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Contact:

Sinikka L. Kvamme, Center for Alcohol and Drug Research, Aarhus BSS, Aarhus University, Building 1322, 217, Bartholins Allé 10, 8000 Aarhus C, Denmark. Email: slk.crf@psy.au.dk

Title: With medicine in mind? Exploring the relevance of having recreational experience when becoming a medicinal cannabis user.

Abstract: Background: Beyond the legal use of medical cannabis in Denmark for selected patient groups, a large unregulated use of *medicinal* (non-prescribed) cannabis occurs. However, little is known about the paths to becoming a medicinal cannabis user and the role that previous recreational experience plays in this process. **Aim:** Inspired by Becker's social learning approach to becoming a cannabis user, this study explores sources of inspiration for medicinal cannabis use, the social control factors related to use, and the relevance of recreational experience (RE) with cannabis. **Methods**: An anonymous survey was made available online to a convenience sample of 2,281 adults (≥ 18 years) who self-medicate with non-prescribed cannabis. Logistic regression analysis compared users with no RE (46.1%) to users with occasional RE (27.4%) and regular RE (26.5%) in terms of user characteristics, initiation of medicinal use, and experiences with social control factors.

Results: Compared to users with RE, users with no RE were significantly more likely to be women, older, more frequent users, and to treat somatic conditions and use low potency CBD-oil. Users with no RE were more likely to rely on social networks for information on medicinal cannabis, use online sources for supply, and find supply stable. Moreover, users with no RE were less likely to keep use secret and find use problematic. Also, when medicinal use develops on a gradual transition from recreational use it is associated with increased odds of treating mental health conditions and with use of smoking as form of intake. **Conclusion:** The heterogeneity among medicinal cannabis users in Denmark, in terms of demographics, motives for use, and patterns of use, is related to the level of previous recreational experience and to whether medicinal use developed on a gradual transition from recreational use.

Keywords: Medicinal cannabis, Medical cannabis, Marijuana, Cannabidiol, Howard Becker, Medicalization.

Background

All drugs are inherently ambiguous phenomena, as they can act both as "benevolent cures" and "dangerous toxins" (Keane, 2008). Thus, just as mundane prescription drugs can be transformed into euphoric substances used for pleasure through specific situational contexts and user practices (Bundy et al., 2017), cannabis can be transformed from a euphoric substance into a mundane medicine (Newhart et al., 2018). In the last decades we have seen a renewed interest in the medical utility of cannabis (Pisanti et al., 2017; Taylor, 2009), in part due to growing evidence that cannabinoids, the active components of cannabis, are effective in the treatment of chronic pain, spasticity, nausea, and epilepsy (National Academies of Sciences Engineering and Medicine, 2017) and also may be relevant for the treatment of other somatic (Cascio et al., 2017; Toczek et al., 2018) and mental health conditions (Scherma et al., 2020). Currently, more than 30 states in the U.S. (National Conference of State Legislatures, 2020), Canada (Fischer et al., 2015), and several European countries (Abuhasira et al., 2018) are allowing medical use of whole plant cannabis despite criticisms of this use (D'Souza et al., 2015; Hill, 2015). In Denmark, a Medical Cannabis Pilot Program (MCPP) was initiated by a political majority in 2018, where patients with treatment resistant multiple sclerosis, spinal cord injury, chronic pain, or chemotherapy-related nausea and vomiting, have been given access to whole plant cannabis via a general practitioner (Ministry of Health, 2016). However, parallel with the growing use of medical cannabis (legal cannabis prescribed by a doctor), use of medicinal cannabis (non-prescribed cannabis used with a medical motive) has emerged. This trend of "Do-It-Yourself"-medicine has been documented in the U.S. (Sexton et al., 2016), the U.K. (Ware et al., 2005), Australia (Lintzeris et al., 2018), Norway (Pedersen et al., 2013), and Denmark (Kvamme et al., 2021a). These studies show that medicinal users tend to find cannabis effective in managing their symptoms and show a great diversity in the conditions treated with medicinal cannabis, often exceeding the official recommendations for legal medical cannabis use. Studies also suggest that medicinal cannabis users form a

heterogeneous group (Hakkarainen et al., 2019; Pedersen et al., 2013) that share traits with both recreational users and licensed medical users, in terms of demographics and patterns of use (Kvamme et al., 2021a; Pacula et al., 2016; Sznitman, 2017), suggesting potential blurred boundaries between medicinal cannabis use and recreational and/or problematic cannabis use. By exploring the paths that users take when becoming a medicinal cannabis user, this article seeks to further outline the diversity related to medicinal cannabis use.

Analytical framework: Becker and becoming

The popular medicalization of cannabis that takes place outside medical jurisdictions calls for further research and while most of the current research study the "drug" i.e. the bio-medical effects of cannabis, research that explores the "set" and "setting" (Hartogsohn, 2017; Zinberg, 1984) is scarce. Applying a theoretical approach that explores the current development of medicinal cannabis use in its psychological, social, and cultural context is important, as it can further our understanding of how cannabis has become medicine for users who do not receive formal medical guidance. One of the most well-known sociological perspectives on factors related to initiation of illegal drug use was developed in the groundbreaking work of Howard Becker, who more than 50 years ago explored the use of cannabis for pleasure, at a time when cannabis use was fairly rare, illegal, and heavily penalized (Becker, 1953, 1963). Becker's prime achievement was to explain incidences of cannabis use as the result of sequences of social experiences, in which the individual acquires a meaning of the behavior, rather than as a result of individual predisposition. In the article *Becoming a Marihuana User* (1953), Becker argued that a person would only be able to use cannabis for pleasure by learning to use cannabis in a dose that produced the desired effects and by learning to recognize and enjoy these effects. According to Becker, this learning process was highly dependent on interaction with members of a "drug-positive" subculture, as this subculture enabled positive interpretations of drug-induced states in the interactions with, and observation of, experienced cannabis users (Becker, 1967). Thus, the Beatles were in tune with Becker's perspective, where "getting high" quite literally required "a

