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## Correlates of patterns of cannabis use, abuse and dependence: evidence from two national surveys in Ireland

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**Background:** Knowledge of factors relating to patterns of cannabis use is important for informing drug policy. This study determined factors associated with recent and current cannabis use. In addition, we explored factors related to having a cannabis use disorder (CUD)—defined using the Diagnostic and Statistical Manual of Psychiatric Disorders—among current users. **Methods:** We analyzed data from Ireland's 2010–11 and 2014–15 National Drug Prevalence Surveys, which recruited 5134 and 7005 individuals respectively, aged 15 years or more, living in private households. Multinomial logistic regression was used to identify factors associated with recent (last year) and current (last month) cannabis use compared to experiential use. Binary logistic regression was used to determine factors related to CUD among current users. **Results:** The weighted prevalence of experiential cannabis use was 18.3%, with 3.0% and 3.3% of participants indicating recent or current use, respectively; 41.3% of current users indicated having a CUD. Factors associated with both recent or current cannabis use included younger age, not being married or cohabiting, having no dependent children and current use of tobacco or alcohol. Male gender, younger age and lower educational levels were significantly related to CUD among current users. **Conclusions:** Males, adolescents/young adults and individuals with lower educational levels are more likely to be current users of cannabis and are at a greater risk of having a CUD. Health professionals should be aware of these factors to improve detection and prevention of CUD.

## Introduction

Cannabis is the third most commonly used drug in the world (after alcohol and nicotine). In addition, the prevalence of cannabis use has increased in many developed countries over recent years<sup>1,2</sup> with evidence suggesting that in some parts of the world, cannabis use could already be considered a normative life event for adolescents and young adults.<sup>3</sup> Adverse health effects of cannabis may include mental health disorders, acute psychotic symptoms, development of a cannabis use disorder (CUD), abnormal cognitive development, chronic lung disease and cardiovascular disease.<sup>2,4</sup> Furthermore, research has shown that a dose–response relationship may exist between frequency of cannabis use and adverse health effects.<sup>5</sup>

In the Republic of Ireland, the most recent national survey, conducted in 2014–15, found that 27.9% of people aged 15–64 years had used cannabis at some point in their lives, with 7.7% and 4.4% having used cannabis within the last year or last month respectively.<sup>1</sup> These prevalence rates are higher than those recorded in previous surveys within Ireland and are considerably higher than for any other illegal drug.<sup>6</sup> Data from 2014–15 also indicate that among Irish people who have used cannabis within the last year, 30.3% meet the criteria for cannabis abuse and 19.7% for cannabis dependence, suggesting that there may be as many as 75 000 users in the population with a CUD.<sup>7</sup>

Concurrent with higher rates of use, the number of people entering treatment for cannabis has also increased in Ireland.<sup>8</sup> In 2007, approximately 1000 people were entering drug treatment for cannabis as their primary problem drug; in 2015, this figure had risen to 2750. In 2016, 27% of all those in drug treatment were there for a CUD, second only to those seeking treatment for heroin addiction. Furthermore, for new entrants to treatment in 2017, cannabis replaced opiates as the most commonly reported primary problem drug.<sup>9</sup> Cannabis is also now the most common illicit substance involved in drug-related admissions to psychiatric hospitals in Ireland.<sup>10,11</sup>

The illegal status of cannabis in Ireland and other jurisdictions drives a black market and users at the end of this chain may be caught and receive a criminal record. There is also an argument that police resources should be better used elsewhere.<sup>12</sup> Consequently, proposals to liberalize cannabis laws are currently being explored in many countries.<sup>13</sup> However, controversy with regard to the merits of these proposals exists, with senior academics and medical experts calling for evidence about cannabis use and cannabis-related health harms.<sup>10</sup> Knowledge of factors relating to patterns of cannabis use, abuse and dependence is important for preventative work and for informing and assessing drug policy. Therefore, the aim of this study was to determine factors associated with recent and current cannabis use, drawing on data from two large nationally representative studies, which used the same field survey procedures and data collection methods. In addition, we explored factors associated with having a CUD among current cannabis users. CUD is an overarching term that combines cannabis abuse and cannabis dependence.

