabis with medium-THC and medium-CBD, followed by high-THC with medium-CBD or low-CBD (see Table 1).

Table 1. Combinations of THC and CBD levels that participants indicated (N=1059)

	High THC	Medium THC	Low THC	Missing
High CBD	5.8%	2.8%	2.5%	0.6%
Medium CBD	**11.9%**	**22.5%**	1.1%	0.3%
Low CBD	**12.0%**	9.6%	1.1%	0.3%
Missing	6.8%	7.8%	0.7%	14.3%

In an additional open-ended question, participants were asked to estimate the THC and CBD concentrations of their most-used cannabis product. If they did not know, they could skip the question. The plausibility of responses was assessed by comparing them to data from the Dutch coffeeshop monitor[4].(10) This monitor gathers data about the THC and CBD concentrations in cannabis sold at coffeeshops in the Netherlands.

About half of participants (55.8%) did not provide an answer for the THC and/or CBD concentration, 35.3% provided plausible values and 8.9% provided implausible values. The relatively high proportion of implausible values (about a fifth of the responses) raises concerns about the reliability of this data. Despite these uncertainties, we chose to analyse the THC and CBD values of plausible responses; although the findings should be interpreted with caution. The median estimated THC values were 20.0% for herbal cannabis, 22.5% for resin cannabis, and 15.0% for sublingual cannabis oil. Median estimated CBD values were around 2-5% across all three product forms (see Table 2).

Table 2. Estimated THC and CBD concentrations in non-prescribed cannabis used for medicinal purposes based on plausible values (n=374)

	THC concentration		CBD concentration	
Cannabis form	Median [1]	Range	Median [1]	Range
Herbal cannabis (n=272)	20.0%	0 – 40%	2.25%	0 – 40%
Resin cannabis (n=18)	22.5%	0.5 – 49%	5.0%	0 – 14%
Sublingual oil (n=84)	15.0%	0 – 40%	5.25%	0 – 30%

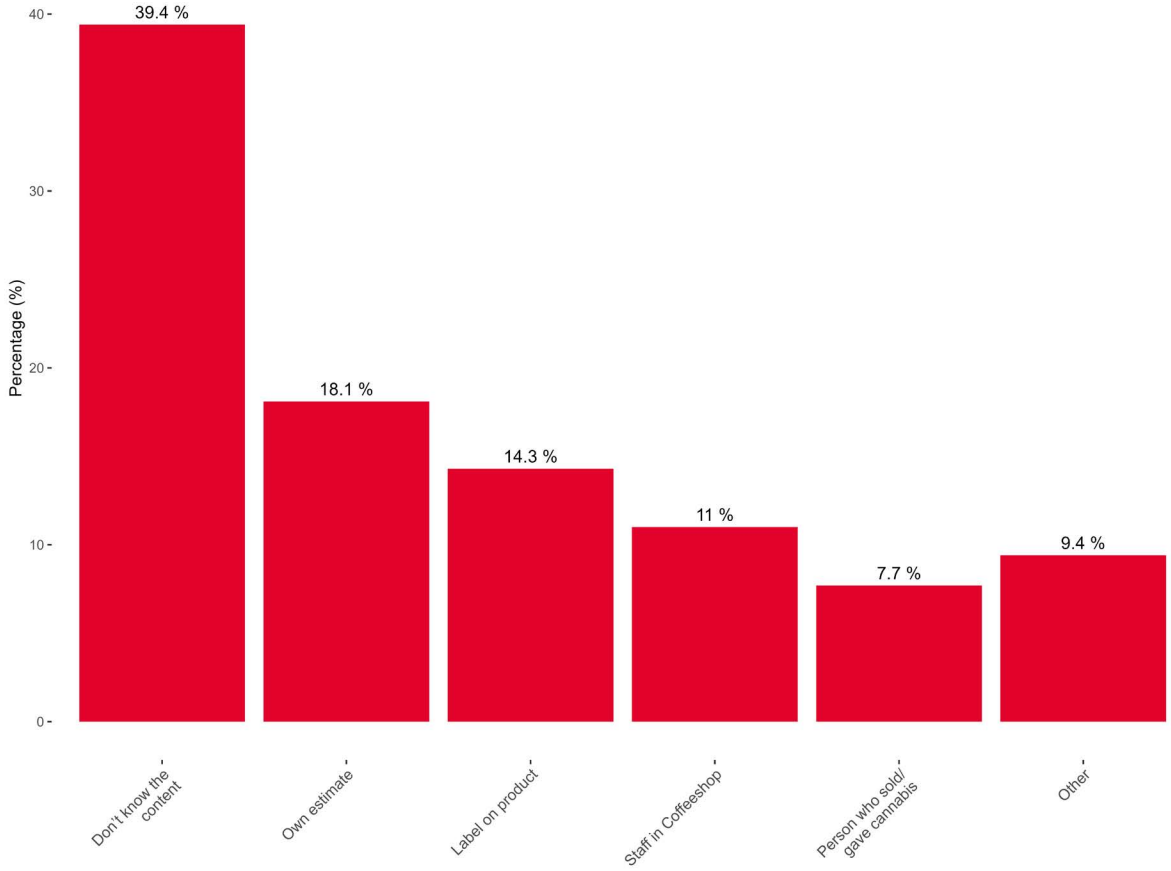
1 We report medians instead of means, because the data of THC and CBD concentration in herbal and resin cannabis is not normally distributed in the Netherlands according to the Dutch coffeeshop monitor.(10)

4 Plausible THC and CBD values were defined based on data from the Dutch coffeeshop monitor (10) plus a 10% margin of error. Since the THC and CBD content of a cannabis plant is balanced (meaning that the sum of THC and CBD cannot exceed a certain maximum), plausible values were determined by adding together the self-reported THC and CBD values. If the sum of THC and CBD concentrations exceeded the set maximum (40% for herbal cannabis, 80% for resin cannabis, and 55% for sublingual oil), both values were set to implausible. If one of the two values was missing, both values were set to missing.

2.3 Source of information of the estimated THC and CBD content of non-prescribed cannabis

Participants were asked how they knew the THC and CBD content of their non-prescribed cannabis which they used for medicinal purposes. They predominantly indicated that they did not know the content (39.4%; see Figure 5). The remaining answers were distributed fairly evenly across categories: participants said it was their own estimate (18.1%), it was written on the label of the cannabis product (14.3%), the coffeeshop staff told them (11.0%), or the person who sold or gave them cannabis told them (7.7%). Participants who indicated other sources (9.4%) reported for example that they tested their cannabis privately.

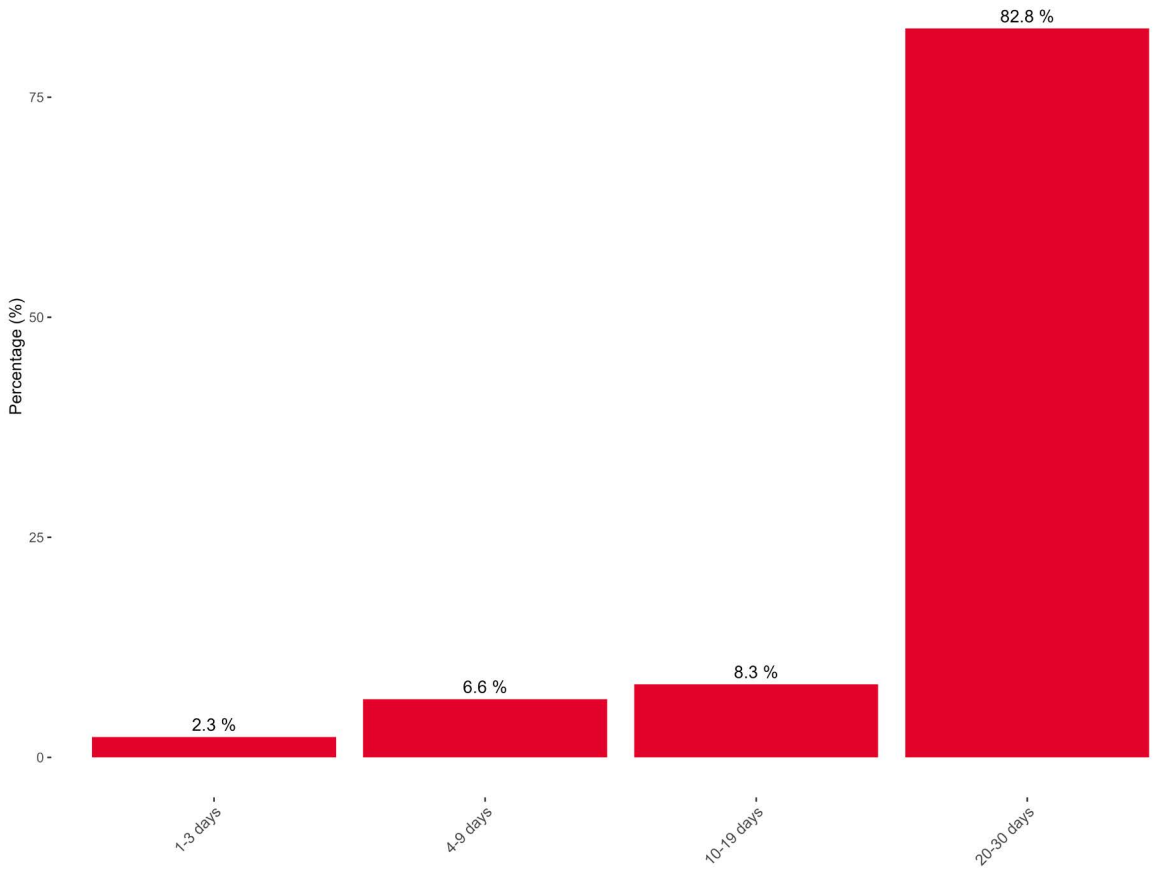
Figure 5. Information source used to estimate the THC and CBD content (N=1059)



2.4 Frequency of use

Most participants (82.8%) used non-prescribed cannabis for medicinal purposes (almost) every day[5] (see Figure 6). The median frequency of use in the past month was 30 days (range 1-30 days). On average, participants used cannabis medicinally on 25 days in the past month.

Figure 6. Frequency of medicinal cannabis use per month (N=1059)



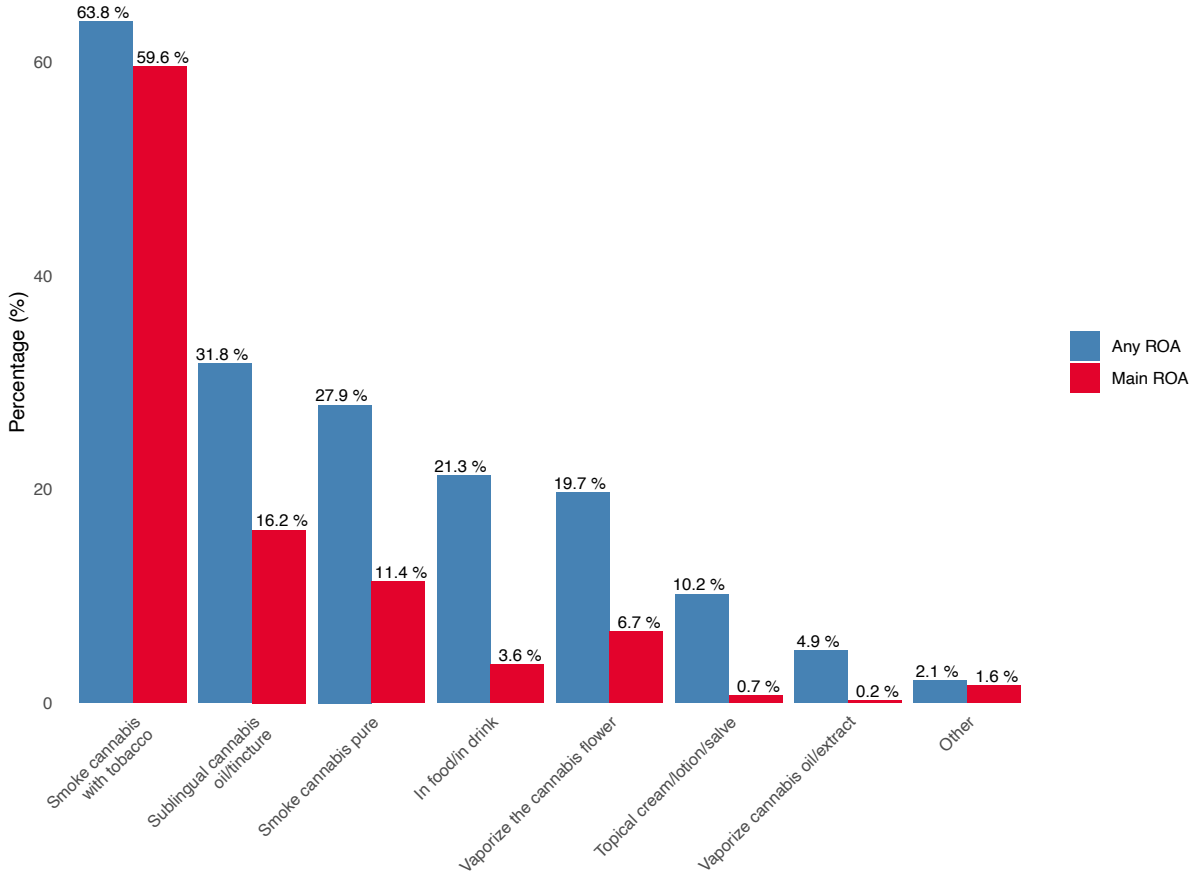
5 The EUDA (previously EMCDDA) defines (near)-daily cannabis use as use on 20 or more days per month.(51)

2.5 Routes of administration

Participants were asked to indicate how they used non-prescribed cannabis for medicinal purposes. They could select up to seven routes of administrations (ROAs) and then indicate which ROA they used the most.

Most participants used cannabis at least some of the time by smoking it with tobacco (63.8%), followed by sublingual cannabis oil (31.8%) and smoking cannabis pure (27.9%). Less participants used cannabis in food or drink (21.3%), vaporized the cannabis flower (19.7%), used cannabis topicals (10.2%) or cannabis oil/extract (4.9%), and other ROAs (2.1%; see Figure 7). More than half of participants indicated that their main ROA was smoking cannabis with tobacco (59.6%). About half of participants (53.5%) used one ROA, 24.4% used two ROAs, and 22.1% used three or more ROAs when using cannabis for medicinal purposes.

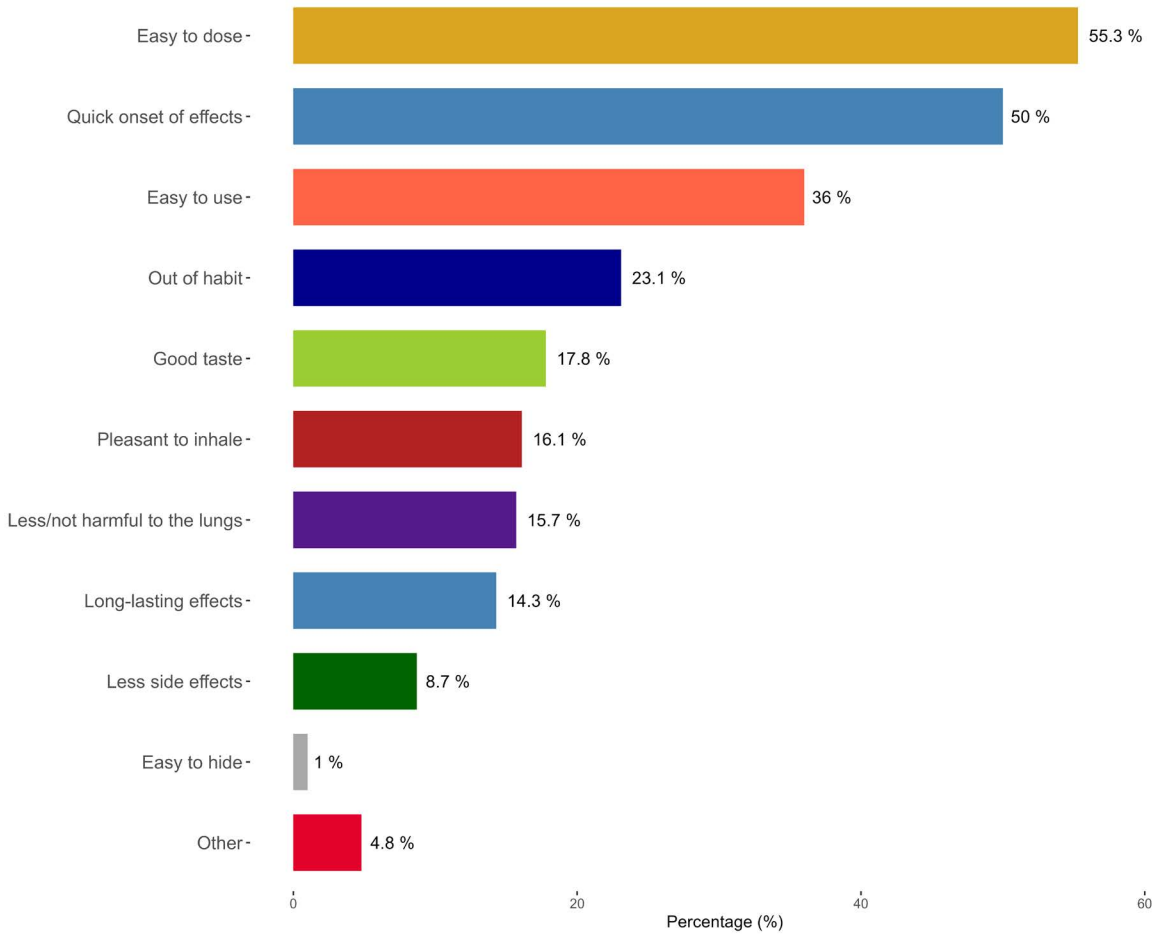
Figure 7. Any and main route of administration (ROA) of cannabis for medicinal purposes (N=1059)



2.6 Reasons for using a route of administration

Participants were asked to provide up to three reasons for why they chose the main route of administration (ROA) of cannabis, as indicated in the previous question. When taking all responses together, without distinguishing by ROA, ease of dosing (55.3%) and quick onset of effects (50.0%) were the most important factors with regard to participants' preferred ROA (see Figure 8). Other popular reasons included that it was easy to use cannabis that way (36.0%), that they chose the ROA out of habit (23.1%), or because it allowed for a good taste of the cannabis product (17.8%).

Figure 8. Reasons for choosing a route of administration (N=1059)



For a more differentiated understanding of why individuals choose a particular ROA, we analysed the three most common responses per ROA. ROA's were merged into three main categories: smoking (with or without tobacco), vaporizing (plant material or oil/extract), and oral use (sublingual oil or in food/drink).

The three most common reasons for each ROA are marked in **bold** in Table 3. Participants who mainly smoked cannabis said they did so because of the quick onset of effects. Those who mainly vaporized cannabis did so because it is less harmful for the lungs. Those who mainly consumed cannabis orally did so because it is easy to dose. Ease of dosing was among the top three most important reasons for all three ROAs.

Table 3. Reasons for choosing a specific route of administration

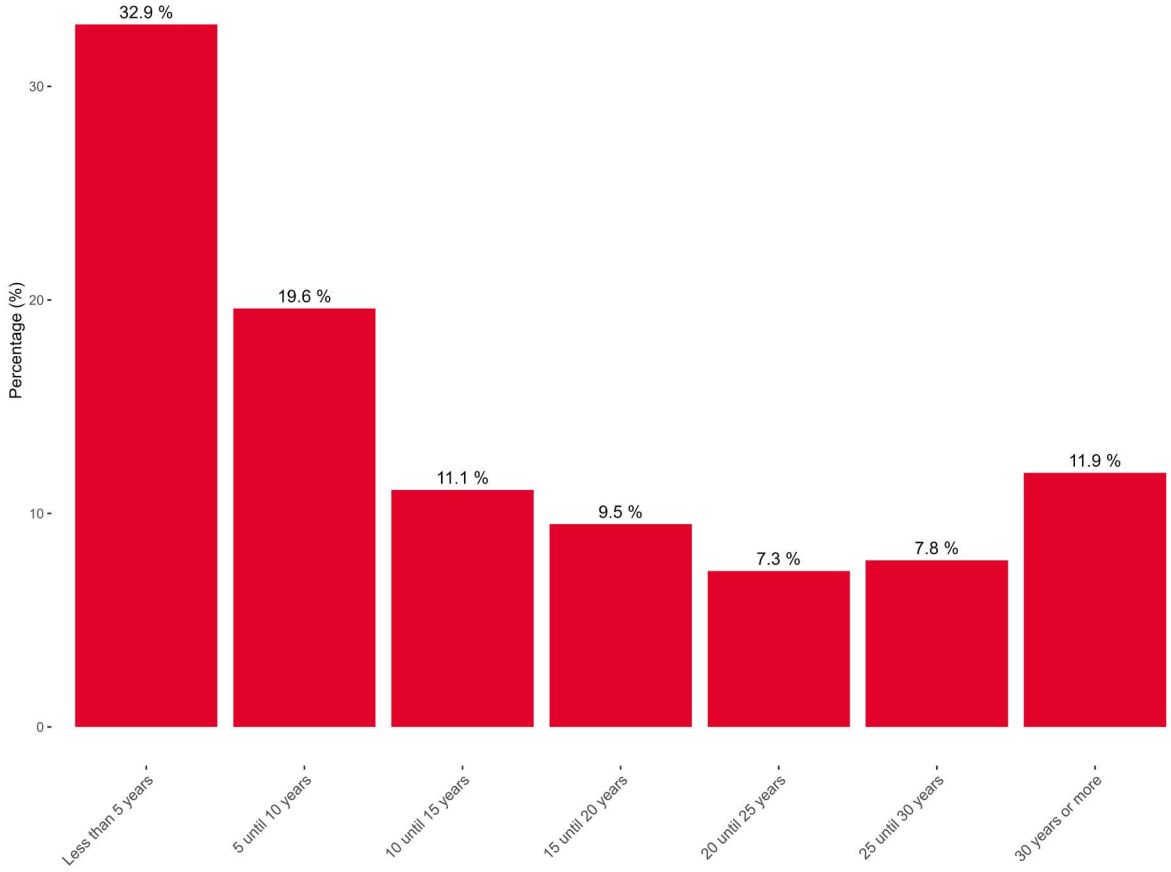
	Smoking		Vaporizing		Oral use	
Reason for choosing preferred ROA	N	%	N	%	N	%
Easy to dose	408	22.6	40	20.0	126	27.1
Quick onset of effect	**421**	**23.3**	**39**	**19.5**	60	12.9
Easy to use	238	**13.2**	21	10.5	**112**	**24.1**
Out of habit	232	12.9	1	0.5	10	2.2
Good taste	165	9.2	18	9.0	3	0.7
Pleasant to inhale	150	8.3	20	10.0	0	0.0
Less/not harmful to the lungs	27	1.5	**47**	**23.5**	**85**	**18.3**
Long-lasting effects	95	5.3	8	4.0	44	9.5
Less side effects	60	3.3	5	2.5	23	5.0
Easy to hide	8	0.4	1	0.5	2	0.4
Total	1804	100	200	100	465	100

Note: Participants could select up to three reasons. N is the number of times that a reason was selected.

2.7 Duration of use

Almost a third of participants (32.9%) had been using cannabis medicinally for less than 5 years, while 11.9% had been using cannabis medicinally for more than 30 years (see Figure 9). The median of duration of use was 10 years (range 0.3 – 55, n=949). On average, people had been using cannabis medicinally for 12.7 years. Among those who had been using cannabis medicinally for less than five years, most had been using it for 1 to 3 years, followed by 3 to 5 years; very few had been using it for less than 1 year.

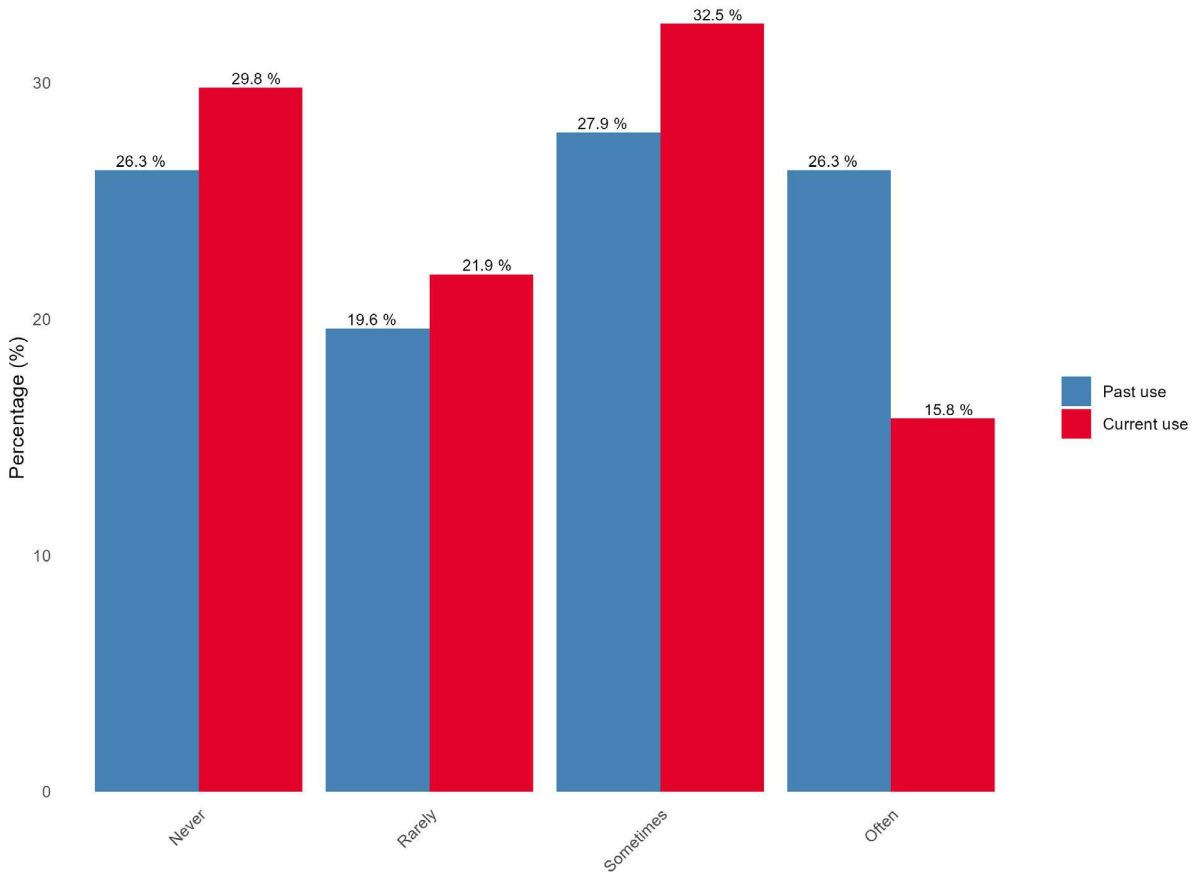
Figure 9. Duration of use of cannabis for medicinal purposes (n=949)



3. Recreational use

Participants were asked how often they used cannabis recreationally *before* they started using it medicinally, and how often they currently used cannabis for recreational purposes. Most participants (73.7%) had used cannabis recreationally before they started using it medicinally. Furthermore, most participants (70.2%) currently engaged in concurrent recreational cannabis use (i.e. use of cannabis for both medicinal and recreational purposes). Overall, participants engaged less frequently in recreational cannabis use in the present than in the past (see Figure 10).

Figure 10. Recreational use of cannabis in the past and present (N=1059)



4. Motives for use

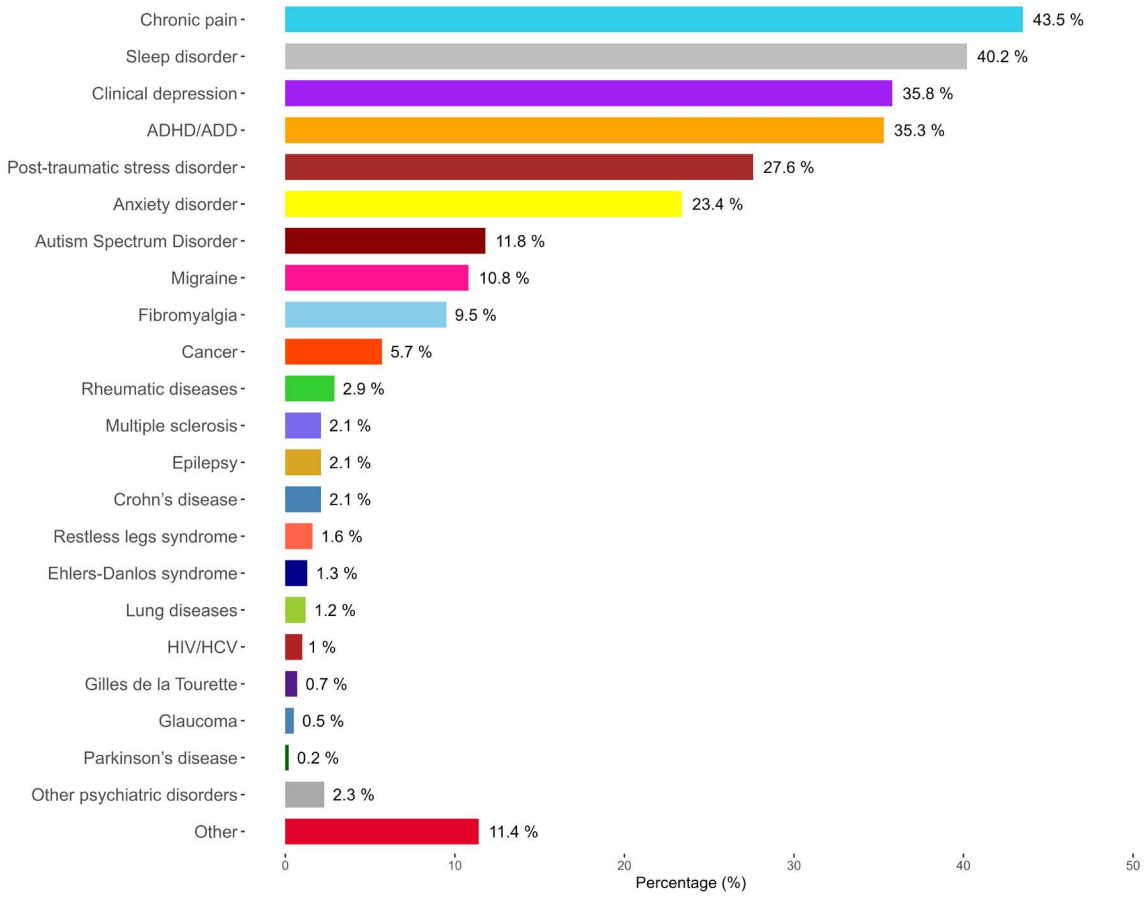
In this section of the survey, we investigated health issues for which participants used non-prescribed cannabis. First, participants indicated whether they used cannabis for medical conditions diagnosed by a physician or for non-specific symptoms (i.e. symptoms not tied to a specific condition). The goal of this was to shed light on what individuals consider to be 'medicinal use' of cannabis. Following this, participants reported either the medical conditions or the non-specific symptoms for which they used cannabis. They could select up to nine responses. An open-response field for identifying other conditions or symptoms was also included [6].

