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ORIGINAL ARTICLE

Cannabis use, dependence and withdrawal in indigenous male inmates

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Abstract

Background: No studies have investigated cannabis withdrawal in indigenous or incarcerated populations, and there is currently no standard treatment for cannabis withdrawal in Australian prisons.

Aims: This cross sectional survey examines cannabis use, dependence and involuntary (abrupt cessation) withdrawal in incarcerated indigenous males for the purpose of improving clinical management.

Methods: 101 consenting inmates (18–40 years) from an Australian correction centre were interviewed. Demographic characteristics, lifetime cannabis use (LCU), severity of dependence, cannabis withdrawal symptoms, psychological well-being and alcohol use were measured and compared using univariate and multivariate analyses.

Results: Cannabis withdrawal symptoms were reported in 57% of current cannabis users compared with 16% of non-users ($p < 0.01$), indicating detectable cannabis dependence and withdrawal in a unique indigenous inmate population. Multivariate analysis revealed statistically significant associations between LCU and cannabis dependence (OR = 8.1; 95% CI: 2.2–29.1) when controlling for psychological well-being and alcohol consumption.

Conclusions: Upon admission to a correction centre, cannabis users should be assessed and monitored for physical and psychological symptoms of withdrawal.

Implications: Routine cannabis withdrawal monitoring will maximise staff and inmate safety. This improvement to policy will ensure appropriate risk management of staff and inmates.

Keywords

Cannabis, incarceration, indigenous

History

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Introduction and background

In many Western countries cannabis has a reputation of being a soft drug (Murray et al., 2007) and although illicit, its use is prevalent (Ross, 2007; Vandrey et al., 2008). The available evidence suggests that cannabis use within indigenous groups is double their non-indigenous counterparts (Adlaf et al., 2005; Australian Institute of Health & Welfare, 2010; Ministry of Health, 2007; Substance Abuse and Mental Health Services Administration, 2011) and high prevalence of cannabis use in indigenous inmates (Richmond et al., 2013). In addition to the harms caused to individuals, families and communities, cannabis is an economic burden to the nation costing billions of dollars each year in policing, legal processing and imprisonment (Begg et al., 2007).

Cannabis dependence requires the presence of selective cognitive, behavioural and physiologic symptoms indicating tolerance with continual use, despite substance-related problems (Hall, 2006). Regular cannabis use at a young age is a risk factor for future cannabis dependence, depression, anxiety and psychosis (American Psychiatric Association, 2010). Cannabis use disorders have now been included in the *Diagnostic Statistical Manual* (*DSM-5*) and the Mental Disorders criteria indicated that one third of users met ''dependency criteria'', and most dependent cannabis users were young (18–24 years old) and unemployed (Allsop et al., 2012; American Psychiatric Association, 2010).

One consequence of severe cannabis dependence is an increased occurrence of ''cannabis withdrawal'', commonly experienced as a combination of symptoms upon abrupt cessation of the drug (Budney & Moore, 2002). In regular high-dose users, cannabis withdrawal syndrome, recently included in the *DSM-5* for the first time, is characterised by symptoms of: increased irritability, insomnia, anxiety, restlessness, and decreases in mood and appetite. These symptoms typically peak within a few days and last for several weeks (Hall, 2001).

Presently, Australian correctional facilities do not clinically manage or have treatment for cannabis withdrawal, nor are there additional safety measures *insitu*. The objectives of this study are to investigate cannabis use, dependence and withdrawal in indigenous male inmates. Findings can improve cannabis withdrawal management for individuals experiencing abrupt cessation.

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Methods

Study setting

Lotus Glen Correctional Centre (Lotus Glen) accommodates approximately 500 male detainees and sentenced prisoners. The centre services Cairns and surrounding northern regions including remote Cape York and the Torres Strait Islands. Indigenous Australians comprise between 60% and 70% of the inmate population (Australian Bureau of Statistics, 2013).

Ethics approval

Ethical clearance was provided by James Cook University (#H37002) and the Cairns and Hinterland Human Research Ethics Committee (HREC#516), with approval granted by Queensland Corrective Services.

