Exploring medicinal use of cannabis in a time of policy change in New Zealand

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ABSTRACT

AIMS: To explore patterns of medicinal cannabis use prior to implementation of the new Medicinal Cannabis Scheme (MCS) in New Zealand.

METHODS: An anonymous online convenience survey of 3,634 last-year medicinal users of cannabis promoted via Facebook™ from May to August 2019.

RESULTS: Fifty percent of the sample were female, 18% were Māori and the median age was 38 years. The medical conditions for which cannabis was most often used were pain (81%), sleep (66%) and mental health conditions (64%). Respondents perceived cannabis to be an effective therapy and reported reducing use of other pharmaceutical medicines. Fifty-two percent reported side effects from cannabis use, including increased appetite (29%), drowsiness (12%), eye irritation (11%), dependency (10%), memory impairment (10%) and lack of energy (9%). Smoking was the dominant route of administration. Nearly half (47%) had discussed their use of cannabis with a medical professional in the previous year, while 14% had requested a prescription and 5% accessed a prescribed cannabis-based product (mostly oral CBD).

CONCLUSION: Respondents self-medicated with cannabis to treat a wide range of health complaints. Only half discussed medicinal cannabis use with their medical professional, and a minority requested a prescription and used a prescribed cannabis-based product.

Despite limited scientific evidence for the medicinal benefits of cannabis (ie, double blind placebo-controlled trials[1,2]), a growing number of countries have facilitated greater legal access to cannabis and/or cannabis-based preparations for medicinal use, including Australia, UK, Canada, Germany, Israel, Netherlands and over half of US states.[3–6] Australia has recently made cannabis-based products legally available for medical patients, but only limited numbers of people have utilised the scheme to date, prompting a Senate inquiry into barriers to patient access.[7]

In December 2019, the New Zealand Ministry of Health (MOH) released regulations for the new Medicinal Cannabis Scheme (MSC), which will establish a domestic medical cannabis industry with cannabidiol (CBD) and tetrahydrocannabinol (THC) products available on prescription from general practitioners.[8] The new MCS regime became operational on 1 April 2020, with opening of the product applications assessment process by MOH.[9] Products brought within the regime must meet minimum quality standards as specified by MOH[10] (efficacy data does not need to be provided) and they must not be in a form intended for smoking (although dried cannabis flower intended for vaping is allowed). Therefore, products under the new MCS scheme can include tablets, capsules, oral liquids, lozenges, but not herbal cannabis for smoking.[10]

Since September 2017, medical practitioners have been allowed to prescribe products containing CBD without sign-off from the MOH. CBD products must contain no more than 2% of tetrahydrocannabinol and other psychoactive-related substances. In the first half of 2019, there were 2,504 prescriptions for CBD products (up from 2,130 for the entire year in 2018),[11] but the cost of imported products remains prohibitive. At the time of publication,

prescriptions for products that contain more than 2% THC still require a sign-off from the MOH (with the exception of Sativex which is a consented "approved" medicine, including for off-label use from 1 April 2020).[9] This is likely to change soon as new cannabis-based products will be brought within the scheme (following their assessment against new MCS quality standards). Since December 2018, patients in palliative care have been permitted to possess and use illicit cannabis for their own medical needs without the risk of being prosecuted.[12]

Largely due to the illegality of cannabis, understanding of how New Zealanders use and access cannabis for medicinal reasons remains highly fragmented. A recent survey of medicinal cannabis users in Australia found that patients self-medicate with illegal cannabis to treat a wide range of conditions, including anxiety (51%), back pain (50%), depression (49%) and sleep problems (44%).[13] In New Zealand, an estimated 5% of the population (aged 15 years+) used cannabis medicinally at the time of the New Zealand Health Survey 2013 (NZHS).[14] Medicinal cannabis users were more likely to be male, younger, Māori, less well-educated and poor. However, the NZHS only included a handful questions on medicinal cannabis use and consequently many aspects of medicinal cannabis use in New Zealand remain unexplored, including reasons for use, modes of administration, means of procurement, interaction with legal medicines, and experience of side-effects. In addition, it is important to explore the extent to which users are aware of recent policy changes and their intention to engage with the new regime.

The aim of this study was therefore to provide exploratory research on patterns of medicinal cannabis use in New Zealand during a period of changing policy.

Methods

An online convenience survey was undertaken of adults (16 years+) who self-report using cannabis or cannabis-based products for medicinal purpose in the last 12 months in New Zealand. The survey was conducted using Qualtrics™ software and could be completed on either a desktop computer or mobile device. The survey was promoted on Facebook™ from May to August 2019 via a paid promotional campaign targeting medicinal cannabis users in New Zealand aged 16 years and older. The URL link to the survey was also shared on Facebook forums dedicated to medicinal cannabis use. The survey preamble included a phone contact for the primary researcher providing an option to complete the survey over the phone (four participants chose to do so). The survey preamble defined “medicinal cannabis” as the “use of cannabis or cannabis-based products to treat a medical condition or alleviate a symptom”. The questionnaire was developed building on a number of other overseas surveys, including a recent Australian study.[13,15,16] Ethical approval for the study was obtained from the Massey University Human Ethics Committee (SOA 19/19).

A total of 3,847 respondents commenced the survey. Completed surveys were audited for consistency and extent of completion. Surveys where respondents did not progress beyond demographic questions (ie, a total of 185 surveys) were removed. Respondents who reported they had suffered from more than 15 health conditions (n=28) or were suffering from cancer but did not have a medical diagnosis for cancer (n=42) were reviewed in detail. Six surveys were subsequently removed during this process due to lack of consistency. A custom survey software solution was developed to convert computer IP addresses into a unique number that facilitated the identification of instances where multiple surveys were completed from the same device, or from outside the country, while ensuring respondent anonymity and avoiding storage of IP addresses. Twenty-two duplicate responses were identified and removed through this process. The final sample consisted of 3,634 respondents.

Measures and analysis

The survey consisted of nine modules: (1) demographics; (2) patterns of use (types of cannabis products, main and preferred route of administration; frequency and history of use); (3) medical conditions and symptoms for which cannabis is used (including conditions diagnosed by a health professional); (4) perceived effectiveness (rated on a seven-point Patient Global Impression of Change scale) and side effects; (6) sources of cannabis supply; (7) discussions with health providers; (8) use of other pharmaceuticals; and (9) knowledge and engagement with the MCS.

