Sociodemographic differences and experienced effects of young adults who use cannabis mainly for self-medication versus recreationally in Finland

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Abstract

Purpose – *Cannabis use continues to increase worldwide, and a number of nation states are changing their cannabis policies. Policy changes require research into key populations, namely, people who use cannabis. This study aims to examine sociodemographic differences of young Finns who reported using cannabis mainly for self-medication versus mainly recreationally, as well as their reported effects of cannabis use.*

Design/methodology/approach – *The data come from an anonymous online survey (*N = *247, 70.0% males, 25.9% females, 4.1% other) that was analysed using multiple logistic regression. The authors focused on whether various demographic indicators differed between those who reportedly used cannabis mainly for recreational purposes and mainly for self-medicinal purposes. The authors also qualitatively examined the respondents' experienced effects of cannabis, both desired and undesired.*

Findings – *Being older and female, living in a smaller city and earlier age of initiation of cannabis use were statistically significant in predicting the medicinal use of cannabis. The majority of recreational effects were related to themes such as relaxation and pleasure, but many participants also reported desired medical effects. Similarly, many participants reported several undesired effects.*

Research limitations/implications – *Understanding especially young people's motivations to use cannabis, which include using it for various medical effects, can improve the design of harm reduction and treatment programmes as well as enhance the well-being of people who use cannabis.*

Originality/value – *This study gives a nuanced account of sociodemographic factors and motivations of young people who use cannabis in Finland as well as the reported effects it has on them, which complements data from national drug surveys.*

Keywords *Cannabis, Youth, Motivations, Online survey*

Paper type *Research paper*

Introduction

The pressure for cannabis policy reform has been increasing both in the Americas (EMCDDA, 2020) and Europe. European countries such as Germany, Malta, Luxembourg, The Netherlands and the Czech Republic have implemented or announced plans to legally regulate the non-medical use of cannabis (Government of Luxembourg, 2022; Government of The Netherlands, 2022; Sabaghi, 2022). Recently drug policies have been under debate also in Finland (Hakkarainen and Kainulainen, 2021) and other Nordic countries (Tham, 2021). Nordic drug policies are said to be at a crossroad and affected by the situation and development in other European countries (Tham, 2021, p. 299). These political changes and public debates, which nowadays take place increasingly online (Månsson, 2014; Hämäläinen and Lahti, 2021; Unlu and Hupli, 2023), can potentially affect current use

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practices, requiring researchers to focus their attention on key populations, in this case, young adults who use cannabis, both medically and recreationally.

In general, motivations for cannabis use vary; beyond numerous medical indications that cannabis-based medical products have been investigated and used in both clinical research and real-world settings (Schlag *et al.*, 2021; Grotenhermen, 2004), cannabis is also reported to be used both for recreational purposes and for self-therapeutic reasons among people who use drugs (Lake *et al.*, 2020). Studies from North America comparing medical and recreational cannabis users have found that medical cannabis users often report lower use of alcohol and other recreational drugs compared to recreational cannabis users, report more frequent cannabis use, and perhaps not surprisingly, report more health-related problems, both physical and psychological (Goulet-Stock *et al.*, 2017; Roy-Byrne *et al.*, 2015; Woodruff and Shillington, 2016; Lin *et al.*, 2016). An interview study among 50 self-reported medical cannabis users in Canada found a great variety of conditions and symptoms the interviewees treated themselves with cannabis, with the majority ($n = 42$) also having experiences with cannabis as a recreational drug (Ogborne *et al.*, 2000). Thus, medical and recreational cannabis use are not mutually exclusive, and the use of cannabis for medical reasons often happens without an official prescription, blurring the boundary between medical and recreational use (Hakkarainen *et al.*, 2015, 2019; Ekendahl *et al.*, 2020; Kvamme *et al.*, 2021).

Cognitive enhancement among university students is also a reported motivation to use cannabis (Franke *et al.*, 2016; Hupli *et al.*, 2019), although this type of use could be more of a coping mechanism among young users (Fox *et al.*, 2011) than an actual "enhancement" of academic performance (Franke *et al.*, 2016; see also Simons *et al.*, 1998). In addition, entheogenic or spiritual use of cannabis has been reported (Johnstad, 2020; Heide *et al.*, 2022). Thus, motivations for cannabis use can go beyond merely recreational or medical, as the validated Marijuana Motives Measure developed by Simons *et al.* (1998) has demonstrated. Motivations include enhancement, coping, conformity, expansion and social motives (Simons *et al.*, 1998) as well as routine (Benschop *et al.*, 2015). It is also important to note that as demonstrated by these different motivations, people who use cannabis do not form a homogenous group, and although we focus on medical and recreational motives and related factors in this study, these groupings are, in part, constructs to aid the data analysis.

In Finland, the 2014 national drug survey asked for the first time whether respondents had used cannabis mainly for recreational or for medicative or self-medicative reasons in the past 12 months, with the majority (78.5%) reporting mainly recreational use and 4.5% mainly medical (Hakkarainen and Karjalainen, 2017). A total of 17% reported using cannabis for both reasons. It has been estimated from the 2014 national drug survey data that 2,000–5,000 people in Finland used cannabis mainly for medical reasons but without an official prescription (Hakkarainen and Karjalainen, 2017). It is likely that this amount has increased since then with the general increase of cannabis use among the Finnish population (Karjalainen *et al.*, 2020, 2023) as well as the more general acceptance of and evidence for cannabis as medicine (Schlag *et al.*, 2021; Vihervaara and Hupli, 2021; Grotenhermen, 2004).