The vast majority (94.5%) self-reported using cannabis for medical conditions and 5.5% used cannabis for non-specific symptoms.

4.1 Diagnosed medical conditions

The most common self-reported medical conditions were chronic pain (43.5%, n=435), sleep disorders (40.2%, n=402), ADHD/ADD (35.3%, n=353), and psychiatric disorders including clinical depression (35.8%, n=358), anxiety disorder (23.4%, n=234) and post-traumatic stress disorder (PTSD, 27.6%, n=276; see Figure 11). Three-quarter of participants used cannabis for multiple medical conditions, indicating high comorbidity. More specifically, 25.4% reported one condition, 25.8% reported two conditions, 21.6% reported three conditions, and 27.2% reported four conditions or more.

Figure 11. Conditions reported as reasons for using cannabis medicinally (n=1001)



6 Responses in the open-response field for other medical conditions were coded and a new category was generated if 10 or more participants indicated a certain condition. Five new categories were generated: rheumatic diseases, restless legs syndrome, Ehlers-Danlos syndrome, lung diseases and other psychiatric disorders.

4.2 Non-specific symptoms

The most common non-specific symptoms were sleep problems (44.8%), stress/nervousness (39.7%), depressive symptoms (27.6%) and chronic pain (22.4%; see Table 4). These symptoms correspond to the most frequently reported medical conditions by other participants (i.e., chronic pain, sleep disorders, and clinical depression). Of the participants who used cannabis for non-specific symptoms, 43.1% reported using cannabis for one symptom, 13.8% for two symptoms, 15.5% for three symptoms, and 27.6% for four symptoms or more.

Table 4. Non-specific symptoms reported as reasons for using cannabis medicinally (n=58)

Non-specific symptoms	n	%
Sleep problems	26	44.8
Stress/nervousness	23	39.7
Depressive symptoms	16	27.6
Chronic pain	13	22.4
Muscle aches and cramps	11	19.0
For improving appetite	9	15.5
Nerve pain	9	15.5
Anxiety	9	15.5
Acute pain	8	13.8
Premenstrual syndrome	3	5.2
Nausea and/or vomiting	2	3.4
Reducing side effects from other medication	2	3.4
Seizures	2	3.4
Tics	2	3.4
Spasticity	1	1.7
Other	21	36.2

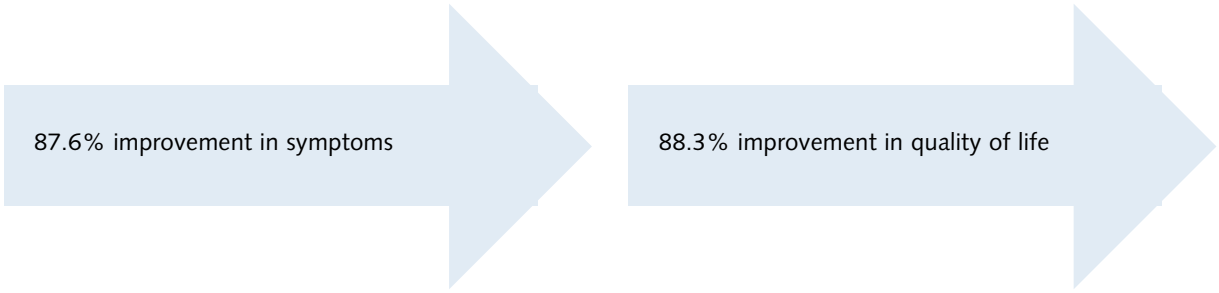
5. Patient-reported outcomes

Next, we assessed the perceived effectiveness of non-prescribed cannabis products using patient-reported outcomes (PROs). PROs offer a valuable subjective measure of an intervention's effectiveness from the perspective of those directly experiencing it. The survey included items on the effect of cannabis use on symptoms, quality of life, different aspects of well-being and functioning, and the use of prescription medication.

5.1 Symptoms and quality of life

To provide a subjective view of cannabis efficacy, participants were asked how much cannabis improved their symptoms and quality of life (QOL) or whether it worsened it. Participants could indicate the degree of improvement on a scale from 1 (no improvement) to 10 (complete improvement) or they had the option to indicate that cannabis worsened their symptoms or quality of life.

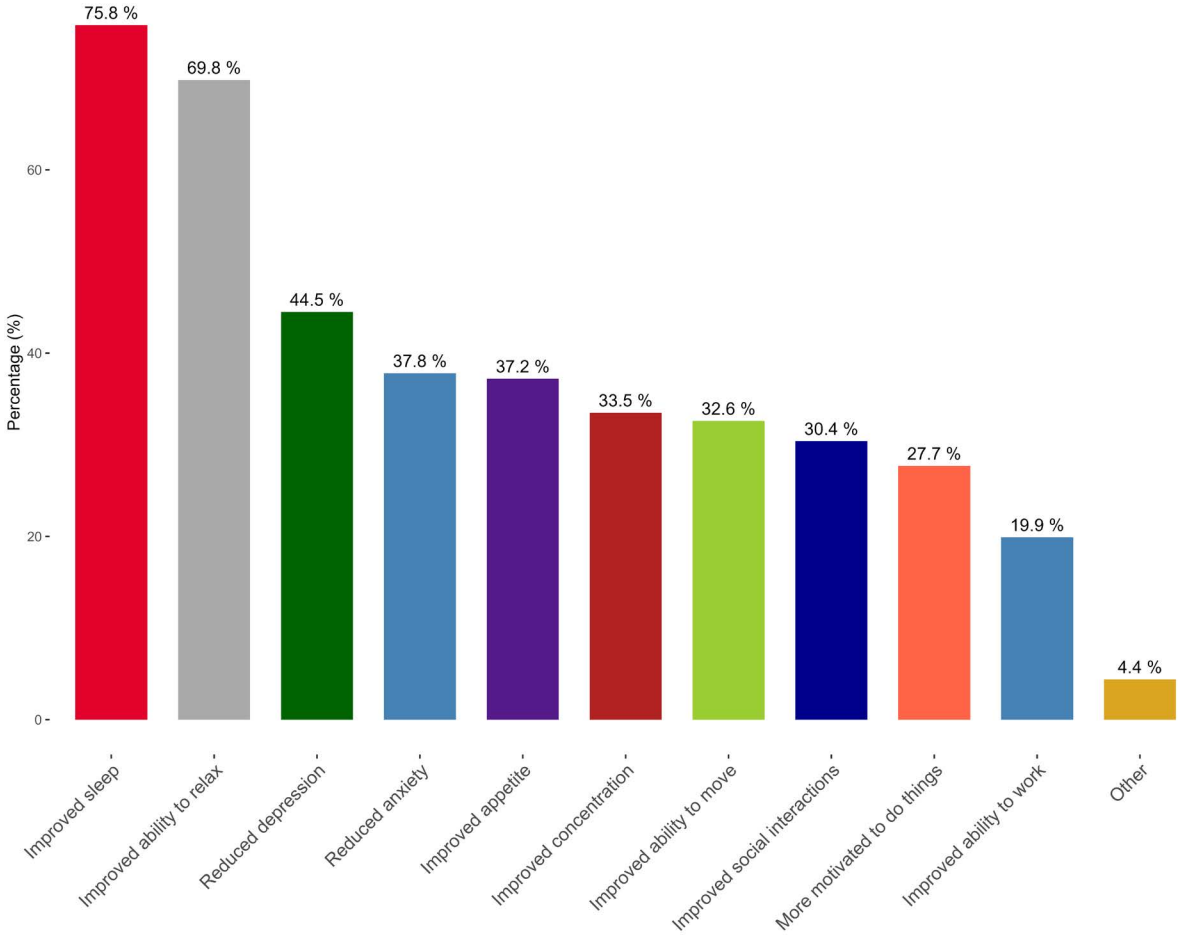
The majority of participants reported that cannabis improved their symptoms and quality of life. The mean improvement of symptoms was 7.88 (n=1048) and the mean improvement of QOL was 7.95 (n=1037). When recalculating this from a 9-point to a 100-point scale, this corresponds to a 87.6% improvement in symptoms and an 88.3% improvement in QOL. However, some participants indicated that cannabis worsened their symptoms and QOL (1.0% and 1.5%, respectively). Six participants did not complete the QOL item.



5.2 Different aspects of wellbeing and functioning

The majority of participants (96.7%) indicated that, besides improving their symptoms, cannabis also had other positive effects on their wellbeing and functioning. Participants were given a list of positive effects and were asked to select all that applied to them. The most common responses were improved sleep (75.8%) and an improved ability to relax (69.8%), followed by reduced depression and anxiety, improved appetite and concentration, and an improved ability to move and engage in social interactions (see Figure 12).

Figure 12. Other positive effects of the medicinal use of cannabis (n=1024)

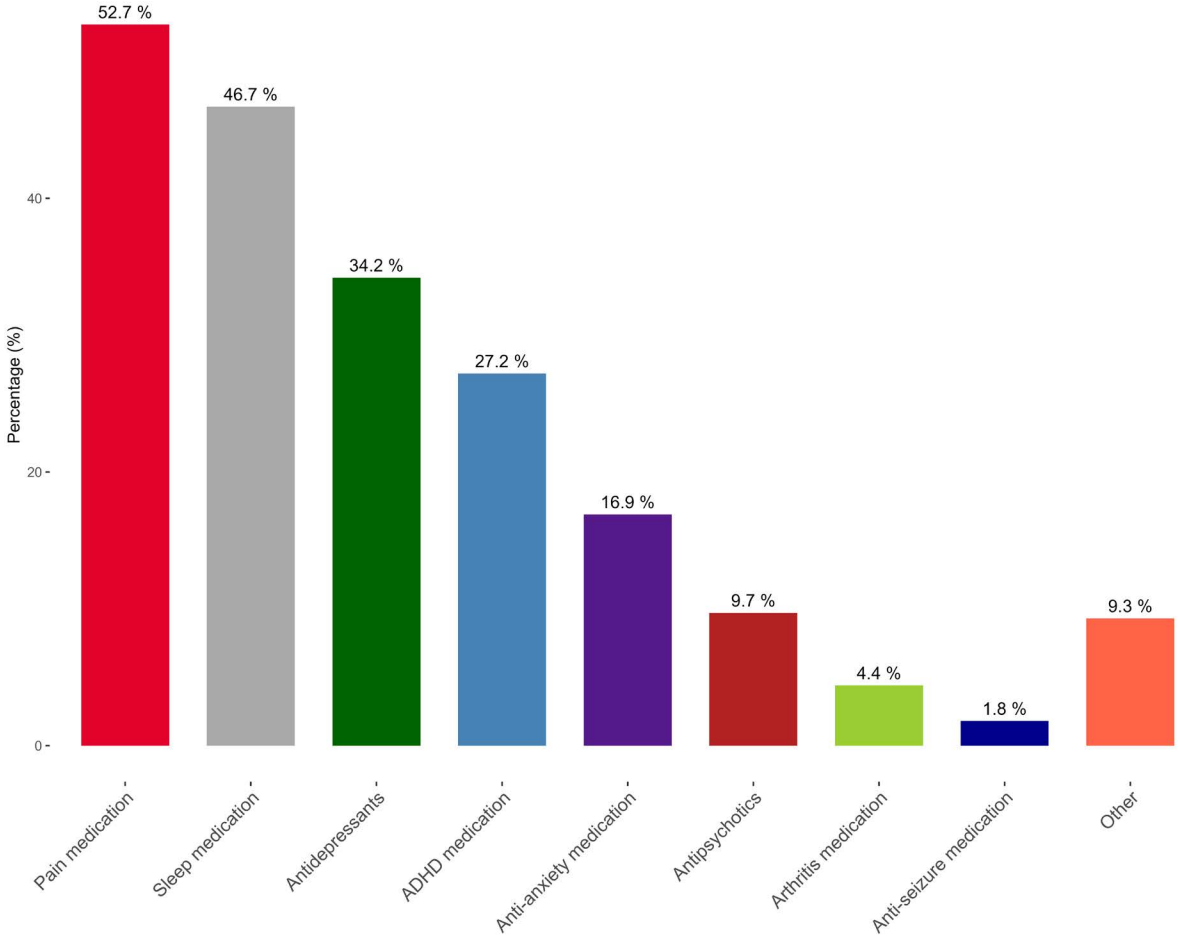


5.3 Prescription medication

Three quarter of participants (77.7%) had ever received prescription medication for the medical conditions or symptoms for which they used cannabis, and 40.7% were currently using prescription medication for these conditions or symptoms.

Among those who had ever received prescription medication, 53.5% reported having used cannabis instead of a prescription medication at least once. The most commonly substituted medications were pain medications (52.7%), sleep medications (46.7%), and antidepressants (34.2%). Other prescription medications, such as ADHD medications, anti-anxiety medications, and antipsychotics were mentioned less frequently (see Figure 13).

Figure 13. Type of prescription medication(s) substituted with cannabis as medicine (n=565)



Participants who had ever tried to replace prescription medication with cannabis (n=794) were asked about the impact of cannabis on their use of prescription medications and how the two compared in terms of effectiveness and side effects.

The majority had stopped (46.1%) or reduced (26.3%) their use of prescription medication, while 18.1% noted no change. Very few participants indicated an increase in their prescription medication (0.5%) or that they now use a different type of prescription medication (1.9%; see Table 5).

The majority of participants felt that cannabis was either slightly (15.7%) or much more effective (59.4%) than prescription medication (see Table 6). Additionally, most indicated that the side effects of prescription medications were either slightly (10.3%) or much worse (71.4%) than those associated with cannabis (see Table 7).

Table 5. Effect of cannabis on the use of prescription medication (n=794)

Response options	%
I stopped using prescription medication	46.1
I use less prescription medication than before	26.3
No change	18.1
I use more prescription medication than before	0.5
I use another type of medication now	1.9
Don't know	7.1

Table 6. Effectiveness of cannabis compared to prescription medication (n=794)

Response options	%
Cannabis is much more effective	59.4
Cannabis is slightly more effective	15.7
No difference	9.3
Prescription medication is slightly more effective	2.8
Prescription medication is much more effective	2.3
Don't know	10.5

Table 7. Side effects of cannabis compared to prescription medication (n=794)

Response options	%
Side effects of prescription medication are much worse	71.4
Side effects of prescription medication are slightly worse	10.3
No difference	9.7
Side effects from cannabis are slightly worse	1.9
Side effects from cannabis are much worse	0.3
Don't know	6.4

6. Cost and concerns

We examined the financial aspects and worries of participants who use non-prescribed cannabis for medicinal purposes. With this information we wanted to understand to what extent participants may be dealing with potential stress factors as a result of obtaining their cannabis through unregulated (illegal) sources.

6.1 Cost and financial burden

When asked about the cost of non-prescribed cannabis for medicinal purposes, 59.6% reported paying for their cannabis, 13.8% said they did not pay for their cannabis, and 26.6% preferred not to say. For those who paid for their cannabis (n=631), the mean cost per month was 158.50 Euro (range 1.50 – 1000 Euro). Of all respondents, 41.4% paid 1-100 Euro a month, 24.6% paid 101-200 Euro a month, 14.6% paid 201-300 Euro a month, 10.1% paid 301-400 Euro a month, and the remaining 9.3% paid 401-1000 Euro a month.

All participants were asked to what extent they had financial worries because of their medicinal use of cannabis. More than half (51.3%) indicated that they did not worry about money at all, 26.4% worried a bit, 15.7% worried somewhat, and 6.6% worried very much about money because of their medicinal cannabis use.

6.2 Concerns

Participants were given a list of topics related to cannabis use and asked to indicate whether they were concerned about each one. Most participants worried about the stigma associated with cannabis (43.0%) and the possibility of contaminants in their cannabis (42.5%). This was followed by concerns regarding the illegal status of cannabis (37.8%), possible health problems from using cannabis (36.2%), the unstable supply of non-prescribed cannabis (33.9%), and the risk of developing an addiction to cannabis (23.7%).

7. Barriers to treatment with prescribed cannabis

Given that most individuals in the Netherlands use non-prescribed rather than prescribed cannabis for medicinal purposes, we wanted to explore potential barriers to treatment. Participants were asked what steps they had taken to try to obtain a prescription for cannabis and what their main reasons were for using non-prescribed instead of prescribed cannabis. We also explored participants' preferences for cannabis products to gain insight into how prescribed cannabis might be improved to better meet patient needs. Moreover, we explored whether participants were aware of negative information about prescribed cannabis, for instance through hearsay, as a potential barrier to treatment.

7.1 Experiences in the healthcare system

We explored various steps in the healthcare system at which barriers to treatment with prescribed cannabis may be experienced. Among all participants, 66.2% had ever spoken to a physician about their medicinal use of non-prescribed cannabis, 30.5% had ever asked their physician for a prescription for cannabis, while 9.2% had ever received a prescription for cannabis. This means that 33.8% had never spoken to a physician about their medicinal use of cannabis, and 21.3% had asked for a prescription but did not receive it. Only 2.3% were currently using prescribed cannabis (see Table 8).

Table 8. Experiences in the healthcare system (N=1059)

Steps	%
Ever spoke to a physician about their medicinal use of cannabis	66.2
Ever asked a physician for prescribed cannabis	30.5
Ever received prescribed cannabis from a physician	9.2
Currently use prescribed cannabis	2.3

7.2 Reasons why participants had not asked a physician for prescribed cannabis

Participants who had never asked a physician for prescribed cannabis (n=736) were asked why they had not done so. Most participants (49.0%) indicated that they believed their physician would not prescribe cannabis and 32.5% indicated that they did not know they could obtain prescribed cannabis from a physician. Moreover, participants indicated that prescribed cannabis was too expensive (24.9%) or that they did not feel comfortable asking their physician for a prescription (23.9%). The percentages of individuals selecting each reason are shown below in Table 9.

Table 9. Reasons why participants had not asked a physician for prescribed cannabis (n=736)

Reasons	%
I do not think that my physician would give me a prescription for cannabis.	49.0
I did not know that I could get prescribed cannabis from a physician.	32.5
Prescribed cannabis is too expensive.	24.9
I do not feel comfortable asking my physician for prescribed cannabis.	23.9
I do not want cannabis from a pharmacy.	20.9
I do not think that my physician would know what cannabis to prescribe me.	18.6
I do not need a physician, I know what cannabis is best for me.	16.8
I do not want my physician to know that I use cannabis for medicinal purposes.	6.2
Other	8.6

Note: Participants could select multiple answers.

7.3 Reasons why physicians did not prescribe cannabis according to participants

Participants who had asked their physician for prescribed cannabis but did not receive it (n=226) were asked why their physician did not write a prescription. Most participants indicated that their physician did not seem to have sufficient knowledge about prescribed cannabis (39.4%) or that they were not eligible to receive cannabis for their condition (31.9%). Moreover, 27.0% of participants indicated that their physician had negative views of cannabis. The percentages of individuals selecting each reason are shown below in Table 10.

Table 10. Reasons why physicians did not prescribe cannabis according to participants (n=226)

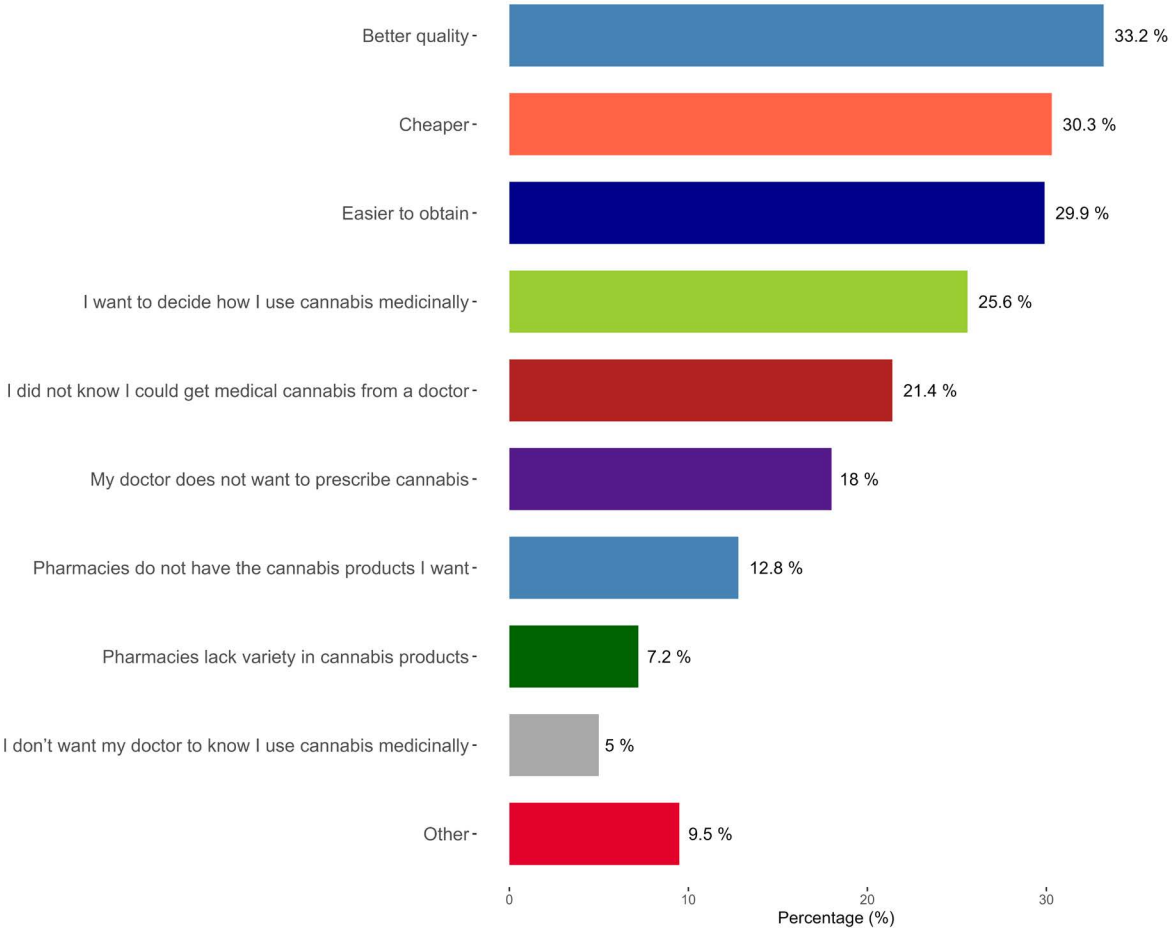
Reasons	%
My physician did not know enough about prescribed cannabis.	39.4
My physician said that I am not eligible to receive prescribed cannabis for my condition.	31.9
My physician had negative views of cannabis.	27.0
My physician did not believe that prescribed cannabis is effective.	26.1
My physician first wanted to try other medications.	15.5
Other	21.7

Note: Participants could select multiple answers.

7.4 Reasons for using non-prescribed instead of prescribed cannabis for medicinal purposes

Participants were asked to indicate up to three reasons for why they used non-prescribed instead of prescribed cannabis. The most common responses were that non-prescribed cannabis was of better quality (33.1%), cheaper (30.2%), and easier to obtain (29.8%). A quarter of participants (25.6%) said that they wanted to decide how to use cannabis. Other responses were less common (see Figure 14).

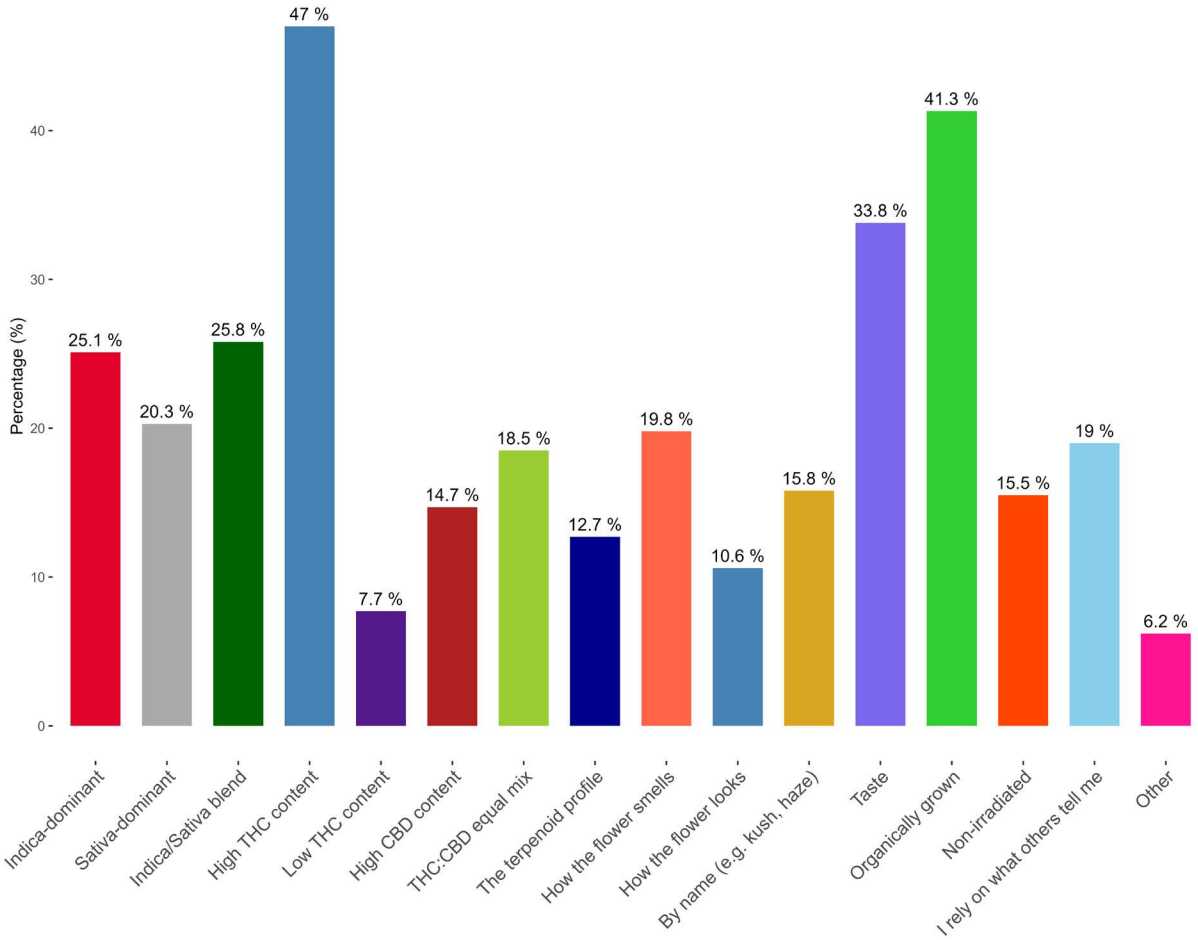
Figure 14. Main reasons for using non-prescribed instead of prescribed cannabis for medicinal purposes (n=1056)



7.5 Cannabis preferences

We assessed what factors people consider important when choosing a cannabis product for medicinal purposes. Participants could select up to five factors. The most common responses were a high THC content (47.0%), that the cannabis is grown organically (41.3%), and that the product tastes good (33.8%). Other popular factors were claims of being Indica or Sativa dominant or a Hybrid (20.3% - 25.8%), while 19.0% relied on what others told them to use. All response options are shown in Figure 15.

Figure 15. Factors that are considered important when choosing cannabis for medicinal purposes (N=1059)



7.6 Negative information about prescribed cannabis

We asked participants with an open question whether they were aware of negative information about prescribed cannabis, for instance through hearsay. Responses were categorized and coded by the researchers (up to three categories were coded per participant). Among the 245 respondents, most had heard that the prescribed cannabis products were not effective or that there was insufficient product variety (30.5%), that the price was too expensive (21.3%), and that the quality of the products was poor (21.3%) (see Table 11). Other negative information included the irradiation of prescribed cannabis (12.3%) and strict eligibility criteria or that physicians were not willing to prescribe cannabis (4.5%).

Table 11. Negative information about prescribed cannabis (n=245)

	Responses	
Information	**N**	**%**
Not effective or insufficient product variety	102	30.5%
Too expensive	71	21.3%
Poor quality, including poor taste/smell	71	21.3%
Irradiated	41	12.3%
Strict eligibility criteria or physicians not willing to prescribe	15	4.5%
Other	34	10.2%

8. Experiences with prescribed cannabis

Participants who reported using prescribed cannabis, either in the past or present, were asked about their experiences with it. This information was gathered to identify potential shortcomings in the prescribed cannabis products.