Table 1: Sample characteristics.

Age (n=3,634)	Mean: 39.3 (s.d. 15.2), Median: 38, range: 16–90	
Gender (n=3,613)	Male	48.4%
	Female	50%
	Gender diverse	1.6%
Ethnicity (n=3,557)	NZ European	75.9%
	Māori	17.8%
	Pacific	1.0%
	Asian	1.8%
	Middle Eastern/Latin American/African	1.5%
	Other	2.1%
Highest level of education (n=3,508)	None	1.4%
	Primary/intermediate	1.1%
	High school	31.1%
	Polytech/technical/trade school	38.3%
	University	27.9%
	Other	0.2%
Main occupation (n=3,514)	Work full-time (includes self-employed)	41.4%
	Work part-time (includes self-employed)	14.8%
	A student	9.3%
	Retired	6.8%
	On sickness benefit	17.3%
	Unemployed	4.3%
	Parenting/unpaid work	6.1%
Household's combined annual income (before tax) (n=2,519)	$20,000NZD or less	21.4%
	$20,001–30,000	13.3%
	$30,001–50,000	17.5%
	$50,001–70,000	15.8%
	$70,001–100,000	14.8%
	Over 100,0000	17.1%
Financial benefit related to medical condition (n=2,445)	None	72.4%
	Work and Income NZ, including:	19.5%
	Supported Living Payment	16.9%
	ACC payments	7.6%
	Private medical insurance payments	1.2%

Results

Demographics

Fifty percent of the sample were female, 48.4% male and 1.6% gender diverse (Table 1). The median age of respondents was 38 years. Seventy-six percent identified as New Zealanders of European descent and 17.8% as Māori. The majority were in full-time (41.4%) or part-time employment (14.8%), and a further 17.3% reported they were on a sickness benefit. Overall, 27.6% were receiving some financial benefit related to their medical condition. Over half the sample (52.2%) reported a combined annual household gross income of $50,000 NZD or less (Table 1).

Patterns of cannabis use for medicinal reasons

Participants had used cannabis for medicinal reasons for a median of five years (mean 10 years, s.d. 11 years, n=3,128). Approximately two-thirds of respondents

Table 2: Conditions treated with medicinal cannabis in the past 12 months and medical diagnoses.

Conditions for which cannabis is used	%	N	% diagnosed by a health professional	% seeing a doctor for this health condition
Pain conditions	**80.9**	**2,338**	**78.9**	**60.4**
Back pain	45.6	1,371	80.1	56.6
Headaches (including migraines)	29.5	885	65.5	50.0
Neck pain	28.8	864	70.9	53.7
Arthritis (including rheumatoid or osteoarthritis)	24.0	720	83.1	63.0
Neuropathic pain (nerve pain)	20.3	609	85.4	68.1
Fibromyalgia	9.8	295	86.9	76.2
Gynaecological pain	8.6	257	80.7	61.3
Spinal cord injury	6.7	200	93.3	76.9
Cancer-related pain	2.8	84	82.9	72.0
Complex regional pain syndrome	0.7	21	95.0	100.0
Other chronic non-cancer pain	11.3	339	89.8	71.1
Sleep conditions	**65.9**	**1,906**	**49.3**	**37.4**
Insomnia (any type)	54.8	1,647	49.1	37.3
Sleep-related movement disorder (eg, restless leg syndrome)	11.5	344	45.5	33.3
Parasomnias (eg, sleep walking, nightmares)	4.8	143	41.4	32.4
Sleep apnoea or other sleep-related breathing disorder	4.4	133	65.6	45.7
Narcolepsy or other hypersomnia	0.5	16	46.7	60.0
Other sleep disorder	3.2	97	55.3	45.7
Mental health and substance use disorders	**64.0**	**1,851**	**78.3**	**55.8**
Anxiety disorder (eg, generalised anxiety, panic disorder, OCD)	45.5	1,367	79.1	60.4

Table 2: Conditions treated with medicinal cannabis in the past 12 months and medical diagnoses (continued).

Depression	41.9	1,259	86.0	61.2
Post-traumatic stress disorder	22.2	668	82.8	59.5
Addiction (including alcohol, opioids, amphetamine)	8.5	255	49.6	28.7
Attention deficit disorder (ADHD)	8.3	248	76.8	37.8
Eating disorders (eg, anorexia/bulimia/obesity)	7.9	237	54.1	32.9
Bipolar disorder	4.6	137	73.7	56.7
Schizophrenia or other psychosis	1.6	49	85.4	62.5
Borderline personality disorder	0.9	27	96.3	74.1
Other mental health condition	1.6	47	62.2	55.6
Gastrointestinal conditions	**17.1**	**494**	**85.4**	**65.5**
Irritable bowel syndrome	12.3	368	83.7	58.4
Crohn's disease	1.7	51	82.0	82.0
Ulcerative colitis	1.2	36	91.7	80.6
Diverticulitis	0.5	14	100.0	78.6
Other gastro-intestinal conditions	2.9	88	89.7	77.4
Neurological conditions	**12.2**	**352**	**82.4**	**68.4**
Epilepsy/seizure disorder	3.3	99	94.8	84.7
Autism	2.8	85	70.2	38.1
Multiple sclerosis	1.2	35	97.1	97.1
Glaucoma	0.8	23	65.2	52.2
Brain injury	0.6	19	88.9	77.8
Parkinson's disease	0.6	18	66.7	66.7
Tourette's syndrome	0.4	11	72.7	27.3
Dementia (including Alzheimer's)	0.3	8	62.5	50.0
Huntington's disease	0.1	2	0.0	0.0
Other neurological condition	2.7	80	86.1	79.7
Cancers	**6.7**	**195**	**78.8**	**74.2**
Skin cancers (melanoma)	1.4	43	76.7	62.8
Gastrointestinal cancer (bowel, colon, stomach, pancreatic)	1.2	36	51.5	48.5
Breast cancer	1.0	30	90.0	79.3
Blood cancers (leukaemia, lymphoma, myeloma)	0.5	16	75.0	81.2
Brain cancers (glioblastoma, neuroblastoma, mesothelioma)	0.6	17	76.5	81.2
Lung cancer	0.5	14	92.9	92.9
Other forms of cancer	2.0	59	88.1	86.2

Table 2: Conditions treated with medicinal cannabis in the past 12 months and medical diagnoses (continued).