However, despite medical cannabis being legal to prescribe for over a decade in Finland, practically no domestic clinical research has been done in this field, and prescription prevalence has decreased in recent years from about 370 in 2017 to 240 in 2020 and to around 160 in 2021 (Honkasalo, 2022; Vihervaara and Hupli, 2021). Fewer than 50 prescriptions were given in the first half of 2022, as reported in the media (Harmaala, 2022). This is counter to global trends; for example, in Australia between 2017 and 2021, more than 130,000 medicinal cannabis prescriptions were approved (Henderson *et al.*, 2021), while in the same time period (2017–2021) in Finland, only 1,270 medical cannabis prescriptions were issued (Harmaala, 2022). In The Netherlands, the number of medical

cannabis prescriptions also increased from 6.4 patients per 100,000 inhabitants in 2003 to 24.6 per 100,000 inhabitants in 2016 (de Hoop *et al.*, 2018), but similar to Finland, prescriptions have been in decline since 2017 (SFK, 2022).

These comparisons exemplify that taking the country-context into consideration is important when researching medical and non-medical use of various drug technologies (Hupli, 2023), including cannabis (Hakkarainen *et al.*, 2019). This local context would also require research into local use practices, for example, in Finland, smoking has been the most prevalent way of using cannabis (90.7%), and cannabis in flower form is nowadays more prevalent than cannabis resin (marijuana = 97% vs hash = 32.9% in Hakkarainen and Karjalainen, 2017), which marks a notable change compared to the early 2000s and before (Hakkarainen *et al.*, 2011). Since around 2010, cannabis in flower form has become more prevalent than cannabis resin, and increased home-grown supply, among other factors, has had a major effect on this transition to "herbalization" (Hakkarainen *et al.*, 2011).

Despite the criminalization of use for more than half a century (Hakkarainen and Kainulainen, 2021), the prevalence of cannabis use has increased in Finland since the 1990s, especially among young adults (Karjalainen *et al.*, 2020, 2023). While in 1992, 6% of the Finnish population had experiences with cannabis use in their lifetime; the number had increased to 24% by 2018 (Karjalainen *et al.*, 2020) and to 28.5% in 2022 (Karjalainen *et al.*, 2023). According to the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA, 2022, p. 51), compared to other Nordic countries, Finland has the second highest prevalence of lifetime cannabis use among adults between 15 and 64 years old, with 25.6% reporting they have used cannabis at least once in their lifetime, Denmark having the highest prevalence with 37.9%. However, Finland has the highest prevalence of use in the past 12 months among young people aged 15-to-34-years (EMCDDA, 2022; see also Moeller, 2019; Karjalainen *et al.*, 2020, 2023).

Attitudes towards cannabis have also changed in recent years; a citizen's initiative to legally regulate cannabis succeeded in collecting more than 50,000 signatures on 20 April 2023 (Yleisradio, 2023). Young people, in particular, increasingly perceive that cannabis use should not be punished, and the general perceptions of risks around cannabis use have somewhat abated (Karjalainen *et al.*, 2020; Hakkarainen and Kainulainen, 2021; see also Savonen *et al.*, 2021; Karjalainen *et al.*, 2023). Support for medical use of cannabis was 40% in 2010, and by 2018, it had increased to 54% in the general population. In 2022, acceptance of medical use reached 56% (Karjalainen *et al.*, 2023). Support for legal access beyond medical reasons also increased from 10% in 2010 to 18% in 2018 (Karjalainen *et al.*, 2020, p. 112) and rose to 24% in 2022 (Karjalainen *et al.*, 2023). Thus, in total, 80% of Finns support legal access to medical cannabis, whereas the combined figure was 50% in 2010 (Karjalainen et *al.*, 2023), assuming that those that support cannabis for recreational use also support it for medical purposes. However, great variability exists, for instance, among age groups. According to the 2018 national drug survey, 8% of 45-to-69-year-old Finns supported legal access to cannabis for any reason, whereas the percentage was 34% among 25-to-34-year-olds (Karjalainen *et al.*, 2020).

An international cannabis grower study also found that medical growers reported using cannabis more frequently than recreational growers (Hakkarainen *et al.*, 2019). However, cannabis cultivators "form a particular group of cannabis users" (Hakkarainen *et al.*, 2019, p. 251), and the authors of the study called for more research on the mixed motivations of recreational and medical cannabis use. Our study aims to fill the gap in the research by exploring factors associated with medical and recreational cannabis use. It is important to focus on people who use cannabis in Finland, especially younger people because research about their lived experiences is limited. People who use cannabis continue to have a marginalized position in Finnish society (Kekoni, 2007), as do people who use illegalized drugs in general (Hakkarainen and Kainulainen, 2021). This is reflected in the way young people find it difficult to talk about their cannabis use due to its illegal status because they

are afraid it might affect their school, work or private life (Holma *et al.*, 2021). Our study hence provides further information on this key population.

The research questions of this study were as follows:

RQ1. What are the main demographic differences between people who use cannabis in Finland for recreational purposes and those who use it for self-medication?

RQ2. What kinds of desired and undesired effects from cannabis do they report?

Methods

Participants and procedure

The study participants were relatively young Finns. There were 247 Finnish respondents in the data, 173 males, 64 females, 4 missing gender data, 4 who did not want to declare their gender and 2 others. Our study was based on data collected in an evaluation study of the project Intervention for Young Cannabis Users 2018–2020, funded by the European Social Fund (Hupli, 2020).