little help from my friends". Furthermore, Becker argued that in order to advance from being a novice cannabis user to being an occasional or regular cannabis user, it was necessary to overcome "powerful forces of social control that made the act seem inexpedient, immoral, or both" (Becker, 1963, p. 58). Becker listed three forms of social control that regular users had to overcome; gaining and sustaining access to the illegal drug (supply), keeping non-cannabis users from discovering the use (secrecy), and renegotiating conventional perceptions on cannabis use (morality) (Becker, 1963). Overcoming social control aspects related to morality referred to rejecting conventional societal notions of the addictive potential of cannabis and the loss of control stereotypically associated with cannabis use, i.e. that "the user becomes a slave to the drug, that he voluntarily surrenders himself to a habit from which there is no escape" (Becker, 1963, p. 73). According to Becker, "the person who takes such a stereotype seriously is presented with an obstacle to drug use. He will not begin, maintain, or increase his use of marihuana unless he can neutralize his sensitivity to the stereotype by accepting an alternative view of the practice." (Becker, 1963, p. 73). Later research has generally been consistent with Becker's social-process-based theory on initiation and maintenance of cannabis use (Hallstone, 2002; Hathaway, 1997; Hirsch et al., 1990; Järvinen et al., 2014). However, some have also questioned the strict necessity of socializing with other recreational users, as the growing normalization of cannabis (see also: Duff et al., 2012; Järvinen et al., 2011) has made the individual user less dependent on cannabis-positive subcultures (Hathaway, 1997) and the increased potency of cannabis may have made it easier to experience an immediate effect without guidance from experienced users (Hallstone, 2002). Another significant change that may have an impact on the development of cannabis use is the growth in online drug communities that enable drug users to meet and share knowledge across distances (Meacham et al., 2018; Rosino et al., 2015; Walsh, 2011).

Path(s) to becoming a medicinal cannabis user

While the process of becoming a medicinal cannabis user is less explored, some qualitative studies have applied Becker's framework to explore the process of becoming a legal medical cannabis user in the U.S. and Canada. This research shows that the driving forces for seeking a prescription for medical cannabis are the patient's own initiative and personal research, along with recommendations from friends and family, while doctors play a minor role (Athey et al., 2017; Lankenau et al., 2018; Newhart et al., 2018). In addition to drawing on their social networks for information on medical and medicinal cannabis, the vast majority of users in these studies had previous recreational experience (RE), and many had discovered therapeutic effects of cannabis in a recreational setting. Similarly, quantitative research shows that most legal medical cannabis users have used cannabis recreationally before initiation of medical cannabis use (Pacula et al., 2016; Reinarman et al., 2011). More nuance is added to the matter of RE in qualitative studies of Danish medicinal cannabis users (Dahl et al., 2011) and Canadian medical cannabis users (Cohen, 2015), finding that for some, a medicalized approach to use develops on a sliding scale (Dahl et al., 2011) or a seamless transition (Cohen, 2015) from recreational use, while others have had a period of cessation from recreational use before initiating medicinal/medical use. Both studies observed that users with a period of cessation were more likely to use cannabis for pain relief, while most users with a gradual transition from recreational use treated mental health conditions. Likewise, studies on both medical (O'Connell et al., 2007) and medicinal (Pedersen, 2015) cannabis users describe a gradual transition from recreational use, where recreational or problematic cannabis use over time is interpreted as medicinal, often in relation to mental health issues, such as ADHD, anxiety and depression. Meanwhile, a novel path to medicinal use seems to have emerged, as the popularity of medicinal cannabis in Denmark has attracted a relatively large number of users with no previous RE (Kvamme et al., 2021a). The emergence of medicinal users with no previous RE makes this type of medicinal cannabis use particularly interesting to explore and compare to that of medicinal users with RE.

Becker's social learning approach to becoming a cannabis user can help us to better understand the process of becoming a medicinal cannabis user and the role that having RE plays in that process. Following the logic of Becker, having RE with cannabis represents a path to medicinal use that differs in important ways from the path that cannabis novices take when learning to use medicinal cannabis. For instance, when medical cannabis users have RE, the essential features of learning involved in becoming a medical user are not centred around learning to use cannabis, as this is already known, but on targeting and relieving specific symptoms (Athey et al., 2017). Also, users with RE have engaged in practices where cannabis has been constructed as an object of pleasure, an embodied experience of use that is absent among medicinal users with no RE, thus rendering the points of entry to medicinal cannabis use markedly different. Furthermore, the intention to treat an illness or its symptoms for users with RE can develop on a gradual transition from recreational use, sometimes immediately after, sometimes years after first consumption of cannabis (Cohen, 2015; O'Connell et al., 2007; Pedersen, 2015). Conversely, having no RE presents a notably different path when initiating medicinal cannabis use, as the intention to use cannabis as a therapeutic tool predates a debut as a cannabis user. Thus, compared to medicinal users with RE, users with no RE are more likely to have "medicine in mind", and may therefore have a more medicalized approach to cannabis use from the onset of their medicinal cannabis user career. Consequently, it is likely that there are profound differences in patterns of use and motives for use, depending on how far the user has already advanced in the career of recreational cannabis use.

The degree of previous RE is also likely to be reflected in the way the users manage the social control aspects of their medicinal cannabis use. To my knowledge, the social control aspects of medicinal cannabis use are unexplored. In Denmark, there is large public support for legal medical cannabis use (Blackman, 2017) and social control aspects related to medicinal cannabis use may be fairly relaxed, as this is the case with recreational cannabis use (Järvinen et al., 2014). Nonetheless, research shows that there is substantial stigma

related to the use of medical cannabis (Satterlund et al., 2015) which may be related to the illness treated with cannabis (Lewis et al., 2017). Therefore, medicinal users may still have to manage social control aspects related to secrecy and morality. Also, users have to manage supply of an illegal product, as all cannabis products outside the legal medical program are illegal to sell and possess[1].

The emergence of medicinal users who are novices to the effects of cannabis prior to onset of medicinal use in Denmark (Kvamme et al., 2021a) presents a unique opportunity to explore the different paths to becoming and sustaining a medicinal cannabis use depending on previous RE. The purpose of the current study was to; 1) describe medicinal cannabis users in terms of demographics, motives for use and patterns of use depending on different levels of previous RE; 2) explore the sources of inspiration for medicinal cannabis use depending on level of previous RE; and 3) explore the social control factors related to sustaining a medicinal cannabis use depending on level of previous RE.