Other conditions	**29.8**	**861**	**86.9**	**72.9**
Skin condition (eg, eczema, psoriasis, dermatitis)	10.8	323	79.4	55.1
Auto-immune condition (eg, SLE, chronic fatigue disorder)	9.4	282	87.2	80.8
Gynaecological condition (eg, endometriosis, PMS)	5.5	166	89.0	76.4
Respiratory disease (eg, asthma, cystic fibrosis)	4.5	135	93.8	80.8
Cardiovascular condition (eg, poor circulation, ischaemic heart disease)	2.7	81	86.8	80.3
Diabetes mellitus	2.0	59	96.6	91.2
Infectious disease (eg, viral hepatitis)	0.8	24	100.0	79.2
AIDS/HIV	0.3	9	88.9	66.7
Other condition	3.1	94	89.2	73.9

(68.5%) reported daily or near daily use of cannabis for medicinal purposes, a further 17.5% used it "once or twice per week", and 9.6% "once or twice a month" (n=3,240). A median twice-daily frequency of administration was reported.

Medical conditions and symptoms

Participants were asked to select all the medical conditions and symptoms for which they had used cannabis from structured lists. The condition groups for which cannabis was used most often were: pain (80.9% of respondents used cannabis for at least one pain condition), sleep (65.9%) and mental health conditions (64.0%), followed by gastrointestinal (17.1%) and neurological (12.2%) conditions and cancers (6.7%) (Table 2).

Participants reported the highest rates of medical diagnoses for gastrointestinal conditions (85.4%) and neurological conditions (82.4%), and the lowest for sleep disorders (49.3%).

History of medicinal cannabis use

Nearly half the participants (47.2%) were using cannabis recreationally at the time they started using it for medicinal reasons. A further 38.4% had tried cannabis before using it medically but never used it regularly, and 14.5% had never used cannabis recreationally (n=3,228). Nearly 60% (58.5%) reported that, in addition to their medicinal use, they had also used cannabis for recreational reasons in the past year.

Reasons for changing levels of medicinal cannabis use

Most respondents (54.5%) reported their use of cannabis for medicinal reasons had not changed in the last year. One in four (25.6%) reported a decrease in medicinal use of cannabis, including 5.7% who completely stopped (n=3,224). The main reasons for stopping or reducing cannabis use for medicinal reasons were participants' concerns over related "legal risks", "improvement of the health complaint", financial cost or inability to find a supplier (Table 3). The leading reasons for using more medicinal cannabis were: "like effect on my wellbeing", "in order to reduce use of other medicines" and "need more to get relief from symptoms" (Table 3).

Modes of administration

Smoking was the most common way of administering cannabis for medicinal reasons: in the last year 66.3% of participants smoked cannabis in a joint; 53.2% smoked cannabis through a water pipe or bong; 48.4% smoked cannabis through a dry pipe. This was followed by eating cannabis in baked edibles (48.4%), taking cannabis by mouth as a tincture or oil (32.9%), vaping (31.5%) and topical application (29.5%) (n=3,588). Respondents were asked to identify the main way they used cannabis in the past 12 months and the most preferred way they would like to use it (if they could

Table 3: Reasons for stopping, reducing or using more cannabis for medicinal reasons during past 12 months (multiple responses permitted).

Reasons for stopping medicinal use of cannabis (n=183)	
Worried about legal risks	34.3%
Unable to find the supply	27.4%
Can't afford it	24.6%
No longer suffer from health complaint/health complaint improved	17.1%
Don't like the side effects	13.7%
Don't like the psychoactive aspect	8.6%
I use other medicines now	5.7%
It never worked	8.6%
Reasons for reducing use (n=643)	
Worried about legal risks	34.5%
Health complaint improved	33.6%
Can't afford it	33.1%
Unable to find supply	32%
Don't like the side effects	5.2%
Don't like the psychoactive aspect	5.0%
I use other medicines now	3.9%
It doesn't work well	2.4%
Reasons for using more (n=641)	
Like the effect on my wellbeing	46.2%
To reduce use of other medicines	44.6%
Need more to get relief from symptoms	42.8%
Found reliable supply	32.2%
Condition is worse and I need more	31.4%
Can afford more now	15.1%
Found a health professional who prescribes	3.2%

access any form). Both response categories were topped by smoking cannabis through a water pipe (Figure 1).

Perceived effectiveness of medicinal cannabis

Participants overwhelmingly believed their symptoms had improved since starting to use cannabis for medicinal reasons. Seizures received the highest scores for perceived improvement (ie, 97.2% who suffered from seizures reported their symptoms had improved) (Figure 2).

Interaction with legal medicines

Eighty-nine percent of participants reported using pharmaceutical medications to treat their health condition(s) in addition to using cannabis. The pharmaceutical drugs used most often included: NSAIDs (eg, ibuprofen) and paracetamol (70.5%); opioids (55.5%), antidepressants (46.5%) and benzodiazepines (34.6%) (n=2,841). High rates of substituting pharmaceutical medicines with cannabis were reported, particularly for opioids: 95% of those who

Figure 1: Main route of cannabis administration during the past 12 months and preferred way.