The project developed a cannabis mini-intervention model and several other harm-reduction tools for health and welfare professionals (see www.kannabishanke.fi). The first author designed the study protocol. Data collection was done by an anonymous online survey on the Surveypal platform. It was launched on 17 April 2020 and remained open until 31 August 2020. The online survey had a national focus, and it was distributed by the first author and two Finnish non-governmental organizations responsible for the intervention project, the Finnish Association for Substance Abuse Prevention and Youth Against Drugs, mainly on social media. In addition, the survey was distributed in the summer of 2020 by sending flyers advertising the survey to specialty paraphernalia stores in five Finnish cities (Turku, Helsinki, Jyväskylä, Kuopio and Lahti). The call for participants stated that the survey was intended for the evaluation of the aforementioned project by young people below the age of 30, as 29 and younger is the defined age of "young" in the Youth Act of Finland. However, people over 30 also responded to the survey. These were filtered out in the original evaluation report (Hupli, 2020) but included in our analysis. However, the exact age of people over 30 is unknown as the last response option for age was 30+. A majority of the respondents were between 18 and 20 ($n = 73$).

The design of the evaluation study and related research ethics were approved by a multidisciplinary steering committee of the mentioned intervention project before launching the study. Participation was voluntary, and they were informed about the aims of the study. Three digital gift cards worth 20 euros were offered as a raffle prize for those who participated. No personal information was collected that could be used to identify the respondents, and the data were kept safe in an external computer requiring a password. The study complies with The European Code of Conduct for Research Integrity (2017) and the EU 2016 General Data Protection Regulation. We also follow the general guidelines of the international research ethics guidelines (e.g. the APA's Ethical Principles of Psychologists and Code of Conduct).

Measures

We provide information on the sample in regard to the most common type of cannabis used in the past month as well as the most common method of use in Supplementary Tables 1 and 2. As these were asked in an extra section of the survey, we were not able to distinguish and compare these use practices between respondents who used cannabis mainly for recreational purposes and those who mainly used it medically. However, we believe this information is valuable to share to contextualize the findings and the sample. Smoking in a bong/water pipe (35%) or in a joint (35%) were the most common ways of using cannabis in the prior month (Supplementary Table 1). Herbal cannabis was the most common type of cannabis used in the prior month, either "normal weed" (53%) or high-potency herbal cannabis (36%), totalling

almost 90% of the respondents, while cannabis resin was reported only by 1% and CBD-cannabidiol by 5% (Supplementary Table 2). In addition, when asked whether the respondents mixed tobacco when smoking cannabis in the extra section of the survey, over half (54%) answered yes (Hupli, 2020).

However, the main interest of the study relied on the differences between those who use cannabis for mainly recreational purposes and those who use it mainly for self-medication purposes. The purpose of cannabis use was measured with four categories, adopted from the Global Drug Survey 2019 edition:

1. primarily for self-medication ($n = 15$);
2. sometimes for recreational purposes but mostly for self-medication ($n = 61$);
3. sometimes for self-medication purposes but mostly for recreation ($n = 102$); and
4. primarily for recreational purposes ($n = 61$).

A dummy variable was created for medical use (0 = mostly or primarily for recreational use, $n = 161$; 1 = mostly or primarily for medical use, $n = 76$).

Independent variables included gender, age, education, city size, frequency of cannabis use, amount used and onset age of use. For gender, we limited our analysis to men and women respondents because the frequency of other gender was low ($n = 2$, missing $n = 8$). Thus, the analysis included 237 observations. Respondents' ages were requested in three-year intervals ranging from 15 to 30 and above. A majority of respondents ($n = 73$) were between the ages of 18 and 20, followed by 21–23 ($n = 50$), 31 and older ($n = 38$), 24–26 ($n = 31$), 27–30 ($n = 29$) and 15–17 ($n = 16$). The respondents' educational status was divided into three categories: elementary school or less ($n = 77$), vocational degree ($n = 106$) and higher education ($n = 54$). Respondents were also asked about the population size of the city in which they lived, which was divided into four categories: less than 50,000 ($n = 67$), between 50,000 and 100,000 ($n = 55$), more than 100,000 ($n = 87$) and the capital area ($n = 28$), which has a population of more than one million people (Table 1).

In addition, respondents were asked how many days they had used cannabis in the previous 30 days, with four options ranging from 1 to 5 days ($n = 87$), 6 to 10 days ($n = 51$), 11 to 20 ($n = 42$) and 21 to 30 days ($n = 57$). Similarly, we asked about the quantity they used, with options ranging from 0.1 g to 5 g or more. Although the variation in amounts less than 1 g was based on 0.1 increments, the increments increased to 0.5 after 1 g. The scores were converted to a scale ranging from 1 to 19, with a mean of 6.4 g ($SD = 4$). The onset age of cannabis use is a final variable that is continuous ($M = 16$, $SD = 3$, min = 7, max = 34; Table 1).

Four of the seven independent variables had missing values; monthly cannabis use ($n = 13$) was the highest, followed by the quantity used ($n = 7$), onset age ($n = 6$) and age ($n = 1$), whereas dependent variable, cannabis use, had five missing values ($n = 5$). The *K*-nearest neighbour algorithm was used to impute missing values by obtaining the samples in the data set that are "closest" to it and averaging these nearby points to fill in the value (Kuhn and Johnson, 2013).