Sampling

This study was conducted from July to August 2010. Participants were imprisoned between 6 and 24 months. Lotus Glen staff facilitated a focus group to introduce researchers to inmates and offer advice on aspects of the study to ensure cultural appropriateness. Eligible participants were: (i) aged 18 to 40 years; (ii) incarcerated for under 2 years; (iii) identified as indigenous, Torres Strait Islander or both. Inmates were excluded if they had physical, mental health or behavioural problems as diagnosed by the prison psychologist. Following sample size calculation of $n = 96$, every second bed per cell block was offered an interview which reduced those eligible to $n = 130$. The study was explained to eligible inmates, detailing its voluntary nature and confidentiality (no data disclosure to the prison). Participants signed an informed consent form and were then interviewed for 15–90 min in an interview room within the prison block. A 98% response rate was achieved and interviews ceased once over 100 were completed ($n = 101$). This sample of inmates were examined cannabis use, dependence and the experience of withdrawal, alongside possible confounders.

Measures

Sample characteristics were collected alongside cannabis use. Participants who had never used cannabis ($n = 31$) were not assessed for lifetime cannabis use (LCU) or Severity of Dependence Scale (SDS). All participants were assessed for ''Mental Health Risk'', ''Alcohol use prior to incarceration'', and ''Cannabis Withdrawal''. Cannabis withdrawal symptoms were measured for all participants as the psychological symptoms assessed may be related to ''incarceration'', and thus non-cannabis users were controls for the potential confounding effects of ''incarceration''. As tobacco use was continued by all participants in prison, it was excluded as a possible confounder for withdrawal.

Cannabis use

To determine cannabis use, a timeline follow-back technique was used (LaBrie et al., 2005). Significant life events prompted recall. Participants were asked to estimate their cannabis use (0 – nil, 5 – daily use) from first to most recent use. A score of three or more (indicating cannabis use at least twice a week) sustained over their lifetime classified them as ''High'' cannabis use. Those with a score <3 were classified as ''Low'' cannabis use.

Severity of cannabis dependence

The degree of psychological cannabis dependence was measured using the SDS (Swift et al., 1998). A dependency for cannabis is positively diagnosed if *three or more* dependency criteria occur at any time in the same 12-month period. The 70 cannabis-using participants were asked these questions about the ''3 months period before incarceration'', for a ''yes'' or ''no'' response. A conservative cut-off score of four was used to categorise cannabis ''dependence'' (Swift et al., 1998).

Cannabis withdrawal symptoms

The seven cannabis symptoms in the latest version of the *DSM-5* ''cannabis withdrawal syndrome'' diagnostic criteria revision were included (American Psychiatric Association, 2010), These symptoms are anger and irritability, depressed mood, restlessness, decreased appetite, insomnia, nervousness and anxiety, and physical symptoms (headache, stomach pains, increased sweating, fever, chills or shakiness). Withdrawal criteria were ''met'' if three (or more) symptoms are reported. Symptoms were diagrammatically represented in a questionnaire and participants were asked to recall their experience of that symptom during the first week of incarceration.

Indigenous risk impact screen

Mental Health Risk (MHR), subset of the indigenous Risk Impact Screen, was used as a measure of psychological wellness (Schlesinger et al., 2007). This validated screening instrument assesses MHR in adult indigenous Australians (Schlesinger et al., 2007). A cut-off score of 11 indicates ''at risk'' for mental health symptoms (Schlesinger et al., 2007). A high internal consistency of 0.81 (Cronbach's alpha) was obtained by the current study (Schlesinger et al., 2007).

Alcohol use prior to incarceration

Alcohol consumption during the 3-month period prior to incarceration was included. Self-reported alcohol intake categorised ''heavy'' alcohol users in participants who consumed more than four standard drinks in a single occasion of drinking (National Health and Medical Research Council, 2009) or who were intoxicated at the time of their offence.

Data analysis

The study population demographics were statistically compared between cannabis users with non-users. Continuous variables are displayed as means with 95% confidence intervals (95% CI) and where normally distributed were compared between cannabis users with non-users using *t*-tests. Categorical data were displayed as proportions and compared between cannabis groups using Pearson's chi square. To test associations between cannabis-use with cannabis dependence; cannabis use with cannabis withdrawal; and cannabis dependence with cannabis withdrawal;

univariate logistic regressions were used, followed by multivariate logistic regression model adjusting for psychological wellness and alcohol use. Statistical analyses were performed using STATA version 12.0 (Stata Corporation, College Station, TX).