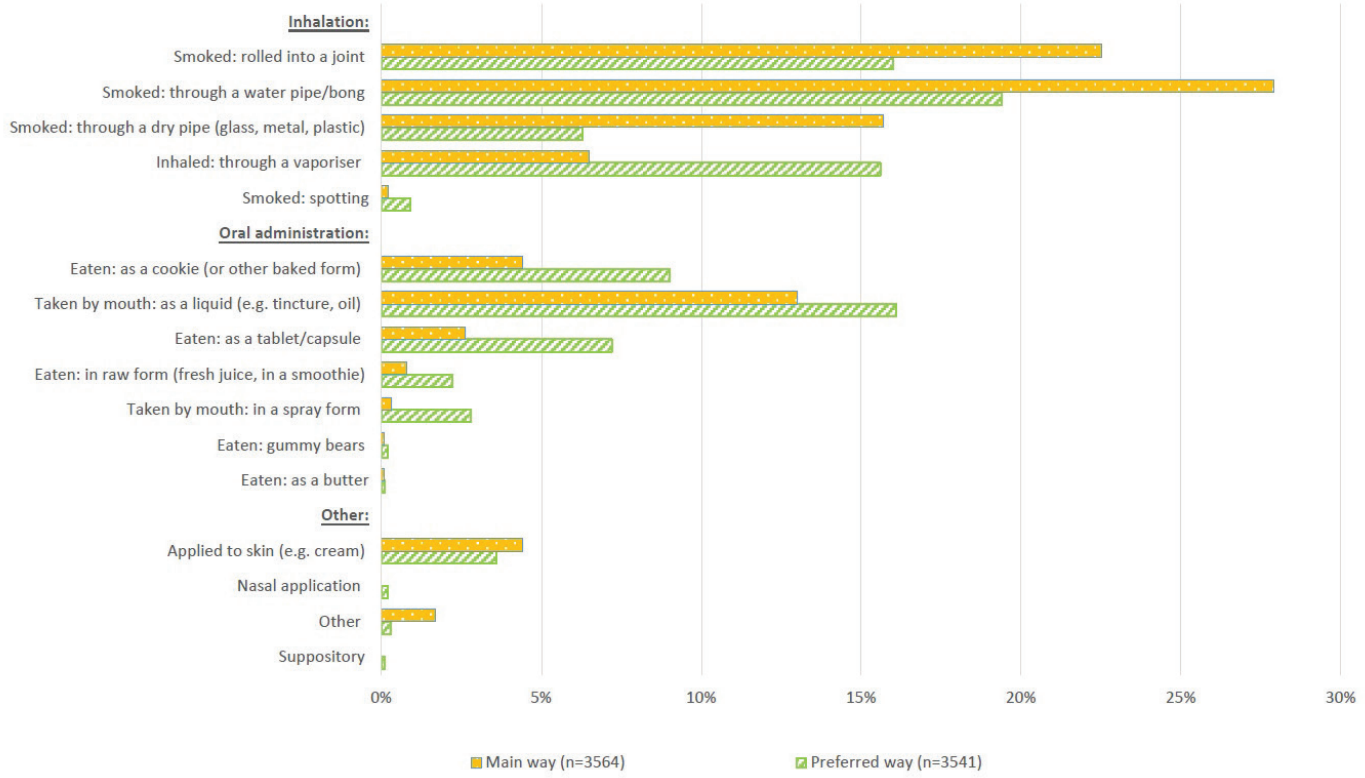


Figure 2: Perceived impact of medicinal cannabis use on the severity of symptoms assessed using Patient Global Impression of Change scale.

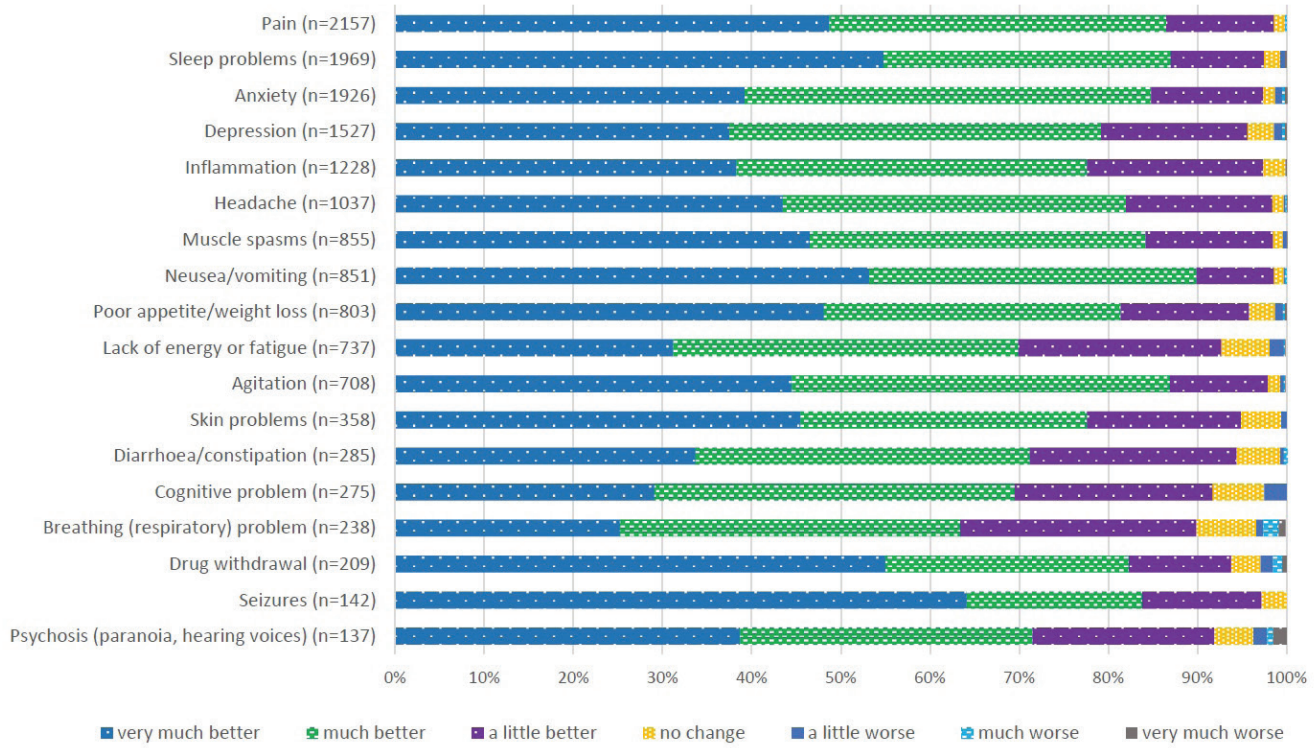
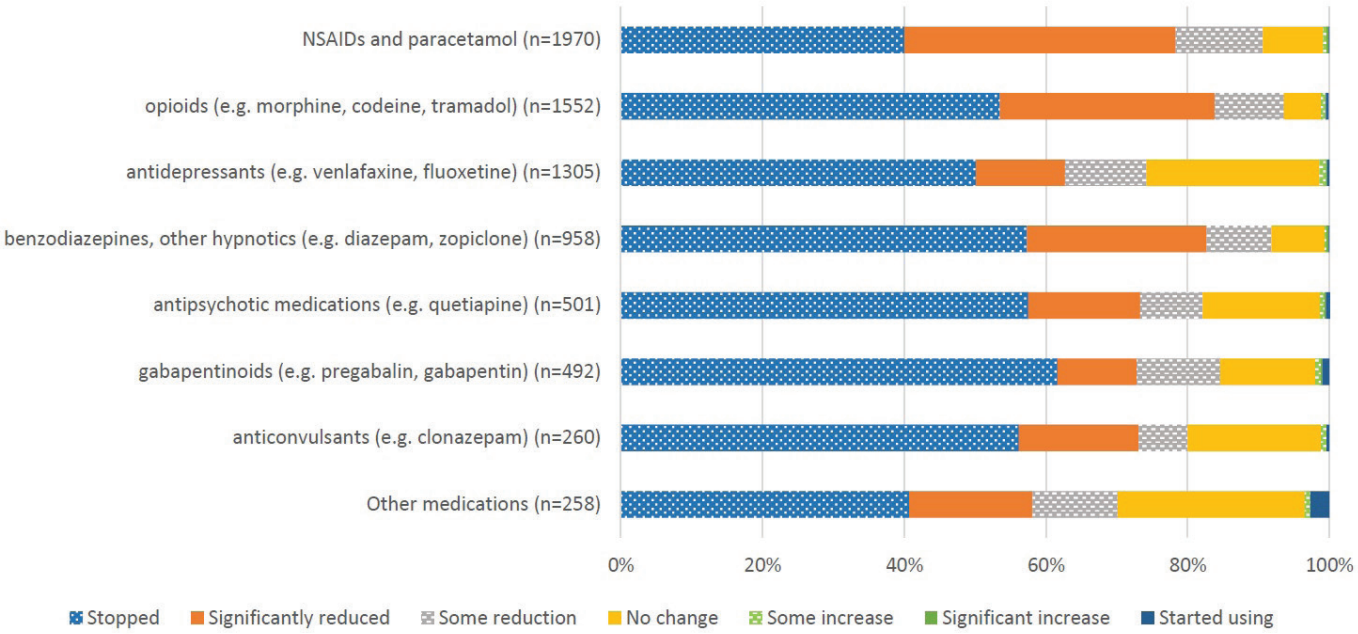