The respondents were also asked via open-ended questions about their experienced effects of cannabis use in an extra section of the survey. Thus, these qualitative reports could not be coupled with the quantitative data of the survey. The question was phrased in two parts: "What are the desired effects that you get from using cannabis?" ($n = 183$) and "What are the undesired effects that you get from using cannabis?" ($n = 182$). The qualitative answers were analysed using thematic content analysis, which "is a method for identifying, analysing and reporting patterns (themes) within data" (Braun and Clarke, 2006, p. 76). The desired effects were categorized based on the content along recreational or medical use. Under recreational use ($n = 107$), the thematic categories were calming down

Table 1 Descriptive statistics

Independent variables	*Recreational use* n *(%)*	*Medical use* n *(%)*	*Total* n *(%)*	p
Gender[a]				0.061
Male	124 (72)	49 (28)	173 (73)	
Female	37 (58)	27 (42)	64 (27)	
Education[a]				0.514
Elementary school or less	52 (68)	25 (32)	77 (32)	
Vocational degree	69 (65)	37 (35)	106 (45)	
Higher education	40 (74)	14 (26)	54 (23)	
City size[a]				0.144
Less than 50,000	38 (57)	29 (43)	67 (28)	
50,000–100,000	40 (73)	15 (27)	55 (23)	
More than 100,000	63 (72)	24 (28)	87 (37)	
Capital area (>1,000,000)	20 (71)	8 (29)	28 (12)	
Age[a]				0.002
15–17	14 (88)	2 (12)	16 (7)	
18–20	58 (79)	15 (21)	73 (31)	
21–23	37 (74)	13 (26)	50 (21)	
24–26	17 (55)	14 (55)	31 (13)	
27–30	17 (59)	12 (41)	29 (12)	
31+	18 (47)	20 (53)	38 (16)	
Monthly usage[a]				0.014
1–5 days	55 (63)	32 (37)	87 (37)	
6–10 days	44 (86)	7 (14)	51 (22)	
11–20 days	28 (67)	14 (33)	42 (18)	
21–30 days	34 (60)	23 (40)	57 (24)	
	Min	Max	Mean (SD)	
Onset age[b]	7	34	16 (3)	0.29
0.1 g to more than 5 g (1–19 levels)	0.1	19	6.4 (4)	0.430
Amount[b]				
Total	161 (68)	76 (32)	237 (100)	

Notes: *p-value:* [a]χ^2 *test for categorical variables*; [b]*two-sided t-test for continuous variables*
Source: Table by authors

Table 2 Multiple logistic regression results predicting medical use of cannabis

Predictors	*OR*	*95% CI*	p
(Intercept)	1.57	0.18–14.30	0.685
Age	1.86	1.49–2.37	*<0.001*
Gender (female)	3.23	1.60–6.68	*0.001*
Education	0.97	0.60–1.55	0.895
City size	0.65	0.46–0.89	*0.009*
Onset age	0.85	0.75–0.95	*0.008*
Monthly usage	0.95	0.71–1.25	0.696
Amount of usage	1.00	0.91–1.09	0.951
Observations	237		
R^2 *Tjur (0.170)*	*MCFadden's* R^2 *(0.144)*		

Source: Table by authors

and relaxing, pleasure, increased sociability and enhancement (Table 3). Desired effects were categorized under medical use when the participants stated that the desired effects were to treat a self-reported medical reason ($n = 76$). The desired medical effects were categorized under psychological, somatic and psychosomatic effects (Table 4).

Table 3 Desired effects of recreational cannabis use ($n = 107$)

Calming down and relaxing *70% (n = 128)*	*Pleasure* *31% (n = 57)*	*Increased sociability* *8% (n = 14)*	*Enhancement* *10% (n = 19)*
"The desired effect of cannabis smoking is relaxation" "Relaxation on a mental and physical level" "Relaxation, stress relief, seeing the world more optimistically and as more beautiful. Facilitating falling asleep"	"Feeling good" "Pleasure, 'improvement' of music and food" "Good feeling and strong visions"	"Sociality and feeling of relaxation" "Socialization and relaxation" "Relaxation and social pastime"	"Sense of rhythm, introspective deep analysis, thought process clarification, increased problem-solving skills" "Senses are emphasized (music sounds better and food tastes better, etc.)" "Helps with studying. Makes sex better"

Source: Table by authors

Table 4 Desired effects of medical cannabis use ($n = 76$)

Psychological 42% (n = 32)	*Somatic 5% (n = 4)*	*Psychosomatic 52% (n = 40)*
"I can concentrate on things (I have diagnosed ADHD that cannabis helps)" "I have noticed that cannabis in the right amount reduces my anxiety and has helped with my depression considerably" "Helps with sleep problems that I've had since I was a teenager and reduces symptoms of my bipolar disorder. And it's nice to be high sometimes;)"	"A decrease in Tic symptoms" "Relief with MS [multiple sclerosis]. Makes my body work the same way as healthy people" "Anti-inflammatory effects against allergic reaction (lungs and nasal cavities)" "Pains and other ailments are relieved"	"Peace of mind from the world events and relief to the pain caused by scoliosis and muscle damage" "Pain relief, sleep facilitation and anxiety relief" "Relaxation, relief of muscle pain, better sleep, relief of depression"

Source: Table by authors

Similar to the desired medical effects, undesired effects were categorized thematically based on the participants' responses as psychological and somatic undesired effects, and answers that had multiple undesirable effects were categorized as undesired psychosomatic effects. Some respondents also reported undesired societal effects and some did not have or did not report undesired effects (Table 5). All of the undesired effects were analysed first together ($n = 182$) and then separately for those reporting undesired effects from recreational ($n = 106$) and medical ($n = 76$) cannabis use.

Analytic techniques

The exploratory nature of the study includes both qualitative and quantitative methods based on a relatively small sample size. The questionnaire items were designed to better understand the profiles of young people who use cannabis, which resulted in inquiries about their demographic characteristics and cannabis engagement. We report descriptive statistics, χ^2 test results for categorical variables and two-sided *t*-test results for continuous variables. Statistical models were conducted with multiple logistic regression (MLR). The *R* programme was used to conduct the MLR analysis, and recreational cannabis use served as the baseline for comparison. Tables report odds ratios (ORs), 95% confidence intervals (CIs) and *p*-values for statistical significance. We also report goodness-of-fit tests and pseudo coefficients of determination.