Results

Sample characteristics

The mean age of the 101 participants interviewed was 28.2 years (95% CI: 26.9–29.6). Around half (56%; $n = 57$) the participants were incarcerated for less than 6 months and the remaining 44% ($n = 44$) between 6 and 24 months with two thirds (64%) either unemployed or receiving income support immediately before incarceration. Only 36.6% had completed school to grade 11, the remainder departed school before grade 10 (63.4%).

Cannabis use

Seventy (70%) participants had used cannabis within 3 months of incarceration. Only 11% ($n = 11$) had never used cannabis, while 89% ($n = 90$) had tried it at least once. Of the 70 current cannabis users, almost 57% ($n = 40$) had used cannabis within 24 hours of their arrest, a further 23% ($n = 16$) reported use within a week of their arrest and the remaining 20% ($n = 14$) had used cannabis 1 week to 3 months before their arrest. Participants who had used cannabis in the previous 3 months before incarceration were classified as ''users'' ($n = 70$) and compared with ''non-users'' ($n = 31$). There was little difference in demographic characteristics between the groups (Table 1).

The mean age of cannabis use was younger at 14.6 years in current cannabis users (95% CI 13.9–15.3). Of the 70 participants classified as ''cannabis users'', 69% ($n = 48$) reported ''high cannabis use'' and 31% ($n = 22$) reported

Table 1. Demographic characteristics of incarcerated indigenous males, by cannabis use.

Characteristics	Users $n = 70$	%	Non-users $n = 31$	%	p
Age (years)					
18–29	40	57.1	18	58.1	NS
30–40	30	42.9	13	41.9	
Geographic location					
Regional	37	52.9	16	51.6	NS
Remote	33	47.1	15	48.4	
Legal problems as juvenile (under 16 yrs)	55	78.6	15	48.4	$\chi^2 = 10.3$, $p < 0.01$ OR:4.3 (95% CI:1.7–10.6)
Duration in prison before interview					
≤6 months	38	54.3	19	61.3	NS
>6 months ≤12 months	14	20.0	7	22.6	
>12 months ≤18 months	9	12.9	2	6.5	
>18 months ≤24 months	9	12.9	3	9.7	
Age left school					
Mean age left school (95% CI)	15.4 (15.1–15.6)		16.0 (15.5–16.5)		$\|t\| = 2.7$, $p < 0.01$
Grade Left School					
Grade 7/8	12	17.1	3	9.7	χ^2 (trend) = 11.7 $p < 0.01$
Grade 9/10	40	57.1	9	29.0	
Grade 11/12	18	25.7	19	61.3	
Employment status					
Full Time	15	21.4	6	19.4	NS
Part time/Casual/Student	10	14.3	5	16.1	
Unemployed/Income Support	45	64.3	20	64.5	
Ethnicity					
Aboriginal	48	68.6	12	38.7	NS
Torres Strait Islander	13	18.6	7	22.6	
Aboriginal + Torres Strait Islander	9	12.8	12	38.7	
Marital Status					
Single/Never married	42	60.0	20	64.5	NS
Partner/defacto/married	19	27.2	7	22.6	
Divorced/separated/widowed	9	12.8	4	12.9	
Number of children					
0	28	40.0	11	35.5	NS
1	10	14.3	8	25.8	
2	13	18.6	7	22.6	
3	10	14.3	4	12.9	
More than 3	9	12.8	1	3.2	
Offence type					
Property offences	12	17.1	3	9.7	NS
Violent offences	48	68.6	21	67.7	
Driving offences	1	1.4	4	12.9	
Other	9	12.9	3	9.7	
Heavy alcohol use prior to offence	38	–	9	–	$\chi^2 = 5.5$, $p = 0.02$ OR:2.9 (95% CI:1.2–7.1)

''low cannabis use''. Those who first used cannabis at an earlier age were significantly ($p = 0.01$) more likely to be in the ''High'' group with 13.9 years duration of cannabis use ($n = 48$) than the ''Low'' group with 16.0 years average of cannabis use ($n = 22$, $|t| = 2.6$) unequal variance.

