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An exploration of medical professionals' attitudes, perceived knowledge, and concerns around medical cannabis in the United Kingdom

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Abstract

Background: In the UK, there are over forty thousand specialist clinicians who are eligible to prescribe cannabis-based medical products (CBMPs); however, only approximately 100 actively do so (0.25%) (Kowalski, 2022). Since the legalization of medical cannabis in the UK in 2018, there has been a limited number of prescriptions issued by the National Health Service (NHS). Their availability through private healthcare is rising, with current estimates suggesting that 25,000-30,000 are accessing medical cannabis through private clinics.

Objective: The objectives of this study were (1) to assess attitudes, perceived knowledge and concerns around medical cannabis among medical professionals in the UK, and (2) to examine differences between professionals who had previously undertaken training on medical cannabis and those who had not.

Methods: Using a quantitative cross-sectional survey design, a questionnaire was presented to participants to explore their personal and professional perspectives towards medical cannabis. Questions addressed HCPs' perceived knowledge, confidence, and concerns about medical cannabis prescribing, alongside their personal experiences and attitudes toward legalization.

Results: A total of 72 HCPs completed the survey, of which 55.6% had received training in medical cannabis. HCPs trained in medical cannabis reported a statistically significant higher perceived knowledge of medical cannabis, greater confidence in prescribing, and increased recognition of its value as a medicine compared to their non-trained colleagues ($p < .05$ for all comparisons). Notably, trained individuals were significantly less concerned that medical cannabis lacks sufficient evidence of efficacy ($X^2(1) = 8.74, (p = 0.003)$). Barriers to prescription and cost of medical cannabis were the most endorsed concerns among both HCP groups.

Conclusions: The study found that undergoing medical cannabis training is associated with less hesitancy in prescribing CBMPs and increased confidence in its medicinal value.

Introduction

Medical cannabis has been legalized in the United Kingdom since November 1st, 2018, allowing doctors to prescribe it to patients for a variety of conditions. Private clinics tend to prescribe it for a broad range of conditions unresponsive to conventional treatment, whereas the NHS restricts its use to specific conditions, including child and adult epilepsy, vomiting and nausea caused by chemotherapy, multiple sclerosis treatment, and palliative care (NHS, 2018).

The NHS is a publicly funded healthcare systems that provides largely free healthcare services to residents in the UK. While many medical cannabis users argue strongly for its effectiveness as a medicine, there continues to be a scarcity of prescriptions issued by the NHS (Gibbs, 2021). Currently in the UK, CBMPs can be prescribed by or under the direction of a professional on the Specialist Register and used only as a last resort when all other medications for the patient's specific condition have been exhausted (Dowden, 2021; Schlag et al., 2020). Patients typically need to be referred to the specialist by their General Practitioner (GP) (General Medical Council, 2022). If the specialist determines that medical cannabis is suitable, it will be prescribed as a specialist medicine, which can be fulfilled by a specialist pharmacy or through a licensed producer. The treatment regimen varies depending on the condition, but dosages are gradually increased under specialist advice. Medical cannabis can be prescribed for a wide variety of conditions that do not respond to conventional treatment, including but not limited to epilepsy, multiple sclerosis, chronic pain, nausea, and vomiting (Arkell et al., 2023).

In 2019, only 6.5% of all cannabis-based medical products (CBMPs) were made available through the NHS, with most patients accessing this treatment via private healthcare at high prices starting from £1000/month (Wickware, 2019; Nutt et al., 2020). In contrast, a 2019 patient survey conducted by the Centre for Medical Cannabis (Couch, 2020) found that 1.4 million people in the UK use illicit cannabis for medical reasons. This poses numerous problems related to unknown quality, different ratios of active compounds, and risk of prosecution.

The NHS defends the incongruity between legal supply and demand on grounds of lack of evidence of efficacy and associated dangers of medical cannabis but fails to consider patient-reported outcomes (PROs) or various types of existing evidence (Nutt et al., 2020). This lack of evidence typically refers to randomized controlled trials (RCTs), which have been considered the 'gold standard' of efficacy evidence in medical and pharmacological circles (Rawlins, 2008). However, this poses serious practical limitations since RCTs are costly, take years to implement, and are often unrepresentative of the wider population where multiple co-morbidities are typically present. In addition, between 1999 and 2016, over 40 medicines and indications lacking RCT evidence were licensed by the European Medicines Agency (Hatswell et al., 2016). Nutt et al. (2020) argue that other types of approaches can inform prescribers on medical cannabis decisions, including patient-reported outcomes, pharmacoepidemiology, and observational research, all of which are currently available.