Figure 3: Self-reported change in use of non-cannabinoid pharmaceutical medicines due to use of cannabis for medicinal reasons.



used opioid medications reported reducing their opioid dose since using medicinal cannabis, including 53% who stopped opioid treatment completely (Figure 3).

Side effects

Approximately half the respondents (51.8%) experienced side effects from their use of cannabis in the past 12 months. The most common side effects were increased appetite (29.2%), drowsiness (11.6%), eye irritation (11.1%), craving for cannabis (dependency) (10.4%) and memory impairment (10.3%). A minority reported psychological problems including anxiety (6.4%), paranoia (4.1%), confusion (3.8%) and "depressed mood" (3.1%) (Table 4). Those who experienced side effects reported a median of two side effects in the past year.

Access and the cost of cannabis therapy

The majority of respondents (51.4%) reported accessing medicinal cannabis from multiple sources. The main method of access was by purchase from a drug dealer (27.7%), followed by home-growing (12.6%), buying from friends and family (12.2%,) and gifts from friends or family (10.0%). Only 4.7% of respondents reported accessing cannabis via prescription (Figure 4).

Participants spent an average $305NZD (median $217) on medicinal cannabis supply per month. Over a quarter (27.7%) received all their medicinal cannabis supply for free (ie, by growing their own or as gifts from friends or family) (n=3,074). Those who accessed legal cannabis via prescription reported an average monthly spend on prescribed products of $656 NZD (median $350).

Discussions with health providers

Nearly two-thirds of respondents (63.5%) had discussed their use of cannabis for medicinal reasons with a health provider, and nearly half of the sample (46.6%) had done so in the past year (n=2,810). GPs were most commonly consulted (89.8%), followed by specialist doctors (45.5%), counsellors or psychologists (39.2%), nurses (21.8%), alternative health providers (21%) and pharmacists (11.1%) (n=1,770).

Fourteen percent (14.1%) of participants requested a prescription for a medical cannabis product in the past year and 4.9% had been prescribed a medical cannabis product. The top three prescribed cannabis products were: Tilray CBD100™ (43%), Tilray CBD25™ (31%) and Sativex (18%). Participants who did not ask for a prescription (85.9%) were asked about reasons for not

Table 4: Side effects from use of medicinal cannabis experienced in the past 12 months (n=2,639, multiple responses were allowed unless the "no side effects" response was chosen).

	%
No side effects	48.2%
Increased appetite	29.2%
Drowsiness	11.6%
Eye irritation	11.1%
Craving for cannabis (dependency)	10.4%
Memory impairment	10.3%
Lack of energy or fatigue	8.9%
Respiratory complaints (eg, cough)	8.7%
Anxiety	6.4%
Racing heart	4.7%
Paranoia	4.1%
Confusion	3.8%
Decreased appetite	3.7%
Dizziness	3.6%
Depressed mood	3.1%
Sweating	3.4%
Sleep disturbance	3.1%
Headaches	2.6%
Panic attack	1.5%
Nausea and/or vomiting	1.4%
Shaking	1.4%
Constipation	1.2%
Diarrhoea	1.2%
Hallucinations	1.2%
Other	1.2%