Severity of cannabis dependence

Of the 70 current cannabis users, 64.3% ($n = 45$) met the ''dependence criteria''. This subset was younger at 26.1 years of age (95% CI: 24.2–28.1), than users who were not dependent at 32.0 years of age (95% CI: 29.8–34.2), $|t| = 3.8$, $p < 0.01$. There was no difference between the age of school departure between users meeting dependence criteria to those not meeting the criteria; however, those classified as dependent were younger with a mean of 14.1 years old, when they commenced cannabis use (95% CI: 13.3–14.9) compared with those not dependent users with a mean of 15.5 years (95% CI: 14.2–16.8) $|t| = 2.0$, $p = 0.05$, and younger when they initially had contact with the law enforcement with a mean of 13.1 years (95% CI: 12.2–13.9) than those not dependent at 14.6 years on average (95% CI: 13.8–15.4) $|t| = 2.4$, $p = 0.02$.

Univariate analysis revealed that cannabis users classified as ''dependent'' had five times the odds of MHR (Table 2) compared with those who were not dependent. Those classified as ''high cannabis use'' had 5.9 times odds of being ''dependent'' cannabis users, compared with those who were not dependent (Table 2). When adjusted for MHR and alcohol in a multivariate model, these associations strengthened to over eight times the odds of being dependent when reporting ''high'' cannabis use than those who did not meet dependence criteria (Table 2). Similarly, those meeting dependence criteria reported odds seven times higher for MHR, than those who did not meet dependence criteria. This model ($\chi^2 = 24.26$, $p < 0.01$) explained 40% of the deviance (variance) in dependence.

Cannabis withdrawal symptoms

Over half of (57%, $n = 40/70$) the current cannabis users reported three or more withdrawal symptoms, meeting the proposed *DSM-5* criteria for cannabis withdrawal syndrome. The most common symptoms in users were physical (53%), insomnia (53%), depressed mood (47%), aggression/irritability (49%) nervousness (46%), decreased appetite (29%) and restlessness (19%) (Figure 1). The most common symptoms in non-users was depressed mood (42%), nervousness (29%), aggression (23%) and insomnia (22%) (Figure 2). Cannabis users reported a mean of 2.9 (95% CI: 2.5–3.4) symptoms. Non-users of cannabis (16%, $n = 5/31$) reported 1.5 (95% CI: 0.9–2.0) symptoms which were most likely due to stress of incarceration.

Statistically significant associations were found on univariate and multivariate analysis between cannabis withdrawal symptoms and cannabis use. The odds of experiencing symptoms of withdrawal were six times higher in cannabis users compared to non-users. Similarly, the risk of impaired psychological well-being, as measured by the ''MHR'', was six times the odds of occurring in cannabis users compared to non-users. Alcohol use, while significantly associated with cannabis withdrawal symptoms on univariate analysis, was no longer significant on multivariate analysis (Table 3). The final model ($\chi^2 = 32.2$, $p < 0.01$) explained 55% deviance. Univariate findings revealed that cannabis withdrawal symptoms were not significantly associated with severity of dependence ($n = 70$, $p = 0.9$), or high cannabis use ($n = 87$, $p = 0.7$).

Discussion

Rates of cannabis use, dependence and withdrawal symptoms are reported in a unique group. When comparing current cannabis users with non-users, current users were more likely to depart school earlier and face legal proceedings as a juvenile than non-users. Cannabis dependence was a significant issue for indigenous inmates, with six in 10 current cannabis users meeting the SDS criteria for cannabis dependence. The strong association between SDS and level of cannabis use indicates a dose–response effect, or tolerance, with high cannabis users reporting greater dependence, strengthening when adjusted for alcohol use and psychological well-being. Psychological well-being was lower in cannabis users meeting dependence criteria, as measured by the MHR, at seven times the odds to those not meeting dependence criteria.

This is the first study to assess cannabis withdrawal in indigenous inmates and the results indicate a large proportion of the cannabis users were suffering from cannabis withdrawal symptoms. This finding was significant when controlling for alcohol consumption and psychological stress

Table 2. Severity of dependence in 70 incarcerated indigenous male cannabis users.