Methods

Design

The study was part of a larger survey study on the use of cannabis as medicine in Denmark (see Kvamme et al., 2021a). The survey was inspired by previous surveys on medicinal and medical cannabis use (Grotenhermen et al., 2003; Hazekamp et al., 2013; Reiman et al., 2017; Reinarman et al., 2011; Sexton et al., 2016; Ware et al., 2005; Webb et al., 2014) and by qualitative research on medical and medicinal use (Athey et al., 2017; Dahl et al., 2011; Lankenau et al., 2018; Pedersen et al., 2013). The survey was tested and revised following nine pilot interviews with users of medicinal cannabis. Data was collected through the software tool for generation of online surveys, Survey XACT (Ramboll, 2014). IP addresses of the respondents were not saved or available to the researchers, as the respondents' fear

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[1] except from cannabis products containing less than 0.2% THC Such products are illegal to sell if they are considered to be medicine by the Danish Medicines Agency, but they are not illegal to possess (Danish Medicines Agency, 2018)

of loss of anonymity was considered a greater issue than the possibility of repeated participation. Participants could withdraw at any time before completion of the survey. All data were stored on secure servers, and procedures for data handling and storage was approved by the Danish Data Protection Agency. For a more detailed description see Kvamme et al. (2021a).

Sampling and recruitment

The survey was made available to a self-selected convenience sample of users of medicinal cannabis from July 14th 2018 to November 1st 2018. Participants were recruited online and via flyers and posters containing survey information, a survey link and QR code. Recruitment material was disseminated via social and public media, patient organizations, selected doctors' offices and hospitals and at the illegal open drug market Christiania.

We have previously reported on the motives and patterns of use of cannabis as medicine (Kvamme et al., 2021a) and on the use of cannabis as a substitute for prescription drugs (Kvamme et al., 2021b). Of the 4,570 respondents who opened the survey, 3,140 answered all questions. Excluded were <18 (n=59), duplicates (n=53), inconsistent answers (n=7), medical users (n=245), former users (n=264), and those answering on behalf of someone else (n=115). Furthermore, 116 were excluded as they were missing or gave inconsistent answers with regard to their level of previous RE, leaving a final study population of n=2,281.

Measures

Patterns of use and motives for use: Respondents were presented with questions related to demographics, patterns of use and motives. For a description of items related to patterns and motives see (Kvamme et al., 2021a) and Appendix 1.

Previous recreational experience: When exploring the degree of previous recreational experience, users were asked "how much experience did you have with recreational (non-medicinal) use of cannabis before you started using cannabis as medicine?*",* and presented

with five options. 1: No experience (never tried it before), 2: Lesser degree of experience (less than five times in my life), 3: Some degree of experience (no more than 10 times in a year) 4: High degree of experience (several times a month), 5: Very high degree of experience (almost daily for several years).

Inspiration for use: Respondents were asked how they discovered that cannabis could be used as medicine, and were provided with a list of 7 suggested sources of inspiration and an "other" category, and respondent could choose more than one source of inspiration. When exploring whether the medicinal cannabis use had developed as a gradual transition from recreational use, users were presented with two statements, and asked to choose the statement that best described their use of medicinal cannabis. Statement 1: "I started using cannabis as medicine from one day to the next". Statement 2: "My use of cannabis as medicine has been a gradual transition from recreational (non-medical) use". Respondents were asked how they reached their current dose and where provided with a list of 6 suggested sources of inspiration for current dose and an "other" category, and respondents could choose more than one source of inspiration.

Social control factors: Respondents were asked to list their supply source of medicinal cannabis, and were provided with a list of seven suggested sources of supply and an "other" category and respondents could choose more than one source of supply. Respondents were asked if they had ever experienced not being able to procure the type of cannabis they preferred to use as medicine and could answer either yes/no/don't know/no answer. When exploring secrecy related to medicinal cannabis use, respondents were presented with the statement "I often find it necessary to hide my use of medicinal cannabis" and could answer on a 5 point Likert scale from Strongly agree (5) to Strongly disagree (1) or choose don't know/no answer. Respondents were asked if they had ever disclosed their use of medicinal cannabis to any health care providers and could answer either yes/no/don't know/no answer. When exploring morality related to medicinal cannabis use, respondents were presented with the statement "The use of medicinal cannabis can lead to addiction" and could answer

on a 5 point Likert scale from Strongly agree (5) to Strongly disagree (1), or choose don't know/no answer. Thus, this item explores to what extent cannabis users have neutralized their sensitivity to the typical notion that cannabis use can lead to addiction and make an exemption from this notion when cannabis is used with a medicinal motive. Further, respondents were asked if they had ever considered stopping use of medicinal cannabis and could answer either yes/no/don't know/no answer. While there are likely many reasons for considering terminating medicinal cannabis use (remission, pregnancy, costs, social pressure etc.), this item also has potential to capture ambivalence towards use.

Data analysis

Data analysis was conducted using Stata SE/15 (Hamilton, 2012). Descriptive statistics including simple proportions, means and standard deviations were used to describe demographics, motives for use, patterns of use and items related to initiation of medicinal use, as well as supply, secrecy, and morality. A variable was coded based on the item exploring degree of previous RE, distinguishing between users with no RE (no experience), users with occasional RE (lesser degree of experience and some degree of experience), and users with regular RE (high degree of experience and very high degree of experience), thus adjusting the variable to fit Becker's terminology. Binary and ordinal logistic regression was used to assess differences between medicinal users with no RE, users with occasional RE, and users with regular RE, with users with no RE as the reference (except for the variable related to transitioning from recreational use where the value among users with no RE was 0). Age and gender were used as control variables. A logistic regression model was made to assess the users with a gradual transition from recreational use on key variables. A histogram was used to assess normality in the variables number of conditions and age. As the variables were not normally distributed, the Mann-Whitney U test was used to assess differences in means between users with no RE, users with occasional RE and users with

regular RE.

Results

Characteristics of medicinal cannabis users by previous recreational experience

Demographics

A total of 2,281 medicinal cannabis users were included in the final sample. A majority of users were female (61.3%), range 18-89 years (*M* 48.6, *SD* 13.4) (see Table 1). Most medicinal users (46.1%) were novices with no RE prior to initiation of medicinal cannabis use, 27.4% had occasional RE and 26.5% had regular RE (see Table 1). Age and gender was significantly related to level of previous RE, as odds of being male rose with level of RE and mean age decreased. When controlled for age and gender, participants with occasional RE were significantly more likely to have a higher education ($p < 0.001$).