In terms of associated dangers, the primary concerns are related to adverse mental health effects and risk of dependence (Di Forti et al., 2009; Ganesh & D'Souza, 2022). Cannabis contains various active compounds, including cannabinoids and terpenes, with the most well-known being delta-9-tetrahydrocannabinol (THC) and cannabidiol (CBD). THC is primarily responsible for the psychoactive effects and carries a higher potential for abuse. However, despite CBD being commonly associated with therapeutic properties, THC is not without therapeutic benefits. Studies have demonstrated the effectiveness of THC-containing cannabis in alleviating symptoms such as nausea and vomiting, pain, insomnia, loss of appetite, and those associated with posttraumatic stress disorder (Klein & Clark, 2022).

A UK study with over 2500 participants found that high-potency cannabis or ‘skunk’ use was the best predictor for dependence, whilst cannabis with lower THC and similar CBD content such as resin (hashish) was not associated with dependence (Freeman & Winstock, 2015). The chances of cannabis dependence after anytime of lifetime exposure is of 8.9% which is significantly lower than alcohol (22.7%), tobacco (67.5%) and cocaine (20.9%) (Lopez-Quintero et al., 2011). According to Curran et al. (2016), the likelihood of developing dependence on recreational cannabis increases when individuals consume high potency THC strains with low CBD content, consume large quantities, engage in frequent use (such as heavy and daily usage), and initiate cannabis use during adolescence. Similarly, frequent use of high-potency THC cannabis is associated with increased risk of psychosis (Di Forti et al., 2009; Sideli et al., 2020; Ganesh & D’Souza, 2022). In a case-controlled study, it was found that individuals who engaged in daily use of high-potency cannabis had a five-fold increased likelihood of experiencing a psychotic disorder compared to non-users (Di Forti et al., 2015). Furthermore, the use of traditional hashish did not elevate the risk of psychosis (Di Forti et al., 2013; 2015). Notably, several studies have demonstrated the mitigating properties of CBD on the psychotogenic effects of THC (Schubart et al., 2011; Murray et al., 2017). Currently, there is a lack of clinical assessment measures available for medical cannabis dependence. Moreover, significant distinctions exist between medicinal and recreational use of cannabis, posing challenges when extrapolating findings between these domains. These disparities encompass motivation and usage patterns, dosage, potency, route of administration, and variations in the active compounds profile of cannabis. According to Schlag et al. (2021), contextualizing medical cannabis dependence requires considering other drug use and the patient's medical condition. In comparison to other drugs, medical cannabis is generally regarded as safe and well tolerated, necessitating an evaluation of the benefits versus the risk of dependence. Further research and training are imperative to equip healthcare professionals with the capacity to accurately assess the risks associated with complex drugs like medical cannabis, without solely relying on findings derived from recreational cannabis use and its associated effects.

There is still a lack of emphasis throughout medical school at undergraduate and postgraduate level concerning complex drugs like cannabis. Lack of training and education is considered one of the main barriers to medical cannabis prescribing (Schlag et al., 2020). A potential corollary is that students can rely on the outdated knowledge that portrays cannabis as toxic and lacking medicinal properties (Nutt et al., 2020). In addition to the lack of training, restrictive guidelines imposed by the National Institute for Health and Care Excellence (NICE) or the Royal College of Physicians’ recommendation that medical cannabis prescriptions should be issued only as a ‘last resort’ when conventional treatment has proved ineffective, have helped to create or exacerbate stigma around prescribing this ‘unconventional’ medication, all which can result in patients not receiving effective treatment for their condition.

In this context, the attitudes, perceived knowledge, and concerns of HCPs regarding medical cannabis may influence their decision to prescribe this category of medication. In the UK, there are over forty thousand specialist clinicians who are eligible to prescribe CBMPs; however, only approximately 100 actively do so (0.25%) (Kowalski, 2022). Therefore, it is imperative to understand the barriers preventing more HCPs to prescribe medical cannabis to their patients. A 2021 systematic review of the literature revealed a complete absence of UK studies investigating these variables among medical professionals (Hordowicz et al., 2021). The review identified a lack of studies evaluating HCPs knowledge and attitudes towards medical cannabis in most European countries. In a systematic review, Gardiner et al. (2019) found that

health professionals are relatively supportive of medicinal cannabis in clinical practice, yet this support is often counterbalanced by a lack of confidence, self-reported competence, and concerns about associated risks. Additionally, there was a universal self-reported lack of knowledge regarding legislative and clinical domains, compounded by the potential influence of biased information sources. The review highlighted that the most concerning direct patient harm is the risk of psychiatric adverse effects, while the most concerning indirect societal harm is the potential for recreational misuse of medically acquired cannabis.