Results

Demographics

For the respondents, descriptive statistics and unweighted frequency distributions of variables were examined (Table 1). Our findings show that the distribution of age for the reason for

Table 5 Reported undesired effects of both recreational and medical cannabis use

Psychological	Somatic	Psychosomatic	Societal	None or no mention of undesired effects
All reported undesired effects of cannabis use, n = *182*				
34% (n = 62)	*13% (n = 24)*	*23% (n = 41)*	*5% (n = 10)*	*25% (n = 45)*
Reported undesired effects of recreational cannabis use, n = 106				
35% (n = 37)	*11% (n = 12)*	*26% (n = 28)*	*2% (n = 2)*	*24% (n = 25)*
"Memory may fail" "Passivity and sometimes a little anxiety" "Mild anxiety sometimes"	"Sometimes, depending on the variety, I get a headache when coming down" "Vomiting when used with alcohol"	"Distraction, possible health problems in the lungs, tolerance" "At times tremors, depression of emotional life, general deterioration of energy levels"	"Intimidation related to illegality" "Some money is spent and some people judge"	"None" "There is no when you know what effects the variety will have" "You don't have them if you know what to use and how much it should be used"
R*eported undesired effects of medical cannabis use, n* = 77				
31% (*n* = 24) "Certain other anxiety" "Memory deteriorated a little" "Impaired social skills and cognition while under the influence" "Inactivity with longer use, anxiety may increase"	16% (*n* = 12) "Dry mouth with certain varieties, red eyes" "Dry mouth" "Headache" "Coughing, phlegm when I smoke a bong and I'll add some tobacco" "I can't do physical tasks while high"	17% (*n* = 13) "Occasional fatigue in the mornings, which does go away quickly" "Dry mouth. Appetite and sweet tooth increase. Mild anxiety (sometimes). Possible 'stuck mode'" "Momentary fatigue, hunger" "Dry mouth, red eyes, and occasional mild paranoia, but worst of all, marked impairment of short-term memory" "Sometimes I get tired in the middle of the day"	10% (*n* = 8) "The biggest problem is getting caught smoking" "Due to illegality, the only disadvantages I have today are paranoia due to the state of illegality. I wouldn't be alive without cannabis and Finnish medical cannabis culture is at a very poor level, which always makes me feel low when I think about it" "Fear of losing my driver's license, even though I don't drive intoxicated, I always keep at least 18 hours in between, but the tests show THC compounds for longer, both fear that the police will break my domestic peace because of smoking the plant"	26% (*n* = 20) "No known unwanted effects" "Nowadays there are no unwanted effects" "Has not been"

Source: Table by authors

cannabis use is significant (χ^2 test, $p < 0.005$), indicating that they are related. Until the age of 24, a majority of respondents said they used cannabis primarily for recreational purposes. Although recreational use accounts for 88% of the reasons given by the youngest group (15–17), it drops to 79% by the age of 18–20 and 74% by the age of 21–23. Among participants aged 24–26, 55% mostly used cannabis for recreational purposes. Corresponding figures were 44% for 27–30-year-olds and 55% for those 31 years or older.

Men were more likely to use cannabis for recreational purposes (72% vs 58%), whereas women were more likely than men to use cannabis for medical purposes (42% vs 27%). Regarding education, 32% of elementary school graduates, 35% of vocational degree graduates and 26% of higher education graduates used cannabis for medical purposes.

In terms of city size, cannabis use for medical purposes was higher (43%) in cities with populations less than 50,000, and the distribution difference in other city sizes was quite small, ranging from 27% to 29%, but the distribution was not statistically significant. The number of days cannabis was used for medical purposes was higher (40%) for 21–30 days, followed by 1–6 days (37%), 11–20 days (33%) and 6–10 days (14%) (χ^2, $p < 0.05$).

No significant difference was observed in the distribution of onset age and monthly usage across cannabis use purposes. Although the mean age of onset for medical cannabis use is slightly lower (15.5 vs 16.3), the mean amount is also slightly higher (6.75 vs 6.31) than for recreational use (statistically not significant) (Table 1).

Regarding the main analysis, Table 2 shows the results of the MLR models for each variable (and level of the variable) as well as the OR, 95% CIs and *p*-values. The Hosmer–Lemeshow test was used for the goodness-of-fit test, which determines whether the observed event rates match the expected event rates in population subgroups (Hosmer *et al.*, 2013). Results show that the *p*-value was 0.680, where a large *p*-value (e.g. greater than 0.05) indicates that the model's predicted values match the real (observed) values, demonstrating that the model is a good fit. In addition, pseudo-R^2 results show that McFadden pseudo-R^2 (McFadden, 1974) is 0.144 and Tjur R^2 (Tjur, 2009) is 0.170 (Table 2), indicating that the model explains between 14% to 17% of the variance in data.

Out of seven independent variables, four were found to be significant predictors of cannabis use for medical purposes after adjusting for other factors. For gender, after adjusting for all the confounders, the OR was 3.23 (95% CI [0.1.60, 6.68]). Therefore, the odds of using cannabis for medical purposes are more than three times higher for females than it is for males. Looking at age, after adjusting for all the confounders, the OR was 1.86 (95% CI [1.49, 2.37]). Therefore, the odds of using cannabis for medical purposes increase by about 86% for every three-year increase in age (Table 1, Figure 1).