Motives for medicinal cannabis use

A majority (72.9%) used cannabis to treat a somatic condition (see Table 1). Treatment of somatic conditions was significantly more frequent among users with no RE (80.4%) compared to users with occasional RE (68.9%), and regular RE (63.8%) ($p < 0.01$). Treating a mental health condition was significantly more frequent among users with regular RE (62.2%) compared to users with occasional RE (45.7%), and users without RE (23.4%) ($p < 0.001$). Treating sleep disturbances and stress increased significantly with level of RE ($p < 0.001$). The five most frequent conditions were arthritis (30.1%), anxiety (21.5%), depression (21.3%), ADHD (11.3%) and herniated disc (10.6%) and treating anxiety, depression and ADHD increased significantly with increase in RE.

Patterns of medicinal cannabis use

A majority were daily users of medicinal cannabis (76.5%) and users with no RE were

significantly more likely to be daily users (83.2%) compared to those with occasional RE (68.6%) and regular RE (72.9%) (p < 0.001) (See Table 1). CBD-oil was the most frequent type of medicinal cannabis used among users with no RE (87.4%) and users with occasional RE (58.7%), while "hash, pot or skunk" was the most frequent type of cannabis among users with regular RE (88.3%). The most frequent form of intake was significantly related to level of previous RE; oil was more frequent among users with no RE (78.8%) compared to users with occasional RE (50.6%), and users with regular RE (20.2%) (p < 0.001), while smoking was the most frequent form of intake among users with regular RE (61.5%). Users with no RE were more likely to be CBD-oil only users (63.1%) compared to users with occasional RE (31.6%) and users with regular RE (6.9%) and this difference was statistically significant (p < 0.001).

Initiation of medicinal cannabis use

Discovery of medicinal cannabis use

Medicinal cannabis use was most frequently discovered through public media (42%), social media (40.1%), or suggested by a friend or family member (30%) or by someone with the same condition (14.6%) (See Table 2). Almost a quarter (24.8%) discovered medicinal use when using cannabis recreationally, while only 2.9% indicated that use was suggested to them by a doctor. Users with regular RE were significantly less likely to discover medicinal use through media (23.6%), social media (22.6%), through friends/family (14.6%) or someone with the same condition (8.4%) (p < 0.001). Users with regular RE (67.6%) and users with occasional RE (20.5%) were significantly more likely to discover medicinal use in a recreational setting (p < 0.001). The only source of inspiration that did not differ significantly between the groups was watching a documentary on medical cannabis.

Gradual transition from recreational use

A majority (72.4%) started their medicinal cannabis use from one day to the next, while 23.8% had a gradual transition from recreational use. A gradual transition from recreational

use was less frequent among those with occasional RE (19.9%), compared to those with regular RE (69.3%) and this difference was significant (p < 0.001). Having a gradual transition from recreational use was associated with increased odds of treating a mental health condition (OR: 1.90 (CI 95%: 1.44-2.50) (p < 0.001)) and using smoking as most frequent form of intake (OR: 26.19 (CI 95%: 18.23-37.63) (p < 0.001)) (see Table 3).

Reaching the current dose

In the process of reaching their current dose, most medicinal users relied on self-experimentation (76.3%), reading descriptions from others online (26.6%) and drawing on advice from other medicinal users (24.6%). Users with regular RE (91.7%) and users with occasional RE (78.9%) were significantly more likely to indicate self-experimentation compared to users with no RE (65.9%) (p < 0.001). When reaching the current dose, users with regular RE were less influenced by online descriptions (16.7%), advice from medicinal users (15%) from someone who gives advice to others (8.6%) and from sellers of medicinal cannabis (6.8%) (p < 0.001).

Social control factors related to medicinal cannabis

Supply

The most frequent sources for medicinal cannabis was ordering online (47.4%), from a friend (22.8%), or growing it oneself (18.2%). Buying cannabis online decreased significantly with increase in RE (p < 0.001), likewise did acquiring cannabis from a person who guides other people in medicinal cannabis use (p < 0.01). Acquiring cannabis from a friend, from a dealer, from Christiania or growing cannabis oneself increased significantly with an increased degree of RE (p < 0.001). One third of medicinal cannabis users (33.3%) had experienced not being able to procure their preferred type of medicinal cannabis, which increased significantly with increased degree of RE (p < 0.001). Most medicinal users spent less than 500 DKK/month on medicinal cannabis (49,1 %), and users with regular RE reported spending significantly more money compared to other users (p < 0.001).

Secrecy

Almost half of users often found it necessary to hide their medicinal cannabis use; 25.8% strongly agreed and 21.4% agreed that secrecy was often necessary. Often finding it necessary to hide use was significantly related to degree of RE ($p < 0.001$) and among users with regular RE 40.5% strongly agreed and 24.8% agreed that secrecy was often necessary. Most users (57.3%) had disclosed use to a health care provider and this was not significantly related to degree of previous RE.

Morality

Most medicinal users disagreed (24%) or strongly disagreed (32%) that use of medicinal cannabis can lead to addiction. Believing that medicinal cannabis can lead to addiction was positively associated with having RE ($p < 0.05$). A small minority (13.9%) had considered stopping use of medicinal cannabis and having considered stopping was significantly more frequent among users with occasional RE (17.3%) and regular RE (20.2%) ($p < 0.01$).

Discussion

The present study is the first to explore the role of recreational experience in a large sample of medicinal cannabis users. Further, to my knowledge, the study represents the largest study to date on the initiation of medicinal cannabis use and the social control factors related to use. The study found that the heterogeneity among the medicinal cannabis users in terms of demographics, patterns of use, and motives for use was related to previous recreational experience with cannabis. In fact, when medicinal users were split in groups according to level of previous recreational experience, two significant trends emerged, that can be linked to two very distinct paths to medicinal cannabis use: the novices who are more likely to have medicine in mind from the onset of medicinal use; and users with extensive recreational experience who, for the most part, have a gradual transition from recreational to medicinal use.

The first trend involves users with no previous recreational experience, who are older and more likely to be women, and who initiate medicinal cannabis use predominantly for the treatment of somatic conditions. Most of these users are daily users of medicinal cannabis who use CBD-oil products that are typically low in tetrahydrocannabinol (THC) and therefore less likely to produce the euphoric effects normally associated with the "high" (Colizzi et al., 2017). When initiating medicinal cannabis use, these users draw on social networks, such as the media and social media, as well as suggestions from friends, family, and other medicinal users. They mostly rely on the illegal online market for supply and their supply is relatively stable, and they are less likely to find it necessary to hide their use. They are also least likely to find use morally problematic, as few agreed that medicinal cannabis use could lead to addiction and few had considered discontinuing use.