A Canadian study from 2020 found that 83% of oncology HCPs self-reported a lack of sufficient knowledge about medical cannabis to make recommendations to their patients (McLennan et al., 2020). A significant association between age and knowledge level was observed, with HCPs aged between 50-59 years reporting less knowledge than their colleagues aged 30-39 years. Additionally, the study revealed that major barriers include monitoring patients' cannabis use and prescribing the accurate dose or strain. Half of the participants reported that a lack of significant or credible research is a barrier, while 48% felt there is insufficient support from the medical community for medical cannabis in oncology. Another study investigating medical cannabis practice patterns in clinical oncology found that 47% of HCPs reported perceived cost, inadequate research, and uncertainty of risks and benefits as important barriers to working with the drug (Zylla et al., 2018). In addition, previous European studies have identified that prior use of medical or recreational cannabis positively influences medical professionals' perceptions of the drug's suitability for patient care (Khamenka et al., 2019; Kusturica et al., 2019; Pereira et al., 2020; Vujcic et al., 2017). The current study sought to examine the relationship between medical cannabis training, HCPs' views, perceived knowledge, and their own experiences in relation to medical cannabis prescribing using a researcher-generated exploratory questionnaire. To the best of the authors' knowledge, this is the first study to date that directly investigates these variables in a UK HCP population.

Method

Participants

Over 500 medical professionals in the UK, from both private and public practice, received a survey invitation through the professional networks Drug Science and were asked to forward it if they felt comfortable, resulting in a response rate of 14.4%. The sample consisted of 72 medical professionals (24 women, 45 men, and 3 gender not specified) between the ages of 29 to 74 ($M = 47.03$, $SD = 11.398$). The professional demographics of medical professions were mixed (14 GPs, 8 prescribing nurses, 24 psychiatrists, and 27 'other'), as was participant religion/beliefs (23 Christians, 35 'no religion', 4 Jewish, 4 Hindu, 2 Buddhist, 4 Muslim). All but one participant fitted the criteria of being able to prescribe medications, with the average number of years since they were able to prescribe being 17 ($M = 17.42$, $SD = 13.927$). At the end of the survey, participants were asked if they would be happy to be contacted for a follow-up interview for a separate study; these data are not reported here.

Design

This study utilized a quantitative cross-sectional survey design. A series of online questions related to attitudes, perceived knowledge, concerns, and experiences with medical cannabis were presented using SurveyMonkey.

Measures

The questionnaire was anonymous and consisted of 31 questions. The questions for the study were constructed by the research team and were divided into three sections.

Section 1: Demographic data

There was a total of 9 questions, 7 of which inquired about participants' demographic information, including age, gender, medical profession, religion, years since qualification, and years since being able to prescribe medications. Two additional yes/no questions asked participants if they have received medical cannabis training and if they are currently able to prescribe medical cannabis, respectively.

Section 2: attitudes, perceived knowledge and concerns around medical cannabis

A second section of the survey included 15 questions related to participants' attitudes, perceived knowledge and concerns around medical cannabis. Example questions included statements such as 'I do not feel we as medical professions currently know enough about efficacy and side effects to be able to prescribe medical cannabis,' 'I do not currently feel confident enough to prescribe medical cannabis,' 'I believe I know enough about medical cannabis.' For each statement, participants had to rate the degree to which they agreed with the item ranging from 'not at all' to 'very much' (scored as 1 to 5, respectively). Additionally, participants were asked what concerns exist for them regarding the delivery of medical cannabis. They were provided with 8 items and could select as many as they wished. Items included: barriers to prescribing, financial costs, lack of evidence of efficacy, lack of access to information, the potential for recreational misuse, psychiatric adverse effects, driving under the influence of cannabis, and an option for participants to indicate if they were unsure about concerns.