8.1 Prescribed cannabis products

Those with past or current experience with prescribed cannabis (n=97) were asked with an open question which cannabis products they (had) used. Responses were coded based on the five available prescribed cannabis strains and an additional category for cannabis oils that are made by specialized pharmacies. For both groups (past and current users) the most frequent answer was the product with the highest THC concentration (22%) named 'Bedrocan' (see Table 12).

Table 12. Prescribed cannabis products used in the past and present (n=97)

Prescribed cannabis products	Past use (n=73)		Current use (n=24)	
	n	%	n	%
Bedrocan: 22% THC, <1.0% CBD (Sativa, flos)	14	19.2%	14	58.3%
Bedrobinol: 13.5% THC, <1.0% CBD (Sativa, flos)	2	2.7%	0	0.0%
Bediol: 6.3% THC, 8% CBD (Sativa, granulate)	4	5.5%	1	4.2%
Bedica: 14% THC, <1.0% CBD (Indica, granulate)	2	2.7%	2	8.3%
Bedrolite: <1.0% THC, 7.5% CBD (Sativa, granulate)	2	2.7%	2	8.3%
Cannabis oil (THC/CBD content not specified)	13	17.8%	3	12.5%
Missing (ambiguous answer or could not remember)	36	49.3%	2	8.3%

Note: The first five products are herbal cannabis (dried flower). Cannabis oil is made by specialized pharmacies and is tailored to patients' individual needs.

8.2 Reasons for no longer using prescribed cannabis and reasons for also using non-prescribed cannabis

Participants who had used prescribed cannabis in the past (n=73) were asked with an open question why they stopped using it. Those who used prescribed cannabis in the present (n=24) were asked why they *also* used non-prescribed cannabis. Responses were analysed and up to three reasons were coded per participant. Most participants indicated they stopped using prescribed cannabis because it was too expensive or because it was less effective than non-prescribed cannabis (see Table 13). Similarly, most participants used non-prescribed cannabis *in addition* to prescribed cannabis because it was cheaper or more effective (see Table 14).

Table 13. Reasons why participants stopped using prescribed cannabis (n=73)

	Responses	
Reasons	**N**	**%**
Price (expensive; not covered by health insurance)	36	40.5%
Effectiveness (less effective than non-prescribed cannabis)	24	27.0%
Convenience (inconvenient to obtain)	3	3.4%
Worse quality	6	6.7%
Physicians (stopped prescribing; new physician didn't prescribe)	3	3.4%
Other	17	19.0%

Table 14. Reasons why participants also used non-prescribed cannabis (n=24)

	Responses	
Reasons	**N**	**%**
Price (cheaper)	8	29.7%
Effectiveness (more effective than prescribed cannabis)	7	25.9%
Convenience (convenient to obtain)	1	3.7%
Insufficient prescribed cannabis or the repeat prescription did not arrive in time	3	11.1%
Other	8	29.6%

8.3 Comparison of non-prescribed and prescribed cannabis

Participants with past or current experience using prescribed cannabis (n=97) were asked to evaluate their experience with non-prescribed cannabis in comparison to prescribed cannabis, using a 5-point Likert scale.

More than half of participants strongly agreed (47.4%) or agreed (15.5%) that non-prescribed cannabis was more effective in providing symptom relief than prescribed cannabis. Less than a third (30.9%) stated that both prescribed and non-prescribed cannabis were equally effective. A small proportion disagreed (3.1%) or strongly disagreed (3.1%) that non-prescribed cannabis was more effective than prescribed cannabis.

Furthermore, more than half of participants strongly agreed (40.2%) or agreed (20.6%) that non-prescribed cannabis was more pleasant to use, for instance in terms of taste or smell, than prescribed cannabis. Less than a third (28.9%) stated that both non-prescribed and prescribed cannabis were equally pleasant to use. A small proportion disagreed (5.2%) or strongly disagreed (5.2%) that non-prescribed cannabis was more pleasant to use than prescribed cannabis.

Discussion

This study provides comprehensive insight for the first time into the characteristics, behaviours and motivations of individuals in the Netherlands who use non-prescribed cannabis for medicinal purposes. The Netherlands offers a unique setting to study this population, as cannabis for recreational use has been available at coffeeshops since the 1970s and prescribed cannabis for medicinal purposes has been available since 2003. Despite this setting, our sample and findings are in many regards similar to studies from around the world. As in previous studies (6,11–14), our sample is mostly male with an upper secondary education and a relatively high proportion of people deemed unfit for work. Below we will discuss similarities in motives for use, patient-reported outcomes, concurrent recreational use, and other findings.

Motives for use

This study shows that pain and mental health conditions are the most common reasons for using non-prescribed cannabis medicinally. This is in line with findings from similar research in countries such as Australia(6), Canada(15), Germany(13), the UK(11), and Belgium.(14) The scientific evidence for the effectiveness of cannabis is more robust for physical health conditions than mental health conditions.(16–18) However, patient-reported outcome measures from our study and others (19–21) suggest that also individuals with mental health issues experience symptom reductions and improvements in wellbeing from using cannabis. Given the large number of individuals around the world who use cannabis for mental health conditions, more research is urgently needed to assess the mechanism behind this, to exclude the possibility of a placebo effect, and to examine possible adverse long-term effects.(22)

One of the goals of this study was to understand what people considered ‘medicinal use’ of cannabis. The vast majority of participants reported using cannabis for medical conditions diagnosed by a physician as opposed to non-specific symptoms. This suggests that most people who self-identify as medicinal users are patients with medical problems rather than healthy

individuals. However, it should be noted that numerous individuals answered 'No' when asked in the screening questions if they used cannabis for physical or mental health symptoms (and were therefore excluded from the study). This indicates that there may be a further subgroup of healthy individuals who do not use cannabis for specific symptoms – but rather to improve their overall wellbeing – and yet consider themselves 'medicinal' users.

Patient-reported outcomes

The results of this study show an overall high level of self-reported effectiveness and improvement of quality of life. This is in line with findings from studies on patients using prescribed cannabis (7,23,24), as well as people using non-prescribed cannabis.(6) In addition, participants in this study reported a multitude of other positive effects on their wellbeing and functioning, which highlights the holistic effects of cannabis.(25) In the absence of sufficient randomized controlled trials, patient-reported outcomes and other observational real-world evidence can play a crucial role in informing policies and treatment decisions.(26) It is, however, important to note the potential bias in the current sample. People who do not experience benefits from cannabis are less likely to continue using it and were therefore less likely to be included in this study. Interestingly, around 1% of the sample indicated that cannabis worsened their symptoms and quality of life. Further research is needed to understand their experiences and why they still continue to use cannabis.

Cannabis source and patterns of use

Coffeeshops were reported as the most popular source and herbal cannabis as the most popular form of non-prescribed cannabis. This is likely due to the widespread availability of coffeeshops in the Netherlands, and because coffeeshops are only permitted to sell herbal and resin cannabis and no extraction-based products such as cannabis oils. However, among patients using prescribed cannabis in the Netherlands, sublingual cannabis oil and herbal cannabis are equally popular. (27) This suggests that, when legally available, patients are more likely to opt for other forms of cannabis. The Netherlands could benefit from implementing policies seen in countries such as Australia (28), Canada (29), and the United States (30), where a wider variety of cannabis products are available by prescription, including extracts, therapeutic vapes, and oral preparations such as oils, capsules, and edibles.

While other countries observe a trend away from smoking to less harmful ROAs (6,31,32), smoking remains the dominant consumption method in the Netherlands. Similar to Dutch recreational cannabis users (33), the majority of our sample smoked cannabis with tobacco. However, less harmful ROAs, such as vaporization and sublingual oils, were more common among our sample of medicinal users compared to recreational users, suggesting greater health-consciousness. Although vaporization of plant material carries some health risks, both vaporization and oral use of cannabis reduce the harms associated with combustion and nicotine addiction (34). Harm reduction is particularly important considering that most participants in our study were daily, long-term cannabis users. The negative effects of smoking, especially with tobacco, may be particularly detrimental for patients who are already dealing with poor health. Our data indicates that individuals who smoke cannabis do so for the quick onset of effects. Since vaporization also yields a rapid onset of effects, this may serve as a suitable alternative for some users.

Our findings also reflect ongoing concerns regarding the use of unregulated cannabis products. Participants had rather little knowledge about the THC and CBD content of non-prescribed cannabis. Even if consumers think they know the content, there is no means for them to check the strength of their cannabis. Moreover, data from Dutch coffeeshops demonstrates a considerable discrepancy between the THC content as sold and the actual THC content.(10) Many coffeeshops offer no information at all about the THC concentration. Participants were also concerned about possible contaminants in their cannabis. Clearly not knowing the content of a product used for therapeutic purposes is not ideal. Overall, these findings indicate significant opportunities for harm reduction, considering the limited available information about the content of non-prescribed cannabis, the limited range of prescribed cannabis products, and the high prevalence of harmful consumption methods.

Recreational use

Similar to other studies (7,13), we found that many people who use cannabis medicinally also use it recreationally. Legal frameworks often draw a hard line between medicinal and recreational use of cannabis, but our results and findings from other studies challenge this binary perception. An important aspect of this is the fundamentally relaxing effect of cannabis. The majority of our participants reported an improved ability to relax. Patients with for example chronic pain or mental health conditions (e.g. anxiety, ADHD) may welcome these relaxing effects. While the health issues are still there, they may be perceived less, be considered less relevant, or help people to function better in daily life. (13)

Furthermore, our research shows that most people used cannabis recreationally *before* they started using it medicinally. Previous research has shown that people who transitioned from recreational to medicinal use are more likely to use cannabis to treat mental health conditions, use cannabis by smoking it, and find their use problematic.(35) Also participants in our study overwhelmingly used cannabis for mental health conditions and smoked cannabis. These findings suggests that a significant subgroup of medicinal users may be particularly vulnerable and benefit from harm reduction interventions and support of healthcare professionals.

Costs and concerns

A substantial number of participants expressed concerns related to their medicinal use of cannabis. Many reported a financial burden, as well as concerns about possible contaminants in their cannabis, the illegal status of cannabis, and perceived stigma. While half of participants stated they did not worry about the cost of their cannabis, this may in part be because some obtained their cannabis for free. Those who paid for their non-prescribed cannabis for medicinal purposes, spent an average of 158.50 Euro a month with some spending up to 1000 Euro a month. These are significant recurring costs, especially for people relying on disability benefits or welfare benefits.

Arguably, health insurance providers have an obligation to cover the cost of prescribed cannabis. Not only are they making it difficult for patients to access a medicine that they benefit from, but they are also saving money when patients substitute their prescription medication with cannabis. (36) Similar to individuals in other studies (5,7), many of our participants reported reducing or completely stopping their use of prescription medication due to cannabis. They also indicated that cannabis was more effective and had less side effects than prescription medication.

This highlights the importance of research demonstrating the cost-effectiveness of prescribed cannabis, as it could help eliminate financial barriers.(37,38) Health insurance coverage could enhance healthcare equity, in particular for socioeconomically vulnerable individuals, given that nearly 40% of our sample was deemed unfit for work or disabled. The Netherlands could start by adopting policies similar to those in Germany and the Czech Republic, where insurances cover the cost of prescribed cannabis for specific conditions.(39,40)

Barriers to treatment with prescribed cannabis

Access to healthcare is a multidimensional challenge, encompassing financial, organizational, social, cultural and other barriers to care.(41) Our data offers initial insights into barriers to treatment with prescribed cannabis in the Netherlands. Most participants had talked about their medicinal use of non-prescribed cannabis with their physician, which aligns with previous studies that show that individuals often discuss this with their healthcare providers.(14,42,43) However, it is also important to note that about a third of participants did not discuss their medicinal cannabis use with their physician. Furthermore, only few participants had requested a prescription for cannabis and even fewer had received one. Qualitative research is needed to better understand why patients refrain from discussing their medicinal cannabis use or from seeking a prescription.

Primary reasons for using non-prescribed rather than prescribed cannabis included the presumed better quality, lower cost, and greater convenience. Also the perceived lack of knowledge among physicians and fear of stigmatization played a role in why individuals did not have a prescription for cannabis. Research from other countries corroborates these findings, indicating that many physicians lack sufficient knowledge about prescribed cannabis, feel unequipped to guide patients, and face conflicting views about its use.(44,45) Greater awareness of physicians' perspectives and competencies is critical for advancing this field.

When selecting a cannabis product for therapeutic use, about half of participants identified a high THC content as the most important factor. This raises an important question: why do people place such a strong emphasis on a high THC content? Further research is needed to explore this preference, particularly given that other sources argue that similar effects can be obtained with lower THC levels. Another significant factor for many participants was the cannabis product's taste. This observation also invites reflection on how cannabis as a medicine differs from conventional pharmaceutical drugs in its appeal and usage. Participants' preferences provide valuable insights into how well prescribed cannabis products currently cater to patients' needs and expectations regarding product variety and quality.

Finally, a notable number of participants reported hearing negative information about prescribed cannabis. Future research should explore the sources of such information and how this may influence individuals' willingness to seek prescribed cannabis.

Experiences with prescribed cannabis

Participants who had accessed prescribed cannabis often preferred non-prescribed cannabis, as they considered it more effective and pleasant to use, for instance in terms of its taste or smell. Those who stopped using prescribed cannabis and those who used non-prescribed cannabis despite having a prescription for cannabis did so because of the lower costs, as well as greater

effectiveness and convenience of non-prescribed cannabis. Altogether, these findings suggest potential shortcomings of prescribed cannabis in the Netherlands.

Limitations

This study has some limitations. First, there may be a selection bias, as individuals who have had negative experiences with the medicinal use of cannabis are less likely to participate in this research. The sample also likely weighs towards individuals with internet access and who have the time and resources to complete an online survey. Therefore, the sample may not be representative of the broader population of medicinal cannabis users. Second, the data may be subject to self-reporting biases, such as recall bias, social desirability bias, or confirmation bias. For example, individuals may exaggerate the efficacy of cannabis or overreport positive effects and underreport adverse effects. Third, we may be dealing with inaccurate reporting of information if participants misunderstood or did not read the instructions. For example, although we asked participants to indicate the conditions they use cannabis for, they may have reported all conditions they have, regardless of whether they use cannabis for it. Moreover, we did not request a medical history to verify participants' diagnoses. Fourth, although duplicates were excluded, we cannot rule out the possibility that some other participants responded multiple times with different answers, as IP-addresses or other identifying information were not accessible to us.

Fifth, the sample may be skewed by our recruitment strategy. Only a small proportion of participants was recruited through coffeeshops even though the majority obtained their cannabis from there. This is because our recruitment efforts at coffeeshops were limited, putting up posters in just ten coffeeshops to announce the study. In contrast, most study resources were invested in Facebook advertisements, as these have been shown to be an effective and cost-efficient way to target a broad audience.(46,47) However, it is important to note that recruiting participants via Facebook advertisements can also introduce selection bias. For example the algorithmic nature of Facebook advertisements can disproportionally target certain demographics.(48) Sixth, people using commercial CBD products were excluded from this study, as these products contain less CBD compared to CBD-medication and there is a lack of scientific evidence for commercial CBD products.(8) However, since around half of people using cannabis for medicinal purposes report using CBD-oils(2), future research should examine the efficacy of commercial CBD products.

Conclusions

Although prescribed cannabis has been available in the Netherlands for over 20 years, most people use cannabis medicinally outside of the healthcare system. Considering the associated health risks (4,16), it is important to ensure access to safe and effective cannabis as medicine. Policies and interventions should be implemented that help reduce barriers to treatment and facilitate the transition for eligible patients from the unregulated market to the regulated healthcare system. By providing prescribed cannabis through healthcare, it provides an opportunity to implement harm reduction interventions, such as educating patients about less harmful consumption methods, providing information about the content of cannabis products, and monitoring the effectiveness, possible side effects, or interactions with other medications. Given that prescribed cannabis can be legally prescribed to patients with any health conditions in the Netherlands, more research is needed to understand how medical guidelines are implemented in practice, as only few patients currently have access to prescribed cannabis. Physicians should be surveyed to shed light on their knowledge and perceptions. Research from other countries shows that physicians generally

lack of knowledge and do not feel sufficiently equipped to prescribe cannabis (49,50), which underscores the need for more education and training. Complementary to that, patterns of use and preferences regarding cannabis products offers some indication for how prescribed cannabis may need to be tailored to better meet patient needs.

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Chapter 2.
Barriers to treatment with medical cannabis from the perspectives of people self-medicating with non-prescribed cannabis

Analysis of interviews

Barriers to treatment with medical cannabis from the perspectives of people self-medicating with non-prescribed cannabis

Introduction

In the Netherlands, cannabis for recreational purposes has been widely available at coffeeshops[7] since the 1970s, while cannabis for medicinal purposes has been available by prescription at specialized pharmacies since 2003. Despite this, the majority of people who use cannabis for medicinal purposes does not have a prescription for cannabis. A 2020 survey of a representative sample of the Dutch adult general population demonstrated that about 95% of people who use cannabis medicinally obtain it from non-regulated sources, such as coffeeshops, cannabis social clubs[8], illicit dealers, or home cultivation.(1) Based on this survey, an estimated 460,000 adults in the Netherlands use non-prescribed cannabis for medicinal purposes. In contrast, only around 7,300 patients had a prescription for cannabis in 2023.(2) Given that prescribed cannabis has been available for over twenty years (3), it is unclear why such a substantial proportion of medicinal users does not access prescribed cannabis.

Five strains of prescribed cannabis with different concentrations of Tetrahydrocannabinol (THC) and Cannabidiol (CBD) are currently available in the Netherlands. Specialized pharmacies can process the cannabis flower into sublingual oils and topical lotions, tailoring them to patient needs.(4) Medical cannabis can be prescribed by any physician, including general practitioners and specialists. General practitioners write the largest share of prescriptions with 65%.(5) Treatment with prescribed cannabis may be considered if standard treatment options and medications are not effective enough or have too many side effects.(4) Physicians are not bound by a list of eligible conditions, which means it is up to them to determine in which situation and for which patient to prescribe cannabis. While there is no accessible registry of prescribed cannabis patients, a recent study suggests that cannabis is most commonly prescribed for chronic pain in the Netherlands.(6) Patients are not required to visit one of the three specialized pharmacies in person; instead, they can have their cannabis delivered to the nearest pharmacy via postal service.

In 2018, the Dutch College of General Practitioners ('Nederlands Huisartsen Genootschap', NHG) issued a statement advising against the prescription of cannabis, except for palliative care patients, arguing that there is insufficient scientific evidence for its efficacy.(7) This prompted health insurance companies to stop reimbursing the cost of prescribed cannabis (6.50 Euro per gram as of February 2024).(8,9) The NHG's recommendation also likely deterred physicians from prescribing cannabis, as the number of prescriptions has been declining steadily from over 53,000 in 2017 to less than 39,000 in 2023.(2,10) This marks a sharp trend change from the previous decade, when prescriptions increased from less than 5,000 in 2007 to more than 50,000 in 2017.(11)

7 A Coffeeshop is an establishment where the sale of cannabis products (herbal cannabis and cannabis resin) in small quantities for personal consumption is tolerated by the Dutch authorities. This means that although the sale is a criminal offence, the Public Prosecution Service does not prosecute coffeeshops for this.(46)

8 A cannabis social club is a non-profit organization in which cannabis is grown and distributed to its members.

From a public health standpoint, self-medicating with cannabis is concerning, because individuals are using unregulated cannabis products that may contain potentially harmful contaminants. These contaminants, such as microbes, heavy metals, and pesticides, can pose serious health risks.(12–14) Moreover, individuals lack the supervision and guidance of healthcare professionals. Physicians can provide crucial support by advising on indications, dosing, and treatment duration, as well as monitoring treatment effectiveness, managing adverse effects, and mitigating other risks and harms. The present study sought to shed light on why people self-medicate with non-prescribed cannabis instead of using prescribed cannabis. No prior research has investigated barriers to accessing prescribed cannabis in the Netherlands.

In this study, medicinal use of cannabis is defined as the use of cannabis-based products to alleviate self-reported somatic or psychiatric symptoms. Prescribed cannabis refers to cannabis-based medicines prescribed by a physician, whereas non-prescribed cannabis refers to cannabis-based products that are not obtained through medical prescription. In the rest of the paper, we refer to cannabis-based products as cannabis.

Aim

The aim of this study is to explore barriers to treatment with prescribed cannabis from the perspectives of people who use non-prescribed cannabis for medicinal purposes. The results of this study provide insight into why these individuals are unable to obtain or feel hampered from obtaining prescribed cannabis. Findings can be used by healthcare professionals and policymakers to remove or reduce barriers to treatment for eligible patients.

Methods

The present study used semi-structured interviews with medicinal users of non-prescribed cannabis to examine barriers to treatment with prescribed cannabis. The study was granted an exemption from ethics from the Medical-Ethical Review Committee METC NedMec (22-912/DB).

Data collection

Between February and April 2023, thirty-three individual interviews were conducted by three interviewers using a semi-structured interview guide. The interviews took 25 - 70 minutes (45 minutes on average) and were conducted online via Microsoft Teams at a time of the participant's choice. Thirty-one interviews were conducted in Dutch; two were conducted in English. Participants provided informed consent and were given a 40 Euro honorarium in the form of an online shopping voucher in recognition of their time.

Participant selection and eligibility criteria

We chose to conduct about thirty interviews, following qualitative research guidance and aiming to capture the target population's heterogeneity in experiences with medicinal cannabis use.(15) A combination of convenience sampling and purposeful sampling was used. First, a convenience sample was recruited in a related online questionnaire study, which explored the characteristics of people in the Netherlands using non-prescribed cannabis medicinally. These participants were

invited to participate in an interview for the present study. From those who signed up for the interviews, we purposefully selected individuals based on a number of criteria. Priority was given to participants who provided detailed answers to open-ended questions, as this indicated a higher level of engagement and willingness to share information. Within this group, efforts were made to ensure diversity by including participants of varying ages, different health conditions, and a balanced gender distribution.

Eligibility criteria were age 18 or older, residence in the Netherlands, and self-reported current use of non-prescribed cannabis-based products for physical or mental health symptoms. Participants could also take part in the study if they used prescribed cannabis in addition to using non-prescribed cannabis for medicinal purposes. Individuals who only used prescribed cannabis or only used commercial CBD products were not eligible to take part in the study.

Conceptual framework

In this research, the conceptual framework of patient-centred access to healthcare outlined by Levesque and colleagues (16) was used to develop the semi-structured interview guide, analyse the coded data, and categorize the identified barriers into dimensions. This multidimensional framework has been used successfully in different healthcare settings to evaluate and identify barriers to treatment.(17,18) It defines access to care as the interface between aspects of the healthcare system and its potential users and includes five dimensions of accessibility (Approachability, Acceptability, Availability and accommodation, Affordability, and Appropriateness) and five corresponding abilities of populations to access care (Ability to perceive, Ability to seek, Ability to reach, Ability to pay, and Ability to engage).

We used this framework to develop an interview guide that takes a comprehensive approach to assessing patient-centred access to care. The interview guide was further refined with themes identified in the literature and in discussion with people with lived experience of using cannabis for medicinal purposes. The guide also explored people's experiences with using non-prescribed cannabis medicinally to gain a broader understanding of their motivations and needs. We examined patients' experiences, knowledge, perceptions, and attitudes and how this informed their actions and decisions within their sociodemographic, economic, and social context. An English version of the interview guide is available in Appendix B.

Study framework

Our research primarily adopted a deterministic approach, while also integrating reflexive components to enhance depth and contextual understanding.(19) A deterministic approach often seeks to uncover patterns that are consistent and replicable. We chose this approach to align with the study's aim of identifying key barriers to treatment, in order to ultimately inform the design of targeted interventions to reduce these barriers. Given that this study is the first of its kind in the Netherlands, the focus was on gaining a comprehensive understanding of the primary barriers. We employed a traditional approach to thematic analysis, with coding reliability and the development of topic-summary-type themes.(19–21) To incorporate reflexivity, we included questions during the interviews that explored broader contextual factors, such as what it means for patients to obtain cannabis without a prescription. This allowed us to better understand the motivations and circumstances behind their decision-making. Additionally, regular reflective sessions were conducted throughout the analysis process to critically evaluate and interpret the findings.(20)

Coding and thematic analysis

Interviews were audiotaped and transcribed verbatim. Each participant was given a pseudonym to ensure confidentiality. All transcripts were read multiple times by the researchers to familiarize themselves with the data. A deductive coding approach was applied. A codebook with coding rules and examples was developed based on the main topics from the interview guide and topics identified from the interviews. The codebook contained 27 codes across 10 categories (see Appendix C). Coding reliability was assured by having two researchers independently coded all meaningful text segments in the qualitative software program MAXQDA 2022 using the codebook to create a useful division of the data.(22) After coding each of the first 3 transcripts, any coding discrepancies and difficulties were discussed in order to verify and adjust the codebook. Interrater agreement on the first 20% of interviews (n=6) was 92%, and therefore above the minimum required 80%.(23) After coding the remaining transcripts, codes were compared and disagreements discussed until consensus was reached.

Data was analysed using thematic analysis. To ensure that data was interpreted the same way, thematic analysis was done by the two coders and a third researcher who had conducted some of the interviews. A theme is defined as capturing "something important about the data in relation to the research question and [representing] some level of patterned response or meaning within the data set".(24) Thematic analysis was guided by the research question and the conceptual framework, specifically its five dimensions of accessibility and the five corresponding abilities of populations. The three researchers looked for themes that related to the conceptual framework in the coded data. Themes were developed and discussed in an iterative process.

Results

Participant characteristics

Thirty-three individuals who used non-prescribed cannabis for medicinal purposes were interviewed (Table 1). The majority was male (60.6%), with ages ranging from 22 to 71 years (mean age 45 years). Participants represented all educational levels. More than half were deemed unfit for work, while about a third was in fulltime or parttime employment. Thirty individuals were Dutch; three were expatriates of other nationalities. Most participants (84.8%, n=28) used only non-prescribed cannabis for medicinal purposes, while five individuals also used prescribed cannabis. Most participants primarily obtained their cannabis from coffeeshops (57.6%, n=19) and mainly used herbal cannabis (66.7%, n=22).

Participants reported a wide range of physical and mental health conditions. The vast majority (87.9%, n=29) had more than one medical condition. The most common reported conditions were chronic pain, sleep disorders, ADHD/ADD, depression, and post-traumatic stress disorder. For an overview of all health conditions, see Table 2. One participant was excluded from further analysis, beyond the participant characteristics, because they reported having brain damage and their responses were inconsistent and conflicting throughout the interview.

Table 1. Participant characteristics

Variables	Categories	%	n
Gender			
	Male	60.6	20
	Female	39.4	13
Age			
	18-29	12.1	4
	30-39	21.2	7
	40-49	30.3	10
	50-64	30.3	10
	65+	6.1	2
Education*			
	Primary education	3.0	1
	Lower/pre-vocational secondary education	27.3	9
	Upper/vocational secondary education	36.4	12
	Bachelor's (or equivalent)	27.3	9
	Master's or Doctorate	6.1	2
Employment			
	Unfit for work/disabled	57.6	19
	Fulltime	18.2	6
	Parttime	15.2	5
	Retired	6.1	2
	Student	3.0	1
Nationality			
	Dutch	90.9	30
	Not Dutch	9.1	3
Type of cannabis			
	Non-prescribed	84.8	28
	Non-prescribed and prescribed	15.2	5
Main source of cannabis			
	Coffeeshop	57.6	19
	Home cultivation	21.2	7
	Online shops	9.1	3
	Other	12.0	4
Main form of cannabis			
	Herbal cannabis	66.7	22
	Resin cannabis	3.0	1
	Sublingual oil	24.2	8
	Other	6.1	2

** Equivalent in the Dutch educational system (from first to last): Basisonderwijs; VMBO, MBO1, praktijkonderwijs, onderbouw HAVO/VWO; HAVO, VWO, MBO; HBO, WO Bachelor; WO Master, Doctoraat.*

Table 2. Medical conditions of participants

Health conditions	%	n
Chronic pain	63.6	21
Sleep disorder	42.4	14
ADHD/ADD	39.4	13
Depression	36.4	12
Post-Traumatic Stress Disorder	33.3	11
Anxiety	18.2	6
Fibromyalgia	15.2	5
Autism Spectrum Disorder	15.2	5
Migraine	12.1	4
Rheumatic diseases	9.1	3
Ehlers Danlos Syndrome	6.1	2
Multiple Sclerosis	3.0	1
Crohn's disease	3.0	1
Glaucoma	3.0	1
Other	24.2	8

Note: Participants could indicate multiple medical conditions.

Themes

We identified five themes – one in each of Levesque's five dimensions of healthcare accessibility: approachability, acceptability, availability, affordability, and appropriateness. These dimensions offered a comprehensive framework for understanding the barriers participants faced in accessing prescribed cannabis. The themes underscore the complex, multidimensional nature of access to care and provide a deeper understanding of the challenges that patients encounter. The themes are presented in no particular order.

Theme 1: Perceived high cost (Affordability)

Affordability of cannabis played an important role in participants' behaviours and choices concerning their medicinal use of cannabis and was influenced by several factors.

Participants generally believed that prescribed cannabis was more expensive than cannabis obtained through other sources, such as coffeeshops or home cultivation. Several participants mentioned that the price difference was the main reason as to why they did not seek a prescription. However, few participants knew the actual price of prescribed cannabis. Many based their beliefs about prices on what they heard from other people.

Most participants indicated that they would use prescribed cannabis if it was covered by health insurance. Some tried getting it reimbursed by their health insurance providers but were rejected. Many did not even ask for a prescription because they assumed that the costs would not be covered by health insurance and that they would not be able to afford it. A few participants had prescribed cannabis reimbursed by health insurance in the past, but when coverage was discontinued a few years ago, they were no longer able to afford it and resorted to the unregulated cannabis market.