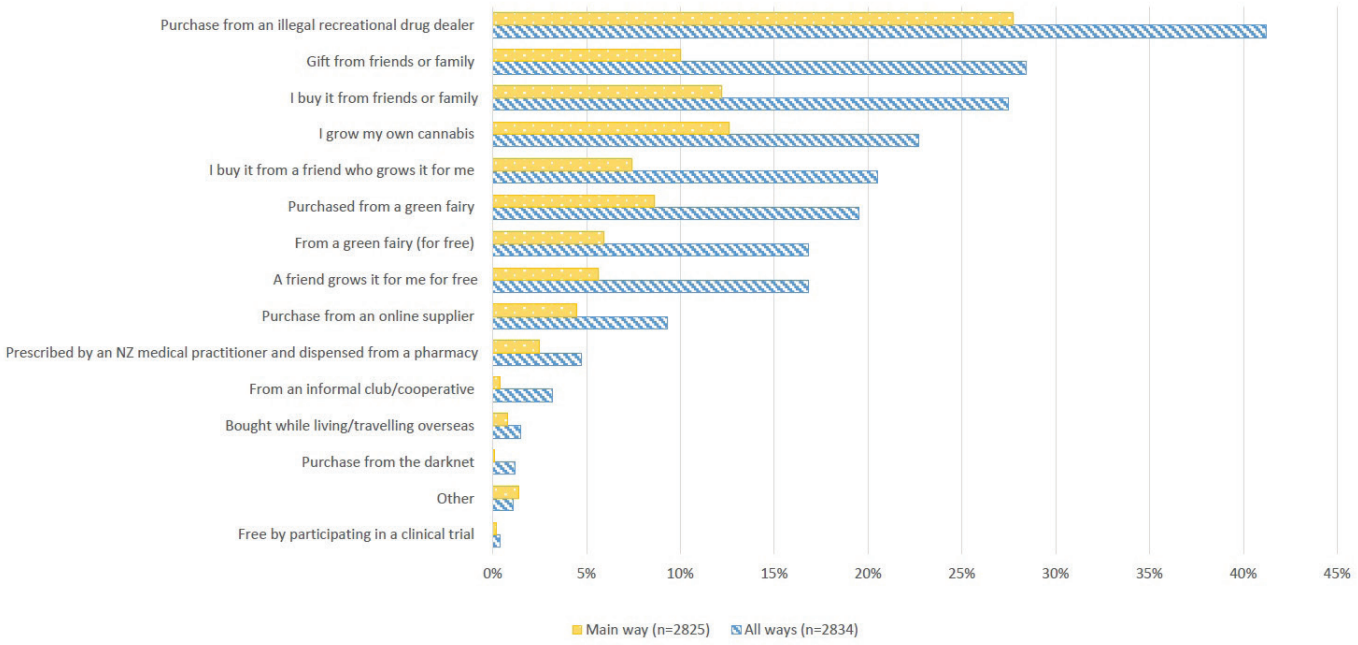
doing so. The main reasons given were lack of faith that the health provider would prescribe a cannabis product (40.8%), the bureaucracy involved in access (39.8%) and unaffordable prices (36.2%) (Table 5).

Anticipated engagement with future regime and preferred legal access

Participants were asked if they were aware of the new Medicinal Cannabis Scheme being developed at the time of data collection. Three quarters (78.2%) were aware of the regime and around two-thirds of those (66%) said they were "likely" or "very likely" to use it. Those who did not intend to engage with the new scheme most often explained their position in terms of the anticipated high financial cost of accessing products (Table 5).

Asked to choose their preferred way of accessing medicinal cannabis in a legal regime, most participants indicated home-growing (77.7%) and purchase from a licensed dispensary (73.9%) (n=2,573,

Figure 4: Ways of accessing medicinal cannabis in the past 12 months.



multiple responses permitted). Less popular were social supply arrangements (ie, "buying from a green fairy or a friend", 40.9%) and access from a pharmacy on prescription (as proposed under the Medicinal Cannabis Scheme) (39.1%).

Discussion

Consistent with similar research overseas[13,15,17] we found that cannabis is used to treat a wide range of health complaints, with most users taking it to manage pain, anxiety, depression and sleeping problems. Cannabis use has been associated with mental health problems, including depression,[18] and consequently the level of using cannabis to medicate these disorders reported in our survey indicates the need for further research to determine efficacy and best practice.

Smoking was the most common way of administering cannabis in our sample, reflecting the fact that cannabis flower is currently the most common form available on the black market. Smoking cannabis exposes users to respiratory health risks, which could be addressed if the new MCS succeeds in encouraging users' transition to other forms, including oral administration. Cannabis users in our survey were cognisant of alternative delivery methods that minimise respiratory damage, including oral administration and vaping cannabis. Vaping can potentially reduce respiratory harms from smoking,[19,20] but safety may vary depending on the vaping method[21] and the long-term effects of cannabis vaping have not been studied.

Despite some relaxation in access to cannabis-based products in New Zealand in the last two years, only 14% of this survey sample had asked their health professional for a prescription for a cannabis-based product, and only 5% received a prescription. Medicinal cannabis users noted the barriers of price and the limited range of cannabis-based products available on prescription, something the new MCS aims to address. However, many respondents also explained they were reluctant to ask for a prescription due to the fear of being judged. As reported by our respondents, only one in three patient requests for a cannabis prescription were successful.

Table 5: Reasons for not asking for a prescription and intention not to engage in the Medicinal Cannabis Scheme (multiple responses permitted).

Why not asked for a prescription for cannabis-based product? (n=2,402)	**%**
I think my provider wouldn't prescribe	40.8%
Process too bureaucratic	39.8%
The current products are not affordable	36.2%
Because I was scared of being judged	34.0%
I wasn't aware that cannabis-based products are available on prescription	33.3%
I am happy with my current supply arrangements	26.8%
The range of products is too limited	24.4%
I don't believe that private industry should profit from my use of cannabis for medicinal reasons	18.2%
I prefer to grow my own	16.7%
I am worried about the use of pesticides and other chemicals in factory produced cannabis	16.4%
Other reasons	4.4%
Why not intending to engage with the new Medicinal Cannabis Scheme? (n=351)	
I don't believe that the products will be affordable enough	56.4%
I don't believe prescriptions will be easy to obtain	48.8%
I am happy with my current supply arrangements	43.9%
I prefer to grow my own	39.4%
I don't believe that private industry should profit from my use of cannabis for medicinal reasons	32.7%
I am worried about the use of pesticides and other chemicals in factory-produced cannabis	32.1%
Other	7.0%

This is in line with other recent New Zealand research where approximately two out of three surveyed GPs did not prescribe a cannabis-based product at the time of patient request.[22] Under the planned reforms there is currently no list of eligible conditions and the decision about prescribing is left to treating clinicians.