Section 3: personal experience with cannabis

This final section consisted of 7 questions related to personal use of cannabis. It was indicated as optional, but only two participants chose not to respond. The first five questions asked about legalisation for recreational and medical use, frequency of work with medical and recreational cannabis users, and about use of cannabis by themselves or their social circle. For each statement, participants had to rate the degree to which they agreed with the item ranging from 'not at all' to 'very much' (scored as 1 to 5, respectively). The final question asked participants, where relevant, to rate their own personal experiences with recreational and/or medical cannabis, and for each statement, participants had to rate the degree to which they agreed with the item between 1 and 5 ('extremely negative' to 'extremely positive').

Participants were also given the option to leave further comments at the end of the survey if they wished.

Data Handling and Analysis

Data were downloaded into the Statistical Package for the Social Sciences (SPSS) (version 28; IBM), and differences between participants who had previously received some medical cannabis training and those who had not were explored. Frequency data were compared between the two groups using chi-squared tests, and ANOVAs were used to test between-group differences in continuous variables assessed in the survey. To better understand the possible ramifications of personal use, the data were reorganized based on participants' responses regarding recreational and medicinal use. The sample was divided between those who had used cannabis (recreationally or medicinally) and those who had not (i.e., answered "not at all" on the Likert scale). Finally, to further understand how various variables potentially related to each other, a series of bivariate Pearson correlations were calculated between items.

Ethical Considerations

The current study was conducted in accordance with the British Psychological Society (BPS, 2020) Guidelines for Ethical Research. Before collecting any data, approval was received by the Psychology Ethics Committee at the University of East London on 25/04/2022. Privacy and confidentiality were provided, with data being collected anonymously and only the researchers and the research partners Drug Science had access to the raw data set. Drug Science is an independent scientific organization dedicated to advancing evidence-based drug policy and research. Drug Science hosted the survey and provided access to their database of HCPs, but otherwise had no role in the analysis of the data.

Results

A summary of demographic variables is presented in table 1. The ‘Other’ category under medical profession included responses: neurologist, consultant, both NHS and private psychiatrists, neurosurgeon, and anaesthetist.

Table 1: Summary of demographic variables for medical cannabis comparing trained and untrained prescribing professionals, and whole sample totals.

| | Trained N=40 | Untrained N=32 | Total N=72 |
|-----------------------|------------------|-------------------|------------------|
| Age – Mean & st.dev | 48.12 (10.66) | 45.66 (12.29) | 47.03 (11.40) |
| Gender | | | |
| Male | 11 | 15 | 26 |
| Female | 28 | 17 | 45 |
| Other | 1 | 0 | 1 |
| Religion | | | |
| Buddhist | 1 | 1 | 2 |
| Christian | 10 | 13 | 23 |
| Hindu | 2 | 2 | 4 |
| Jewish | 1 | 3 | 4 |
| Muslim | 4 | 0 | 4 |
| No religion | 22 | 13 | 35 |
| Medical Profession | | | |
| GP-NHS | 5 | 5 | 10 |
| GP-Private | 3 | 0 | 3 |
| GP-Specialist | 1 | 0 | 1 |
| Other | 16 | 11 | 27 |
| Nurse-NHS | 2 | 6 | 8 |
| Psychiatrist-NHS | 4 | 4 | 8 |
| Psychiatrist -Private | 9 | 6 | 15 |
| Yrs since qualified | | | |
| Mean | 22.18 | | |
| St.dev | (11.75) | 19.17 (13.32) | 20.87 (12.45) |
| Yrs able to prescribe | | | |
| Mean | 19.24 | 15.13 | 17.42 |
| St.dev | (14.17) | (13.50) | (13.93) |

Overall, the sample was predominantly female, with more trained than untrained professionals. Most identified as Christian or having no religion. There were no differences between the trained and untrained groups for any demographic variables ($p > .05$ for all comparisons).

The data on knowledge and views regarding medical cannabis in the trained and untrained groups are presented in Table 2, with higher scores indicating a greater endorsement of any given statement.

As can be seen in table 2, there were significant differences between trained and untrained professionals for all statements, with the untrained group agreeing more strongly with the statements referring to a lack of knowledge in the profession and a lack of personal confidence to prescribe. All other items were more positively endorsed by the trained professionals. There were significant differences in both views and perceived knowledge between trained and untrained professionals ($p < .05$ for all items).