	Dependence not met		Dependence met[a]		Dependence met[a]		Dependence met[a]	
Variables	*n*	%	*n*	%	Unadjusted OR (95% CI)	*p*	Adjusted OR (95% CI)	*p*
Cannabis use								
Low	14	20.0	8	11.5	1.0	<0.01	1.0	<0.01
High[b]	11	15.7	37	52.9	5.9 (1.9–17.7)		8.1 (2.2–29.1)	
Mental health risk								
Not at risk	20	28.6	20	28.6	1.0	<0.01	1.0	<0.01
At risk[c]	5	7.1	25	35.7	5.0 (1.6–15.7)		7.0 (1.8–26.6)	
Alcohol use								
No	11	15.7	21	30.0	1.0	NS	1.0	NS
Yes	14	20.0	24	34.3	0.9 (0.3–2.4)		1.2 (0.4–3.7)	

[a]Cut-off score of ''4'' indicates Dependence Met on the Severity of Dependence Scale.
[b]High users were defined as those who reported a lifetime average use of either ''a fair bit'', ''a lot'', or ''too much''.
[c]Cut-off score of ''11'' indicates ''at risk'' on the indigenous risk impact screen.

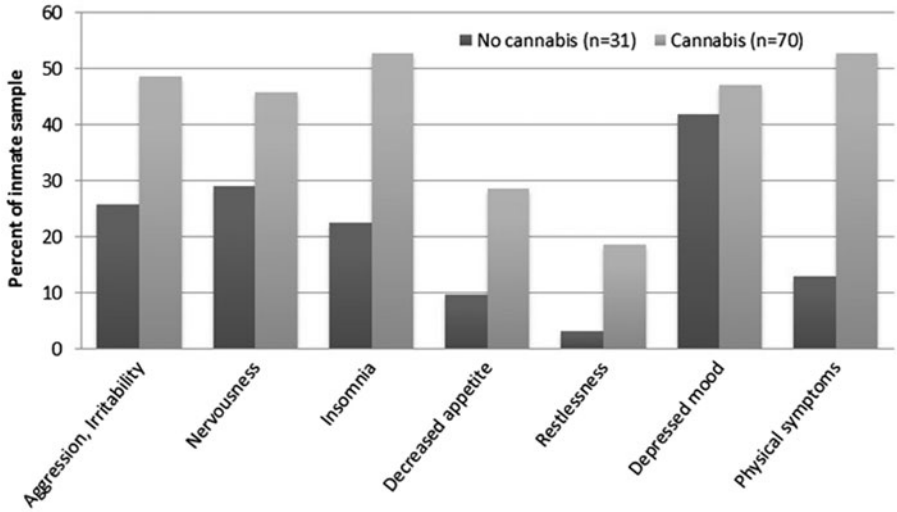

Figure 1. Symptoms (%) recorded on the CWC in cannabis users compared to non-cannabis users.

Table 3. Cannabis withdrawal symptoms, cannabis use and potential confounders among 101 indigenous male inmates.

Variables		CWC				Unadjusted		Adjusted	
		Not Met		Met[a]					
	n 101	*n*	%	*n*	%	OR (95% CI)	*p*	OR (95% CI)	*p*
Cannabis use									
Non-user	31	26	25.7	5	4.9	1.0	<0.01	1.0	<0.01
Current user[b]	70	30	29.7	40	39.6	6.9 (2.4–19.5)		6.3 (1.9–20.3)	
Mental health risk									
Not at risk	63	18	17.8	45	44.6	1.0	<0.01	1.0	<0.01
At risk[b]	38	27	26.7	11	10.9	6.1 (2.5–14.8)		6.1 (2.3–16.0)	
Alcohol use									
No	54	35	34.7	19	18.8	1.0	0.04	1.0	NS
Yes	47	21	20.8	26	25.7	2.3 (0.9– 5.1)		1.7 (0.7–4.4)	

[a]Cut-off score of ''3 or more'' indicates ''withdrawal met'' for cannabis withdrawal.
[b]Cut-off score of ''11'' on the indigenous risk impact screen.

from incarceration, suggesting this is a true measure of cannabis withdrawal. Cannabis users were three times more likely to record higher frequencies on all symptoms than non-users. The most frequently-reported withdrawal symptoms in this study were physical symptoms, insomnia followed by depression, aggression/irritability, nervousness, decreased appetite and restlessness.