The MCS will not require efficacy data (unlike for standard medicines). The scarcity of high-quality evidence for cannabis therapy in specific conditions has been a major challenge in implementing medical cannabis schemes overseas.[23] Our survey shows a clear discord between user-reported experiences with a range of conditions and symptoms and the existing medical evidence. Based on the currently available studies, there is a reasonable level of evidence that medical-quality cannabis preparations and cannabinoids help reduce symptoms of epilepsy, nausea and vomiting.[24,25] Cannabinoids are superior to placebo for chronic pain, but only marginally so, and the recent systematic review of controlled trials and observational studies concluded that the evidence for effectiveness of cannabinoids in chronic non-cancer pain remains "limited".[26] The evidence for effectiveness of cannabinoids for the treatment of mental disorders also remains scarce.[27,28] CBD has been found to reduce anxiety symptoms at the time of a stressful events[29] but larger studies are needed to verify its usefulness in the treatment of social anxiety disorder. Overall, medical research on cannabis is in its early stages and more evidence will be available in the coming years.

The high efficacy scores reported in our survey may reflect sampling bias (those having positive experiences being more likely to participate in the survey) and a placebo effect. Many participants also reported reducing or stopping their use of other pharmaceutical drugs, and the improvement in symptoms may be due to the reduction of side effects from pharmaceutical drugs or negative interactions between different pharmaceuticals. On the other hand, the positive therapeutic benefits of the pharmaceutical medicines would also be lost, complicating this explanation. The interaction of medicinal cannabis with traditional pharmaceutical medicines deserves further study. Some American studies have found reduced opioid overdose deaths in US states with medical cannabis programmes.[30]

Despite the limited engagement of medicinal cannabis users with the current legal access route, most respondents indicated their willingness to engage with the new MSC. The legality and consistency of legal products may encourage the transition from unofficial sources of supply to legal supply, but the availability of potentially cheaper cannabis from the black market will also provide an alternative if administrative barriers are high.[31] Finally, the legalisation of cannabis for recreational use, pending results of the September 2020 referendum, may also provide an alternative way of supply, with the convenience of price and access but at the expense of medical oversight.

A challenge in studying medicinal cannabis use lies in the blurred boundary between medical, therapeutic and recreational uses of cannabis. Like other studies,[32,33] including previous analysis of New Zealand Health Survey data,[14] we found a significant proportion of medicinal cannabis users also use cannabis recreationally.

Limitations

The study has a number of important limitations. As outlined, the survey was a convenience sample, and consequently is not representative of the medicinal cannabis user population in New Zealand. At the very least, our recruitment strategy is likely to be biased towards Facebook™ users. New Zealand has a high level of digital engagement by international standards.[34] For example, 2.3 million New Zealanders log on to Facebook™ every day (from a total population of 4.8 million).[35] Further, the challenges and costs of recruiting a representative sample of a small hidden population of medicinal cannabis users are likely to be high.[36] Representative household surveys also have their own issues, including low response rates, particularly with regard to hard-to-reach, stigmatised populations.

Our online sample broadly resembles the demographic profile of the New Zealand population. For example, 50% of our online sample were female, 18% Māori and 76% European (as compared to the wider New Zealand population at the 2018 Census, of whom 17% were Māori and 70% European[37]). Our online sample included lower proportions of Asian people (<2%) compared to the Census (where 15% identify with at least one Asian ethnicity).[37,38] The online survey sample were more likely to have university qualifications compared to the national 2018 Census (28% had a university degree compared to 23% in the Census[38]). Furthermore, employment was lower in the online survey than in the general population (ie, 56% of the online sample was in full-time or part-time employment vs 65% employment according to the 2018 Census data). Support from a government benefit was also more common in our online sample, eg, 17% of the sample were receiving Supported Living Payments (compared to 2–3% estimates for the New Zealand population[38,39]). It is unclear the extent to which these differences represent specific characteristics of medicinal cannabis users or the consequences of the online convenience sample recruitment.

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REFERENCES:

1. Newton-Howes G, McBride S. Medicinal cannabis: moving the debate forward. N Z Med J. 2016; 129(1445):103–9.
2. Wilkins C. The case for medicinal cannabis: where there is smoke there may well be fire. N Z Med J. 2016; 129(1445):11–4.
3. Belackova V, Shanahan M, Ritter A. Mapping regulatory models for medicinal cannabis: a matrix of options. Aust Health Rev. 2017:
4. Klieger SB, Gutman A, Allen L, et al. Mapping medical marijuana: state laws regulating patients, product safety, supply chains and dispensaries, 2017. Addiction. 2017; 112(12):2206–16
5. Abuhasira R, Shbiro L, Landschaft Y. Medical use of cannabis and cannabinoids containing products - Regulations in Europe and North America. Eur J Intern Med. 2018; 49:2–6
6. Case P. The NICE Guideline on Medicinal Cannabis: Keeping Pandora's Box Shut Tight? Medical Law Review. 2020; doi:10.1093/medlaw/fwaa002
7. Senate Community Affairs References Committee. Current barriers to patient access to medicinal cannabis in Australia. 2020. http://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Community_Affairs/Medicinalcannabis/Report
8. New Zealand Government. Misuse of Drugs (Medicinal Cannabis) Regulations 2019. 2019. http://www.legislation.govt.nz/regulation/public/2019/0321/latest/LMS285243.html
9. Ministry of Health. Medicinal Cannabis Agency - Information for health professionals. 2020. http://www.health.govt.nz/our-work/regulation-health-and-disability-system/medicinal-cannabis-agency/medicinal-cannabis-agency-information-health-professionals
10. Ministry of Health. Medicinal Cannabis Agency - Minimum quality standards. 2020. http://www.health.govt.nz/our-work/regulation-health-and-disability-system/medicinal-cannabis-agency/medicinal-cannabis-agency-information-industry/medicinal-cannabis-agency-working-medicinal-cannabis/medicinal-cannabis-agency-minimum-quality-standard
11. Ministry of Health. Impact Statement: the Medicinal Cannabis Scheme. 2019. http://www.health.govt.nz/system/files/documents/information-release/medicinal_cannabis_scheme_impact_assessment-10dec19.pdf
12. Health Committee. Misuse of Drugs (Medicinal