Many participants had limited income or relied on disability benefits or welfare benefits, as they were deemed unfit for work or were unable to work full time due to chronic health problems. They reported that, as a result, they were unable to afford prescribed cannabis or struggled with the cost of non-prescribed cannabis. The cost of cannabis was considered significant by most participants, regardless of income.

> *If I have really severe pain, then I really have to use cannabis, because otherwise it is not doable for me. I just can't. At one point I talked to the GP about it, and yes, it was possible [to get prescribed cannabis], but the costs were so high that it is not affordable if you are on welfare. And yes… then I decided to just grow it myself. (Male, 44) (Translation)*

The ability to pay for cannabis affected participants' choices regarding their medicinal use of cannabis, including what products they used, how much they used, and where they obtained it from. Some participants turned to cheaper alternatives, such as growing cannabis themselves or purchasing it from dealers instead of coffeeshops. Others coped with the costs by using less cannabis than needed or settling for products they preferred less. For example, some preferred sublingual oil, as they found it to be more effective for symptom relief than inhaling herbal cannabis, but they were unable to afford it due to its higher cost. Some participants regularly felt forced to choose between buying cannabis as medicine and meeting basic needs such as groceries or leisure activities, as they could not afford both.

> *I: Do you also have financial worries because of the use of cannabis?*
> *P: Yes, sometimes I do and I feel very guilty about that. Then I'm like 'I'm in pain. I'm really in pain. And I can't go to the doctor.' And you just want to get rid of some of the pain if possible or just be less in pain.*
> *I: You just said you feel a bit guilty. Why is that?*
> *P: Well, you have to forgo other things. You have to cut back on your groceries again. And on other things. (Female, 64) (Translation)*

The chosen alternatives often compromised their wellbeing, as using less cannabis or a different cannabis product was typically less effective for symptom relief. Moreover, not being able to afford cannabis on a regular basis generally led to stress for participants.

> *I: Do you ever worry about the costs of cannabis?*
> *P: Every week. Stress, like, 'how am I going to do that next week? Am I going to beg someone for money again, or ask my mother?' And yes… That's not so nice. … It would just be nice if it was just reimbursed. (Male, 36) (Translation)*

Theme 2: Lack of prescribing physicians (Availability)

Different aspects of the availability of prescribed cannabis and its related services were discussed. Participants generally felt that there were insufficient physicians who prescribed cannabis. A few participants reported positive or neutral experiences, in which physicians were open to prescribing cannabis or were tolerant of their use of non-prescribed cannabis. However, most participants either had negative experiences with their physicians or believed that their physician would not prescribe cannabis.

According to participants, physicians typically had limited knowledge about prescribed cannabis. Participants noted that physicians were uninformed about the medicinal properties of cannabis, as well as the prescribed cannabis products, eligibility criteria, and prescription procedure. They stated that physicians with less knowledge of prescribed cannabis were generally less likely to have an open attitude towards it and were less willing to prescribe it. Participants also talked about experiences where physicians expressed prejudices and negative beliefs about cannabis.

> *I: Did you feel comfortable discussing it with your GP?*
> *P: No. [Because of] the stigma I mentioned earlier. And also because I know that many GPs have limited knowledge about it. From what I understand, it is not part of the standard curriculum for GPs. So yeah, I also noticed that in this conversation, that there was just relatively little prior knowledge. And that also caused a certain tension for the GP: 'Oh, oh, oh, yes, well, oh, yes, it is good that you are looking for a way to deal with the pain, buuut…' [laughs] […] I also read that there was actually a call for GPs to learn more about this. Because there is a lack of knowledge. (Male, 35) (Translation)*

Several participants described frustrating experiences in which physicians referred to medical guidelines and protocols as their reason for not prescribing cannabis. Participants stated that, according to the guidelines, prescribed cannabis is seen as a last resort rather than a viable treatment option. Some participants said that their physicians wanted to prescribed cannabis but were unable to because they felt bound by medical guidelines or the recommendation of the Dutch Society of General Practitioners (NHG).

> *If it was just easier… Ehm I don't want to say 'easy to get'… If you didn't have to go through all these hoops, like it was the last resort. Because that's really off-putting. I also don't want to try all these other drugs that I don't really know 100% to then end up with weed that I know. It feels like a bit of a test… like a bit of a performance. I just wish weed was seen the same as other drugs. And that it was also a first option if they felt it would work. (Male, 28, expat)*

> *A lot of GPs still have really limited knowledge of it. You have to be a bit lucky with who you get in front of you. And there is not some kind of standard protocol where it is easier to say 'Gosh, just give it a try.' (Male, 35) (Translation)*

Many participants simply assumed that their physicians would not prescribe cannabis. This was often based on information they heard from other people, such as about strict eligibility criteria, or negative past experiences with uncooperative physicians. As a result, some participants said they did not even attempt to request a prescription to avoid potential disappointment.

Furthermore, some participants believed the mode of provision of prescribed cannabis to be inconvenient. The contact procedure – discussing a cannabis prescription with a physicians and obtaining repeat prescriptions – was viewed as a lengthy bureaucratic procedure. Some stated that there was no pharmacy in their vicinity or that the delivery would take too long. It should be noted that these concerns were mostly based on beliefs about – rather than experiences with – prescribed cannabis. Participants who had received a cannabis prescription in the past typically

viewed the service as convenient, citing a smooth prescription process and quick postal delivery. For various participants, it was not that prescribed cannabis was particularly inconvenient, but more so that coffeeshops were viewed as the more convenient option, as coffeeshops tend to be widely available, have long opening hours, and a low-threshold contact procedure.

> *I just find prescriptions a hassle, what with requesting a repeat prescription, and it all takes time, and then you have to hope that nothing went wrong again, and eh… I have experienced that too. So I prefer to have it in my own hands. (Female, 30) (Translation)*

> *As long as it's all freely available, I don't think that I wouldn't switch to that [prescribed cannabis]. Unless, let's say, the state accepts all that and there's a lot more choice and there's not such a stigma attached to it. But right now, it's all so cumbersome that I don't bother with it. (Female, 49) (Translation)*

Theme 3: Limited availability of accurate information (Approachability)

While participants generally knew that prescribed cannabis was available in the Netherlands, they felt that they were unable to approach or reach it. The interviews revealed that the availability of information about prescribed cannabis played a key role in how approachable it was perceived to be.

Most participants searched for information about prescribed cannabis on the Internet, some relied on their physician for information, and some said they had never looked for information about prescribed cannabis. Of those who had looked for information online, many expressed that information from official authorities was not easy to find. Those who did find information on government websites often said that the information was insufficient for their needs. For instance, participants noted that the eligibility criteria were unclear and they emphasized the need for guidance on dosing and selecting suitable cannabis strains for their condition.

Participants usually searched for information about the medicinal use of cannabis in *general* as opposed to information about prescribed cannabis. They stated that they looked for information on informal (non-governmental) websites, including websites of cannabis social clubs and foundations for medicinal cannabis users[9], as well as online fora (e.g., Reddit) and platforms of specific patient associations where patients exchange information and experiences. Various participants described how patients tried to help each other on online fora and platforms due to insufficient information and guidance from official authorities.

> *P: I'm a lot in those Facebook groups of people with fibromyalgia or rheumatism… So I also read from other people, and you just see that everyone is searching. A lot of people are… They just have no idea what to do. So, yeah, it really has a big impact on your life.*

9 Foundations for medicinal cannabis users are foundations set up by patients for patients with the aim of providing information about the use of cannabis to help alleviate health symptoms. For example, they may offer information about the use and application of cannabis for different health conditions, how to grow cannabis and make cannabis oil at home, and medical cannabis-related national or international news.

I: And what do you think about the fact that all those Facebook groups exist?
P: It does help me. I think it's good. For lack of better options or support. And you're a bit lonely with all those symptoms. (Female, 63) (Translation)

Many of these websites and platforms also acted as informal or indirect sources of information about prescribed cannabis in the Netherlands. In the interviews, participants frequently described what they heard or read about online. For example, most participants believed that they were not eligible to receive prescribed cannabis for their health conditions. They found limited lists of eligible conditions online and consequently never searched for further information or never asked for a prescription. Participants also mentioned reading stories and other people's opinions about the irradiation of prescribed cannabis and the undesirable effects this might have on cannabis. This informal information shaped participants' views of prescribed cannabis and their willingness or motivation to approach it.

I once looked it up [on the internet]. I also once talked about it with my GP at the time. But anyway, it's not reimbursed for the reasons that I use it [cannabis]. But I heard from people who do get their cannabis from the pharmacy that the price is higher and the quality is lower. So, yeah, then the choice is made very quickly. […] Eh… yeah, I don't really know that much about it. What I just said is what I heard from others. So I can't really say with any certainty how reliable that information is. But I just hear that the quality is, on average, a lot lower than what you get in the coffeeshop. (Female, 50) (Translation)

Theme 4: Poor fit between services and patient needs (Appropriateness)

Various participants had concerns regarding the appropriateness of the prescribed cannabis services, meaning the fit between the services and patient needs. This includes what services are provided (i.e. the cannabis products) and the way in which the services are provided (e.g. quality of the interaction with their physician).

The interviews revealed that participants' knowledge and perceptions of the prescribed cannabis products varied. In general, they *wanted* to use prescribed cannabis because it was important to them to use a clean and consistent product (i.e., no contaminants, consistent THC content) that is produced under controlled conditions with quality controls. However, various participants also expressed concerns about the quality and variety of available products. They believed that prescribed cannabis might be less effective than non-prescribed cannabis, citing low THC levels and insufficient strain variety. The lack of diverse strains with different cannabinoid and terpene profiles was a particularly common criticism among participants. Additionally, some believed that the irradiation of prescribed cannabis reduced its medicinal properties and worsened the taste and smell. Thus, while prescribed cannabis was seen as reliable, many doubts remained about its effectiveness in providing adequate symptom relief.

I do find that there are only few strains of prescribed cannabis. There are only 4 or 5 strains that are cultivated, so you don't really have that many options. That's a shame, I think. I think they should start cultivating more strains for prescription cannabis. […] With outdoor cannabis I could at least grow a few more strains and I could just experiment more with what I like and don't like. (Female, 52) (Translation)

Furthermore, many participants had negative expectations about the way in which the services would be provided. Participants were concerned about whether their physician would engage them sufficiently in shared decision-making. Some stated that they would appreciate professional support and guidance, but most emphasized that they also wanted their own knowledge and previous experience to be taken into consideration. Some feared that physicians might make decisions about their treatment in a way that would limit their autonomy and reduce their quality of life.

> *Because I think, why make it so difficult?! I know what I want. I know what I benefit from. Help me, damn it! [I feel that I'm] not being taken seriously or that they don't think with me. I mean, if you have all that knowledge yourself [as a patient] and you have a discussion with your doctor, then you just want to be taken seriously. And it is probably because there is so little knowledge about it, that [doctors] push it away and don't want to cooperate. (Female, 52) (Translation)*

> *I was disappointed in the reaction, even though I had expected it. When you get a reaction like that, then um... Yeah, I don't know if I... Maybe it sounds a bit extreme, but [I] almost don't feel like a full-fledged citizen. That I'm not taken completely seriously regarding what I need, with my right to self-determination. And the part about trusting the patient's insight was completely missing. And I thought that was really a shame. [It feels like it's] not open for discussion, even though I know that it works. That makes the situation so difficult. (Male, 35) (Translation)*

Another aspect of service provision that deterred many from asking for a prescription was the interpersonal quality of the interaction with physicians. Some participants expected interactions with physicians to be unpleasant, as they believed that physicians would judge or dismiss them if they asked for prescribed cannabis. Some explained that they had unpleasant experiences in the past, for example where physicians expressed prejudices or where they did not feel heard or taken serious by their physician. This discouraged participants from asking for a prescription, especially if they believed that their request for prescribed cannabis would be denied.

> *I think I would not feel heard [by a doctor]. And that makes me uncomfortable to ask for [a prescription]. If you know that it is very likely that you will get a 'No', then you don't really want to try. (Male, 35) (Translation)*

The ability to engage with the healthcare system, as defined by Levesque et al. (16), differed across participants. Individuals generally seemed to have the *capacity* to engage. Based on what participants said, many sought out much information about the medicinal use of cannabis. They also expressed a desire to be involved in shared decision-making with their physicians regarding treatment. However, their *motivation* to engage in care differed significantly across participants. While some expressed a willingness to use prescribed cannabis in its current form, others stated they would only seek a prescription if it met their needs. A few, however, had no interest in engaging with the healthcare system to obtain prescribed cannabis. These individuals often cited a history of negative experiences with the healthcare system or a general distrust of the government, and preferred to 'keep matters in their own hands'.

Theme 5: Stigma (Acceptability)

Data from the interviews shows that the acceptability of cannabis as medicine was influenced by sociocultural factors. A prevalent topic was the role of stigma around cannabis, which was related to negative views of cannabis as a recreational drug and a potential drug of abuse.

Participants discussed both experienced and perceived stigma from physicians, friends and family, and the general population. Many stated that they had been called 'drug users' or believed that this is how people viewed them. Others talked about experiences where they felt that physicians or other people were dismissive or judgmental about their medicinal use of cannabis. A few reported sympathetic reactions from physicians or friends and family, but this was not the norm.

> *[My physician] asked me 'What kind of medication have you been using up until now?' I said 'cannabis.' And she reacted so poorly to it. Really, she just looked at me like I was a junkie. And because I had such a negative experience with sharing honestly that I use cannabis, it taught me very quickly that I have to keep my mouth shut about it if I want them to take me seriously and to hear me tell my story and not to see me through their prejudiced and outdated glasses. (Female, 27) (Translation)*

> *It's not nice at the coffeeshop here in this city. There's only one for so many residents. It opens at 6 p.m. and there's always a line in front of the door. And then you stand outside in line and, yes, you feel watched and stigmatized. You don't have that at all at a pharmacy. You have much more privacy there. (Male, 41) (Translation)*

Experienced and perceived stigma sometimes led to internalized stigma. Some participants described feelings of shame around their medicinal cannabis use. They noted that they felt as if they were doing something bad or forbidden. Others described feeling stigmatized or uncomfortable when purchasing their medicinal cannabis at a coffeeshop, because they felt that they did not belong there. They identified as patients and did not want to purchase their cannabis at a location where others might view them as recreational cannabis users.

> *I always feel a bit like a burden when I use it. I don't want to bother anyone. And yet I feel like I'm bothering people, while I think that it's actually something that helps me a lot. But with other people it's immediately 'Oh, no, no, no, no cannabis.' They see it as a hard drug. So that stigma definitely needs to go down. (Male, 30) (Translation)*

Stigma had a mixed impact on the judged appropriateness for people to seek care. On the one hand, participants stated that they did not feel comfortable seeking a prescription due to stigma. For example, they feared being judged or being seen as a 'junkie' by their physician. Others noted that they did not want to have prescribed cannabis in their medical record out of fear that this may lead to discrimination or exclusion from other medical care. On the other hand, participants described feeling as if a cannabis prescription would reduce the stigma. They said that a prescription would legitimise the use of cannabis as a medicine and legitimize them as patients.

It's quite a step to talk about it with my GP, because I've never talked to him about it. I'm also a bit afraid that I'll be stigmatized, that he'll look at me differently from then on. […] That you'll be dismissed as a, eh… yeah a weed user, a junkie. Many people still see it as a drug. (Male, 41) (Translation)

I: Is that door [to ask for prescribed cannabis] closed for you now?
P: It is closed. Because the problem is that my request to use cannabis would then be included in my medical record. And since I also need psychiatric help and have been on the waiting list for psychiatric help for years, I want to have as few barriers as possible. I want to create as few biases as possible, like: 'Oh, I see in the file that you want to use cannabis. You must be another junkie'. Because one psychiatrist literally said to me: 'The only reason why you want to use dexamphetamine is because you are a junkie, and you are manipulating me to get what you need.' Yeah, duh, I have ADHD and I can't function without medication. (Female, 27) (Translation)

The legality of prescribed cannabis was another reason as to why many participants stated that they wanted a prescription. They felt uncomfortable or experienced stress from obtaining cannabis from unregulated sources. Some did not want to contribute to criminality by purchasing products from illicit sources. Others were afraid of getting involved with the police or being evicted from their homes for domestic cannabis cultivation. However, participants also felt that the illegal status of non-prescribed cannabis reduced the acceptability of cannabis and its medicinal use in society.

Participants typically seemed to have a strong ability to seek care, as defined in Levesque's framework. They demonstrated personal autonomy, as they self-medicated with cannabis and often claimed to have much knowledge about the medicinal use of cannabis. Moreover, they were adamant about their right to self-determination and emphasized the right to have access to a medicine that works for them.

I just want to be able to get my medicine, just like anyone else. Even if it is, well, let's call it a homeopathic prescription. But then preferably regulated. And that is the most important thing for me. [Prescribed cannabis] needs to get out of that grey area. (Male, 44) (Translation)

Discussion

The present study examined barriers to accessing prescribed cannabis from the perspectives of individuals who self-medicate with non-prescribed cannabis. Data from the interviews shows that barriers exist across all five dimensions of a patient-centred access to care model.(16) Key barriers include the perceived high cost of prescribed cannabis (Affordability), the limited availability of prescribing physicians and inconvenient service provision (Availability), a lack of accurate information about prescribed cannabis (Approachability), concerns about how well prescribed cannabis meets patient needs (Appropriateness), and the stigma associated with cannabis use (Acceptability). The findings are significant because they offer a comprehensive and patient-centred view of current issues that prevent individuals in the Netherlands from transitioning from

using non-prescribed to prescribed cannabis. Taking the patient perspective provides a deeper understanding of how barriers are experienced in practice, as opposed to evaluating access strictly through legal frameworks and policies.

Our findings align with research from countries such as Germany, Belgium, Australia, and North America. Studies from these regions also identified the affordability of prescribed cannabis and the difficulty in finding physicians willing to prescribe it as key barriers.(25–30) Much like in our study, individuals discussed the high cost of prescribed cannabis, the lack of health insurance coverage, and their often-limited income as relevant factors. Expanding health insurance coverage for prescribed cannabis could enhance healthcare equity, particularly for those on disability or welfare benefits. The Netherlands might benefit from adopting policies seen in countries like Germany and the Czech Republic where insurances cover prescribed cannabis for specific conditions.(31,32)

According to participants in our study and other research, physicians seem to lack knowledge or have negative perceptions of cannabis.(28,29) Recent research on the physicians' perspectives confirmed that physicians generally experience a lack of knowledge about prescribed cannabis and that many are concerned with its potential for abuse.(33–36) Consequently, finding a physician who is willing to prescribe cannabis seems to be a matter of luck rather than the consequence of a well set-up healthcare system. This has serious implications, as varying knowledge and attitudes among physicians can lead to different health outcomes for patients. This highlights the need for educational interventions targeting physicians to improve their knowledge and willingness to prescribe cannabis when appropriate. Moreover, our data shows that medical guidelines act as significant systemic barriers. Physicians often feel obligated to follow these guidelines, but since they are vague and open-to-interpretation, physicians are reluctant to prescribe cannabis. To help physicians feel confident in prescribing cannabis, clearer and more flexible medical guidelines are needed.

Prescribed cannabis remains a stigmatized medicine. Although participants believed that a prescription for cannabis would legitimize them as patients, stigma from healthcare providers and society deterred many from seeking it. Similarly, studies in other countries show that patients feel uncomfortable asking their physician for prescribed cannabis due to fear of stigma or judgment.(25,28,29,37) In addition, some participants were deterred by the potential consequences of having prescribed cannabis documented in their medical record, such as the risk of being excluded from other essential treatments. Future studies should explore the impact of anticipated stigma on treatment-seeking behaviour and assess stigma reduction strategies. Training programs for physicians could address misconceptions and stigma among physicians to improve patient access. Furthermore, physicians should be trained in having unbiased conversations, as the comfort level with a healthcare provider is an important factor in patients' willingness to open up about sensitive topics like cannabis use.(38)

Participants considered the alignment between prescribed cannabis and their needs a key factor in determining its appropriateness. They felt that the appropriateness was limited due to concerns about the perceived low effectiveness of prescribed cannabis, the limited product range, and the potential negative effects of irradiation. Similarly, medicinal cannabis users in other countries consider it important to have access to a variety of strains and alternative forms such as tinctures and edibles.(27) Many participants in our study expressed reluctance to engage with the prescribed

cannabis services in the way that they are currently offered. Levesque and colleagues (16) argue that being able to only use services that are of poor quality or that are not effective is a restriction of access to healthcare. To better meet patient needs, a wider range of prescribed cannabis products should be offered, including different strains and forms. For example, in Germany, over 150 strains of herbal cannabis are available on prescription as of 2023.(31) Australia, Canada and the United States offer prescribed cannabis in a wide range of forms including extracts, therapeutic vapes, and oral preparations, such as edibles, oils and capsules.(39–41)

Another barrier was the limited availability of accurate information about prescribed cannabis. Information from official authorities was hard to reach or insufficient, whereas information from other sources was often inaccurate, outdated, incomplete, or biased by personal opinions. As a result, data from the interviews revealed that participants often lacked knowledge or had wrong information about prescribed cannabis, which in turn hindered them from being able to make informed decisions about whether to seek care. Research from other countries has highlighted similar issues, including people's difficulties in accessing accurate information about prescribed cannabis, the prevalence of misinformation, and the role of the Internet in the dissemination of misinformation.(42–44)

In the present study, the lack of accurate information also affected several other dimensions of accessibility of healthcare. For instance, many participants had knowledge gaps about the price of prescribed cannabis, the types of products available, or the eligibility criteria. This affected whether individuals perceived prescribed cannabis to be affordable, appropriate for their needs, or even available to them. Based on the stories that participants shared, we also found that physicians sometimes misinformed patients, for example about the eligibility criteria or available products. This underlines the need to educate both physicians and patients. In countries like Germany and Australia, information about prescribed cannabis is made widely available online by different entities within the healthcare system, such as the Ministry of Health, health insurance providers, and national associations of physicians. To improve accessibility in the Netherlands, official authorities should provide clear and user-friendly online resources. These resources should be tailored to patients' needs, addressing common concerns and empowering patients to make informed decisions about seeking care and engage in informed discussions with their physicians.

Barriers to treatment identified in this study were primarily related to Levesque et al.'s (16) dimensions of accessibility rather than the dimensions of abilities. For example, many participants expressed health literacy and digital literacy but still struggled to find accurate and adequate information about prescribed cannabis. Participants also demonstrated a strong sense of personal autonomy and yet described feeling hampered from seeking care due to the stigma around cannabis use. Additionally, although participants were motivated to seek care, they said that they were reluctant to ask for a prescription because they believed that the services did not meet their needs. It is important to note that participants generally wanted to use prescribed cannabis, as they recognized the benefits of prescribed over non-prescribed cannabis. This suggests that the largest improvements in access to prescribed cannabis in the Netherlands can be achieved through healthcare system reforms. At the same time, interventions should target patients, for example by enhancing access to accurate information. Future research should further explore the role of people's abilities in shaping access to care, as this could inform the development of interventions that empower patients. Finally, comparing access models from other countries could help identify effective strategies for enhancing access to care and improving patient satisfaction.

Limitations

This study has several limitations. First, the results are based on a small sample size, limiting their generalizability. However, the sample was diverse and the results mirror findings from other research, which supports the validity of our results. Second, interviews were conducted online to lower the threshold for participation, as individuals were recruited from across the country. A limitation of conducting interview research online is that it may hinder the development of rapport between the researcher and the participants.(45) This may especially be an issue given the stigmatizing nature of the subject of medicinal cannabis use. To try to counteract this, the interviewers underwent extensive training prior to conducting the interviews to sensitize them to the topic and study population. Interviewers focused on establishing a trusting rapport with participants before and throughout the interviews. Third, while our study primarily used a deterministic approach, future research could benefit from adopting a reflexive approach to thematic analysis. In this approach, researchers actively reflect on their role and assumptions throughout the process, recognizing that their subjectivity shapes the analysis.(20) This can produce more nuanced and contextually grounded themes, making it particularly well-suited for a deeper exploration of patients' experiences and how the five ability dimensions contribute in generating barriers to treatment.

Conclusions

This study contributes to a deeper understanding of barriers that hamper patients from accessing regulated prescribed cannabis. Despite being available in the Netherlands for over twenty years, our data shows that access to prescribed cannabis remains limited due to a range of different factors. Key barriers were the perceived high cost of prescribed cannabis, the limited availability of physicians willing to prescribe it, a lack of accurate and easy to reach information about prescribed cannabis, concerns about whether the services would meet patient needs, and the stigma surrounding cannabis use. Our findings also reveal that oftentimes barriers to treatment stem from a lack of knowledge or misconceptions among both patients and physicians, rather than actual experiences of trying to obtain prescribed cannabis. However, since prescribed cannabis is currently not covered by health insurance and physicians are generally hesitant to prescribe it, it is likely that people will continue to obtain their cannabis from unregulated sources, despite the associated health, financial, and legal risks. For policymakers and healthcare professionals, this study highlights the importance of addressing these barriers through policy changes, education of physicians, and improved public information to enhance patient access.

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Chapter 3.
Potency of non-prescribed cannabis used for medicinal purposes: a comparison of laboratory analysis and self-reports

Chemical analysis of cannabis samples

Potency of non-prescribed cannabis used for medicinal purposes: a comparison of laboratory analysis and self-reports

Introduction

Cannabis sativa has been used medicinally by humans for thousands of years.(1) However, it was not until the 20th century when the active components in cannabis were first identified.(2) More than 100 so-called phytocannabinoids have been isolated from *Cannabis sativa*.(3) These are plant-derived compounds which bind to cannabinoid receptors. Tetrahydrocannabinol (THC) is the main psychoactive compound in the cannabis plant. It is also the most important compound when considering the medicinal benefits of cannabis products, as there is evidence that THC can, among other things, reduce pain and nausea, and stimulate appetite.(4,5) However, THC can also cause adverse effects, such as impaired concentration, memory and cognition, cardiovascular events, and psychotic and mood disorders.(5) Moreover, THC's reinforcing effects play a pivotal role in the emergence of cannabis use disorder, with the use of high-potency cannabis being a key risk factor.(6)

Cannabidiol (CBD) is a non-psychoactive compound with medicinal properties. A high-dose CBD preparation, sold under the brand name Epidyolex, has been approved as an anti-seizure medication.(7) There is also some evidence that CBD has antipsychotic properties in dosages of hundreds of milligrams per day.(8) However, the use of low-dosed, over-the-counter CBD-containing products as anti-anxiety medication or sleeping aid has been shown to be placebo-powered at best.(9,10) Moreover, it was thought that CBD could reduce the harmful acute effects of cannabis use, but recent studies did not find this modulatory effect.(11,12)

Cannabinol (CBN) is a psychoactive phytocannabinoid with a pharmacology similar to that of THC, albeit with lower potency, resulting in milder effects.(13) In most cannabis products, CBN is present in much lower concentrations than THC, making it less relevant for its medicinal properties. As THC degrades to CBN over time(14), the concentration of CBN gives researchers some indication as to the freshness of the cannabis product.

Beyond these better-known phytocannabinoids, it has been proposed that other cannabinoids (e.g., cannabigerol) and terpenes (e.g., myrcene, limonene) may enhance or modulate the effects of cannabis through biochemical interactions – the so-called *entourage effect*. Although some studies have found certain individual cannabis-derived compounds (besides THC and CBD) to be pharmacologically active(3,15), rigorous scientific studies have yet to consistently confirm the entourage effect.(16) Current clinical evidence does not strongly support the importance of terpenes or cannabinoids other than THC and CBD in the context of medicinal use of cannabis.(17), although further research into some minor cannabinoids is certainly warranted.(18)

For over two decades, prescribed medical cannabis has been legally available in the Netherlands. Physicians are not restricted by a specific list of medical conditions and can prescribe it when standard treatments prove insufficient or cause intolerable side effects. In the Netherlands, there are no guidelines relating to cannabinoid profiles and their suitability for distinct symptoms or

conditions. Five different strains of herbal cannabis with different THC and CBD concentrations are available. In addition to that, oils can be prepared by pharmacists based on these plant-based products to attain specific cannabinoid profiles. Despite being legally available, the vast majority of people in the Netherlands who report using cannabis for medicinal purposes do not have a prescription for cannabis. In 2020, a survey conducted among a representative sample of the Dutch adult general population revealed that 92.7% of individuals who reported using cannabis medicinally did so without a prescription. This is estimated to equate to 460,000 adults.(19)

There are various non-regulated sources through which cannabis can be acquired in the Netherlands. Although under Dutch law, trade, production and possession of cannabis are prohibited, the small-scale sale of cannabis under strict conditions in so-called "coffeeshops" is tolerated. Coffeeshops are allowed to sell herbal and resin cannabis, as well as derived products that have not been chemically processed, such as cannabis cigarettes (joints) and edibles based on raw cannabis. Sale of cannabis extracts and oils is not permitted. Beyond coffeeshops, small-scale home cultivation (maximum five plants) has been largely decriminalized. Cannabis social clubs, a closed network where cannabis is grown and distributed amongst its members, are rare in the Netherlands but exist, especially in a context where cannabis is primarily used for medicinal purposes.

One aspect that sets the unregulated cannabis sources apart from the legal prescribed cannabis supply chain is a lack of quality control. Prescribed cannabis has to comply with limits for contaminants (e.g., micro-organisms, heavy metals and pesticides) and its cannabinoid concentrations are measured and documented. The content of non-prescribed cannabis is generally not known, as analysis is costly and in most cases not allowed by law. That is because most methods used for cannabinoid analysis involve an extraction step, which is chemical processing of cannabis and prohibited in the Netherlands. However, research has shown that recreational users of cannabis have limited capability to asses cannabis potency. Two studies have shown a weak association between estimated potency level and THC concentration.(20,21)

Aims

This study aims to investigate the THC and CBD content of non-prescribed cannabis products that people use for medicinal purposes and to assess users' knowledge of the content of these products. To this end, self-reported potency was compared with analytically assessed cannabinoid concentrations of non-prescribed cannabis products submitted by participants.