Table 2: Attitudes and perceived knowledge on medical cannabis

| Attitudes and perceived knowledge statements | Trained N=40 | Untrained N=32 | Sig p value |
|---|-------------------------|---------------------------|------------------------|
| Do not feel we as medical professionals know enough | 1.42 (1.41) | 2.44 (1.59) | .006 |
| Not confident enough to prescribe | 0.58 (1.01) | 2.50 (1.46) | <.001 |
| I believe I know enough about medical cannabis | 3.05 (.96) | 1.16 (1.22) | <.001 |
| I am aware of how the medical cannabis market works | 2.55 (1.26) | .84 (1.17) | <.001 |
| I believe current evidence shows medical cannabis is of value | 3.43 (.712) | 2.72 (1.14) | .002 |
| I am currently aware of the legal status of medical cannabis in the UK | 3.45 (.749) | 2.16 (1.37) | <.001 |
| I'm willing to signpost a patient to a medical cannabis clinic | 3.60 (.841) | 2.53 (1.37) | <.001 |
| I'm comfortable training in medical cannabis if the law changes | 3.73 (.60) | 2.66 (1.47) | <.001 |

Note: all questions rated from 1 (not at all) to 5 (Very much so)

Questions regarding recreational and medicinal use personally, within social circles or in patients are presented in Table 3. Analyses indicated that trained and untrained professionals did not significantly differ on most of these items, except for their frequency of working with cannabis users. Trained healthcare professionals were more likely to report encountering patients who use cannabis ($F(1,62) = 5.96, p < 0.02$).

Table 3: Legalisation views and experiences of personal, social group and patient usage of medical and recreational cannabis

| Cannabis statement | Trained N=40 | Untrained N=32 | Sig p value |
|---|-------------------------|---------------------------|------------------------|
| I feel cannabis should be legalised for recreational and medical use | 3.03 (1.27) | 2.66 (1.59) | .30 |
| I often work with patients who are recreational cannabis users | 2.59 (1.05) | 2.45 (1.27) | .63 |
| I often work with patients who are medical cannabis users | 2.29 (1.47) | 1.41 (1.43) | .01 |
| Have you ever in the past or currently use cannabis recreationally? | .74 (1.11) | 1.00 (1.13) | .35 |
| Have you ever in the past or currently use cannabis medically? | .82 (1.51) | .66 (1.40) | .64 |
| Does anyone in your social circle use cannabis recreationally? | 1.56 (1.54) | 1.59 (1.48) | .94 |

Note: all questions rated from 1 (not at all) to 5 (Very much so)

The next series of questions related to HCP's concerns about their ability to deliver medical cannabis treatment to patients. Participants could endorse as many items as they wished. Table 4 summarizes the number and proportion of professionals checking each item, and the comparison between groups.

Table 4: Concerns about prescribing medical cannabis to patients: numbers of practitioners endorsing items in trained and untrained professionals and chi square comparison p-values.

| Concern | Trained N=40 | Untrained N=32 | Sig p value |
|--|-----------------|-------------------|----------------|
| Barriers to prescription | 20 (50%) | 19 (59%) | .42 |
| Lack of access to information/literature | 14 (35%) | 12 (38%) | .82 |
| Lack of evidence of efficacy | 6 (15%) | 15 (47%) | .003 |
| Potential for recreational use | 11 (27.5%) | 13 (41%) | .24 |
| Psychiatric adverse effects | 11 (27.5%) | 14 (44%) | .15 |
| Driving under the influence of cannabis | 16 (40%) | 11 (34%) | .62 |
| Financial costs | 28 (70%) | 17 (53%) | .14 |
| Unsure | 1 (2.5%) | 2 (6%) | .58* |

Note: the number and percentage of practitioners endorsing each item

**Assessed by Fisher exact test, as cell count <5*

As can be seen in table 4, ‘barriers to prescription’ and concern about costs were the most endorsed items, and overall, the profile of concerns did not differ between groups. However, a higher proportion of untrained HCPs endorsed the item ‘lack of evidence of efficacy’ (47%), compared to trained HCPs ($\chi^2(1) = 8.74$, ($p = 0.003$)).