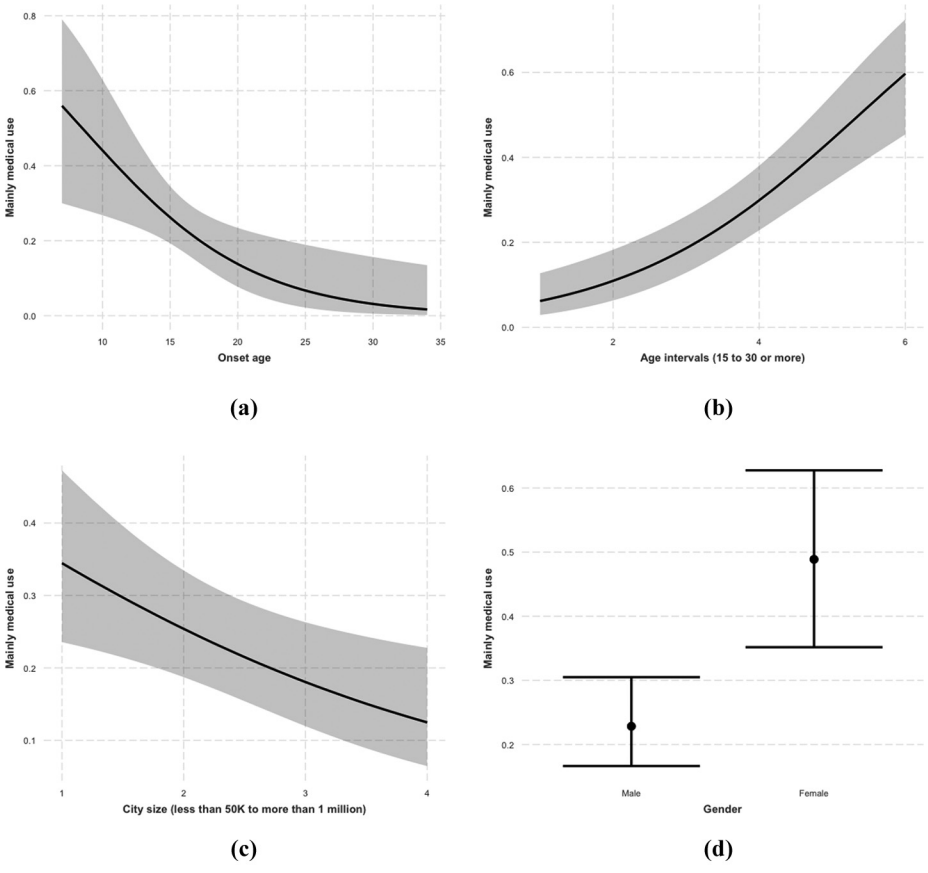
Living in a smaller city is also an important predictor of cannabis use for medical purposes. The OR was 0.65 (95% CI [0.46, 0.89]), which indicates that a one-unit increase in city size results in a 35% decrease in cannabis use for medical purposes. Finally, each additional increase of one year in the onset age is associated with a decrease in the odds of using cannabis for medical purposes. Put differently, each additional increase of one year in onset age is associated with a 15% decrease in the odds of using cannabis for medical purposes, given an OR of 0.85 (95% CI [0.75 to 0.95]; Table 1, Figure 1).

Experienced effects

The participants were asked through open-ended questions about their desired and undesired effects relating to their use of cannabis. The questions were part of an extra section of the survey and could not be coupled with the quantitative data of the main part.

The qualitative answers to the desired ($n = 183$) and undesired ($n = 182$) effects have been analysed using thematic content analysis and categorized based on the described effects.

Figure 1 Predicted probabilities of medical cannabis use



Note: Error bars indicate 95% CI (a) onset; (b) age; (c) city; (d) gender

Desired effects. The answers were categorized under broader recreational ($n = 107$) and medical ($n = 76$) themes based on the described effects. Many respondents listed several desired recreational effects due to which Table 3 showing recreational effects has more categorizations than the total number of respondents. Each response was assigned a maximum of two categorizations. The table shows the categorization percentage in proportion to the number of respondents, and each category is illustrated with example answers that have been translated from Finnish to English by the first author.

The most common reported recreational effects were calming down and relaxing, reported by 70% of the participants, followed by pleasure (31%), enhancement (10%) and increased sociability (8%).

Desired medical effects were reported to alleviate various psychological issues (42%), such as attention-deficit/hyperactivity disorder (ADHD), anxiety, depression, insomnia and bipolar disorder, as well as more somatic symptoms (5%) related to tics, multiple sclerosis, pain and inflammation. The most desired medical effects were thematically grouped as psychosomatic (52%), which included, for instance, analgesic and anxiolytic effects (Table 4).

Undesired effects. Similar to reported medical effects, the answers related to undesired effects were thematically grouped as psychological, somatic and psychosomatic undesired effects. Some respondents reported undesired societal effects and some did not report undesired effects.

We first categorized all qualitative answers related to undesired effects ($n = 182$) and then focused on those who had reported undesired effects from medical use ($n = 76$), comparing them to those who reported undesired effects from recreational use ($n = 106$).

Table 5 shows the categorization percentage in proportion to the number of responses for all reported undesired effects, then those reporting more undesired effects from recreational use and finally, those reporting undesired effects from medical use. These are illustrated with example answers.

Proportionally the medical and recreational groups do not seem to differ greatly in terms of undesired effects. Both groups reported similar undesired psychological effects (35% in the recreational group vs 31% in the medical) and undesired somatic effects (11% in the recreational group and 16% in the medical) or reported having no undesired effects (24% in the recreational group and 26% in the medical). The recreational group reported relatively more undesired psychosomatic effects (26% vs 17%), and the medical group reported more societal undesired effects (2% recreational vs 10% medical).