Our finding of young age of cannabis use initiation suggests that age plays a leading role in establishing future trends of behaviour. Baker reported that cannabis use in school-aged adolescents predicted criminal involvement; with assault, malicious damage, and acquisitive property crime between two and five times greater among frequent cannabis users than non-users (Baker, 1998). Others have similarly reported that younger users are more likely to be socially disadvantaged, unemployed and have behavioural difficulties (Copeland & Swift, 2009; Fergusson & Boden, 2008; Legleye et al., 2010). Furthermore, evidence suggests that early cannabis users have poorer coping skills, leading to outward expressions of anger, with frequent outbursts of aggression and violence (Eftekhari, Turner, & Larimer, 2004; Hyman & Sinha, 2009; Simons & Carey, 2002). Greater use of cannabis in conjunction with maladaptive emotion responses to stressful situations, often further escalates life-stressors and perpetuates a cycle of poor problem-solving skills and poor coping mechanisms (Hyman & Sinha, 2009). This link between cannabis use and maladaptive emotional responses with poor coping skills may explain the high number of violent convictions in our cohort of indigenous males who initiated cannabis use at a younger age than reported by others (Copeland et al., 2006; Hall, 2001).

The dose–response effect of cannabis use and dependence (high SDS) indicates tolerance and although this has been reported by others (Budney & Moore, 2002; Coffey et al., 2002), our cohort report extremely high rates of use even when compared with other indigenous populations internationally (Adlaf et al., 2005; Fergusson & Boden, 2008; Ministry of Health, 2007; Putt & Delahunty, 2006). Others report greater cannabis dependence identified in youth the younger they were when first in contact with law enforcement, indicating movement towards an established pattern of criminal behaviour (Copeland, 2006; Hall, 2001; Ross, 2007).

The range of cannabis withdrawal symptoms has similarly been reported by others (Vandrey et al., 2008), although our group reported higher rates of physical complaints, insomnia, followed by aggression and nervousness. These symptoms of aggression and nervousness are of concern in a cohort of known violent offenders, who may have trouble regulating

Figure 2. Map of service region of Lotus Glen Correctional Centre including Torres Strait Islands.

emotions and have poor coping skills. Of note, the studies that informed the proposed inclusion of ''cannabis withdrawal'' into the *DSM-5* did not include any studies from indigenous populations (Budney et al., 1998; Vandrey et al., 2005), our findings of high rates of physical complaints with aggression and nervousness, support the inclusion of these symptoms in the ''withdrawal syndrome''.

Conclusions

These findings indicate that high levels of cannabis use are associated with dependence and withdrawal symptoms in incarcerated indigenous males. This can assist corrective services better understand cannabis dependence to implement appropriate screening and treatment services that assist new inmates manage cannabis withdrawal. These changes are warranted at the policy level to ensure safety to other inmates and prison officers is maximised, especially in the light of high rates of violent convictions in this cohort of inmates. This research has implications for correction centres nationally as well as internationally. Additionally, this indigenous group was younger, reported higher rates of unemployment, and higher rates of violent convictions than indigenous prisoners nationally (Sweeney & Payne, 2012). To alter the trajectory of many young indigenous males, community-based programmes that delay cannabis uptake should be offered to remote indigenous populations in school-aged youths, and these programmes should include training in mechanisms that enhance coping skills.

Study limitations

Some limitations occurred that may have introduced bias to this study. Interval random sampling was used as a method of stratified sampling that may not have completely eliminated selection bias. Interviewed inmates had been incarcerated for up to 2 years and such length of imprisonment term may have impeded their memory and recall skills. However, the combination of timeline follow-back coupled with habitual cannabis use involves multiple memory systems and thus recall is more likely to be accurate (Tulving, 1985). The Cannabis Withdrawal Scale has been validated as a diagnostic instrument in clinical and research settings (Allsop et al., 2012) and the SDS has been validated for cannabis use in adolescents (Martin et al., 2006), however, neither scale has been specifically validated for low numeracy and literacy populations which is the focus of a present study (Rogerson et al., 2013). Although cannabis was not readily available in prison, occasionally inmates obtain illegal access and this may have influenced cannabis withdrawal findings; this was not controlled for during the study and would benefit from biological validation of cannabis use.

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Declaration of interest

The authors declare no conflicts of interests. The authors alone are responsible for the content and writing of this article.

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