## Methods

### Study population and setting

We analyzed data from Ireland's 2010–11 and 2014–15 Drug Prevalence Surveys. These national, cross-sectional studies recruited stratified clustered samples of individuals aged 15 years and over living in private households in Ireland. The numbers interviewed in 2010–11 and 2014–15 were 5134 and 7005 respectively. For both surveys, the sampling frame used was the An Post/Ordnance Survey Ireland GeoDirectory database, which is a list of all addresses in the Republic of Ireland and distinguishes between residential and commercial establishments. A three-stage process was used to construct

the sample for each survey. The first stage involved stratifying the population into 10 former health board regions in Ireland. In the second stage of stratification, electoral divisions were selected as the primary sampling units across the 10 former health board regions. Before selection, the primary sampling units were ranked by the following sociodemographic indicators: population density, male unemployment and social class, according to the year of data collection, to ensure that a representative cross-section of areas were included. Finally, in each primary sampling unit, addresses were chosen randomly, and at each address, one person was selected to participate in the survey using the 'last birthday' rule. For each survey, the achieved sample was weighted by gender, age and former health board region to maximize its representativeness of the general population. A more comprehensive description of the methodology used in the surveys has been detailed elsewhere.<sup>14,15</sup>

The surveys involved face-to-face interviews in the home of each participant and a self-completed questionnaire. The interviews were conducted by trained interviewers using Computer Assisted Personal Interviewing. Fieldwork for the surveys was carried out between October 2010 to May 2011 and August 2014 to August 2015 and both achieved a 60% response rate. The studies were granted ethical approval by the Royal College of Physicians in Ireland and signed informed assent (from parental guardians of minors) or consent (for subjects 18+ years) was obtained for data to be used for research purposes. Ireland's National Drug Prevalence Surveys are GDPR compliant.

### Measures

#### Outcome variables

**Cannabis use.** The main outcome measure was a categorical variable classifying participants' history of cannabis use as either experiential, recent or current using the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA) criteria.<sup>16</sup> Respondents who had used cannabis at some point in their lives were classified as either experiential users (used cannabis at least once in their life but not in the past year), recent users (used cannabis at least once within the past year but not in the past month) or current users (used cannabis at least once within the past month).

**Cannabis abuse and cannabis dependence.** The Diagnostic and Statistical Manual of Psychiatric Disorders (DSM), better known as the DSM-IV, is published by the American Psychiatric Association and covers all mental health disorders for children and adults. Substance abuse and dependence is defined by the DSM-IV as a maladaptive pattern of substance use leading to clinically significant impairment or distress.<sup>17</sup> In this study, cannabis abuse and cannabis dependence were classified according to DSM-IV criteria and were measured via a self-completed questionnaire using four items that denote cannabis abuse and seven items that denote cannabis dependence from the Composite International Diagnostic Interview (CIDI).<sup>18</sup> Cannabis abuse was established from a positive response in one or more of the four domains on the DSM-IV diagnostic criteria in the 12 months before the interview. Cannabis dependence was determined from a positive response in three or more of the seven domains on the DSM-IV in the 12 months before the interview. CUD was determined as any cannabis abuse or dependence in the 12 months prior to the interview.

The CIDI is a widely accepted and frequently used operationalization of the DSM-IV. Advised by the EMCDDA, the abbreviated version, the Munich CIDI, a 19-item instrument reflecting the four cannabis abuse and the seven cannabis dependence criteria, was used for both the 2010–11 and 2014–15 Drug Prevalence Surveys.<sup>19</sup>

#### Exposure variables

Independent variables likely associated with any and increased cannabis use were identified through the literature. Demographic

**Table 1** Characteristics of the study population—full sample and according to experiential, recent and current cannabis use