Also, qualitatively the reported undesired effects did not differ greatly between the two groups. In relation to psychological undesired effects, impaired memory and increased anxiety were commonly reported by both groups. Dry mouth and eyes, as well as headache, were common undesired somatic effects. Feeling fatigued or tired was also commonly reported, which was categorized under psychosomatic undesired effects. Illegality was the most common societal undesired effect. About a quarter in both groups did not report any undesired effects.

What is noticeable is that occasionally the reported undesired effects are the exact opposite of the desired effects. For instance, sometimes when the desired effect is reported to be calming, relaxing or otherwise anxiolytic, the undesired effect is reported to be increased anxiety.

Discussion

In this study, we analysed the demographic differences between young adults who reported using cannabis mainly for recreational purposes and compared them to those who use cannabis mainly for medical reasons in Finland. Our quantitative analysis showed that the sociodemographic factors of being older and female, living in a smaller city and an earlier onset age of initiating cannabis use were statistically significant in predicting motives for medical cannabis use. This finding is somewhat in line with a survey study from Denmark looking at medical cannabis users, which found that especially CBD oil-only users were often older women (Kvamme *et al.*, 2021). However, CBD oil-only users had initiated their use recently, unlike in our sample, and had little recreational experience. The survey was also directed to Danes who used cannabis as medicine in particular, so it is difficult to make concrete comparisons between the studies.

However, as in the study by Kvamme *et al.* (2021), our thematic analysis of the reported desired and undesired effects also showed that although most of the recreational effects related to relaxation and pleasure, many participants also reported medical effects ranging from finding relief to psychological issues such as ADHD, depression, sleeping problems, bipolar disorder and anxiety to more somatic and psychosomatic symptoms related to multiple sclerosis, pain and inflammation. Similarly, many participants from both studies reported undesired effects ranging from psychological ones like memory problems and increased anxiety to somatic undesired effects like dry mouth and headache. Fear of "getting caught" for doing an illegal activity, which was categorized as a societal undesired effect, was reported in our sample, especially by those who reported using cannabis for medical purposes. The study by Kvamme *et al.* (2021) did not inquire about potential societal undesired effects, but most of the participants (90.9%) did not have an official prescription.

Sometimes the reported desired and undesired effects were polar opposites, the reported desired effect being, for instance, feeling less anxious while the reported undesired effect was reported as increased anxiety. Several factors influence the effects from cannabis, which is not a single drug as it contains hundreds of chemical compounds (Andre *et al.*, 2016). While we provide some general information on self-reported types and methods of cannabis use (see Supplementary Tables 1 and 2), we were not able to match these between the groups of users. In addition, the actual consumed cannabinoid content would have remained unknown, not only to us, the researchers, but most likely to the people who use cannabis as well, partly due to its illegal status in Finland and most European countries. Thus, while the information on motives and effects of cannabis use in Finland remains limited, we believe our study can guide future research endeavours and also provide real-world evidence about desired and undesired effects from cannabis use and the often blurred boundary between recreational and medical cannabis.

The results, in part, confirm the blurred boundary between recreational and medical use of cannabis found in earlier studies (Hakkarainen *et al.*, 2015, 2019; Ekendahl *et al.*, 2020; Kvamme *et al.*, 2021). For instance, several participants in our study reported medical use mostly or primarily as their motivation to use cannabis and experienced a variety of desired medical effects. This was despite the relatively young age of the participants, although motivation for medical use also increased with age. Nonetheless, young people who use cannabis are often not seen as potentially using cannabis for medical purposes, which is an important factor to consider also from a harm reduction perspective. Motivating someone to stop using cannabis, or at least use less, can be challenging if there are perceived medical benefits from that use.

Another example of the blurred boundary between recreational and medical use of cannabis is a respondent who reported experiencing desired medical effects in relation to their sleep problems and bipolar symptoms but also stated that "it's nice to be high sometimes". This shows that the line between medical and recreational use, in general, is not clear-cut; young people often try to balance between desired and undesired effects of a variety of psychoactive drugs, including cannabis (Hupli *et al.*, 2019; Holma *et al.*, 2021). People who use cannabis often report both medical and recreational cannabis use motives (Ogborne *et al.*, 2000; Hakkarainen and Karjalainen, 2017; Ekendahl *et al.*, 2020; Kvamme *et al.*, 2021) and a recent study suggests that feeling "high" can also have an important role in symptom relief among medical cannabis patients, especially younger ones (Stith *et al.*, 2023).

Although developing harm reduction tools for professionals who work with young people is vital, it is also important to give agency to young people who often practice "harm reduction from below" by inventing, using and sharing protective use practices (Van Schipstal *et al.*, 2016). Young people have perceptions in relation to cannabis and what works in terms of drug prevention that should be considered when designing prevention and harm reduction programmes as well as treatment services (Canadian Centre on Substance Abuse, 2017; Hupli, 2020; Holma *et al.*, 2021).