Potential ramifications of personal use

In total there were 32 participants who indicated recreational use of cannabis, and 15 medicinal use; with 13 of the latter indicating both recreational and medicinal use. 29 participants reported never having used cannabis for either purpose and 9 did not answer this question. No demographic differences were found between users and non-users for either cannabis category. Chi-square analyses were performed between knowledge, attitude, and concern items and recreational use status and medicinal use status, respectively. One significant association emerged between recreational use status and the concern of driving under the influence of cannabis, $\chi^2(1) = 4.72$, $p = .03$. The variables were inversely related, suggesting that recreational users express less concern for driving under the influence of cannabis, $\phi = -0.274$, $p = .03$. Medicinal use status was significantly associated with the lack of evidence of efficacy concern, $\chi^2(1) = 4.12$, $p = .04$. Healthcare providers who were medicinal users were less likely to endorse the lack of evidence of efficacy concern, $\phi = -0.256$, $p = .042$.

ANOVA analyses revealed significant differences between recreational cannabis users and non-users. Recreational cannabis users were found to be more recently qualified ($F(1, 59) = 6.6, p = .013$), expressed greater concern that association with recreational cannabis makes medical cannabis problematic ($F(1, 61) = 5.51, p = .02$), were more likely to have used medical cannabis ($F(1,61) = 11.67, p = .001$), and had a higher likelihood of having people in their social circle using cannabis ($F(1, 61) = 10.17, p = .002$).

Significant differences between medical cannabis users and non-users were found. ANOVA analyses indicated that medical cannabis users were more recently qualified ($F(1, 59) = 3.9, p = .05$), agreed more strongly with the statement that current evidence shows that medical cannabis is of value ($F(1, 61) = 11.31, p = .001$), were more aware of the current legal status of cannabis ($F(1, 61) = 5.42, p = .02$), believed more strongly all cannabis should be legalized ($F(1, 61) = 9.88, p = .003$), and had a higher likelihood of having people in their social circle using cannabis ($F(1, 61) = 18.93, p < .001$).

Correlations

Finally, to further understand how various variables potentially related to each other, a series of bi variate Pearson correlations were calculated, with significant associations shown below in Table 5. Given the restricted range of scores for individual items and the substantial number of correlation comparisons, a Bonferroni correction was applied. Consequently, the p-value was adjusted to $p = 0.0005$. However, it is important to note that due to limitations in the SPSS output, the smallest reported p-value was $p < .001$. Consequently, only those correlation coefficients with p-values below .001 are reported as statistically significant.

Table 5: Correlations between perceived knowledge, attitudes and concern factors

| Factors | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|--|--------------------------------|--------------|-------------------------------|-------------------------------|-------------|-------------------------------|-------------|-------------------------------|-------------|----|
| (1) I do not currently feel confident enough to prescribe medical cannabis. | 1 | | | | | | | | | |
| (2) Not enough knowledge about efficacy and side effects to be able to prescribe medical cannabis. | .41 <.001 | 1 | | | | | | | | |
| (3) I am aware of how the medical cannabis market works. | -.60 <.001 | -.18 .115 | 1 | | | | | | | |
| (4) I believe current evidence shows that medical cannabis is of value. | -.36 .002 | -.21 .077 | .41 <.001 | 1 | | | | | | |
| (5) I am very aware of the current legal status of medical cannabis in the UK. | -.42 <.001 | .05 .66 | .49 <.001 | .40 <.001 | 1 | | | | | |
| (6) If the law changed tomorrow and I was given the same rights as a specialist consultant, I am comfortable prescribing medical cannabis. | -.52 <.001 | -.21 .06 | .45 <.001 | .51 <.001 | .25 .029 | 1 | | | | |
| (7) I feel all cannabis should be legalised for recreational and medical use. | -.29 .02 | -.04 .71 | .27 .03 | .65 <.001 | .10 .42 | .47 <.001 | 1 | | | |
| (8) Have you ever in the past or currently use cannabis recreationally? | .01 .91 | .01 .90 | .09 .04 | .34 .005 | .03 .76 | .13 .30 | .29 .02 | 1 | | |
| (9) Have you ever in the past or currently used cannabis medicinally? | -.11 .38 | -.05 .66 | .23 .06 | .38 .002 | .30 .01 | .10 .43 | .35 .004 | .50 <.001 | 1 | |
| (10) Does anyone in your social circle currently use cannabis recreationally or medicinally? | -.05 .6 | -.01 .9 | .11 .39 | .40 <.001 | .10 .41 | .24 .05 | .37 .002 | .56 <.001 | .39 .001 | 1 |