Methods

This study was granted an exemption from ethics from the Medical-Ethical Review Committee METC NedMec (22-912/DB). Participants who completed the survey from WP1 of the MEDUSA study were invited to participate in this follow up study. Interested individuals were asked to provide informed consent and their postal address so that they could receive the material needed to participate in this study. Participants were then sent a pre-paid envelop to submit their cannabis sample and a Cannabis Information Card (CIC).

The CIC was a brief questionnaire asking participants to provide information about themselves and the cannabis sample they submitted. This included the participants' gender and age, the source of the cannabis sample, the estimated THC and CBD content of the cannabis sample (expressed as high, medium, or low level and/or a percentage), what source of information they based this estimate on, and the price per gram (if participants had paid for the cannabis sample). The full CIC is available in Appendix D. Participants were asked to submit a minimum of 1.5 gram of the non-prescribed cannabis that they used the most for medicinal purposes. Only herbal and resin cannabis could be submitted; other products such as cannabis oils were not accepted because of logistical limitations (i.e., mailing of potentially fragile containers) and legal limitations.

Cannabis samples were received and registered at the Trimbos Institute under permit nr 108461 CO/W. Submission containing less than 1 gram of cannabis were excluded. Those who complied with the instructions were sent shopping vouchers worth €40 as compensation for their efforts. After registration of sample characteristics and the information on the CIC, the cannabis samples were sent to an analytical laboratory for cannabinoid analysis. Chemical analysis of cannabinoid content was performed by Lab Ofichem in Ter Apel using HPLC-UV in accordance with the cannabis analysis monograph as issued by the Office of Medicinal Cannabis.(22) Total concentrations of THC, CBD and CBN were reported.

Data analysis was performed with the aid of descriptive statistics using RStudio 2023.06.1(524). Given the small sample sizes, no statistical testing was performed to assess differences found between the different forms of cannabis products. Non-parametric testing was performed to assess differences between the chemical analysis results of different estimated cannabinoid level categories.

Results

Sample characteristics

A total of 117 individuals completed the consent form. Sixty-seven participants submitted cannabis products for analysis. One participant was excluded because they submitted cannabis oil and four were excluded because they submitted less than 1 gram cannabis. Of the remaining 62 participants, forty-nine (79%) identified as male, 11 (17.7%) as female and 2 (3.2%) as other. The mean age of participants was 47.4 ± 14.8 (median 46), and ranged from 19 to 74 years old. All provinces except Groningen were represented in the study population, with most participants coming from Noord-Holland and Zuid-Holland (19 and 16 participants, respectively). Fifty-eight (93.5%) participants sent in a herbal cannabis product and four (6.5%) sent in resin cannabis.

Cannabis source and price

More than half of participants (54.8%, n=34) submitted a home-grown cannabis sample for analysis. All home-grown samples were herbal cannabis products. More than a third of participants submitted cannabis from coffeeshops (37.1%, n=23). Most resin cannabis samples (75%, n=3) were purchased at a coffeeshop. Other sources were reported less: three samples were obtained from friends or family, one from a dealer, and one from a cannabis social club (see Table 1).

Table 1. Source of cannabis products as reported by participants

Source	Herbal (n=58)	Resin (n=4)	Total (n=62)
Home-grown	34 (58.6%)	-	34 (54.8%)
Coffeeshop	20 (34.5%)	3 (75%)	23 (37.1%)
Friends or family	3 (5.2%)	-	3 (4.8%)
Dealer	-	1 (25%)	1 (1.6%)
Cannabis social club	1 (1.7%)	-	1 (1.6%)

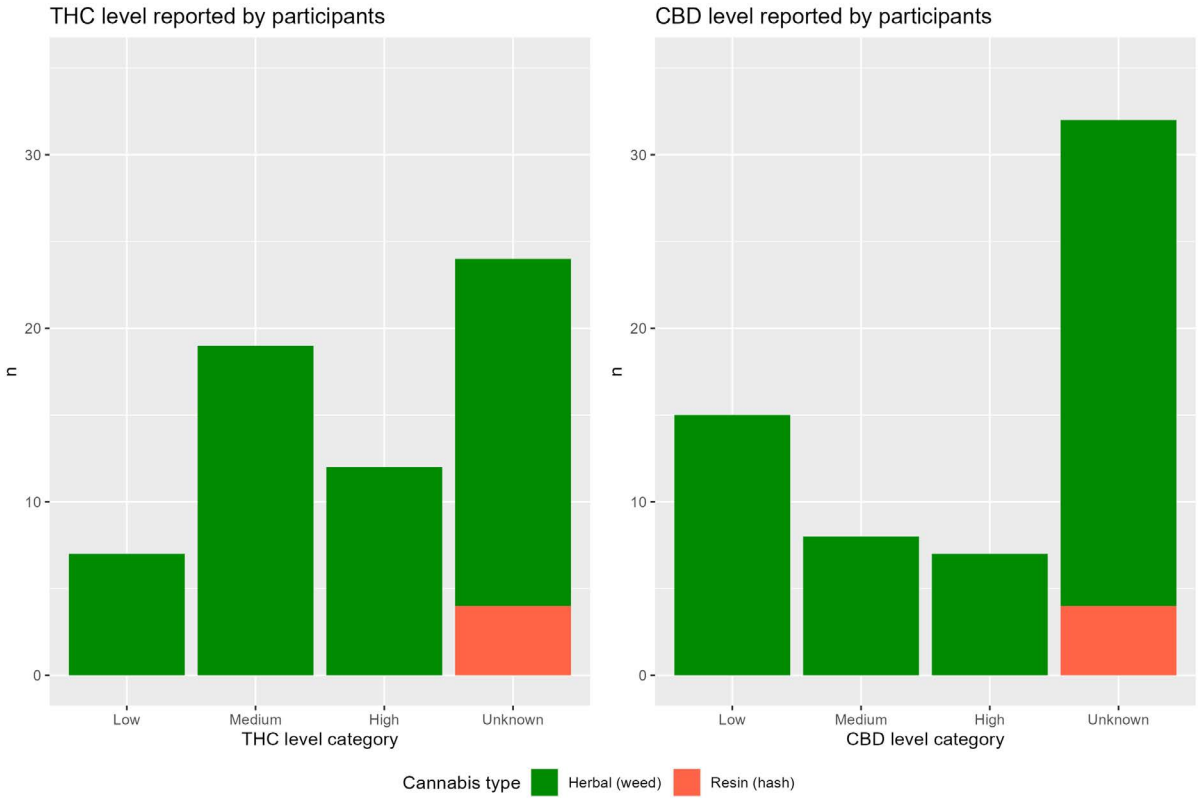
Thirty-three (53.2%) participants indicated that they received their submitted cannabis product for free. In all of these cases, the product was herbal cannabis and home-grown or obtained from friends or family. Twenty-six participants (41.9%) indicated that they had paid for their submitted cannabis product. These individuals had purchased their cannabis sample from a coffeeshop, dealer, social club, or friends or family. The mean price per gram of all cannabis products was €9.60 ± 3.50 (median €10, range €2 – €15). Herbal cannabis samples (n=22) had a mean price of €9.70 ± 3.40 (median €10, range €2 – €15); resin cannabis samples (n=4) had a mean price of €9.20 ± 4.40 (median €11, range €2.70 – €12). Three participants did not indicate whether they paid for cannabis; they submitted herbal cannabis which was home-grown.

Estimated potency

Participants were asked about the THC and CBD content of the submitted cannabis products. Cannabis is often sold or described as high, medium or low THC, especially in the absence of information about the THC/CBD concentration. Participants were therefore asked what level of THC and CBD they thought their cannabis contained ('high', 'medium', or 'low'). Levels were not pre-defined with corresponding ranges of THC/CBD content, so as not to influence the responses.

Of those who provided an estimated THC level, most participants (30.6%, n = 38) indicated that their cannabis product contained a 'medium' level of THC, followed by a 'high' level (19.4%) and a 'low' level (11.3%) of THC (see Figure 1 below). With regard to CBD, most participants (24.4%) reported a 'low' level of CBD, followed by a 'medium' level (12.9%) and 'high' level (11.3%) of CBD. However, the largest proportion of participants indicated that they did not know the level of THC (38.7%) or CBD (51.6%) of their cannabis sample. Notably, none of the participants who submitted a resin cannabis product provided an estimate for the THC or CBD level of their sample.

Figure 1. Levels of THC and CBD content of non-prescribed herbal and resin cannabis as reported by participants



In addition to that, participants were asked about the exact THC and CBD concentration of the cannabis product that they had submitted. If they did not know (n = 34 for THC, n = 42 for CBD), they could skip the question. Twenty-eight (45.2%) participants reported a THC concentration and 20 (32.3%) participants reported a CBD concentration. Only participants who submitted a herbal product estimated cannabinoid percentages. The mean self-reported THC concentration was 21.2% ± 14.8 (median 19.5%, range 0.9% – 70%). The mean self-reported CBD concentration was 8.5% ± 17.6 (median 3%, range 0.1% – 80%).

Participants were also asked what source of information they based their estimate on (see Table 2). Most participants said they did not know the content of their cannabis product (37.1%) or that it was their own estimate (16.1%). Of the participants who indicated a source, most said they based their expected potency on the label of their cannabis product (e.g., labels of cannabis seeds). Three participants who indicated "Other" sources of information noted that they had tested their cannabis product: one had utilized a service using a commercial near-infrared spectroscopy instrument, the other two merely indicated that their product was "tested". The remaining 7 participants who indicated "Other" left no further remarks.

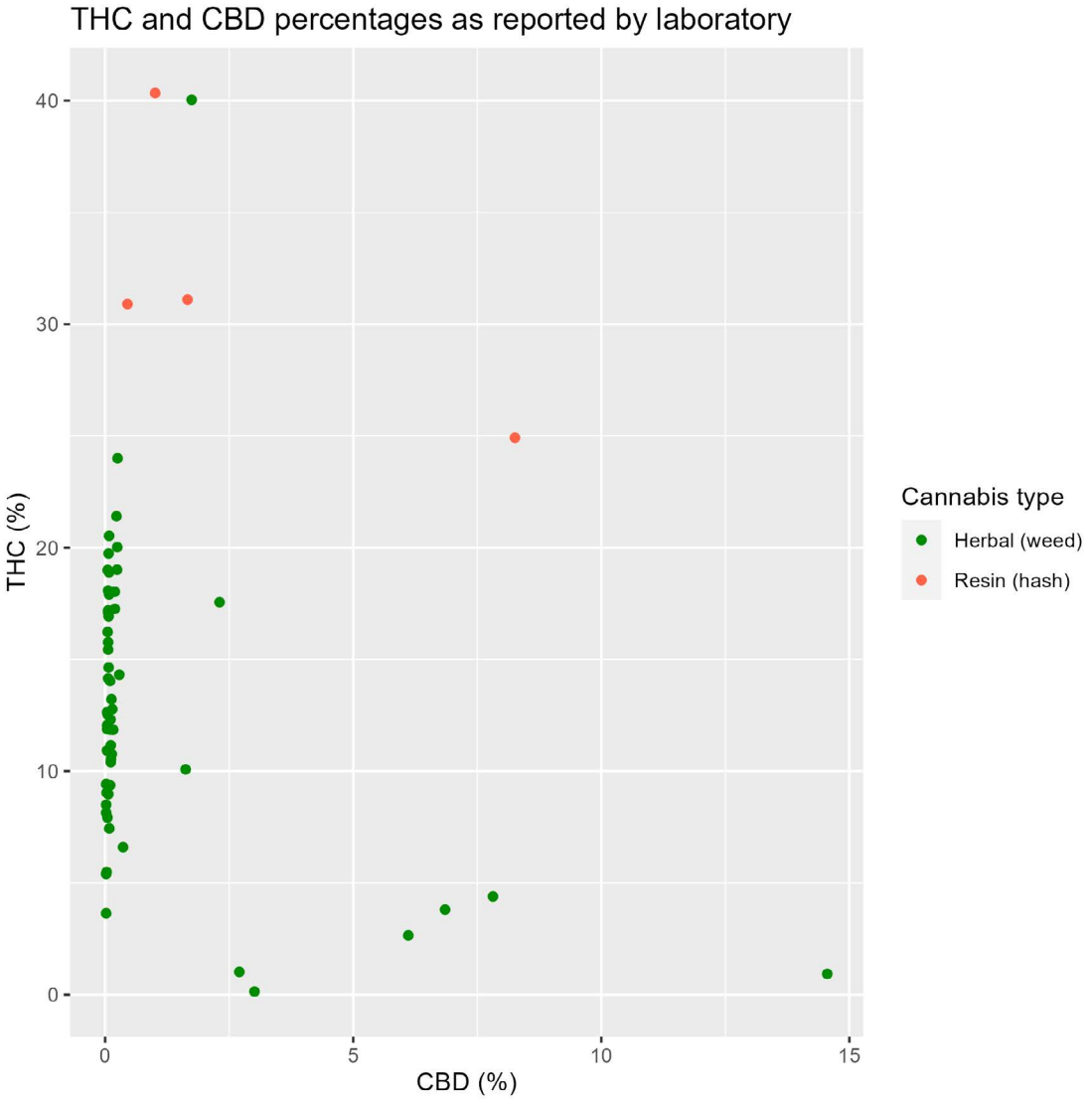
Table 2. Source of information for self-reported potency

Source of information	Total (n=62)
I don't know the THC/CBD content	23 (37.1%)
Label of cannabis product	13 (21.0%)
My own estimate	10 (16.1%)
Staff in coffeeshop	4 (6.5%)
Person who sold or gave product	2 (3.2%)
Other	10 (16.1%)

Laboratory-analysed potency

Figure 2 shows a scatter plot of the results of the chemical analysis for each cannabis sample. Most samples, especially the herbal cannabis ones, cluster in a group with 10 - 20% THC and less than 1% CBD.

Figure 2. Scatter plot of the cannabinoid concentrations of each cannabis sample as analysed by the laboratory



CBN content was low for all herbal samples (median 0%) and slightly higher for resin samples (median 0.2%). Resin samples had higher CBD and THC levels than most herbal samples.

Table 3 shows the descriptive statistics for THC and CBD concentrations of submitted cannabis samples. The median THC and CBD values of samples were 12.6% and 0.1%, respectively. Median THC percentages were 12.2% for herbal cannabis and 31.0% for resin cannabis; median CBD percentages were 0.1% for herbal samples and 1.3% for resin samples.

Table 3. Descriptive statistics of cannabinoid concentrations of samples as analysed by the laboratory

	Herbal (n=58) Average % ± SD (min ≤ median ≤ max)	**Resin (n=4)** Average % ± SD (min ≤ median ≤ max)	**Total (n=62)** Average % ± SD (min ≤ median ≤ max)
THC	12.7 ± 6.7 (0.1 ≤ 12.2 ≤ 40)	31.8 ± 6.4 (24.9 ≤ 31.0 ≤ 40.3)	13.9 ± 8.1 (0.1 ≤ 12.6 ≤ 40.3)
CBD	0.9 ± 2.4 (0 ≤ 0.1 ≤ 14.6)	2.8 ± 3.6 (0.4 ≤ 1.3 ≤ 8.3)	1 ± 2.5 (0 ≤ 0.1 ≤ 14.6)
CBN	0.0 ± 0.0 (0 ≤ 0 ≤ 0.2)	0.4 ± 0.4 (0.1 ≤ 0.2 ≤ 1)	0.0 ± 0.1 (0 ≤ 0 ≤ 1)

Comparison of self-reported and lab-analysed cannabinoid content

Participants' self-reported exact THC and CBD percentages were compared to those analysed by the laboratory (Figures 3 and 4). Participants only self-reported THC and CBD concentrations for herbal cannabis samples and not resin cannabis samples. Therefore, THC and CBD values for resin samples are only available from the laboratory analysis. Cannabinoid concentrations identified by the laboratory were generally lower than those estimated by participants. This can also be seen in Figure 5, where the self-reported and lab-analysed THC and CBD percentages of each individual sample is shown.

Figure 3. Box plots displaying THC percentages as reported by participants and as analysed by the laboratory

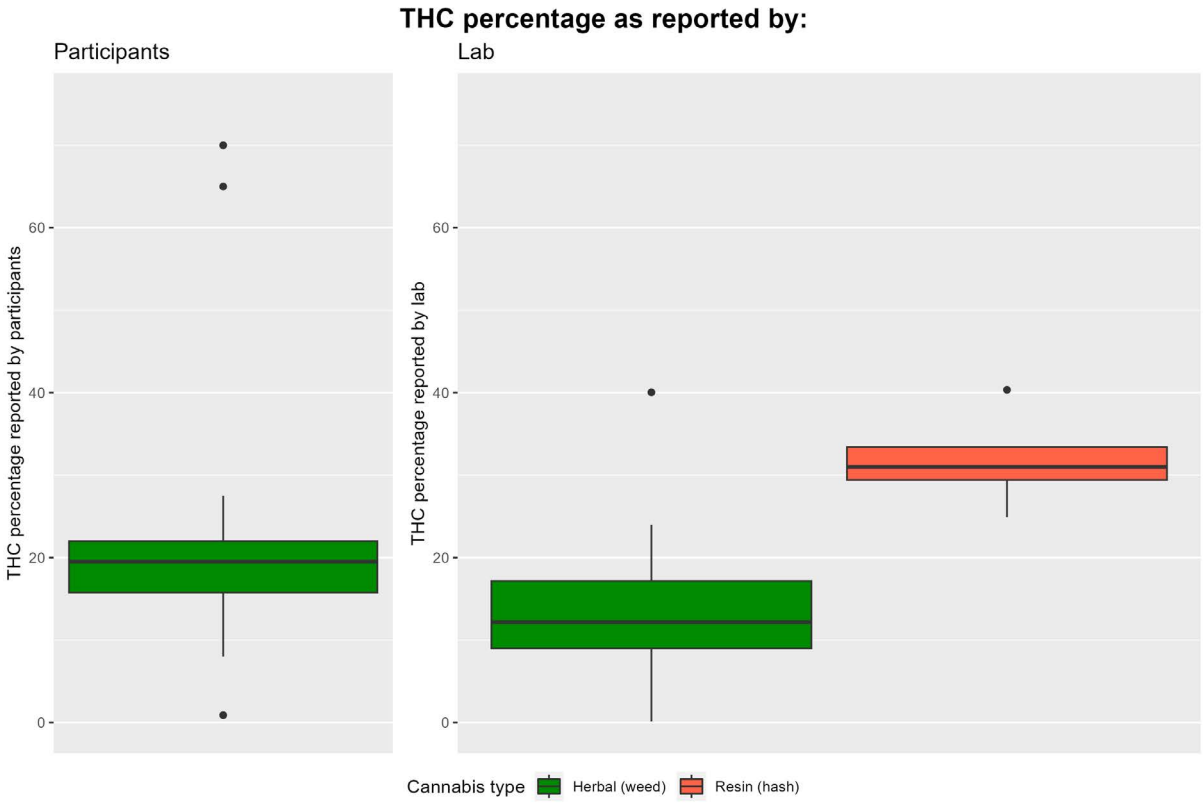
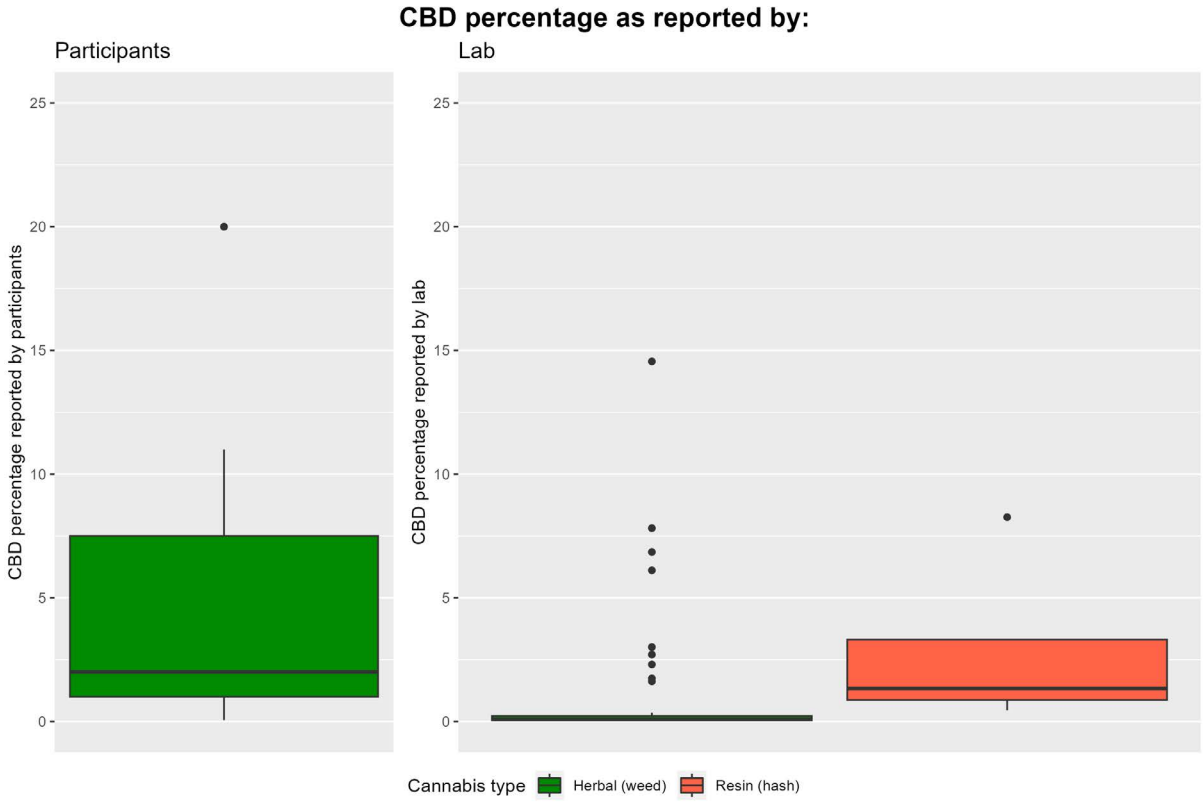
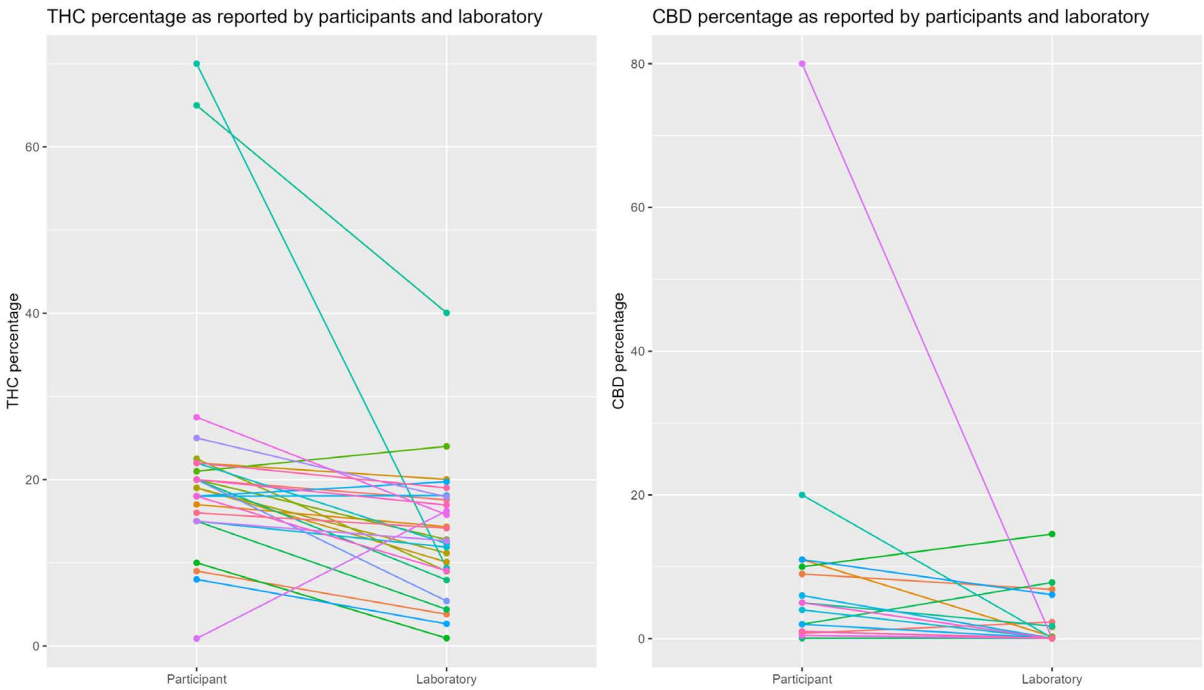


Figure 4. Box plots displaying CBD percentages as reported by participants and as analysed by the laboratory



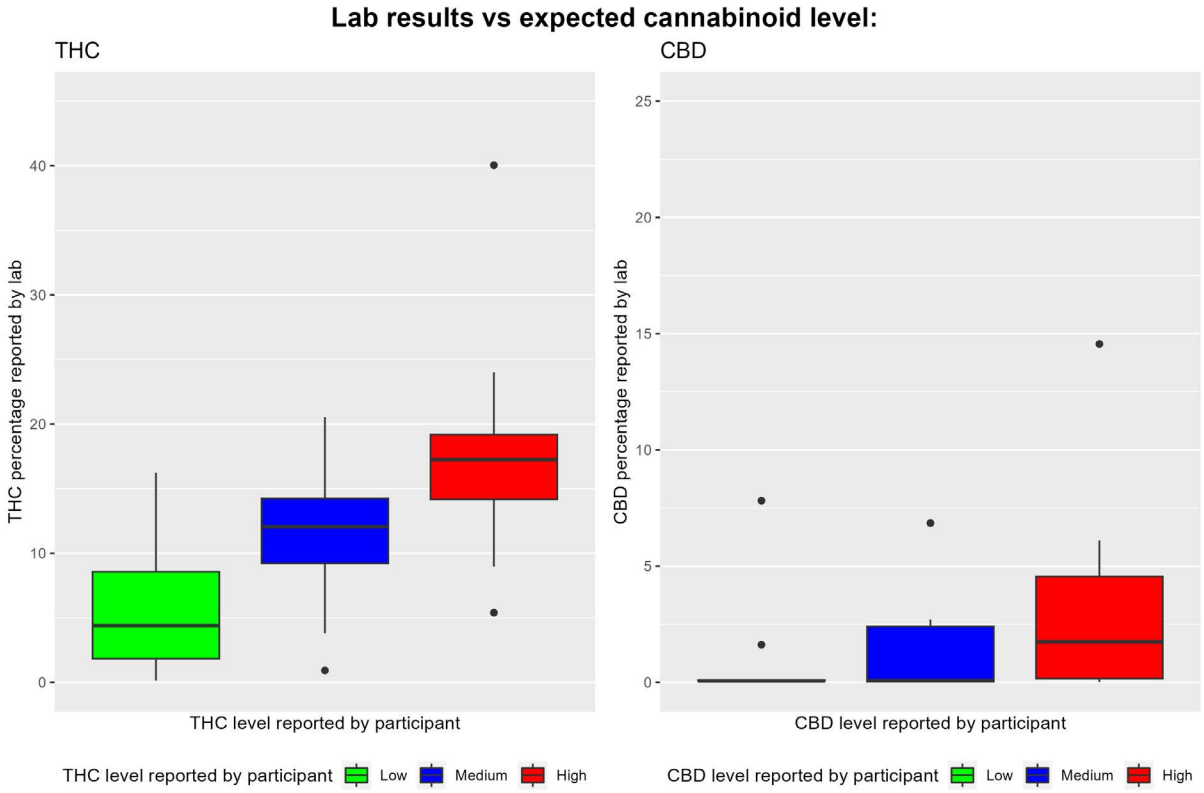
On average, participants' self-reported THC concentrations (n = 28) deviated 120% ± 216. For CBD (n = 20), this was 11,684% ± 35,357 (median 1,525%, range: -74% to 159,900%). This means that on average, participants estimated the THC content of their samples to be 2.2 times higher than the analysis result, and CBD content 117.8 times higher. For THC, 10 samples (35.7%) had an analytical result that deviated less than 25% from the expected percentage stated by participants. Of these, 3 participants based their estimate on the label of their cannabis product, 2 participants on their own estimate, 1 on information from coffeeshop staff and 4 from other sources, of which one person noted that they had tested their product. No participants estimated the CBD concentration of their product within 25% of the lab results.

Figure 5. Comparison of individual sample cannabinoid concentrations as reported by participants and analysed by the laboratory



Finally, for the participants who estimated a (high, medium, or low) level of THC and CBD, we compared the self-reported levels to the lab-analysed results (see Figure 6 below). A monotonic increase of THC percentages that follows the increasing level categories can be observed, meaning that a higher self-reported THC level category appears to be associated with higher THC concentrations as reported by the laboratory. To test this hypothesis, a Kruskal-Wallis test was performed. We found a statistical difference between the THC concentrations reported by the laboratory for different THC level categories ($H(2) = 10.9$, $p = 0.0043$). However, a signed-rank Wilcoxon test was not able to ascertain which levels were significantly different from each other. No statistical difference was found between the CBD level categories.