The second trend involves medicinal users with regular recreational experience, who are younger, more likely male, and who treat mental health conditions with the same frequency as somatic conditions. A majority of these users have made a gradual transition from recreational use to a medicinal cannabis use, they are less likely to be daily users, more likely to use smoking as form of intake, and to use cannabis products such as "hash, pot or skunk", products that are higher in THC (Freeman et al., 2020; Rømer Thomsen et al., 2019) compared to CBD-oils available (Eriksen et al., 2020). In the initiation process of medicinal use, these users draw less on social networks, predominantly discovered medical effects of cannabis through their recreational use, and relied more on self-experimentation when reaching their current dose. Also, these users rely more on offline cannabis markets for supply, such as "pushers", friends, home growing, and Christiania, they spend more money per month on medicinal cannabis, and they experience more instability in supply. Most of these users often find it necessary to hide use, and are more inclined to believe that medicinal cannabis use can lead to addiction, and to have considered stopping use.

These two trends underscore the relevance of Becker's emphasis on drug positive subcultures as crucial in shaping drug use, and suggest the existence of multiple "cannabis

positive" subcultures that shape different forms of medicinal cannabis use. Users with occasional recreational experience fall somewhere in between these two trends, but may be more similar to the novices than to users with regular recreational experience, particularly in relation to initiation of medicinal use, where few have a gradual transition from recreational use and draw on social networks of information at almost the same rate as novices.

Novices with medicine in mind seek "cannabis without cannabis"

The study findings suggests that when a person with no recreational experience initiates medicinal cannabis use, their patterns of use differ substantially from the conventional patterns of recreational use. They frequently use routes of administration other than smoking and use products that aim to exclude the "high" normally associated with cannabis use. To a large extent, these users resemble legal medical cannabis users, who tend to use cannabis more frequently than recreational users (Hakkarainen et al., 2019; Lankenau et al., 2017; Pacula et al., 2016; Sznitman, 2017) and have patterns of use that are consistent with routine treatment of medical problems (Woodruff et al., 2016), i.e. using small controlled doses to avoid intoxication and maximize role functioning (Newhart et al., 2018).

This trend in medicinal use suggests that, while cannabis use up till now for the most part has been synonymous with smoked plant material ingested with the purpose of producing a high (Russell et al., 2018), there has been a diversification of cannabis in recent years with the introduction of novel cannabis products, formulations, and methods of administration (Spindle et al., 2019). The medicalization of cannabis has likely played a role in this reshaping of cannabis use, as medical cannabis users are more likely to use alternative methods of administration of cannabis, such as vaping or ingesting cannabis, compared to recreational cannabis users (Borodovsky et al., 2016; Lankenau et al., 2017). Further, in recent years, CBD-dominant cannabis products have become popular worldwide (Carrieri et al., 2020; Hazekamp, 2018; Manthey, 2019), both as a specific therapy for medical conditions and for general health and wellbeing (Corroon et al., 2018). The popularity of CBD-products can be understood in the context of its broad therapeutic potential (Hurd,

2017; Khan et al., 2020; Russo, 2017), and the fact that CBD is non-intoxicating and has a superior safety profile compared to THC (Bergamaschi et al., 2011; Iffland et al., 2017). The emergence of CBD-dominant cannabis products is particularly interesting, as it seems to offer users the opportunity to use "cannabis without cannabis", to experiment with the new potential panacea that cannabis is advertised as online (Cavazos-Rehg et al., 2018; Lewis et al., 2019), while dispensing with the common features of traditional recreational use of smoking and euphoria. The emergence of a large market for cannabis oil in Denmark is likely driven by the medicalization of cannabis that has taken place in recent years, with increased media coverage of medical cannabis and the initiation of the Medical Cannabis Pilot Program (Kvamme et al., 2021a). It is likely that this coverage inspires users with no previous experience with recreational cannabis use, who discover medical cannabis in news- and social media and other social networks, and realize that these products are easily available online. The prominence of social media as a source of inspiration for initiating medicinal cannabis use, particularly among novices, is interesting in the context of the business model of large social media platforms, where attracting and keeping users' attention is central, as attention is the commodity in surveillance capitalism (Deibert, 2019). Therefore, platforms such as Facebook use algorithms to target its users with content that will keep them engaged, a design that skews toward dissemination of content that generates strong emotions (Bakir et al., 2018). Illicit drug use with a medicinal motive is likely a great topic for capturing attention and this business model may have furthered the creation of the drug-positive subculture that Becker identified as crucial for becoming a drug user. In Denmark, large groups have emerged on Facebook, offering guidance in the use of medicinal cannabis (Bechgaard, 2014; Cannabis Recovery, 2021; CBD oile, 2021) and they may have inspired novices remote from a recreational setting.

Medicinal cannabis on a gradual transition from recreational use

The study findings indicate that medicinal users with recreational experience tend to bring their previous experiences with cannabis in play when shaping their medicinal cannabis use,

as they are more likely to remain users of smoked plant material traditionally associated with recreational use (Russell et al., 2018). Users with recreational experience have already acquired "recreational learning" (Cohen, 2015), in form of the skills identified by Becker that are needed to effectively use cannabis (recognizing effects, perceiving them as favorable, and associating them with cannabis). The study findings indicate that having a gradual transition from recreational use increased the odds of "spillover" from recreational learning and treating a mental health condition, which has also been found in previous qualitative research findings, where users with a gradual transition from recreational use were more prone to treat mental health conditions such as depression, anxiety, or ADHD with cannabis (Cohen, 2015; Dahl et al., 2011). Thus, a self-medication hypothesis for underlying mental health problems may in large part explain the predominance of mental health conditions treated among users with previous recreational experience. This explanation indicates the blurred boundaries between recreational and medicinal cannabis use experienced by users (Newhart et al., 2018; Ryan et al., 2017), that may be further blurred in cases where the individual user lacks knowledge of, or has received limited psychoeducation on, an underlying mental health condition.