Note: Items in bold are statistically significant at the adjusted P level

As presented in Table 5, moderate correlations were observed and were statistically significant. Notably, professionals who reported a lack of confidence in prescribing medical cannabis were less likely to be aware of how the medical cannabis market operates ($r = -0.61$, $p < 0.001$) and were also less inclined to prescribe if granted the same rights as a specialist consultant ($r = -0.53$, $p < 0.001$). Those who reported a belief in the current evidence supporting the value of medical cannabis were more likely to express willingness to prescribe if given the same rights as a specialist consultant ($r = 0.51$, $p < 0.001$) and believed cannabis should be legalized for both medical and recreational use ($r = 0.65$, $p < 0.001$). Furthermore, individuals with a history of recreational cannabis use were more likely to have social circles that included both medical and recreational cannabis users ($r = 0.57$, $p < 0.001$).

Although not detailed here, participants were given the opportunity to provide additional comments if they wished. Emergent themes revolved around (1) the personal and transformational use of medical cannabis by themselves and their close ones, (2) a lack of awareness about medical cannabis among medical professionals, and (3) the significant stigmatisation of medical cannabis in the media. One participant also noted the necessity for more precise terminology when discussing medical cannabis and CBMPs.

Discussion

In the UK, there are over forty thousand specialist clinicians who are eligible to prescribe CBMPs; however, only approximately 100 actively do so (0.25%) (Kowalski, 2022). The study aimed to explore and understand the potential issues that HCPs in the UK face when considering the use of MCBPs for their patients. This was achieved by examining the perceived knowledge, attitudes, concerns, and personal experiences of two groups: medical cannabis trained HCPs and untrained, respectively.

In this sample, 55.6% of participants ($n = 40$) had received medical training on cannabis. ANOVAs revealed that trained HCPs had greater perceived knowledge of medical cannabis, the medical cannabis market, legal status, and higher confidence in prescribing compared to their untrained colleagues ($p < .05$ for all comparisons). These results suggest that training is associated with overall positive attitudes and perceptions of medical cannabis and can be an important factor in addressing practitioners' hesitancy in prescribing medical cannabis. Unlike McLennan et al. (2020), no significant relationship between age of HCPs and perceived knowledge was found in this sample.

There is currently an increasing number of educational programs regarding medical cannabis in the UK and worldwide, varying widely in terms of duration, modality, and cost. Most UK educational programs for HCPs are in the form of online courses, webinars, and occasional in-person events. Additionally, the NHS in partnership with University of Birmingham offers a comprehensive course on cannabis prescription, covering in detail the physiological and clinical aspects of prescribing cannabis (Elfh, 2022). Currently there are eight CPD-accredited medical cannabis training providers in the UK, including the Medical Cannabis Clinicians Society (MCCS), Sativa Learning, and medical cannabis private clinics such as Medisonal or Sapphire Medical. When evaluating the impact of training on HCPs' prescribing practices, it is essential to acknowledge the variability of available education. For instance, courses can range from introductory, such as the 3-hour "Medical Cannabis Explained: Become a Confident Prescriber" webinar, to more advanced options, such as the 20-module "Medical Cannabis Course for Medical Professionals," both offered by MCCS, or the "Advanced Medical Cannabis Training," which spans over 40 hours, provided by Lyphe Group. In the current study, we did not specifically investigate the type or duration of training received by participants. However, it is imperative to recognize that these factors may significantly influence HCPs' understanding, perceptions, and attitudes towards medical cannabis prescribing. It is worth emphasizing that the study only assessed perceived knowledge, rather than actual knowledge, of medical cannabis, making the association with the effect of training indirect. However, a previous study from 2022 conducted in the United States found that perceived knowledge predicted actual knowledge in 244 physicians (Kruger et al., 2022). Future research in this field should prioritize examining the types of courses undertaken, their duration, content, and the accreditation status of providers. Additionally, researchers should develop and utilize tools to measure actual medical cannabis knowledge.

Regarding training impact on medical cannabis prescribing, participants did not significantly differ on most concerns. 'Financial cost' emerged as the primary concern for both groups of professionals regarding the delivery of medical cannabis, followed by 'barriers to prescription'. This aligns with NHS' reported views around barriers to accessing CBMPs on an NHS prescription (NHS England, 2019). According to the NHS report, both clinicians and the

public indicated that in the case of clinical agreement for the prescription of a CBMP, the next primary obstacle is the cost of the product and the availability of funding. Similarly, American oncology clinicians reported 'perceived cost' as the biggest barrier to enrolling patients to a medical cannabis program, followed by 'inadequate research' (Zylla et al., 2018).