Figure 6. Lab-analysed results for THC and CBD in samples for which cannabinoid levels were estimated as a category (n=38 for THC, n=30 for CBD)



Discussion

The present study provides first-ever insight into the concentrations of the most relevant cannabinoids in non-prescribed cannabis used for medicinal purposes in The Netherlands. This is different from the annual coffeeshop monitor, for which cannabis is analysed that is not specifically used medicinally.(23) This study could be performed in the Netherlands because it is legally possible to send, receive and process small quantities of illicit yet decriminalized cannabis samples for analysis. Similar to the survey sample from WP1 of the MEDUSA study, most participants were male with an average age in their mid-40s and predominantly used herbal cannabis.

Cannabis source and price

Most participants in this study submitted home-grown cannabis. This shows that the present sample differs from the MEDUSA WP1 sample, where most obtained their cannabis from coffeeshops. Research suggests that people grow cannabis at home for reasons such as avoiding the high cost of cannabis at other sources, not wanting to engage in criminal activities, enjoying the process of growing cannabis, and the perceived better quality of home-grown cannabis compared to other sources.(24) The lower cost of home-grown cannabis may explain why this group was more willing to participate in the present study and 'donate' their cannabis for research than those who bought their cannabis. A paper presenting a so-called "standard joint unit" based on the THC content of donated joints indicated that a potential limitation of their study was that participants might reduce the quantity of cannabis in the joints they donated for analysis.(25) This is not relevant for our study, as a submitted quantity below one gram was not eligible for analysis or compensation.

More than half of the participants reported obtaining their cannabis for free, a notable contrast to the WP1 study sample, where only about 15% reported not paying for their cannabis. Those who did purchase their cannabis mostly did so in coffeeshops. In 2023, the average price per gram in Dutch coffeeshops was €13.31 for herbal cannabis and €10.52 for resin cannabis, which is higher than the average prices per gram paid by participants in this study (€9.70 and €9.20, respectively). This discrepancy could be due to participants purchasing cannabis from less expensive sources, such as dealers or friends, or opting for cheaper products at coffeeshops. It is worth noting that cheaper variants in coffeeshops do not necessarily contain less THC, as recent coffeeshop-monitoring studies found no correlation between the price and THC content.(23,26) Therefore, cheaper products may be used medicinally, as they contain similar levels of THC. In the WP1 survey, medicinal users often cited the costs of prescribed cannabis as a barrier to treatment with prescribed cannabis.

Estimated potency and chemical analysis

The THC concentrations in cannabis analysed in this study are comparable to those found in cannabis in Dutch coffeeshops.(23) The THC concentrations in resin cannabis products are generally higher than in herbal cannabis. This follows from the nature of resin cannabis, which is essentially a concentrated preparation of the cannabinoid-containing trichomes found on herbal cannabis. Resin cannabis samples submitted for the current study exhibited a higher median CBD concentration than resin cannabis in Dutch coffeeshops in 2023. Research shows that some medicinal users of cannabis indicate a preference for CBD-rich products for certain conditions.(27) However, it should be noted that the medicinal importance of CBD levels typically associated with herbal and resin cannabis products or even commercial CBD products is as of yet unclear and probably limited.(9,28) The finding that participants in our study significantly overestimate the CBD percentage of their non-prescribed product might indicate a preference for cannabis with higher CBD content among medicinal users.(10)

A key concern with the medicinal use of unregulated cannabis is the lack of (reliable) information about the content and quality of products. Users' estimates of cannabis potency is known to be imprecise.(20) This is also the case in the current study, where both THC and CBD concentrations were generally overestimated by participants. THC concentrations in samples, for which participants estimated high, medium, or low THC levels, were found to be significantly different. A similar result was found in earlier research with non-medicinal cannabis users, which found that cannabis that were categorized as strong, average, and mild indeed exhibited significantly different potencies.(20) While the current study could not identify which specific estimated levels differed from each other using a signed-rank Wilcoxon test, a clearer pattern may emerge with a larger sample.

The discrepancy between the estimated and actual cannabinoid concentrations of submitted samples indicates a knowledge gap that is difficult to bridge in an unregulated market. Individuals do not know and overestimate the THC and CBD content of the cannabis products they are using medicinally. They also cannot know if they are using cannabis of similar potency from time to time, as home growers or suppliers of coffeeshops might have vastly different results batch-to-batch.(29,30) Moreover, in coffeeshops, a product with the same name can be two completely different cultivars from one supply moment to the next. This is especially concerning when cannabis is used medicinally without oversight from healthcare professionals. If an individual uses

cannabis with a higher THC concentration than what they are normally used to, it can lead to more adverse effects.(5,6)

Limitations and recommendations for future research

The present study has several limitations. First, the sample size was small, so findings cannot be generalized. Although our results give a good first overview of the cannabinoid content of non-prescribed cannabis used for medicinal purposes in the Netherlands, larger studies with more diverse samples are needed to better understand the full scope of cannabinoid concentrations – for instance in cannabis oils and edible products. However, a challenge is that the content of cannabis on the unregulated market is often unknown and can vary from batch to batch. If sufficient control could be achieved over the cannabis content across batches, this could allow for the collection of real-world evidence to try to identify relationships between cannabinoid profiles and their efficacy for certain conditions. This is possible in the current system of prescribed cannabis, and, as such, efforts should focus on reducing barriers and monitoring the people who use prescribed cannabis. Second, because of legal limitations the study excluded cannabis products other than herbal and resin cannabis. However, other products such as sublingual oils are often used for medicinal purposes. Future research should include these products to provide a more comprehensive overview of the medicinal cannabis landscape.

To our knowledge, this was the first time that such a study design was employed. Less participants took part than expected. To boost participation, the recruitment process and compensation could be streamlined. For instance, allowing sample submissions via coffeeshops or drug-checking services, rather than just by postal service, might attract more participants and reduce privacy concerns that may have discouraged some from participating. Another area for improvement is the form of compensation. Some individuals stated during the recruitment phase that they opted not to participate because the shopping voucher could not be used to buy cannabis to replace the sample they would donate. A possible solution could be to reimburse the cost of the cannabis separately from the compensation for study participation.

Future research could also examine other important compounds beyond cannabinoids, such as terpenes. Although the medicinal value of terpenes is likely limited at the low concentrations found in unregulated cannabis products(16,17), they play a significant role in the aroma and flavour of cannabis. Participants in the WP1 survey of MEDUSA considered the aroma and flavour of cannabis to be important factors when choosing a cannabis product for medicinal use. Research might explore the role of terpenes in potential placebo effects related to the medicinal use of cannabis.(31) Furthermore, it would be interesting to investigate whether patients titrate their use of non-prescribed cannabis and the relation to its potency. Such research could potentially involve the "Standard THC units" that have previously been proposed.(32)

Conclusions

The present study investigated the cannabinoid content of non-prescribed cannabis products used for medicinal purposes. The THC concentrations in the analysed samples were generally comparable to those found in Dutch coffeeshops, while CBD concentrations of resin samples were slightly higher (but still low) in the submitted samples than in coffeeshops. A key finding is the persistent knowledge gap among medicinal cannabis users regarding the actual potency of their products. Participants typically overestimated cannabinoid levels. This was especially the

case for CBD, which may indicate a preference for products with a higher CBD content among medicinal user; though the therapeutic significance of these higher CBD levels remains unclear. The discrepancy between estimated and actual potency highlights the challenges users face in obtaining reliable information about their cannabis – a situation worsened by the unregulated nature of the illicit market, where cannabinoid content can vary significantly even between batches. Medicinal users may face health risks if they unknowingly use cannabis of different potencies, as it can affect the effectiveness of symptom management and increase the likelihood of side effects or unintended outcomes.

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Chapter 4.
A comparative analysis of characteristics of people using prescribed versus non-prescribed cannabis for medicinal purposes

Comparative analysis of secondary data

A comparative analysis of characteristics of people using prescribed versus non-prescribed cannabis for medicinal purposes

Introduction

Healthcare equity is the idea that all individuals should have fair access to the resources and care needed to achieve the best possible health. Factors such as socioeconomic status, education, location and other social determinants can create barriers, making it difficult for some groups to access healthcare services.(1) Research shows that, for example, health needs and social factors such as age and gender play a significant role in determining whether people use prescribed medicines or self-medicate with non-prescribed alternatives.(2,3) Addressing disparities in healthcare is not only a moral obligation but also essential for improving overall public health, as studies have shown that persistent inequities are linked to poorer health outcomes and reduced wellbeing.(1)

Prescribed (medical) cannabis has been available in the Netherlands for over twenty years.(4) Despite this, most people who use cannabis for medicinal purposes rely on non-prescribed rather than prescribed cannabis. A recent survey of a representative sample of the adult general population in the Netherlands found that approximately 95% of medicinal cannabis users obtain their cannabis from unregulated sources such as coffeeshops, home cultivation, or dealers.(5) This translates to about half a million people using non-prescribed cannabis for medicinal purposes, while only around 7,300 patients use prescribed cannabis.(6) To date, no study has examined the differences between people using prescribed cannabis and those using non-prescribed cannabis for medicinal purposes in the Netherlands. A comparison of demographics and self-reported outcomes could help shed light on potential inequalities in access to care.

Aim

The aim of the present study was to compare the characteristics of individuals using prescribed cannabis with those using non-prescribed cannabis for medicinal purposes.

Methods

A qualitative comparative analysis of secondary data from two independent studies was performed. One study focused on medicinal users of non-prescribed cannabis, while the other examined patients using prescribed cannabis. Both studies were conducted in the Netherlands, aiming to provide insight into the characteristics, use patterns, motives for use, and perceived effectiveness of cannabis among these populations. The studies were carried out around the same time, using similar methodologies and outcome measures.

MEDUSA study

The MEDUSA study ('Medicinal use of non-pharmaceutical grade cannabis: motives for use, perceived effectiveness and barriers to treatment') was a cross-sectional observational study

conducted by the Trimbos Institute (MEDUSA final report WP1, 2024). Data was collected via an online questionnaire from 1,059 participants between January and April 2023. Participants were recruited through Facebook advertisements, a post on the Trimbos Institute's website and its monthly newsletter, and leaflets placed in coffeeshops. The target group was people who self-identified as current users of non-prescribed cannabis-based products to ease physical or mental health symptoms. Exclusion criteria were being younger than 18 years old, not being resident in the Netherlands, exclusive use of prescribed cannabis, and exclusive use of commercial CBD products. Participants who completed the only questionnaire of the MEDUSA study were also invited to submit a cannabis sample for analysis of cannabinoid concentrations (MEDUSA final report WP3, 2024). Sixty-two cannabis samples were analysed.

MC-LIM study

The MC-LIM study ('Medical Cannabis Lareb Intensive Monitoring: cohort study on indication, patient experiences and safety of the use of medicinal cannabis in the Netherlands') was a longitudinal observational cohort-study performed by The Netherlands Pharmacovigilance Centre Lareb (Lareb) in cooperation with the Office of Medicinal Cannabis (OMC).(7) Data was collected at four points in time (at baseline and 2, 6 and 12 months after) via online questionnaires from 251 patients between March 2021 and March 2023. In the present study, only the baseline data was compared to the data from the MEDUSA study. Patients were invited to participate in this study through leaflets which were sent to patients when they ordered their prescribed cannabis. Moreover, social media posts about the study were posted by Lareb and a rheumatism patient association. The target group was patients who currently use prescribed cannabis. Individuals were excluded if they only used cannabis recreationally or only used cannabis from coffeeshops for medicinal purposes.

Data analysis

Data was compared and described qualitatively using descriptive statistics from both studies. Since the questionnaire items were not identical, no statistical analyses were conducted to compare the findings and the results should be interpreted with caution. To facilitate a direct comparison, some data was merged. For instance in the MC-LIM study, data for floss (the whole cannabis flower), granulate (the cannabis flower in ground up form), and sublingual oil was sometimes merged to allow for comparisons to the MEDUSA study independent of the form of cannabis. We compared data on demographics, cannabis products, patterns of use, motives for use, self-reported effectiveness and quality of life, and financial burden.

Results

1. Sociodemographic characteristics

A higher proportion of female patients took part in the study on prescribed cannabis (56%), while more male participants were represented among non-prescribed cannabis users (59%). In both groups, most respondents were in the age category 51-60 (see Table 1). However, the prescribed cannabis group included relatively more older participants compared to the non-prescribed cannabis group. Moreover, individuals using prescribed cannabis tended to have slightly higher levels of education than those using non-prescribed cannabis.

Table 1. Sociodemographic characteristics of the two study samples

Variable	Categories	MC-LIM (N=251)		MEDUSA (N=1059)	
		%	n	%	n
Gender					
	Male	44%	111	59%	629
	Female	56%	140	38%	403
	Other	N/A	N/A	1%	14
	Prefer not to say	N/A	N/A	1%	13
Age					
	0 - 20 years	1%	2	4%	41
	21 - 30 years	4%	11	18%	185
	31 - 40 years	13%	32	18%	188
	41 - 50 years	18%	46	21%	225
	51 - 60 years	25%	62	22%	237
	61 - 70 years	23%	58	14%	150
	71 - 80 years	13%	32	3%	32
	80+ years	3%	8	<1%	1
Education					
	Primary education	4%	9	4%	47
	Lower/pre-vocational secondary education	19%	47	24%	253
	Upper/vocational secondary education	34%	86	42%	439
	Bachelor's (or equivalent)	28%	71	19%	205
	Master's or Doctorate	9%	23	5%	50
	Not applicable/ Don't know	6%	15	6%	65

2. Cannabis products and patterns of use

Among prescribed cannabis patients, slightly more used sublingual oil (52%) than herbal cannabis (48%), while the majority of people using non-prescribed cannabis used herbal cannabis (71.1%). Most prescribed cannabis patients had been using cannabis medicinally for 1 to 5 years (53.3%), whereas the majority of people using non-prescribed cannabis had been using cannabis medicinally for more than 5 years (67.9%). People using prescribed and non-prescribed cannabis were asked about their reasons for choosing a particular cannabis form or route of administration (ROA), respectively. Regardless of form or ROA, both groups cited ease of dosing as the most important factor, followed by ease of use and rapid onset of effects. Other reasons were mentioned less frequently (see Table 2).

Table 2. Cannabis products and patterns of use

Variable	Categories	MC-LIM (N=251)		MEDUSA (N=1059)	
		%	n	%	n
Form					
	Herbal cannabis*	48%	120	71.1%	753
	Sublingual oil	52%	131	17.7%	187
	Resin cannabis	N/A	N/A	8.2%	87
	Other forms (e.g. topicals)	N/A	N/A	3.0%	32
Duration of use					
	Less than a month	8.3%	29	0.0%	0
	1 until 6 months	9.0%	25	0.3%	3
	6 until 12 months	6.7%	19	0.9%	9
	1 until 3 years	28.3%	86	11.2%	119
	3 until 5 years	25.0%	61	9.4%	99
	Longer than 5 years	23.0%	49	67.9%	719
	Unknown	0.3%	1	10.4%	110
Reasons for choosing a form/ROA**					
	Easy to dose	50.7%	134	55.3%	586
	Easy to use	49.7%	131	36.0%	381
	Quick onset of effects	39.3%	101	50.0%	529
	Pleasant to inhale/smoke	27.5%	80	16.1%	171
	Long-lasting effects	6.3%	15	14.3%	151
	Other	***		****	

**For the prescribed cannabis products, categories floss and granulate were merged into one category 'herbal cannabis'.*

***Even though the studies enquired about different variables (cannabis form and ROA), the data was compared because the primary interest was in understanding the reason behind a choice, regardless of the specific form or ROA. Participants in both studies could select multiple reasons.*

****Other reasons in MC-LIM: No other form available: 10.0%; Other: 29.0%.*

*****Other reasons in MEDUSA: Out of habit 23.1%; Good taste 17.8%; Less/not harmful to the lungs 15.7%; Less side effects 8.7%; Easy to hide 1.0%; Other 4.8%.*

Next, we compared the available prescribed cannabis strains with the strains that people use from unregulated sources. Five strains of prescribed cannabis are currently available, with the strongest strain having a THC concentration of 22% (see Table 3). In the online questionnaire of the MEDUSA study, participants were asked to estimate the THC and CBD content of their non-prescribed cannabis. The responses were analysed for plausibility. Among the plausible estimates of herbal cannabis content (n=272), the median THC concentration was 20.0% (range 0 - 40%) and the median CBD concentration was 2.25% (range 0 - 40%). This indicates that half of the respondents reported using non-prescribed cannabis with more than 20% THC. However, it is important to note that these values are self-reported, and their reliability cannot be confirmed.

Additionally, in the MEDUSA study, 62 samples of non-prescribed cannabis (58 herbal, 4 resin) were submitted by participants for chemical analysis. The lab analysis showed that, for herbal cannabis products (n=58) the median THC concentration was 12.2% (range 0.1 – 40.0%) and the median CBD concentration was 0.1% (range 0 – 14.6%). Participants were also asked to estimate the potency of their submitted herbal samples; respondents estimated a median THC concentration of 19.5% (0.9% - 70%; n = 28) and a median CBD concentration of 3.0% (0.1% - 80%, n=20). Thus, participants overestimated the content of their cannabis samples.

Table 3. THC and CBD content of cannabis products

THC and CBD content in prescribed herbal cannabis strains available in the Netherlands	Median THC and CBD content in non-prescribed herbal cannabis used for medicinal purposes, as reported and analysed in the MEDUSA study
Bedrocan: 22% THC, <1.0% CBD Bedrobinol: 13.5% THC, <1.0% CBD Bediol: 6.3% THC, 8% CBD Bedica: 14% THC, <1.0% CBD Bedrolite: <1.0% THC, 7.5% CBD	Self-reported estimates from participants who completed the online survey (n=272): • 20.0% THC; 2.3% CBD Self-reported estimates from participants who submitted cannabis samples (THC n=28; CBD n=20): • 19.5% THC; 3.0% CBD Lab-analysed values of submitted cannabis samples (n=58): • 12.2% THC; 0.1% CBD

3. Motives for use

We present the top 20 medical conditions for which cannabis was used as medicine. In both groups, most patients reported using cannabis for chronic pain (see Table 4). However, non-prescribed cannabis users were more likely to use cannabis for conditions other than chronic pain, particularly sleep problems, ADHD/ADD, and mental health conditions, such as depression, post-traumatic stress disorder, and anxiety.

Table 4. Motives for use

MC-LIM (N=251)	%	n	MEDUSA (n=1001)	%	n
Chronic pain	60.2%	151	Chronic pain	43.5%	435
ADHD	7.2%	18	Sleep problems	40.2%	402
Cancer	7.2%	18	Depression	35.8%	358
Multiple sclerosis	6.8%	17	ADHD/ADD	35.3%	353
Fibromyalgia	5.6%	14	Post-traumatic stress disorder	27.6%	276
Osteoarthritis	4.8%	12	Anxiety	23.4%	234
Sleep problems	4.8%	12	Autism Spectrum Disorder	11.8%	118
Migraine	4.0%	10	Migraine	10.8%	108
Nerve pain	3.6%	9	Fibromyalgia	9.5%	95
Post-traumatic stress disorder	3.6%	9	Cancer	5.7%	57
Rheumatoid arthritis	3.2%	8	Rheumatic diseases	2.9%	29
Complex regional pain syndrome	2.8%	7	Multiple sclerosis	2.1%	21
Pain	2.8%	7	Epilepsy	2.1%	21
Chron's disease	2.8%	7	Chron's disease	2.1%	21
Polyneuropathy	2.0%	5	Restless legs syndrome	1.6%	16
Anxiety	1.6%	4	Ehlers-Danlos syndrome	1.3%	13
Depression	1.6%	4	Lung diseases	1.2%	12
Ehlers-Danlos syndrome	1.6%	4	HIV/HCV	1.0%	10
Epilepsy	1.6%	4	Gilles de la Tourette	0.7%	7
Irritable bowel syndrome	1.6%	4	Glaucoma	0.5%	5

Note: Multiple answers were possible for both MC-LIM and MEDUSA.

4. Effectiveness and quality of life

The self-reported effect of cannabis on symptoms and quality of life (QOL) cannot be compared directly due to different item formats in the two studies. However, both studies show that most participants experienced benefits from using cannabis as medicine.

Prescribed cannabis patients were asked to rate their agreement with the statements: "I experience a positive effect of medical cannabis on my symptoms" and "I have experienced an improvement in QOL since using medical cannabis", using a 5-point Likert scale. Among long-term users (defined as using cannabis for more than 6 months), most agreed or fully agreed that cannabis had a positive effect on their symptoms (98%) and that it improved their QOL (94%). Among short-term users (defined as using cannabis for less than 6 months), a smaller proportion agreed or fully agreed that cannabis had a positive impact on their symptoms (70%) and that it improved their QOL (62%), with more respondents remaining neutral (see Table 5).

People using non-prescribed cannabis were asked to indicate whether cannabis improved or worsened their symptoms and QOL. They could rate the degree of improvement on a scale from 1 (no improvement) to 10 (complete improvement) or they could indicate that cannabis worsened their symptoms or QOL. Participants reported an average symptom improvement of 7.88 and an average QOL improvement of 7.95. Only few participants reported that cannabis worsened their symptoms (1.0%) or QOL (1.5%; see Table 6).

Table 5. Effect of cannabis use on symptoms and quality of life among prescribed cannabis patients

	Positive effect on symptoms		Improved quality of life	
	Long-term users	New users	Long-term users	New users
Fully agree	77% (n=153)	37% (n=19)	69% (n=136)	29% (n=15)
Agree	21% (n=42)	33% (n=17)	25% (n=49)	33% (n=17)
Neutral	2% (n=3)	25% (n=13)	6% (n=11)	33% (n=17)
Disagree	0% (n=0)	0% (n=0)	1% (n=2)	2% (n=1)
Fully disagree	0% (n=0)	6% (n=3)	0% (n=0)	4% (n=2)

Table 6. Effect of cannabis use on symptoms and quality of life among people using non-prescribed cannabis

	Symptoms	Quality of life
Mean improvement	7.88 (n=1048)	7.95 (n=1037)
Participants who Indicated a deterioration	1.0% (n=11)	1.5% (n=16)

Note: Six participants did not complete the quality of life item.

5. Financial burden

Participants were asked about the financial burden of using cannabis for medicinal purposes. More prescribed cannabis patients (73%) than non-prescribed cannabis users (49%) reported experiencing a financial burden (see Table 7). However, the data should not be directly compared, because only prescribed cannabis patients could indicate if the question did not apply to them because they did not pay for their cannabis. Participants using non-prescribed cannabis were asked an additional question about cost; 13.8% indicated that they did not pay for their cannabis (see Table 8).

Table 7. Financial burden

	MC-LIM *	MEDUSA
Yes	73% (n=183)	49% (n=516)
No	25% (n=62)	51% (n=543)
Not applicable because health insurance covers the cost	2% (n=5)	Not a response option in MEDUSA

Table 8. Cost of cannabis for medicinal purposes among participants in the MEDUSA study

Response option	% (n)
I pay for my cannabis	59.6% (n=631)
I don't pay for my cannabis	13.8% (n=146)
Prefer not to say	26.6% (n=282)

Discussion

This qualitative comparative analysis examined differences in characteristics between people using prescribed and non-prescribed cannabis for medicinal purposes in the Netherlands. The findings reveal differences in patterns of use and motives for use, while also highlighting similarities in self-reported outcomes and financial burden.

Demographic characteristics

It is difficult to know whether differences in demographics reflect actual distinct population characteristics or result from different recruitment strategies. The difference in gender distribution should be interpreted cautiously, as previous studies on prescribed and non-prescribed cannabis users have shown varying gender patterns.(8–13) However, individuals using prescribed cannabis were generally older with higher levels of education compared to those using non-prescribed cannabis. Similarly, a study in Australia found that prescribed cannabis users were significantly older than non-prescribed users, though no difference in education level was observed.(14) Our data suggests that younger individuals and those with lower socioeconomic status may face barriers to accessing prescribed cannabis. Further research is needed to confirm this.

Cannabis products and patterns of use

A higher proportion of prescribed cannabis users consumed sublingual oils compared to non-prescribed users. This shows that, when legally available, individuals are likely to use other forms beyond herbal cannabis. The majority of people using non-prescribed cannabis for medicinal purposes smoke it with tobacco (MEDUSA final report WP1, 2024). In contrast, when herbal cannabis is prescribed by a physician, smoking is not permitted; instead, patients must use a vaporizer or consume it as tea. This presents a significant opportunity for harm reduction, as smoking cannabis, especially with tobacco, poses health risks related to respiratory issues and nicotine addiction. Promoting the use of vaporizers or other non-smoking methods can reduce these risks. When implementing harm reduction strategies, it is essential to consider user's motivations for choosing certain consumption methods, such as ease of dosing, which was a key factor for both prescribed and non-prescribed cannabis users in these studies.

People using prescribed cannabis had been using it for shorter periods than those using non-prescribed cannabis. More research is needed to understand why individuals seem to use prescribed cannabis only short-term and what happens when patients stop using it. A possibility is that they transition to unregulated cannabis sources.

Participants using non-prescribed cannabis often overestimated the THC and CBD levels in their samples. While the self-reported values were similar to the strongest prescribed cannabis strain (about 20% THC), chemical analysis revealed that the actual THC content was closer to that of the second strongest strain (about 12-13% THC). Interestingly, many non-prescribed users indicated that a high THC content was the most important factor when choosing cannabis for medicinal use (MEDUSA final report WP1, 2024). However, the findings suggest that slightly lower THC levels can still be effective therapeutically. Inaccurate THC estimations may be due to individual misjudgements, but it is also possible that other compounds – such as other cannabinoids, oils, terpenoids, and flavonoids – play a significant role in the therapeutic effects of cannabis, a phenomenon known as the entourage effect. Experts have criticized clinical trials for treating cannabis as a single entity, without giving much consideration to the wide range of chemical compounds it contains. This narrow focus may explain why clinical trials tend to find only mild to negligible benefits.(15,16) More research is urgently needed to assess the effectiveness of cannabis as complex mixtures containing thousands of compounds. Additionally, expanding the range of prescribed cannabis strains available in the Netherlands - similar to Germany and Australia (17,18) - could better address patient needs and improve therapeutic outcomes.

Motives for use

Non-prescribed users were more likely to use cannabis for conditions beyond chronic pain, such as sleep problems, mental health issues, and ADHD. This could reflect challenges in obtaining a prescription for psychiatric conditions, potentially due to limited evidence from randomized controlled trials (RCTs).(19) However, it is arguably better to allow these individuals to access regulated, prescribed cannabis under the supervision of a healthcare professional than for them to continue to use unregulated cannabis products from the illicit market. This would reduce the risks associated with unregulated products and it would create opportunities for harm reduction interventions and monitoring to help prevent risks and harms, such as the development of cannabis use disorders.

Effectiveness and quality of life

Most participants reported experiencing benefits from using cannabis as medicine, regardless of whether they used prescribed or non-prescribed cannabis. Only a small proportion did not report improvements in symptoms or quality of life. Higher satisfaction ratings among long-term compared to new patients suggests that it may take time to find the optimal strain and dose. Future research should use identical patient-reported outcome measures under controlled conditions to compare the perceived effectiveness of prescribed and non-prescribed cannabis.

Financial burden

Both groups reported significant financial burdens, with more prescribed cannabis users reporting a financial strain. This discrepancy may be explained by two key factors: a higher proportion of non-prescribed users obtained their cannabis for free and they also had access to cheaper alternatives. Data from WP1 shows that 43.9% of non-prescribed users primarily obtained cannabis from sources other than coffeeshops, such as home cultivation or from friends and family (MEDUSA final report WP1, 2024). Cannabis from these sources is often more affordable than in coffeeshops, which may explain why fewer non-prescribed cannabis users reported a financial burden. In contrast, prescribed cannabis patients are limited to a small selection of prescribed cannabis products with fixed prices and which are not covered by health insurance. Expanding health insurance coverage for prescribed cannabis could help alleviate financial burdens and enhance access to care, particularly for those with low income.

Limitations

This analysis has some limitations. First, although the two studies used similar outcomes, direct statistical comparisons were not possible due to differences in how the survey items were formatted. Second, methodological differences between the studies hindered a direct comparison of findings. For example, the different recruitment strategies may have introduced sample biases. Facebook advertisements in the MEDUSA study were somewhat skewed towards men, while the MC-LIM study had a relatively low response rate. This may affect the generalizability and therefore comparability of the findings. Finally, both participant groups are convenience samples, which are likely biased towards individuals experiencing positive effects from using cannabis medicinally. It is important to acknowledge that the medicinal use of cannabis may not be suitable for everyone, as some may find its effects undesirable or ineffective.

Conclusions

This exploratory study offers initial insights into the differences between individuals using prescribed and non-prescribed cannabis for medicinal purposes. The findings suggest that these two groups likely represent the same patient population, with the main distinction being that some individuals face greater challenges in accessing prescribed cannabis. These challenges may be linked to sociodemographic factors, financial inequalities, and differences in health conditions. Notably, individuals with psychiatric conditions appear to have more difficulty obtaining prescribed cannabis. The results underscore the urgent need to improve access to prescribed cannabis, particularly for those with specific medical conditions or facing financial obstacles. Facilitating the transition from non-prescribed to prescribed cannabis also presents opportunities for harm reduction, such as reducing the number of individuals who smoke cannabis with tobacco. A patient-centred approach is essential to enhance access to care and ensure that prescribed cannabis meets patients' needs. When designing interventions to promote healthcare equity,

special attention must be given to addressing the unique challenges faced by socioeconomically vulnerable individuals.

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Recommendations

Prescribed cannabis has been legally available in the Netherlands for over twenty years, yet access remains severely limited. The MEDUSA study identified several key barriers to treatment. These include the affordability of prescribed cannabis, difficulties finding physicians willing to prescribe it, restrictive interpretations of medical guidelines, insufficient product variety, stigma surrounding cannabis use, and the limited availability of accurate information as well as widespread misinformation about prescribed cannabis. These barriers undermine patient health and wellbeing, as many individuals feel forced to turn to the illicit cannabis market, exposing themselves to unregulated, potentially contaminated products without medical oversight. Targeted policies and interventions are needed to reduce these barriers and allow eligible patients to transition from the unregulated market to the regulated healthcare system. Since access to healthcare is a multidimensional challenge, a comprehensive strategy is needed to overcome these barriers and safeguard public health. Below, we present a number of recommendations – listed in no particular order – to improve access to prescribed cannabis and ensure safer, more effective, and patient-centred care.