In addition, although we categorized desired relaxation effects reported by 70% of the respondents under recreational use, considering that the survey was conducted in the first summer of the COVID-19 pandemic, finding stress relief through the use of cannabis could be seen as a coping mechanism that some young people in Finland relied upon when isolated from their normal social surroundings, such as reported in Canada (Prowse *et al.*, 2021). Although survey studies on this issue are mixed (Chong *et al.*, 2021), for instance, in Belgium (Vanderbruggen *et al.*, 2020) and Spain (Liébana-Presa *et al.*, 2020), similar studies did not find increased use or intention to use cannabis during social isolation (see also Bonnet *et al.*, 2023). However, they did find increased alcohol and tobacco use (Vanderbruggen *et al.*, 2020) and increased stress levels (Liébana-Presa *et al.*, 2020). In Finland, Oksanen *et al.* (2021) found that workers who had existing stressors in life

increased their drinking in the beginning of the COVID-19 pandemic, and data from the Global Drug Survey COVID-19 Special Edition ($n = 20{,}417$) suggests that neighbouring Danish cannabis users were most likely to report that their cannabis use had increased at least a little compared to the other study countries (Puljević *et al.*, 2023). While our study remains speculative on this issue, the impact of COVID-19 pandemic on drug use, in general, remains a topic worth investigating (Chong *et al.*, 2021; Puljević *et al.*, 2023).

Important in this regard is not only the type of drug but the method of use. Smoking cannabis continues to be the most common route of administration both in Finland (Hakkarainen and Karjalainen, 2017) and, for instance, North America (Russell *et al.*, 2018; Knapp *et al.*, 2019; Wadsworth *et al.*, 2022). Use of cannabis by smoking was the most common method of use in our data set as well; more than half of the participants also mixed tobacco when using cannabis, increasing health-related risks (Russell *et al.*, 2018; Lemyre *et al.*, 2019; Schoeler *et al.*, 2022). Researching and discussing various types of inhalation methods, including vaping, which as a route of administration has less of a public health effect (Russell *et al.*, 2018), is of importance also from a harm reduction perspective (see also Supplementary Table 1).

Another signal from our exploratory study that can guide future research was that the use of cannabis flower was reported by almost 90% of the respondents, whereas only 1% reported using cannabis resin, a significantly lower percentage compared to national surveys (Hakkarainen and Karjalainen, 2017). This could indicate a continuation of the "herbalization" trend (Hakkarainen *et al.*, 2011; Hakkarainen and Karjalainen, 2017) and the increasing popularity of new emerging cannabis products (see, e.g. Knapp *et al.*, 2019), which include so-called CBD-cannabis, edibles and various medical cannabis products (see Supplementary Table 2).

To conclude, our findings raise several questions that should be explored in future studies; for instance, is there a transition period related to age when mainly recreational use of cannabis becomes more medically motivated, as our findings suggest? What can explain the significant relation between urban settings of large cities versus smaller ones that seem to influence motivations to use cannabis, and what makes women more prone to use cannabis for medical reasons compared to men and vice versa? Although the statistically significant results and reported effects found in this study require confirmation from larger and more representative data samples, they give direction and insight into where to focus future research efforts as cannabis use continues to increase both in Finland (Karjalainen *et al.*, 2023) and globally (United Nations Office of Drugs and Crime, 2022) in a time when cannabis and other drug policies are in the "crossroads" both in the Nordic countries (Tham, 2021) and elsewhere (EMCDDA, 2020). As legislation alone, whether lenient or punitive, does not seem to have an impact on youth cannabis use prevalence in Europe (Gabri *et al.*, 2022), efforts should be made to ensure that especially young people have access to evidence-based information regarding cannabis and its various effects, and when needed, to treatment and harm reduction services.

Limitations

Our study was limited to Finland, limiting its generalizability to other countries as well by its cross-sectional design and self-reported information also in relation to reported motivations and experienced effects of cannabis use. The survey also targeted 18- to 30-year-olds, thus leaving many older age groups out of the analysis, even though several over 30-year-olds also participated in the survey (16%, $n = 38$). In addition, even though the survey was nationwide, the geographic distribution of participants was uneven, and we have fewer respondents from the capital area of Helsinki than expected. Several questions related to cannabis use were asked in a relatively short extra section, and the survey did not ask about other substance use besides cannabis, except if they mix tobacco when smoking cannabis. Nor did it inquire in detail about several other confounding factors, like health status or experiences with health

services, that could play a significant role in explaining reported effects and motivations. While the amount and type of cannabis, method of use and possible simultaneous use of other drugs, like tobacco and alcohol, most likely have an impact on the experienced effects and motivations, further studies are needed to provide information on these confounding factors. Despite these limitations, our exploratory study provides important insights into a population of which there is a very limited amount of information about, namely young adults who use cannabis in Finland. Future studies should include additional measures on subjective well-being and health behaviours that could also give more insights into people who use cannabis for medical and other purposes.

Conclusions

Our quantitative analysis of survey data shows that sociodemographic factors such as being older and female, living in a smaller city, and earlier age of initiation of cannabis use are statistically significant in predicting the medicinal use of cannabis. Qualitative analysis of reported desired and undesired effects also showed that although the majority of recreational effects are related to themes such as relaxation and pleasure, many participants also reported desired medical effects, ranging from finding relief for psychological problems such as ADHD, depression, sleep disorders, bipolar disorder and anxiety but also somatic and psychosomatic symptoms related to multiple sclerosis, pain and inflammation. Similarly, many participants reported undesired effects ranging from memory problems and increased anxiety to dry mouth and the fear of being caught engaging in illegal activities. Both proportionally and qualitatively, the undesired effects did not differ greatly between those who reported desired medical effects versus recreational ones, even though recreational users reported somewhat more psychosomatic undesired effects and medical users more undesired societal effects. Understanding young people's motivations to use cannabis, which sometimes include using it for various medical effects, is important in future policymaking. Understanding and communicating also about undesired effects is important to enhance the well-being of young people who use cannabis and in designing relevant harm reduction and treatment programmes.

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Supplementary materials

Supplementary materials of this article can be found online.

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