In addition, NHS Trusts emphasized that although funding played a role in their decision-making process, the predominant factor influencing the prescription decision was the absence of substantial clinical evidence supporting the use of CBMPs (NHS England, 2019). In contrast, in the present sample, the 'lack of evidence of efficacy' was not the primary concern regarding the delivery of medical cannabis. Notably, a significant difference was observed ($p < .05$) in relation to this issue, with only 15% of trained professionals considering it a concern, compared to 47% of untrained professionals. This suggests that training is associated with a reduced perception of insufficient evidence of efficacy among HCPs, and might also suggest that trained providers have a different conceptualization of what "evidence" equates to in the context of medical cannabis research and knowledge (e.g. being less concerned about a lack of RCTs). The perception of insufficient evidence among untrained professionals can be partly explained by their heavy reliance on a standardized form of evidence used in pharmacological research and favored by UK guidelines, particularly RCTs. Despite the limited availability and limitations of RCTs in research on CBMPs, HCPs could rely on an increasing body of real-world evidence (RWE) which 'encompasses all forms of clinical data collected on patients outside of the traditional RCT setting' (Schlag et al., 2022, p. 4). With recent technological advances in the area of real-time data collection (e.g., biosensors, wearable technologies), professionals can get a better understanding of illness trajectories and approximations about the use and effects of medicines, enabling the trial of novel treatments at lower costs. Additionally, both trained and untrained professionals expressed similar levels of concern about the lack of access to information on medical cannabis. Many medical professionals have expressed a desire for increased educational materials regarding medical cannabis, such as programs or its inclusion in the medical school curriculum (Gardiner et al., 2019).

In the current sample, no significant differences were observed between trained and untrained individuals in terms of their attitudes towards personal use or their social circle use of medical or recreational cannabis. In addition, training status did not have an impact on attitudes towards legalization of medical or recreational cannabis.

One limitation of the current study is the use of the overarching term 'medical cannabis' which encompasses a wide variety of forms and concentrations of active ingredients. Future research should differentiate between licensed, unlicensed, and plant-based products, as well as their concentrations, to gain better understanding of HCPs perceptions related to different types of medical cannabis, and their prescribing practices. Another limitation of the current study was the small sample size and low response rate (14.4%). Similar participation rates in the UK HCP population have been reported in a study that established a questionnaire on healthcare professionals' knowledge and attitudes towards cannabis across Europe (Jouanjus et al., 2021). Another significant limitation was that the majority of respondents were trained in and able to prescribe medical cannabis, which is not representative of the wider population of prescribing professionals (Kowalski, 2022). This could be evidence of potential selection bias, with professionals who had training and positive prescribing experience being more interested in the study and more likely to participate. It's also possible that those participants with no training might be motivated by more negative views of medicinal cannabis. Both forms of self-selection could create an enhanced gap between group responses. Furthermore, there was a significant

proportion of psychiatrists in the sample. This can be attributed to the distribution of the survey among HCPs in the Drug Science database, thereby introducing a selection bias that may restrict the generalizability of the findings to a broader population of HCPs. Future research endeavors should prioritize recruiting larger and more diverse samples to improve the representativeness of the findings. Finally, this is the first study to investigate these issues surrounding medical cannabis prescribing by HCPs in the UK, and as such, it did not use an established or recognized questionnaire. As an exploratory study, the survey was not rigorously developed but rather derived from discussions within the research team using existing knowledge. Therefore, the research has revealed some degree of clarity lacking in certain items, which will be addressed in future work.

The present study aimed to explore the perceived knowledge, attitudes and concerns of HCPs regarding medical cannabis prescribing. Training was significantly associated with increased perceived knowledge and confidence in prescribing medical cannabis. Financial costs and limited access to information are key barriers to medical cannabis prescribing. Addressing these concerns through comprehensive education, increased research, and improved affordability can help HCPs make informed decisions and increase patient access to medical cannabis. Notably, medical cannabis training was associated with decreased concern of 'lack of evidence of efficacy', emphasising the need to better elucidate HCPs' understanding and attitudes towards different types of medical evidence. Educating healthcare professionals about the diverse types of evidence available for assessing the therapeutic value of medical cannabis and the unique considerations associated with botanical products like cannabis could enhance their decision-making processes.

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