1. Offer health insurance coverage for prescribed cannabis

Dutch health insurance does not currently cover the cost of prescribed cannabis, creating a significant financial barrier for patients, particularly for socioeconomically vulnerable individuals. Since most individuals use cannabis on a daily basis, the ongoing costs can be substantial, regardless of income. This financial burden is particularly challenging for those with chronic health conditions who cannot work full-time and rely on a low income or disability benefits. Nearly 40% of participants in the MEDUSA study reported being unfit for work or disabled. Expanding health insurance coverage for prescribed cannabis would promote healthcare equity. The Netherlands could start by adopting policies like in Germany and the Czech Republic, where health insurance covers prescribed cannabis for specific conditions. Additional agreements for financially vulnerable individuals are highly recommended.

2. Enhance physician education about prescribed cannabis

Finding a physician in the Netherlands who is willing to prescribe cannabis seems to be a matter of luck rather than the result of a well-organized system. Many physicians seem to lack sufficient knowledge about prescribed cannabis and feel ill-equipped to guide patients effectively. This knowledge gap is likely due to the absence of cannabis-related education in the standard medical curriculum. Moreover, misconceptions and negative views of prescribed cannabis persist among physicians, further complicating patient access. These findings underscore an urgent need for comprehensive education about prescribed cannabis and related training programs for physicians. By equipping healthcare providers with accurate information and practical guidance, the medical community can better support patients and ensure more consistent and informed prescribing practices.

3. Establish a medical cannabis expertise centre or a centralized network of prescribing physicians

Given the time and resources required to train a sufficient number of physicians at the national level, additional strategies are needed to improve access to prescribed cannabis. One potential approach is to establish a prescribed cannabis expertise centre in the Netherlands, or alternatively, to create a centralized and publicly accessible list of physicians who are willing to prescribe cannabis.

An expertise centre could serve as a hub of clinical knowledge and support, staffed by physicians and specialists with advanced training in medical cannabis. This centre could offer direct care to patients and act as a consultation point for other physicians interested in prescribing cannabis. For example, it could assist physicians in choosing a cannabis product and navigating the prescription process, as well as offer up-to-date guidance on best practices. In addition, the centre could contribute to research efforts by collecting real-world data on patient outcomes, helping to strengthen the evidence base for prescribed cannabis. Establishing such an expertise centre in the Netherlands would create a more coordinated and efficient care infrastructure, improve patient access, and ensure that treatment is informed, comprehensive, and patient-centred.

Alternatively, a nationwide network of general practitioners and specialists who are willing to prescribe cannabis could be developed. This network could be made accessible through a dedicated website, enabling patients to easily locate prescribers in their area. In addition, the network would foster peer-to-peer knowledge exchange and support among clinicians, promoting consistent and evidence-informed prescription practices.

4. Develop clear prescribing guidelines to support clinical decision-making

Prescribing guidelines for medical cannabis need to be improved to adequately support physicians in clinical decision-making. The findings of the MEDUSA study highlight two persistent misconceptions that appear to hinder prescribing practices. First, although Dutch law permits the prescription of medical cannabis for any physical or mental health conditions, many physicians and other professionals as well as patients mistakenly believe that prescribed cannabis is restricted to a small set of indications. Second, despite official guidance stating that cannabis may be prescribed if regular treatment is not effective enough or causes too many side effects, physicians often interpret this as a mandate to use cannabis strictly as a treatment of last resort.

This restrictive interpretation may lead to suboptimal care. For example, research has shown that cannabis can provide similar symptom relief compared to opioids, but with fewer side effects.(5) However, since opioids are often regarded as 'sufficiently effective' first-line treatment, physicians are reluctant to consider cannabis as an alternative, even when patients experience substantial adverse effects from opioids and other prescription medication.

At present, beyond these minimal prescribing criteria, there are no consensus-based guidelines for prescribing cannabis in the Netherlands. To address this gap, national guidelines should be

developed in collaboration with key stakeholders, including general practitioners, medical specialists, psychiatrists, researchers, and patient organizations. These guidelines should reflect current international research and clinical experience, and be regularly updated as new evidence becomes available. Special attention should be given to the treatment of psychiatric conditions, as patients with psychological complaints constitute a substantial subgroup and face particularly high barriers to accessing prescribed cannabis. Importantly, these guidelines should promote a patient-centred approach, prioritizing improvements in daily functioning and quality of life, and emphasizing individualized care that respects patients' needs and preferences.

In parallel, the 2018 recommendation issued by the Dutch College of General Practitioners (Nederlands Huisartsen Genootschap, NHG) warrants a critical reassessment. The NHG currently advises against prescribing cannabis, citing an alleged lack of evidence for its effectiveness.(3) Following this recommendation, the number of cannabis prescriptions declined(4) and reimbursement by health insurers ceased. Participants in the MEDUSA study frequently reported that their physicians referred to the NHG statement as a reason to not prescribe cannabis. However, the NHG's position appears to be based on a limited interpretation of the available evidence and fails to consider the broader context in which medical cannabis should be evaluated (i.e. not focusing solely on randomized controlled trials). Given the increasing volume of international research supporting the therapeutic potential of cannabis, an updated review of the scientific literature is warranted. Revising the NHG's recommendation in line with current evidence would remove unnecessary barriers to access and align national policy with international best practices.

5. Expand product variety

Expanding the range of prescribed cannabis products is essential to better address the divers therapeutic needs of patients. Individuals with varying health conditions and physiological responses may require different cannabis strains and cannabinoid profiles for optimal effectiveness. In addition, different product forms can meet different therapeutic goals, for example, rapid symptom relief versus longer-lasting effects. A broader selection of product types and forms can improve patient satisfaction and support adherence to treatment. The Netherlands could benefit from adopting approaches seen in countries such as Australia, Germany, and Canada, where prescriptions include a wide variety of cannabis strains and forms, such as therapeutic vapes, extracts, oils, capsules, and edibles. A structured system could help organize these products and guide patient and physician choice. For example, one might have different product types (e.g. cannabis strains) with identical primary active compounds (i.e. THC/CBD concentrations), and variations in other compounds (e.g. other cannabinoids, terpenes), which can be administered in different forms (e.g. vaporizer, oil, oral). By considering factors such as therapeutic effect, taste, aroma, and preferred method of consumption, physicians can tailor treatment more precisely to individual patient needs and preferences.

6. Provide clear, tailored, and accessible information for patients

A major barrier to accessing prescribed cannabis is the limited availability of accurate, comprehensive, and accessible information for patients. This undermines patients' ability to make informed decisions about treatment options. Addressing this information gap requires authorities to take responsibility for providing trustworthy, user-friendly resources on prescribed cannabis. One effective solution would be the development of a centralized, publicly accessible website that consolidates all relevant information on prescribed cannabis. To ensure the platform meets the needs of its users, its development should involve meaningful collaboration with patient representatives. The website could offer practical information such as eligibility criteria, cost, and referral pathways, while also addressing common myths and misconceptions and clearly outlining the current state of scientific knowledge. For instance, many individuals seek guidance on which cannabis strains are most effective for specific medical conditions – an area with ongoing scientific uncertainty. In addition, the platform could include a directory of key institutions and service providers, such as specialized pharmacies and cannabis expertise centres or prescribing physicians, to help patients navigate the healthcare system more effectively. As a central hub, this website would enhance transparency, support informed decision-making, and promote more equitable access to prescribed cannabis.

7. Train physicians in non-stigmatizing communication and shared-decision making

To improve access to prescribed cannabis, it is essential to invest in physician training focused on stigma reduction and effective communication. Findings from the MEDUSA study indicate that many patients refrain from discussing their therapeutic cannabis use with physicians due to fear of stigma or judgment. One-third of participants had not disclosed their use of non-prescribed cannabis to their physician, and only a small proportion had requested a prescription. Research shows that patients' comfort level with their healthcare provider significantly influences their willingness to open up about sensitive topics like cannabis use.(6) Training programs should therefore equip physicians with the skills to engage in non-judgmental and unbiased conversations and make them aware of the influence that stigma can have on patient behaviour and trust.

Equally important is the promotion of shared-decision making as a core component of patient-centred care. This approach emphasizes the active involvement of patients in treatment decisions, ensuring they are informed of available options and supported in choosing a course of action aligned with their values and preferences. While many patients wish to take an active role, it is also important to recognize that others may prefer to defer decision-making to their clinician while still being included in the discussion. Respecting these individual preferences is essential for ethical, person-centred care. Excluding patients from decisions that directly affect their health and wellbeing is ethically and morally wrong. It undermines autonomy and can negatively impact therapeutic outcomes. By empowering patients with informed choices and fostering collaborative communication, healthcare providers can enhance treatment adherence, improve patient satisfaction, and build stronger and more trusting patient-physician relationships.

8. Implement harm reduction strategies

For individuals who are not eligible for prescribed cannabis – for instance due to a lack of formally recognized medical indication – and yet continue to use non-prescribed cannabis to manage somatic or psychological symptoms, harm reduction strategies are essential. Given that the majority of individuals smoke cannabis with tobacco, harm reduction efforts should focus on safer consumption methods, such as vaporization, which is generally considered less harmful than combustion-based methods. Additionally, integrating tobacco cessation support into these strategies may further reduce health risks. By adopting a harm reduction framework, healthcare providers and public health authorities can help mitigate the adverse effects associated with non-prescribed cannabis use, while supporting individuals in making safer, more informed choices.

9. Increase funding for research

Increased investment in scientific research is critical to advancing evidence-based use of medical cannabis. Priority areas include the generation of high-quality data through randomized controlled trials (RCTs), real-world observational studies, and patient-reported outcomes, as well as longitudinal data on treatment effects and safety. Although some efforts to gather real-world data in the Netherlands are already underway, a more coordinated and systematic approach is needed. This includes establishing mechanisms to integrate and analyse data from diverse sources. Moreover, existing evidence from international studies should be used to inform local clinical and regulatory practices, reducing unnecessary duplication and accelerating the translation of research into practice. As policy measures to improve access to prescribed cannabis are implemented, ongoing monitoring of the population using non-prescribed cannabis remains important. The long-term goal should be to reduce reliance on non-prescribed cannabis by expanding access to regulated therapeutic options. The development of an anonymous national database of patients using prescribed cannabis could facilitate robust scientific analyses and support the tracking of treatment trends, patient characteristics, and outcomes over time.

10. Apply a personalized medicine framework

Finally, it is important to reiterate that cannabis as a plant medicine requires a different framework for evaluation than pharmaceutical prescription medications. A common critique of prescribed cannabis is the limited evidence from randomized controlled trials (RCTs). However, while RCTs are considered the gold standard in medical research, their application to plant medicines like cannabis presents unique challenges. Pharmaceutical medicines are typically composed of a single active compound or a well-defined combination of compounds, making it easier to isolate their effect. In contrast, plant medicines contain hundreds or even thousands of compounds, many of which work synergistically. This complexity makes it difficult to pinpoint specific active compounds and understand their mechanism of action. Cannabis is composed of over 500 different compounds – such as cannabinoids, terpenoids, and flavonoids – that exist in varying combinations and ratios, each potentially affecting the human endocannabinoid system in unique ways. Cannabis is therefore not ‘one’ product, but a family of products. Moreover, cannabis is being studied for its therapeutic applications across a wide range of health conditions. Generating robust findings

through RCTs for combinations of cannabis compounds tailored to specific conditions will require substantial time and resources.

Leading international experts therefore argue that a personalized medicine framework should complement ongoing RCT efforts.(1,2) In this approach, patients' lived experiences are recognized as valuable evidence for the effectiveness and tolerability of cannabis. For instance, patient-reported outcome measures can be used to track changes in symptoms and wellbeing over time. Expanding access to prescribed cannabis also provides an opportunity to collect real-world data, building a broader evidence base. Unlike RCTs, this approach allows for the inclusion of patients with high comorbidity or rare diseases, offering insights that are often excluded from traditional clinical trials. This dual strategy—combining personalized medicine with RCTs—can accelerate our understanding of cannabis's therapeutic potential while overcoming the limitations of existing methodologies. As the field evolves, it is essential to build on the growing body of research demonstrating the potential therapeutic uses of cannabis. This approach ensures timely support for patients, rather than delaying treatment until extensive RCT findings become available.

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Appendices

Appendix A. Questionnaire

Welkom bij de MEDUSA vragenlijst

Gebruik je wiet, hasj, of wietolie om lichamelijke of psychische klachten te verminderen?
En haal je deze cannabisproducten bij de coffeeshop, maak of kweek je ze zelf, of krijg je ze van familie/vrienden?
Dan kun je deze vragenlijst invullen.

Door jouw ervaringen te delen komt er meer kennis beschikbaar over hoe cannabis als medicijn wordt gebruikt. Zo kunnen we proberen de toegang tot medicinale cannabis en het aanbod ervan te verbeteren, zodat het beter aansluit bij de behoeften van patiënten.

Het invullen van de vragenlijst duurt 10 tot 15 minuten. Je antwoorden zijn anoniem.
Als je meedoet maak je kans op één van de 10 geldprijzen van 200 euro.

Uitgebreidere informatie over het onderzoek vind je **hier** terug. **Lees deze pagina goed door**. Op die pagina vind je ook informatie over de vervolgonderzoeken waaraan je later kunt meedoen.

Voor vragen over dit onderzoek kun je mailen met Lisa Strada (lstrada@trimbos.nl) of Pieter Oomen (poomen@trimbos.nl) van het Trimbos-instituut.

Toestemming

Ik ben goed geïnformeerd over het onderzoek én de wijze waarop mijn persoonsgegevens worden verwerkt.

Vragen die ik nog had over het onderzoek en over de verwerking van persoonsgegevens heb ik kunnen stellen, en zijn naar tevredenheid beantwoord.

Ik weet dat meedoen vrijwillig is. Ik weet ook dat ik op ieder moment kan stoppen met deelname aan het onderzoek en dat ik de toestemming voor de verwerking van persoonsgegevens kan intrekken.

Ik stem in met deelname aan het onderzoek en stem in met de verwerking van mijn persoonsgegevens, waaronder gezondheidsgegevens, voor dit onderzoek zoals beschreven in de **informatiebrief** en **privacyverklaring**.

- ○ Ja ik stem in.

Heb je dit kalenderjaar eerder meegedaan met een onderzoek van het Trimbos-instituut en daarvoor een vergoeding ontvangen?

- ○ Ja
- ○ Nee

Eerst een paar korte vragen…

Waar heb je deze vragenlijst gevonden?

- ○ Facebook
- ○ Andere sociale media (bijvoorbeeld Twitter, Instagram)
- ○ Coffeeshop
- ○ Website over cannabis
- ○ Cannabis Social Club (een non-profit stichting waar cannabis wordt gekweekt en gedeeld)
- ○ Anders, namelijk: _____

Gebruik je cannabisproducten voor lichamelijke of psychische klachten?

- ○ Ja
- ○ Nee

Hoe kom je aan de cannabisproducten die je als medicijn gebruikt?

- ○ Van de dokter
- ○ Niet van de dokter
- ○ Zowel van de dokter als van ergens anders

Ben je 18 jaar of ouder?

- ○ Ja
- ○ Nee

Woon je in Nederland?

- ○ Ja
- ○ Nee

Gebruik je *alleen* CBD-producten (zonder THC) die je koopt bij een drogisterij of internet?

Als je alleen zulke CBD-producten gebruikt, kun je helaas je niet meedoen aan de vragenlijst.

- ○ Ik gebruik *alleen* CBD-producten van een drogisterij of internet.
- ○ Nee, ik gebruik (ook) andere cannabisproducten als medicijn, zoals wiet, hasj, en wietolie.

Algemene informatie over jou

Geslacht:

- ○ Man
- ○ Vrouw
- ○ Anders
- ○ Zeg ik liever niet

Leeftijd:

Ik ben [getal] jaar oud.

Hoogst behaalde opleiding:

- ○ Basisonderwijs
- ○ Vmbo, mbo1, praktijkonderwijs, onderbouw havo/vwo
- ○ Havo, vwo, mbo
- ○ Hbo, wo bachelor
- ○ Wo master, doctor
- ○ Niet van toepassing/weet ik niet

Werk op dit moment:

- ○ Fulltime
- ○ Parttime
- ○ Werkloos
- ○ Met pensioen
- ○ Arbeidsongeschikt/ziek/invalide
- ○ Student

De volgende vragen gaan over de cannabisproducten die je als medicijn gebruikt en die je **niet** van de dokter of de apotheek krijgt.

Waar haal je de cannabisproducten die je als medicijn gebruikt?
Meerdere antwoorden mogelijk.

- ○ Coffeeshop
- ○ Cannabis Social club (een non-profit stichting waar cannabis wordt gekweekt en gedeeld)
- ○ Ik kweek de cannabis zelf
- ○ Ik maak de wietolie zelf
- ○ Ik krijg het van een vriend of familielid
- ○ Online winkel
- ○ Dealer
- ○ Anders, namelijk: _____

Toon deze vraag als meer dan een bolletje is aangekruist:
Waar haal je het vaakst je cannabisproducten vandaan? *< Uitklap keuzelijst: bovenstaande opties tonen >*

Welke cannabisproducten gebruik je als medicijn?
Meerdere antwoorden mogelijk.

- ○ Wiet
- ○ Hasj
- ○ Cannabisolie die ik via de mond neem of onder mijn tong leg
- ○ Cannabisolie om in te ademen of te verdampen
- ○ Cannabisproducten om te smeren, zoals crème/lotion/zalf
- ○ Anders, namelijk: ____

Toon deze vraag als meer dan een bolletje is aangekruist:
Welk cannabisproduct gebruik je het meest? *< Uitklap keuzelijst: bovenstaande opties tonen >*

Hoeveel THC en CBD zit in het cannabisproduct dat je gebruikt?
Geef antwoord voor het cannabisproduct dat je het meest gebruikt.
THC:

- ○ Veel
- ○ Gemiddeld
- ○ Weinig
- ○ Weet ik niet

CBD:

- ○ Veel
- ○ Gemiddeld
- ○ Weinig
- ○ Weet ik niet

Hoeveel procent THC en CBD zit er in je cannabisproduct? Als je het niet weet, ga dan naar de volgende vraag.

THC ____ %
CBD ____ %

Hoe weet je hoeveel THC en CBD er in je cannabisproduct zit?

- ○ Het personeel in de coffeeshop vertelde het me
- ○ Het stond op het etiket van het cannabisproduct
- ○ Degene die mij het cannabisproduct heeft gegeven of verkocht vertelde het me
- ○ Het is mijn eigen schatting
- ○ Ik weet niet hoeveel THC en CBD er in zit
- ○ Anders, namelijk: ____

Hoe vaak gebruik je cannabis als medicijn?

Gemiddeld op [getal] dagen per maand. (Een maand heeft 30 dagen).

Op welke manier gebruik je cannabis als medicijn?

Meerdere antwoorden mogelijk.

- ○ Ik rook cannabis met tabak (joint)
- ○ Ik rook cannabis puur (zonder tabak)
- ○ Ik verdamp de cannabis (de bloemen/ toppen)
- ○ Ik verdamp cannabisolie/extract
- ○ Ik doe cannabisolie onder mijn tong
- ○ Ik eet of drink het
- ○ Ik gebruik cannabis crème/lotion/zalf
- ○ Anders, namelijk: ____

Toon deze vraag als meer dan een bolletje is aangekruist:

Op welke manier gebruik je cannabis het vaakst? *< Uitklap keuzelijst: bovenstaande opties tonen >*

Waarom gebruik je de cannabis op die manier?

Kies maximaal drie redenen.

- ○ Het begint snel te werken
- ○ Het werkt lang
- ○ Ik kan makkelijk bepalen hoeveel ik neem
- ○ Gemakkelijk te gebruiken
- ○ Prettig om in te ademen/ te inhaleren
- ○ Minder of niet schadelijk voor de longen
- ○ Goede smaak
- ○ Minder bijwerkingen
- ○ Gemakkelijk te verbergen (bijvoorbeeld buiten of voor de politie)
- ○ Uit gewoonte
- ○ Anders, namelijk: _____

Hoe lang gebruik je cannabis al als medicijn?
Als je het niet meer weet, ga dan naar de volgende vraag.
____ jaren

Hoe vaak gebruik je cannabis alleen voor plezier en niet voor je klachten?

- ○ Nooit
- ○ Heel soms
- ○ Soms
- ○ Vaak

Hoe vaak gebruikte je cannabis voor je plezier voordat je het als medicijn ging gebruiken?

- ○ Nooit
- ○ Heel soms
- ○ Soms
- ○ Vaak

Redenen om cannabis als medicijn te gebruiken

Voor welke lichamelijke ziektes of psychische aandoeningen gebruik je cannabis? Hiermee bedoelen we ziektes of aandoeningen die door een dokter zijn vastgesteld.
Als je geen diagnose van een dokter hebt, maar cannabis wel gebruikt om bepaalde klachten te verminderen, ga dan naar de volgende vraag.

- ○ Chronische pijn
- ○ Fibromyalgie
- ○ Kanker
- ○ Multiple sclerose (MS)
- ○ Ziekte van Crohn
- ○ Migraine
- ○ Gilles de la Tourette
- ○ Glaucoom
- ○ Epilepsie
- ○ Ziekte van Parkinson
- ○ Hepatitis C
- ○ HIV/AIDS
- ○ Slaapstoornis
- ○ ADHD/ADD
- ○ Depressie
- ○ Angststoornis
- ○ Posttraumatische stressstoornis (PTSS)
- ○ Autismespectrumstoornis (ASS)
- ○ Anders, namelijk: _____

Voor welke lichamelijke of psychische klachten gebruik je cannabis?

- ○ Langdurige (chronische) pijn
- ○ Kortdurende (acute) pijn
- ○ Zenuwpijn
- ○ Misselijkheid en/of braken
- ○ Verbeteren van de eetlust
- ○ Verminderen van bijwerkingen door medicijnen
- ○ Epileptische aanvallen
- ○ Spasticiteit
- ○ Spierpijn en krampen
- ○ Tics
- ○ Tumorgroei tegengaan
- ○ Verhoogde oogdruk
- ○ Premenstrueel syndroom (PMS)
- ○ Slaapproblemen
- ○ Depressieve klachten
- ○ Angsten
- ○ Stress/nervositeit
- ○ Anders, namelijk: _____

Jouw ervaring met cannabis

Hoeveel verbetert cannabis je klachten?

Geef een cijfer: 1 = geen verbetering; 10 = volledige verbetering.
Als je klachten door cannabis erger worden, kies dan de optie 'cannabis verergert mijn klachten'.

[10-point scale: 1-10]
Option: Cannabis verergert mijn klachten.

Zorgt het gebruik van cannabis als medicijn ervoor dat je je op andere manieren ook beter voelt?

- ○ Ja
- ○ Nee

Zo ja, kruis alles aan wat van toepassing is:

- ○ Minder angst
- ○ Minder depressief
- ○ Ik kan beter met mensen omgaan
- ○ Ik kan me beter bewegen en actief zijn
- ○ Ik kan beter werken
- ○ Ik heb meer zin om dingen te doen
- ○ Ik kan me beter ontspannen
- ○ Ik kan me beter concentreren
- ○ Ik slaap beter
- ○ Ik eet beter
- ○ Anders, namelijk: _____

Hoeveel verbetert het gebruik van cannabis als medicijn je kwaliteit van leven?

Geef een cijfer: 1 = geen verbetering; 10 = volledige verbetering.
Als je kwaliteit van leven door cannabis slechter is geworden, kies dan de optie 'cannabis verslechtert mijn kwaliteit van leven'.

[10-point scale: 1-10]
Option: Cannabis verslechtert mijn kwaliteit van leven

Heb je ooit medicijnen van de dokter gekregen voor je ziektes/klachten?

- ○ Ja
- ○ Nee

Krijg je op dit moment medicijnen van de dokter voor je ziektes/klachten?

- ○ Ja
- ○ Nee

If YES to 'ooit medicijnen', get the following questions. Otherwise re-directed to 'ervaring met de zorg'.

Heb je ooit cannabis gebruikt in plaats van een medicijn dat je van de dokter hebt gekregen?

- ○ Ja
- ○ Nee

Zo ja, welke medicijnen van de dokter heb je vervangen door cannabis?

- ○ Medicijnen tegen pijn
- ○ Medicijnen tegen depressie (antidepressiva)
- ○ Medicijnen tegen angst
- ○ Medicijnen tegen psychoses (antipsychotica)
- ○ Medicijnen tegen ADHD
- ○ Medicijnen tegen epilepsie
- ○ Medicijnen tegen artritis
- ○ Medicijnen om te slapen
- ○ Anders, namelijk: ____

Hoe heeft cannabis het gebruik van de medicijnen van de dokter beïnvloed?

- ○ Ik ben gestopt met het gebruik van de medicijnen die ik van de dokter kreeg.
- ○ Ik gebruik de medicijnen van de dokter minder dan eerst.
- ○ Er is niks veranderd. Ik gebruik de medicijnen van de dokter op dezelfde manier.
- ○ Ik gebruik nu meer medicijnen van de dokter dan eerst.
- ○ Ik gebruik nu een ander soort medicijn van de dokter.
- ○ Weet ik niet

Werkt cannabis beter of slechter dan de medicijnen van de dokter om je klachten te verminderen?

- ○ Cannabis werkt veel beter dan de medicijnen van de dokter.
- ○ Cannabis werkt iets beter dan de medicijnen van de dokter.
- ○ Cannabis werkt even goed als de medicijnen van de dokter.
- ○ De medicijnen van de dokter werken iets beter dan cannabis.
- ○ De medicijnen van de dokter werken veel beter dan cannabis.
- ○ Weet ik niet

Zijn de bijwerkingen van medicijnen van de dokter erger dan de bijwerkingen van cannabis?

- ○ De bijwerkingen van de medicijnen zijn veel erger dan die van cannabis.
- ○ De bijwerkingen van de medicijnen zijn iets erger dan die van cannabis.
- ○ Er is geen verschil in bijwerkingen.
- ○ De bijwerkingen van cannabis zijn iets erger dan die van de medicijnen.
- ○ De bijwerkingen van cannabis zijn veel erger dan die van de medicijnen.
- ○ Weet ik niet

Ervaring met de zorg

Heb je ooit met een dokter gesproken over dat je cannabis als medicijn gebruikt? Ja/Nee
Heb je ooit aan een dokter gevraagd om je cannabis als medicijn te geven? Ja/Nee
Heb je ooit cannabis als medicijn van de dokter gekregen? Ja/Nee
Gebruik je op dit moment cannabis die je van de dokter hebt gekregen? Ja/Nee

Als NEE bij vraag 2:

Ik heb nog nooit een dokter gevraagd om mij cannabis als medicijn te geven omdat:

Meerdere antwoorden mogelijk.

- ○ Ik wist niet dat ik cannabis als medicijn van de dokter kon krijgen.
- ○ Ik denk niet dat mijn dokter mij cannabis als medicijn zou geven.
- ○ Ik denk dat mijn dokter niet zou weten welke cannabis hij aan mij moet geven.
- ○ Ik vind het niet prettig om mijn dokter om cannabis als medicijn te vragen.
- ○ Ik wil niet dat mijn dokter weet dat ik cannabis als medicijn gebruik.
- ○ Ik wil geen cannabis uit de apotheek.
- ○ Ik heb geen dokter nodig; ik weet welke cannabis het beste voor mij is.
- ○ Cannabis uit de apotheek is te duur.
- ○ Anders, namelijk: _____

Als JA bij vraag 2 en NEE bij vraag 3:

Mijn dokter heeft me geen cannabis als medicijn gegeven omdat:

Meerdere antwoorden mogelijk.

- ○ Mijn dokter zei dat mijn ziekte/aandoening niet in aanmerking komt voor medicinale cannabis.
- ○ Mijn dokter wist niet genoeg over cannabis als medicijn om het aan mij te geven.
- ○ Mijn dokter denkt dat cannabis iets slechts is.
- ○ Mijn dokter wilde eerst andere medicijnen proberen.
- ○ Mijn dokter denkt dat cannabis als medicijn niet goed werkt.
- ○ Anders, namelijk: _____

Als JA bij vraag 3 en NEE bij vraag 4:

Je hebt laten weten dat je vroeger cannabis van de dokter hebt gekregen, maar het nu niet meer gebruikt.

Wat voor soort cannabisproduct heb je toen gekregen van de dokter? (Naam, percentage THC en CBD) _____

Waarom ben je gestopt met het gebruiken van cannabis die je van de dokter kreeg? _____

Als JA bij vraag 4:

Je hebt laten weten dat je op dit moment cannabis van de dokter gebruikt.

Wat voor soort cannabisproduct krijg je van de dokter? (Naam, percentage THC en CBD) _____

Waarom gebruik je ook andere cannabis, die je niet van de dokter krijgt, als medicijn? _____

After 'MC in het verleden' and 'MC op dit moment':

Hoeveel ben je het eens of oneens met de volgende uitspraken:

Cannabis die ik zelf kan halen (zonder doktersrecept) werkt beter tegen mijn klachten dan de cannabis die ik van de dokter kreeg/krijg.

- ○ Helemaal mee eens
- ○ Mee eens
- ○ Ze werken even goed
- ○ Mee oneens
- ○ Helemaal mee oneens

Cannabis die ik zelf kan halen is prettiger om te gebruiken dan de cannabis die ik van de dokter kreeg/krijg (de smaak of de geur is bijvoorbeeld prettiger).