Self-medicalization among cannabis users with recreational experience could be viewed as an attempt to trade badness for sickness, preferring to be declared sick and deserving of help, rather than being viewed as deviant and deserving of criminalization, not unlike the way medicalization has transformed many forms of deviance, including addiction, into treatable conditions (Conrad et al., 2010). Thus, a self-medicalization of cannabis use could be a form of governmentality (Foucault, 1979), where the individual feels pressured to internalize and profess pathology in order to escape criminalization of a behavior that is deemed deviant. Such a user interpretation of personal cannabis use may be a consequence of the narratives that are available and acceptable to the user at the time of interpretation. When quantifying the reports of more than 4,000 cannabis users seeking recommendations for medical cannabis in California, O'Connell identified a consistent

pattern of undiagnosed ADHD and childhood trauma among otherwise healthy young men who had initiated cannabis use during adolescence (O'Connell et al., 2007). In this context, O'Connell noted that while he personally believed that their cannabis use had been self-treatment of a mental health condition, the users preferred the interpretation of pleasure over the stigma that came with having a mental disorder (Newhart et al., 2018), suggesting that in some situations, "badness" is preferred over "sickness". However, qualitative studies indicate that in adulthood, the ADHD diagnosis can become an attractive discursive tool for explaining both problematic childhood behavior and daily cannabis use (Berger et al., 2016; Pedersen, 2015).

From a sociological perspective, the increased use of diagnoses in society both by specialists and laypeople could be viewed as problematic, as it risks drowning out other relevant languages of suffering (Brinkmann et al., 2016; Rapley et al., 2011; Rose, 2018) and medicalize (and thusly individualize) problems that could also be understood as social, moral or political (Brinkmann, 2014). In this sociological critique, the medical narrative is criticized for being too dominant, but in the case of cannabis, this critique may only be half-true. In fact, in strict biomedical terms, the medical utility of cannabis is still underexplored, particularly in the context of mental health conditions, were the literature is in its infancy, albeit showing a potential therapeutic effect of cannabinoids for conditions such as PTSD and ADHD (Sarris et al., 2020; Scherma et al., 2020). A century of prohibition of cannabis has impeded the medical exploration of the plants utility (Mikuriya, 1969) and multiple barriers to conducting cannabis research remain (National Academies of Sciences Engineering and Medicine, 2017; Piomelli et al., 2019). However, while much is still unknown, we know enough to make cannabis consumption safer (Englund et al., 2017), as cannabis products high in THC are associated with higher risk of cannabis related harms compared to low-THC products (Colizzi et al., 2017; Englund et al., 2017; Freeman et al., 2018). The study findings that a substantial proportion of medicinal users with recreational experience also use CBD-oil, suggests that the process of reinterpreting previous

recreational use as medicinal may inspire a change in patterns of use. Indeed, it has been found that gaining access to a medical cannabis program also has an impact on consumption practices (Lankenau et al., 2018) and providing legal access to low-THC cannabis products, could potentially provide safer material conditions for medicinal users and access to other enabling resources within the healthcare system.

Differences in social control of medicinal cannabis users

The study findings indicate that novices are the least strained by social control aspects related to medicinal cannabis use, as their supply is more stable, they feel less need to keep use secret, they are the least likely to believe that medicinal use can lead to addiction, and also least likely to consider stopping compared to users with recreational experience. There are several possible reasons for these findings. Firstly, according to Becker, developing a perception that cannabis use can be controlled is a central feature in overcoming social control factors related to use (Becker, 1963) and novices may have an easier task of interpreting and also presenting their use as controlled, as their use is more medicalized with frequent use of products that seeks to exclude intoxication. Secondly, the differences in social control factors may be related to the differences in conditions treated, as novices in the study were less likely to treat mental health conditions compared to users with recreational experience. A randomized experiment found that participants who viewed narratives in which the protagonist treated a stigmatized condition with medical cannabis expressed more negative attitudes toward medical cannabis (Lewis et al., 2017). Indeed, mental health conditions are more stigmatized than somatic conditions (Rusch et al., 2013; Vendsborg et al., 2011) and the association between heavy cannabis use and poorer mental health outcomes (National Academies of Sciences Engineering and Medicine, 2017) may further a problematic view on medicinal users who treat mental health conditions. Opinions on use also vary depending on the seriousness of the condition, as public opinion tend to be strongly supportive of medical cannabis use for serious life-threatening conditions such as cancer (Newhart et al., 2018). Thirdly, the fact that novices appear to be less strained by

social control factors may be related to social inequalities in medicalization, as the help and sympathy that medicalization evokes is not equally distributed in society. A striking example of such inequalities comes from the US, where drug addiction appears to be easier medicalized among white middle- and upper-class citizens than poor inner-city black citizens (Anderson et al., 2015; Kerrison, 2015). In this perspective, there is not a "war on drugs", but a war on some people who use some drugs. Furthermore, the majority of women among users with no recreational experience in the study may explain the differences in social control, as women are often found more deserving of help than men (Connell, 2013; Kullberg, 2005). Also, it is curious that a political space for a medical cannabis program opened up after people with substantial resources such as celebrities and politicians were vocal about their personal use of medicinal cannabis in the media (Kvamme et al., 2021a), pointing to the notion that a medical explanation for drug use among "nice people" is often more easily accepted (Bell et al., 2009).

Strengths and limitations

The study has several strengths, including its large diverse sample size, which was the result of utilizing multiple recruitment strategies. The use of an anonymous web-based survey is an advantageous tool for studying topics that are sensitive and/or illegal in so-called hidden populations (Barratt et al., 2015), and online self-reported use is generally reliable and valid (Ramo et al., 2012). Also, the study represents a detailed exploration of the heterogeneity of the emerging use of medicinal cannabis in Denmark providing greater insight on a contested topic.

However, some important limitations must be noted. The study sample is a self-selected convenience sample and it may not be representative of the overall population of medicinal cannabis users. The sample likely weighs towards successful users of medicinal cannabis, users who are engaged with the topic on social media, and those with the resources necessary to answer online surveys. Also, the data from the study may be subject to self-

reporting biases, such as recall bias, confirmation bias, or social desirability bias (Althubaiti, 2016). Moreover, it is not possible to rule out multiple responses from the same person, as IP addresses were not available to researcher. Furthermore, the cross-sectional study design lacks a temporal dimension and is not able to explore medicinal use over time. An exploration of co-occurring recreational use and age of onset of first cannabis use are relevant factors that should have been explored. Also, it should be noted that while the current study draws a clear distinction between medicinal and recreational cannabis use, these categories are seldom discrete in real life, where the difference between therapeutic and pleasant effects are not easily distinguished (Newhart et al., 2018; Ryan et al., 2017). Therefore, as the survey does not explore motives for initiation of recreational cannabis use among users with previous recreational experience, the findings from the present study can only hypothesize on potential self-medication motives related to the previous recreational use. Lastly, the exploration of social control factors in the current study is not an exhaustive inquiry into the complexity that Becker displayed in his qualitative material.