Cannabis) Amendment Bill. Report of the Health Committee. July 2018. 2018. http://www.parliament.nz/resource/en-NZ/SCR_78856/c8e00c5ea12f9ae59420e76d94c4d-d32a5b8c840

13. Lintzeris N, Driels J, Elias N, et al. Medicinal cannabis in Australia, 2016: the Cannabis as a Medicine Survey (CAMS-16). Med J Aust. 2018; 209(5):211–6.
14. Pledger M, Martin G, Cumming J. New Zealand Health Survey 2012/13: characteristics of medicinal cannabis users. N Z Med J. 2016; 129(1433):25–36.
15. Sexton M, Cuttler C, Finnell JS, Mischley LK. A Cross-Sectional Survey of Medical Cannabis Users: Patterns of Use and Perceived Efficacy. Cannabis Cannabinoid Res. 2016; 1(1):131–8.
16. Hazekamp A, Ware MA, Muller-Vahl KR, et al. The Medicinal Use of Cannabis and Cannabinoids—An International Cross-Sectional Survey on Administration Forms. J Psychoactive Drugs. 2013; 45(3):199–210.
17. Kosiba JD, Maisto SA, Ditre JW. Patient-reported use of medical cannabis for pain, anxiety, and depression symptoms: Systematic review and meta-analysis. Soc Sci Med. 2019; 233:181–92.
18. Fergusson DM, Boden JM, Horwood LJ. Psychosocial sequelae of cannabis use and implications for policy: findings from the Christchurch Health and Development Study. Soc Psychiatry Psychiatr Epidemiol. 2015; 50(9):1317–26.
19. Abrams DI, Vizoso HP, Shade SB, et al. Vaporization as a smokeless cannabis delivery system: a pilot study. Clin Pharmacol Ther. 2007; 82(5):572–8.
20. Van Dam NT, Earleywine M. Pulmonary function in cannabis users: Support for a clinical trial of the vaporizer. Int J Drug Policy. 2010; 21(6):511–3.
21. Borodovsky JT, Cavazos-Rehg PA, Bierut LJ, Grucza RA. Cannabis vaping and health: regulatory considerations. Addiction. 2020; 115(3):587–8.
22. Oldfield K, Braithwaite I, Beasley R, et al. Medical cannabis: knowledge and expectations in a cohort of North Island New Zealand general practitioners. N Z Med J. 2020; 133:
23. Hall W, Stjepanović D, Caulkins J, et al. Public health implications of legalising the production and sale of cannabis for medicinal and recreational use. Lancet. 2019; 394(10208):1580–90.
24. Whiting PF, Wolff RF, Deshpande S, et al. Cannabinoids for medical use: A systematic review and meta-analysis. JAMA. 2015; 313(24):2456–73.
25. National Academies of Sciences EaM. The Health Effects of Cannabis and Cannabinoids: The Current State of Evidence and Recommendations for Research. Washington, DC: The National Academies Press; 2017.
26. Stockings E, Campbell G, Hall WD, et al. Cannabis and cannabinoids for the treatment of people with chronic noncancer pain conditions: a systematic review and meta-analysis of controlled and observational studies. Pain. 2018; 159(10):1932–54.
27. Black N, Campbell G, Tran LT, et al. Cannabinoids for the treatment of mental disorders - Author's reply. Lancet Psychiatry. 2020; 7(2):127–8.
28. Black N, Stockings E, Campbell G, et al. Cannabinoids for the treatment of mental disorders and symptoms of mental disorders: a systematic review and meta-analysis. Lancet Psychiatry. 2019; 6(12):995–1010.
29. Bergamaschi MM, Queiroz RHC, Chagas MHN, et al. Cannabidiol Reduces the Anxiety Induced by Simulated Public Speaking in Treatment-Naïve Social Phobia Patients. Neuropsychopharmacology. 2011; 36(6):1219–26.
30. Hasin DS. US Epidemiology of Cannabis Use and Associated Problems. Neuropsychopharmacology. 2018; 43(1):195–212.
31. Rychert M, Wilkins C, Noller G. Medicinal Cannabis Scheme in New Zealand: lessons from international experience and our own recent drug policy reform setbacks. N Z Med J. 2019; 132(1503):8–12.
32. Hakkarainen P, Decorte T, Sznitman S, et al. Examining the blurred boundaries between medical and recreational cannabis – results from an international study of small-scale cannabis cultivators. Drugs: Education, Prevention and Policy. 2019; 26(3):250–8.
33. Pedersen W, Sandberg S. The medicalisation of revolt: a sociological analysis of medical cannabis users. Sociol Health Illn. 2013; 35(1):17–32.
34. Statistics NZ. Internet Service Provider Survey 2018. 2018. http://www.stats.govt.nz/information-releases/internet-service-provider-survey-2018
35. Fyers A, Cooke H. Facebook is New Zealand's second-fa-

vourite leisure activity. 2017. http://www.stuff.co.nz/technology/90005751/how-many-kiwis-are-on-facebook

36. Barratt MJ, Potter GR, Wouters M, et al. Lessons from conducting trans-national Internet-mediated participatory research with hidden populations of cannabis cultivators. Int J Drug Policy. 2015; 26(3):238–49.

37. Stats NZ. New Zealand's population reflects growing diversity. 2019. http://www.stats.govt.nz/news/new-zealands-population-reflects-growing-diversity

38. Census NZ. 2018 Census totals by topic – national highlights (data file). 2019. http://www.stats.govt.nz/information-releases/2018-census-totals-by-topic-national-highlights

39. Ministry of Social Development. Supported Living Payment - December 2019 quarter. 2020. http://www.msd.govt.nz/about-msd-and-our-work/publications-resources/statistics/benefit/latest-quarterly-results/supported-living-payment.html