- ○ Helemaal mee eens
- ○ Mee eens
- ○ Ze zijn even prettig om te gebruiken
- ○ Mee oneens
- ○ Helemaal mee oneens

Wil je nog iets zeggen over je ervaring met cannabis die je van de dokter kreeg/krijgt? _____

Waarom gebruik je cannabis die je zelf kunt halen (zonder doktersrecept) in plaats van cannabis die je van de dokter kunt krijgen?

Kies maximaal 3 redenen.

- ○ Cannabis die ik zelf kan halen is goedkoper
- ○ Cannabis die ik zelf kan halen is makkelijker te verkrijgen
- ○ Cannabis die ik zelf kan halen is van betere kwaliteit
- ○ Apotheken hebben niet de cannabisproducten die ik wil
- ○ Apotheken hebben niet genoeg verschillende soorten cannabisproducten
- ○ Mijn dokter wil mij geen recept voor medicinale cannabis geven
- ○ Ik wil niet dat mijn dokter weet dat ik cannabis als medicijn gebruik
- ○ Ik wil zelf bepalen hoe ik cannabis als medicijn gebruik
- ○ Ik wist niet dat ik cannabis als medicijn van de dokter kon krijgen
- ○ Anders, namelijk: _____

Heb je wel eens slechte dingen gehoord over de medicinale cannabis die je van de dokter kunt krijgen? Zo ja, schrijf op wat je hebt gehoord: _____

Wat voor soort cannabis gebruik je het liefst?

Ik vind de volgende dingen belangrijk als ik de cannabis kies die ik als medicijn gebruik.
Kies maximaal vijf.

- ○ Indica-dominant
- ○ Sativa-dominant
- ○ Indica/Sativa mix
- ○ Veel THC
- ○ Weinig THC
- ○ Veel CBD
- ○ THC:CBD gelijke mix
- ○ Wat voor soort terpenen erin zitten
- ○ Hoe de bloem ruikt
- ○ Hoe de bloem eruit ziet
- ○ Naam (bijv. kush, haze)
- ○ Smaak
- ○ Biologisch geteeld (zonder chemische bestrijdingsmiddelen)
- ○ Niet bestraald
- ○ Ik vertrouw op wat anderen mij vertellen (bijvoorbeeld coffeeshoppersoneel, vrienden, internet)
- ○ Anders, namelijk: _____

Kosten en stress

Hoeveel geef je ongeveer per MAAND uit aan de cannabisproducten die je als medicijn gebruikt?

- ○ _____ Euro's per maand (vul hier in)
- ○ Ik betaal niet voor mijn cannabis.
- ○ Zeg ik liever niet.

Heb je geldzorgen omdat je cannabis als medicijn gebruikt?

- ○ Helemaal niet
- ○ Een beetje
- ○ Enigszins
- ○ Heel erg

Maak je je wel eens zorgen over je gebruik van cannabis als medicijn als het gaat om de volgende dingen:
Beantwoord elk onderdeel

- ○ De illegale status Ja/Nee
- ○ Stigma (slechte imago) Ja/Nee
- ○ Gezondheidsproblemen (bijvoorbeeld met de longen) Ja/Nee
- ○ Vervuiling (bijvoorbeeld met pesticiden) Ja/Nee
- ○ Onzekerheid of mijn cannabisproduct altijd beschikbaar is Ja/Nee
- ○ Kans op verslaving Ja/Nee

Wil je nog iets zeggen over het gebruik van cannabis als medicijn? Of over deze vragenlijst?

____

Hartelijk dank voor het invullen van deze vragenlijst!

Zo meteen kun je meedoen aan een loterij. Daarmee maak je kans op 200 euro.
Je kunt je eerst nog aanmelden voor vervolgonderzoeken van dit project. Dit is vrijwillig.

Als je mee wilt doen aan één of beide vervolgonderzoeken, dan vragen we om je e-mailadres. In de **privacyverklaring** vind je meer informatie over hoe we met je gegevens omgaan en welke rechten je hebt.

Ken je iemand die cannabis als medicijn gebruikt? Stuur deze link alsjeblieft door: https://trimbos.nl/medusa/
Hoe meer mensen hun ervaringen delen hoe beter!

Vervolgonderzoek 1: een interview.

We willen graag van je weten:
Waarom haal je de cannabis die je als medicijn gebruikt niet van de dokter?
Wat vind je prettig of niet prettig aan de manier waarop je nu aan je cannabis komt?

Het interview duurt 45-60 minuten en gebeurt online. Wie meedoet krijgt een **vergoeding van 40 euro.**

In de informatiebrief en in de privacyverklaring vind je meer informatie over het onderzoek, over hoe we met je gegevens omgaan en welke rechten je hebt.

Heb je interesse om deel te nemen?

- ○ Ja, ik wil graag meer informatie krijgen over het onderzoek. Mijn emailadres is: _____
- ○ Nee

Vervolgonderzoek 2: Je wiet/hasj opsturen.

We willen weten hoeveel THC en CBD in de wiet/hasj zit die je voor je klachten gebruikt. Zo weten we welke soort cannabisproducten patiënten het liefst gebruiken.

Om precies te weten hoeveel THC en CBD er in je wiet/hasj zit, hebben wij 1,5 gram van je wiet of hasj nodig.
Je krijg **40 euro als vergoeding** als je meedoet**.**

In de informatiebrief en in de privacyverklaring vind je meer informatie over het onderzoek, over hoe we met je gegevens omgaan en welke rechten je hebt.

Heb je interesse om deel te nemen?

- ○ Ja, ik wil graag meer informatie krijgen over het onderzoek. Mijn emailadres is: _____
- ○ Nee

Je kunt nu meedoen aan een loterij om kans te maken op één van de 10 prijzen van 200 euro.

Klik om mee te doen op **DEZE LINK**. Dan kom je op een pagina waar je je e-mailadres kunt invullen.

Als je niet wilt deelnemen aan de loterij klik dan op **Volgende** om de vragenlijst af te ronden.

Vul hier je e-mailadres in om mee te doen aan de loterij.

E-mail: _____

We stellen je binnen 4 maanden per e-mail op de hoogte als je hebt gewonnen.

Hartelijk dank voor je deelname aan dit onderzoek!

Appendix B. Interview guide

MEDUSA Interview draaiboek

Introductie

Stel jezelf voor (naam, Trimbos Instituut).
Als het goed is hebben we nu een interview; komt het je nog steeds goed uit?
Vraag de deelnemers om hun e-mailadres te herhalen, zodat we weten dat we met de juiste persoon praten.

Bedankt dat je aan dit interview mee wilt doen. Dit interview maakt deel uit van het onderzoek "MEDUSA" naar het gebruik van cannabis als medicijn. Het onderzoek wordt uitgevoerd door het Trimbos-instituut. Mijn naam is *<vul naam in>*, en ik ben onderzoeker bij het Trimbos-instituut.

Het doel van dit interview is om beter te begrijpen waarom mensen de cannabis die ze voor medicinale doeleinden gebruiken niet van de dokter krijgen maar zelf halen. Met deze informatie willen we kijken hoe de toegang tot medicinale cannabis van de dokter en het aanbod ervan verbeterd kan worden. Er zijn geen goede of foute antwoorden. Wij zijn geïnteresseerd in jouw ervaringen en meningen.

Meedoen aan dit onderzoek is vrijwillig en anoniem. Het interview duurt ongeveer 60 minuten. Met jouw toestemming zou ik graag een opname willen maken van het interview. We maken een video-opname omdat het met Microsoft Teams niet mogelijk is om alleen een opname van het geluid te maken. We verwijderen de video's zodra alle gegevens zijn verwerkt.

Alle antwoorden worden vertrouwelijk behandeld. Informatie die we in het eindrapport van ons onderzoek opnemen is niet te herleiden naar individuele deelnemers – en dus ook niet naar jou.

Je kunt altijd stoppen met het interview als je niet meer wilt meedoen. Je hoeft dan niet te zeggen waarom. Heb je nog vragen voordat we beginnen?

Mag ik beginnen met opnemen? *< Ja/ Nee >*
Start de opname. Nadat de opname is gestart, bevestig je:
Ik heb je toestemming gekregen om van dit interview een video-opname te maken, klopt dat?
< Ja >
En zoals ik net heb uitgelegd: Zodra de gegevens van de interviews zijn verwerkt, we verwijderen de video's.

Als iemand het niet eens is met de video opname, maak een audio-opname met het audio opname apparatuur.
Nadat de opname is gestart, bevestig je:
Ik heb je toestemming gekregen om van dit interview een geluidsopname te maken.

Bouw een band op met de deelnemer
Voordat we beginnen stel ik me graag even aan je voor. Ik ben < *naam* > en ik werk bij het Trimbos Instituut. Ik werk bij de afdeling < *X* >. Ik ben betrokken bij dit onderzoek als interviewer. Dit doe ik onder leiding van Lisa Strada.

Ik zou graag ook iets over jou weten. *Kun je iets over jezelf vertellen?*
- *Prompts: Naam, leeftijd, werk*

Let op: Naast de interviewvragen, gebruik ook algemene vragen zoals:
"Kun je me daar iets meer over vertellen?" *en* **"Hoe ziet dat er voor jou uit?"**

Interview vragen

1. **Kun je me iets vertellen over je medicinaal gebruik van cannabis?** [introductory question]
   - *Prompts: Wat zijn de redenen dat je cannabis als medicijn gebruikt? (Welke klachten)*
   - *Prompts: Wat voor cannabisproducten gebruik je als medicijn? (Wiet, hasj, olie, veel THC/CBD)*

2. **Hoe ben je op het idee gekomen om cannabis als medicijn te gebruiken?** [introductory question]
   - *Prompts: Heeft iemand het je aanbevolen?*

3. **Kun je me vertellen hoe je aan je cannabis komt, en kun je me meer vertellen over de redenen dat je het op deze manier verkrijgt?** [Key question; general question]

Sub-vraag: Wat vind je prettig of niet prettig aan de manier waarop je je cannabis verkrijgt?
- *Prompts: Bijv. makkelijk om in de coffeeshop te kopen; veel moeite om het zelf te telen/olie te maken*

4. **Kun je me vertellen wat je weet over de cannabis die je met een recept in de apotheek kunt krijgen?** [knowledge; health literacy]
   - *Prompts: Wat weet je over de soorten cannabis? Of de verschillende producten (bijv. olie)?*
   - *Prompts: Denk je dat deze cannabis aan jouw wensen voldoet?*
   - *Prompts: Weet je of je in aanmerking zou komen voor medicinale cannabis?*

Sub-vraag: Heb je ooit naar informatie gezocht over de medicinale cannabis op doktersrecept? [information]
- Als 'Ja': Hoe gemakkelijk kon je hier informatie over vinden?

5. **Heb je ooit met een dokter besproken dat je cannabis als medicijn gebruikt?** [Key question; experience with doctors → cultural and social factors; doctors not willing or equipped to prescribe]

Als 'Ja': Kun je iets vertellen over hoe dat ging en hoe je je voelde?

- *Prompts: Hoe reageerde jouw dokter? Voelde je je op je gemak? Wat voor soort dokter was dat?*

Als 'Nee': Kun je me iets vertellen over de redenen waarom je hierover niet met een dokter hebt gesproken?

- *Prompts: Voel je je niet op je gemak? Zou je liever met een andere arts praten dan je huisarts?*

Sub-vraag: Hoe denk je dat dokters aankijken tegen het gebruik van cannabis als medicijn? [stigma]

- *Prompts: Denk je dat dokters vooroordelen hebben? En wat voor effect heeft dit op jou? Bijv. ga je hierom niet naar de dokter of heb je een andere dokter gezocht?*

6. **Wat denk je dat de voor- en nadelen zijn van de cannabis op doktersrecept?** [e.g. health literacy]
   - *(Voor- en nadelen in vergelijking met cannabis zonder doktersrecept)*
   - *Prompts (PRO): Altijd dezelfde hoeveelheid THC/CBD; geen vervuilingen; goedkoper; gegarandeerd dat ik altijd mijn voorraad heb; legale status*
   - *Prompts (CON): Kost tijd om naar de dokter te gaan; afhankelijk van wat de dokter voorschrijft*

7. **Wat is voor jou belangrijk bij het kiezen van een cannabisproduct dat je als medicijn gebruikt?** [clients' needs and preferences; self-management]
   - *Prompts: Specifieke producten kunnen kiezen (THC/CBD-gehalte; geur; kwaliteit; toedieningsvorm)*
   - *Prompts: De vrijheid om mijn cannabis te kunnen kiezen; veel opties hebben; kunnen experimenteren*

8. **Kun je iets vertellen over de kosten van je medicinale cannabis en hoe je daarmee omgaat?** [affordability]
   - *Prompts: Speelt geld een rol bij jouw beslissingen over je medicinaal cannabis gebruik?*
   - *Prompts: Heb je geldzorgen door je gebruik van cannabis als medicijn?*
   - *Prompts: Weet je of jouw cannabis goedkoper of duurder is dan de cannabis van de dokter?*

9. **Wat betekent het voor jou om cannabis op een andere manier dan op recept te krijgen?** [autonomy/empowerment versus discrimination/need for more support]
   - *Prompts: Beschouw je het als iets positiefs of negatiefs dat je je eigen keuzes maakt over je medicinaal gebruik van cannabis?*
   - *Prompts: Denk je dat mensen baat zouden hebben bij professionele ondersteuning rond hun medicinaal cannabisgebruik? En op welke manier?*

Sub-vraag: Hoe neem je beslissingen over je medicinaal cannabisgebruik? Hoe denk je dat beslissingen worden genomen met een arts, en hoe zou je willen dat beslissingen worden genomen? [decision-making process]

- *Prompts: Heb je veel er over gelezen of geëxperimenteerd? Vertrouw je op wat anderen je vertellen?*
- *Prompts: Denk je dat dokters voldoende kennis hebben om patiënten goed te begeleiden?*

10. Is er nog iets dat je wilt zeggen over je gebruik van cannabis als medicijn, waar we het tot nu toe niet over hebben gehad?

Extra vragen

Wat zou het makkelijker of aantrekkelijker voor je maken om cannabis op doktersrecept te gebruiken?

- *Prompts: Wat moet er veranderen voordat je cannabis van de dokter zou gebruiken?*
- *Prompts: Zou je cannabis van de dokter gebruiken als het vergoed zou worden door de zorgverzekering? Waarom/ waarom niet?*

Hartelijk dank voor je tijd en openheid, en voor het delen van je ervaringen.

Je ontvangt een waardebon t.w.v. 40 euro binnen twee werkdagen op je e-mailadres.

Als je later nog vragen hebt, kun je altijd een mail sturen naar [X], met wie je tot nu toe contact hebt gehad.

Appendix C. Codebook for the analysis of interviews

Medusa codebook

Aim for 30-35 codes → now 27 codes in 10 categories
Abbreviations: MC = medical cannabis; Ps = participant; health care professionals = HCP
Note: 'MC' refers to prescribed medical cannabis; 'medicinal use of cannabis' (or similar) is used for non-prescribed use.

Main code	Sub-code	Definition	Inclusion/exclusion criteria	Examples	Relevant interview questions
Socio-demographics		Socio-demographic factors	Includes socio-demographic factors that may be relevant to this population	E.g. age, employment, ethnicity, income, education, family	**Q0 establishing rapport** Can you tell me something about yourself?
Research question	No prescription	Why Ps do not have a prescription for MC	Only use this code when Ps give a direct answer to this question. (Always double-code with other codes.)	E.g. doctor does not prescribe it; too expensive and not covered by health insurance; 'don't think I'm eligible'	**Q3 key question** Can you tell me about the way you obtain cannabis and the reason you obtain it this way? **Q11 extra question** What would make it easier or more attractive for you to use cannabis on prescription?
Health and wellbeing	Symptoms	Health and wellbeing reasons for cannabis use	Include physical and mental conditions/ symptoms, quality of life issues, daily functioning and social participation issues for which cannabis is used	E.g. pain, sleep, ADHD, to relax, to reduce stress, to be able to go out, anxiety	**Q1 introductory, prompt** What are the reasons you use cannabis as medicine?
	Positive effects	Positive effects of cannabis use on health and wellbeing	Includes positive effects and side-effects on health, wellbeing, and other life aspects. Includes intended and unintended effects. Includes non-prescribed and prescribed cannabis	E.g. improved sleep and quality of life, alternative to other medication (for instance with lesser or no side effects)	**Q1 introductory** Can you tell me about your medicinal use of cannabis?
	Concerns and negative effects	Concerns and negative effects of cannabis use on health and wellbeing	Includes concerns and negative effects and side-effects on health, wellbeing, and other life aspects. Includes expected and experienced negative effects. Includes non-prescribed and prescribed cannabis. Excludes stigmatization or discrimination	E.g. addiction, vaporizing because smoking is bad for lungs	**Q1 introductory** Can you tell me about your medicinal use of cannabis?

Consumer behavior	Products	Type of cannabis products and reasons for using that product	Includes both non-prescribed and prescribed cannabis products. May include information about products used for recreational use for context. Includes personal preferences and wishes as well as medicinal needs	E.g. product form (oil, THC), smoke/ vaporize, can't/do not want to smoke, dislike the taste, dislike the effect, price	**Q1 introductory, prompt** Can you tell me about your medicinal use of cannabis? What cannabis products do you use medicinally? **Q7 Needs and preferences** What is important to you when choosing a cannabis product for medicinal use?
	Pattern	How cannabis is used and reasons for using it that way	Includes both consumption of non-prescribed and prescribed cannabis products. Includes personal preferences and wishes as well as medicinal needs	E.g. frequency, dosage, timing, routine	**Q1 introductory, prompt** Can you tell me about your medicinal use of cannabis? What cannabis products do you use medicinally? **Q7 Needs and preferences** What is important to you when choosing a cannabis product for medicinal use?
	Source	Source where Ps obtain their cannabis and reasons for obtaining it via that source	Includes how/where the cannabis is obtained and why that source is used. Includes preferences and needs that Ps mention in addition	E.g. coffeeshop, self-cultivation, prescription E.g. convenience, cheap price, disinterest in MC	**Q3 key question** Can you tell me about the way you obtain cannabis and the reason you obtain it this way? **Q7 Needs and preferences** What is important to you when choosing a cannabis product for medicinal use?
	Pathways to medicinal use	How Ps found out that cannabis could benefit them medicinally	Includes first use of cannabis (also recreationally), how Ps started using cannabis medicinally, and how Ps chose a suitable cannabis product and way of using it	E.g. transition from recreational to medicinal; products found through reading or experimentation	**Q2 introductory** How did you get into using cannabis as medicine?
Information		Whether and how Ps looked for and could find information on MC and the medicinal use of cannabis	Includes what information Ps looked for. Includes reported availability of i nformation on (prescribed) MC: what could they find? Includes information seeking behavior about (prescribed) MC: how/ where did they search?	E.g. whether Ps looked for informa-tion; how and where they looked; whether the information was easy to find and understandable	**Q4 information, sub** Have you ever looked for information about the prescribed medical cannabis?

Prescribed medical cannabis	Knowledge and beliefs	Knowledge, beliefs, assumption and expectations about prescribed MC	Includes knowledge/ beliefs about prescribed MC from experience or from having read/heard about it. Includes assumptions and expectations. Excludes PRO's and CON's	E.g. available products, cost, eligibility criteria, potential benefits of MC, quality of MC, the effects of radiation, whether it meets their needs	**Q4 knowledge** Can you tell me what you know about the prescribed medical cannabis?
	PROs and CONs	Advantages and disadvantages of prescribed MC	Includes PROs and CONs based on both imagination and experience. Includes the product, process, and more	E.g. clean consistent regulated product; legality; not supporting crime; differences in effects and taste	**Q6 health literacy** What do you think are the pros and cons of using prescribed medical cannabis?
Health care	Experiences	Experiences with health care and HCP	Includes experience with discussing cannabis as medicine with HCP. Includes experience with receiving prescribed MC. Includes experiences with health care system (e.g. health insurance but not about costs). Includes experiences with non-cannabis-treatment if it affected the Ps' perception of health care/HCP	E.g. 'I want to use prescribed MC but I tried and I can't access it'; the insurance does not recognize it as being effective for my condition	**Q5 experience doctor** Have you ever talked to your doctor about your medicinal use of cannabis? (Can you tell me about how that interaction went and how you felt?)
	Beliefs	Beliefs about health care and HCP	Includes beliefs and perceptions about health care and HCP. Includes ideas about HCPs level of knowledge and attitudes towards the medicinal use of cannabis	E.g. 'I think that…'; HCP don't have enough knowledge about MC; 'I want to use MC but don't think the doctor would prescribe it to me, because they see this as…'	**Q5 experience doctors** Have you ever talked to your doctor about your medicinal use of cannabis? (Can you tell me about the reason you have not talked to your doctor about this?) **Q9, sub, prompt** Do you think doctors have sufficient knowledge to guide patients well?
	Decision-making	Decision-making process with a HCP about starting and continuing with MC (from experience, preferred or hypothetical)	Includes preferences on how decisions around MC should be made with a HCP. If based on a real life experiences double code with 'experience'	E.g. HCP and patients should make decisions together	**Q9 decision-making** How do you take decision about your medicinal use of cannabis? How do you think decisions would be made with your doctor and how would you like decisions to be made?
	Professional support	Professional support with regard to the medicinal use of cannabis (from experience, preferred or hypothetical)	Includes preference or need for professional support, and whether useful for self or others. Includes support with prescribed MC. If based on a real-life experience, double code with 'experience'	E.g. 'I don't need help anymore, but others could benefit from guidance'	**Q9 prompt** Do you think people would benefit from professional support regarding their medicinal cannabis use?

	Other medications and substances	Experiences, beliefs and perceptions around other medications and substances	Includes norms and perceptions about alternative medications and other drugs. Excludes cannabis/MC. Includes comparisons with other medications and substances	E.g. 'Benzo's and opioid painkillers are freely prescribed yet you can get dependent'; 'alcohol is more harmful than cannabis'	
	Past prescription	Why Ps stopped obtaining cannabis on prescription	Includes reasons for obtaining cannabis through prescription in the past and reasons why that stopped	E.g. product got banned; doctor stopped prescribing; it became too expensive; stigma	**Q3 key question** Can you tell me about the way you obtain cannabis and the reason you obtain it this way?
Norms and values	Stigma	Perceived and experienced stigma around cannabis	Includes social and cultural norms around cannabis and MC expressed by or experienced from doctors or society more broadly. Includes stigma that Ps believe to exist and if they personally experienced discrimination. Includes how it affects Ps	E.g. Ps don't dare to go to doctor out of fear of being seen as a 'stoner'; Ps don't want others to know about their cannabis use	**Q5 stigma, sub** How do you think doctors perceive the use of cannabis as medicine? **Q5 prompt:** Do you think there is a stigma around the medicinal us of cannabis? What effect might that have on doctors and on yourself and your choices?
	Personal	Personal norms and values of Ps	Includes personal norms, values, and beliefs that are important to Ps, and how they affect the Ps' way of using cannabis medicinally or how Ps feel about their situation with the medicinal use of cannabis	E.g. autonomy; freedom of choice; liberal society; the right to choosing a medicine or health care	**Q9 meaning** What does it mean to you to obtain cannabis by other means than by prescription? **Q9 prompt:** Do you view it as something positive or negative that you make your own choices about your medicinal use of cannabis?
Cost	Current costs	Cost of cannabis	Includes the cost of prescribed and non-prescribed cannabis	E.g. Knowledge of cost of MC; how much the Ps spend per month	**Q8 affordability** Can you tell me about the cost of cannabis that you use medicinally?
	Financial situation	Financial situation and its role in MC use	Includes the overall financial situation and how that influences cannabis decisions, purchasing, and/or use	E.g. affordability, income, burden, if/how cost plays a role in decisions about cannabis use	**Q8 affordability** Can you tell me about the cost of cannabis that you use medicinally, and how you deal with that? **Q8 prompt:** Does the cost play a role when you make decisions about your cannabis use?
	Health insurance	Health insurance coverage of MC	Includes knowledge, experiences, opinions, and preferences regarding health insurance coverage for prescribed MC	E.g. impact on use of MC; past experience where it was covered and now not anymore	**Q11 health insurance** Would you use prescribed medical cannabis if it was covered by health insurance?

Legal and governance	Illegality of cannabis	Experiences and concerns around the illegality of cannabis	Includes experiences and concerns around the illegality of cannabis, and choices made because of it	E.g. not growing cannabis because worried about getting caught by the police; worried about traveling with cannabis	
	Government policy	Views of the government's role in MC and cannabis policy	Includes beliefs about how the government is (positively or negatively) involved, and what their involvement should be like	E.g. disappointment or frustration with government actors; trust in regulated products; 'NL used to be progressive but not anymore'	
	Health policy	Views of health system actors' role in MC and cannabis policy	Includes the role of health care system actors in influencing MC prescribing behavior	E.g. influence of NHG statement; no MC training for physicians	
	International comparisons	Views of MC and cannabis policy in other countries	Includes comparisons to policies in other countries and possible cultural differences	E.g. comparing the U.S. to NL	
Other		Things that do not fit in the existing codes	To be sorted or decided later in the process		

Quotes – create a separate system for noting good/interesting quotes. They should be illustrative and stand on their own without context.

Appendix D. Cannabis Information Card

Cannabis als medicijn: het Medusa-onderzoek

Onderdeel: Chemische analyse van wiet en hasj

Hartelijk dank dat je mee wilt doen aan dit onderzoek!
Hieronder leggen we uit hoe je kunt deelnemen.

Het doel van dit onderzoek is om te kijken welke soorten cannabis als medicijn worden gebruikt buiten de zorg. Met deze informatie kunnen we ervoor zorgen dat in de toekomst de medicinale cannabis van de dokter meer overeen komt met de wensen van patiënten.

Hoe stuur ik de cannabis op?

1. Vul de vragenlijst op de tweede pagina in.
2. Doe **1,5 gram wiet of hasj** in een klein plastic zakje.
3. Doe de **wiet/hasj** en deze **twee pagina's** (met de vragenlijst) in het luchtkussenenvelop.
4. Dit envelop is vooraf gefrankeerd door ons. Je hoeft dus geen postzegels erop te plakken.
5. Breng het envelop naar een brievenbus.
6. Zodra we de cannabis hebben ontvangen, sturen we je de vergoeding per email (een bol.com waardebon van 40 euro). Dit kan 2 weken duren.

Wat voor soort cannabis kan ik opsturen?

- Stuur **1,5 gram wiet of hasj** op, die je als medicijn gebruikt en die je **niet van de dokter** hebt gekregen. Helaas kun je geen andere cannabisproducten zoals cannabisolie opsturen.
- Als je meer dan één soort wiet/hasj gebruikt, stuur dan die soort op die je het meest gebruikt.
- Stuur ons alleen je wiet/hasj als je dat specifieke soort al minimaal enkele weken als medicijn gebruikt.
- Het maakt niet uit of je de cannabis hebt gekocht, zelf hebt gekweekt of van iemand hebt gekregen.
- Let op: Je krijgt ***geen* vergoeding** als je ***minder* dan 1 gram** wiet of hasj opstuurt.

Is het veilig om mee te doen aan het onderzoek?

- Ja, het is zeker veilig! Je stuurt je wiet/hasj naar het Trimbos-instituut als onderdeel van het onderzoek MEDUSA over het gebruik van cannabis als medicijn. Het Trimbos-instituut heeft toestemming van de overheid om de wiet en hasj te ontvangen en te onderzoeken.
- Als je meedoet met dit onderzoek ben je niet strafbaar of verantwoordelijk voor wat er met de wiet/hasj gebeurt. Je kunt ook niet worden opgespoord omdat er geen persoonlijke informatie in de envelop zit die je verzendt.
- Alleen wij kunnen je identificeren met de code die in de rechterbovenhoek van de vragenlijst staat. Door middel van deze code koppelen we de cannabis die je ons stuurt aan je email-adres, zodat wij je een vergoeding van 40 euro kunnen uitkeren.

Voor vragen of informatie over dit onderzoek, mail Pieter Oomen: POomen@trimbos.nl.

Vragen over jou en over de cannabis die je opstuurt

(1) Je geslacht:

- ○ Man
- ○ Vrouw
- ○ Anders
- ○ Zeg ik liever niet

(2) Je leeftijd:

Ik ben _____ jaar oud.

(3) Waar heb je de wiet/hasj die je opstuurt vandaan?

- ○ Coffeeshop
- ○ Cannabis Social Club (een stichting waar cannabis wordt gekweekt en gedeeld)
- ○ Ik kweek de cannabis zelf
- ○ Ik krijg het van een vriend of familielid
- ○ Online winkel
- ○ Dealer
- ○ Anders, namelijk: _____

(4) Hoeveel THC zit in de wiet/hasj die je opstuurt?

- ○ Veel
- ○ Gemiddeld
- ○ Weinig
- ○ Weet ik niet

(5) Hoeveel CBD zit in de wiet/hasj die je opstuurt?

- ○ Veel
- ○ Gemiddeld
- ○ Weinig
- ○ Weet ik niet

(6) Hoeveel procent THC en CBD zit er in deze wiet/hasj? Als je het niet weet, schrijf dan niks op.

THC %: _____

CBD %: _____

(7) Hoe weet je hoeveel THC en CBD er in deze wiet/hasj zit?

- ○ Het personeel in de coffeeshop vertelde het me
- ○ Het stond op het etiket van het cannabisproduct
- ○ Degene die mij het cannabisproduct heeft gegeven of verkocht vertelde het me
- ○ Het is mijn eigen schatting
- ○ Ik weet niet hoeveel THC en CBD er in zit
- ○ Anders, namelijk: _____

(8) Hoeveel heb je betaald voor 1 gram van de wiet/hasj die je opstuurt?

- ○ _____ euro
- ○ Ik heb niet betaald voor deze wiet/hasj
- ○ Weet ik niet

Trimbos instituut