Table 1. Characteristics of medicinal cannabis users by previous recreational experience		Level of previous recreational experience		
User Characteristics	Total 2,281	None 1,052	Occasional 624	Regular 605
	n (%)	n (%)	n (%)	n (%)
Demographics				
Female	1,399 (61.3)	832 (79.1)	382 (61.2)***	185 (30.6)***
Mean age (18-89)	48.6 (SD 13.4)	53.9 (SD 11.5)	46.2 (SD 12.7)***	41.8 (SD 13.3)***
Higher education[1]	1,088 (47.7)	553 (52.6)	337 (54)***	198 (32)
Full time occupation	713 (31.3)	271 (25.8)	195 (31.3)	247 (40.8)
Motives for medicinal cannabis use				
Conditions treated with medicinal cannabis				
Somatic condition	1,662 (72.9)	846 (80.4)	430 (68.9)**	386 (63.8)**
Mental health condition	907 (39.8)	246 (23.4)	285 (45.7)***	376 (62.2)***
Chronic pain	691 (30.3)	331 (31.5)	184 (29.5)	176 (29.1)
Sleep disturbances	679 (29.8)	224 (21.3)	194 (31.1)**	261 (43.1)***
Stress	608 (26.7)	155 (14.7)	181 (29)***	272 (45)***
Five most frequent conditions				
Arthritis	687 (30.1)	374 (35.6)	177 (28.4)	136 (22.5)
Anxiety	490 (21.5)	143 (13.6)	157 (25.2)**	190 (31.4)***
Depression	486 (21.3)	127 (12.1)	145 (23.2)***	214 (35.4)***
ADHD/ADD	255 (11.3)	38 (3.6)	68 (10.9)**	149 (24.6)***
Herniated disc	241 (10.6)	115 (10.9)	68 (10.9)	58 (9.6)
Mean number of conditions treated with cannabis	3.3 (SD 2.5)	2.8 (SD 2.2)	3.4 (SD 2.4)***	4 (SD 2.8)***
Patterns of medicinal cannabis use				
Types of cannabis				
THC-oil	541 (23.7)	242 (23)	164 (26.3)	135 (22.3)
CBD-oil	1,507 (66.1)	919 (87.4)	366 (58.7)***	222 (36.7)***
Hash, pot or skunk	884 (38.8)	82 (7.8)	268 (43)***	534 (88.3)***
Other	175 (7.7)	76 (7.2)	55 (8.8)	44 (7.3)
missing	18 (0.8)	13 (1.2)	5 (0.8)	0 (0)
CBD only	903 (39.6)	664 (63.1)	197 (31.6)***	42 (6.9)***
Most frequent form of Intake				
Smoked	595 (26.1)	37 (3.5)	186 (29.8)***	372 (61.5)***
Vaporized	77 (3.4)	11 (1.1)	24 (3.9)*	42 (6.9)**
Oil	1.267 (55.6)	829 (78.8)	316 (50.6)***	122 (20.2)***
Edibles, Suppositories, Tea, Topical	109 (4.8)	52 (4.9)	32 (5.1)	25 (4.1)
Capsules	89 (3.9)	60 (5.7)	24 (3.9)	5 (0.8)**
Other	137 (6)	61 (5.8)	40 (6.4)	36 (6)
Missing	7 (0.3)	2 (0.2)	2 (0.3)	3 (0.5)
Daily user (7-6 days a week)	1,744 (76.5)	875 (83.2)	428 (68.6)***	441 (72.9)***

Notes: *=p<0.05, **=p<0.01 ***=p<0.001. Controlled for age and gender. [1]Post secondary education or higher

Table 2. Initiation of Medicinal Cannabis Use by Previous Recreational Experience		Level of Previous Recreational Experience		
Initiation of Medicinal Cannabis Use	Total 2,281	None 1,052 (46.1)	Occasional 624 (27.4)	Regular 605 (26.5)
	n (%)	n (%)	n (%)	n (%)
Source(s) for the discovery of medicinal cannabis use				
Read about medical cannabis in the media	959 (42)	530 (50.4)	286 (45.8)	143 (23.6)***
Read about other peoples medicinal use on social media	914 (40.1)	519 (49.3)	258 (41.4)*	137 (22.6)***
Suggested to me by a friend/family member	685 (30)	391 (37.2)	206 (33)	88 (14.6)***
Noticed medical effect when using cannabis recreationally	565 (24.8)	28 (2.7)	128 (20.5)***	409 (67.6)***
Suggested to me by someone with the same condition as me	334 (14.6)	174 (16.5)	109 (17.5)	51 (8.4)***
Documentary on medical cannabis	318 (13.9)	148 (14.1)	103 (16.5)	67 (11.1)
Suggested to me by a doctor	66 (2.9)	26 (2.5)	31 (5)*	9 (1.5)
Other	168 (7.4)	63 (6)	49 (7.9)	56 (9.3)
Don't know/no answer	31 (1.4)	4 (0.4)	7 (1.1)	20 (3.3)
What statement best describes your situation?				
Initiated medicinal cannabis from one day to the next	1,652 (72.4)	1,033 (98.2)	469 (75.2)	150 (24.8)***
Medicinal cannabis was a gradual transition from recreational use	543 (23.8)	0 (0)	124 (19.9)	419 (69.3)
Don't know/No answer	86 (3.8)	19 (1.8)	31 (5)	36 (6)
Source(s) of inspiration for current dose				
Self-experimentation	1,740 (76.3)	693 (65.9)	492 (78.9)***	555 (91.7)***
Read descriptions from others online	607 (26.6)	325 (30.9)	181 (29)	101 (16.7)***
Advice from a medicinal user	560 (24.6)	301 (28.6)	167 (27.3)	89 (15)***
Advice from a person who guides others in use of medicinal cannabis	352 (15.4)	204 (19.4)	96 (15.4)	52 (8.6)***
Advice from a seller of medicinal cannabis	292 (12.8)	179 (17)	72 (11.5)*	41 (6.8)***
Guidance by a doctor	29 (1.3)	10 (1)	13 (2.1)	6 (1)
Other	75 (3.3)	26 (2.5)	18 (2.9)	31 (5.1)**
Don't know/no answer	11 (0.5)	2 (0.2)	3 (0.5)	6 (1)

Notes: *=p<0.05, **=p<0.01 ***=p<0.001. Controlled for age and gender

Table 3. Odds ratios (ORs) and 95% CIs for demographics, using smoke as most frequent form of intake and treating a mental health condition among medicinal users with a gradual transition from recreational use

User Characteristics	Gradual transition from recreational use
Gender (male)	1.60 (1.21-2.11)***
Age	0.98 (0.97-0.99)***
Higher education	0.96 (0.72-1.26)
Fulltime employment	1.39 (1.04-1.86)*
Treating a mental health condition	1.90 (1.44-2.50)***
Using smoke as most frequent form of intake	26.19 (18.23-37.63)***
R2	0.42

Table 4. Social Control Factors - Supply, secrecy, morality		Level of Previous Recreational Experience		
Social Control Factors	Total 2,281	None 1,052 (46.1)	Occasional 624 (27.4)	Regular 605 (26.5)
	n (%)	n (%)	n (%)	n (%)
Supply				
Source(s) of medicinal cannabis.				
I buy it online	1,081 (47.4)	713 (67.8)	254 (40.7)***	114 (18.8)***
From a friend	519 (22.8)	139 (13.2)	174 (27.9)***	206 (34.1)***
I grow it myself	416 (18.2)	72 (6.8)	133 (21.3)***	211 (34.9)***
From a pusher	367 (16.1)	39 (3.7)	99 (15.9)***	229 (37.9)***
From a person who guides other people in medicinal cannabis use	279 (12.2)	162 (15.4)	78 (12.5)	39 (6.5)**
At Christiania	275 (12.1)	41 (3.9)	79 (12.7)***	155 (25.6)***
From a store	71 (3.1)	41 (3.9)	15 (2.4)	15 (2.5)
Other	58 (2.5)	16 (1.5)	22 (3.5)	20 (3.3)
Don't know/No answer	100 (4.3)	40 (3.8)	23 (3.7)	37 (6.1)
Money spend on medicinal cannabis pr. month				***
<500 DKK. (<67 €)	1,119 (49.1)	591 (56.2)	318 (51)	210 (34.7)
500-1.000 kr. (67 € -134 €)	631 (27.7)	305 (29)	173 (27.7)	153 (25.3)
>1.000 kr. (>134 €)	451 (19.8)	123 (11.7)	119 (19.1)	209 (34.6)
Don't know/No answer	80 (3.5)	33 (3.1)	14 (2.2)	33 (5.5)
Experienced not being able to procure preferred type of medicinal cannabis				
Yes	760 (33.3)	202 (19.2)	239 (38.3)***	319 (52.7)***
No	1,480 (64.9)	835 (79.4)	369 (59.1)	276 (45.6)
Don't know/No answer	41 (1.8)	15 (1.5)	16 (2.6)	10 (1.7)
Secrecy				
I often find it necessary to hide my use of medicinal cannabis			***	***
Strongly agree	589 (25.8)	178 (16.9)	166 (26.6)	245 (40.5)
Agree	488 (21.4)	189 (18)	149 (23.9)	150 (24.8)
Neutral	355 (15.6)	179 (17)	104 (16.7)	72 (11.9)
Disagree	460 (20.2)	266 (25.3)	116 (18.6)	78 (12.9)
Strongly disagree	359 (15.7)	218 (20.7)	83 (13.3)	58 (9.6)
Don't know/No answer	30 (1.3)	22 (2.1)	6 (1)	2 (0.3)
Disclosed medicinal cannabis use to any health care providers				
Yes	1,352 (59.3)	603 (57.3)	380 (60.9)	369 (61)
No	871 (38.2)	417 (39.6)	230 (36.9)	224 (37)
Don't know/no answer	58 (2.5)	32 (3)	14 (2.2)	12 (2)
Morality				
The use of medicinal cannabis can lead to addiction			**	***
Strongly agree	97 (4.3)	26 (2.5)	37 (5.9)	34 (5.6)
Agree	260 (11.4)	50 (4.8)	88 (14.1)	122 (20.2)
Neutral	485 (21.3)	199 (18.9)	136 (21.8)	150 (24.8)
Disagree	548 (24)	262 (24.9)	149 (23.9)	137 (22.6)
Strongly disagree	729 (32)	410 (39)	172 (27.6)	147 (24.3)
Don't know/No answer	162 (7.1)	105 (10)	42 (6.7)	15 (2.5)

Considered stopping use of medicinal cannabis				27
Yes	318 (13.9)	88 (8.4)	108 (17.3)**	122 (20.2)**
No	1,884 (82.6)	924 (87.8)	495 (79.3)	465 (76.9)
Don't know/No answer	79 (3.5)	40 (3.8)	21 (3.4)	18 (3)

Notes: *=p<0.05, **=p<0.01 ***=p<0.001. Controlled for age and gender

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Appendix 1:

Somatic condition (36): Acne, Aids, Alzheimer's, Asthma, Chrons disorder, Herniated disc, Dystonia, Eczema, Epilepsy, Endometriosis, Fibromyalgia, Osteoarthritis, Rheumatoid arthritis, Psoriatic arthritis, Cataracts, Hepatitis, Brain damage, COPD, Cancer, FE(chronic fatigue), Chronic nerve inflammation, migraine, Menstrual pain, Multiple sclerosis, Neurodermatitis, IBS, Lupus (SLE), Palliation, Parkinson's, peripheral neuropathy, Psoriasis, Spinal cord injury, pain following operation, pain following an accident, tinnitus, trigeminal neuralgia

Psychiatric condition (13): ADHD, Anxiety, dependence (alcohol), dependence (hard drugs), dependence (prescription drugs), Anorexia, Autism, Bipolar disorder, Depression, OCD, PTSD, Schizophrenia, Tourettes/tics

Potential comorbidities (3); Chronic pain, Sleep disturbances, Stress.