Variables	Full sample <i>n</i> = 12 133	Experiential cannabis use <i>n</i> = 2215	Recent cannabis use <i>n</i> = 362	Current cannabis use <i>n</i> = 402
	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)
Gender				
Male	5993 (49.4)	1361 (61.4)	247 (68.2)	316 (78.4)
Age group (years)				
35+	7250 (59.9)	1180 (43.4)	84 (23.2)	90 (22.4)
25–34	2781 (23.0)	816 (36.9)	128 (35.4)	159 (39.6)
15–24	2064 (17.1)	215 (9.7)	150 (41.4)	153 (38.1)
Marital status				
Married/cohabiting	7259 (59.9)	1409 (63.7)	108 (29.9)	125 (31.0)
Divorced/separated/widowed	8734 (7.2)	125 (5.7)	11 (3.0)	20 (5.0)
Single/never married	3979 (32.9)	679 (30.7)	242 (67.0)	258 (64.0)
Region				
Dublin (compared to outside Dublin)	3362 (27.7)	819 (37.0)	134 (37.0)	180 (44.7)
Education				
Completed third level	5391 (44.6)	1327 (60.0)	179 (49.6)	171 (42.6)
Completed secondary	4478 (37.0)	699 (31.6)	146 (40.4)	152 (37.9)
Primary/none	2227 (18.4)	185 (8.4)	36 (10.0)	78 (19.5)
Employment				
Employed	6483 (53.4)	1517 (68.5)	179 (49.4)	180 (44.7)
Unemployed	1519 (12.5)	341 (15.4)	73 (20.2)	113 (28.0)
Student	1464 (12.1)	141 (6.4)	97 (26.8)	83 (20.6)
Other	2667 (22.0)	215 (9.7)	13 (3.6)	27 (6.7)
Housing tenure				
Owned	8118 (66.9)	1379 (62.3)	165 (45.5)	113 (28.1)
Rented	2967 (24.5)	687 (31.0)	144 (39.7)	203 (50.5)
Living with family/friends or other	1048 (8.6)	149 (6.7)	54 (14.9)	86 (21.4)
Dependent children				
Yes	4638 (38.4)	1137 (51.4)	68 (18.8)	86 (21.6)
Current tobacco use				
Yes	3212 (26.5)	867 (39.2)	226 (62.4)	324 (80.6)
Current alcohol use				
Yes	7972 (65.7)	1781 (80.4)	324 (89.5)	348 (86.6)
Current anti-depressant use				
Yes	544 (4.5)	124 (5.6)	14 (3.9)	31 (7.7)
Age at first cannabis use				
<25 years of age	2692 (22.2)	1968 (89.5)	343 (94.8)	381 (96.0)
Attitude <sup>a</sup>				
Should be legal	2709 (22.3)	972 (43.9)	222 (61.3)	336 (83.6)
Ease of access to cannabis <sup>b</sup>				
Very easy or easy	622 (5.1)	–	279 (77.1)	343 (85.3)
Cannabis abuse				
Yes	194 (1.6)	–	72 (19.9)	122 (30.3)
Cannabis dependence				
Yes	125 (1.0)	–	32 (8.8)	93 (23.1)
Any cannabis abuse or dependence				
Yes	253 (2.1)	–	87 (24.0)	166 (41.3)

Note: Displayed frequencies and percentages (in brackets) are weighted.

a: Believe that cannabis should be legal for recreational purposes.

b: Data were available for recent and current cannabis users only.

variables selected were gender, age and marital status. Additionally, geographic region (Dublin/outside Dublin) was included to control for any possible effects of sociopolitical and cultural factors present within Ireland. Socioeconomic variables included educational attainment, employment and housing tenure. Dependent children, current tobacco, alcohol or anti-depressant use, age at which cannabis was first used, attitudes towards legalization of cannabis for recreational purposes and ease of access to cannabis were also included as covariates.

### Statistical analysis

The datasets were codified, affixed with a timestamp variable (year) and merged. Descriptive characteristics were examined according to patterns of cannabis use. Displayed frequencies and percentages are weighted. Univariate and multivariable multinomial logistic regression analyses were used to identify factors associated with recent and current cannabis use compared to experiential use. Univariate and multivariable binary logistic regression analyses were used to

determine factors related to having a CUD among current cannabis users. Odds ratios (ORs) and 95% confidence intervals (CIs) are reported. Candidate variables that had a *P* value of < 0.2 in univariate analyses were entered into multivariable models. Backwards elimination regression was used to build the models, with model fit determined using the likelihood ratio chi-square. All variables were adjusted for each other and year of data collection.

Data analysis was conducted using Stata SE Version 15.1 (Stata Corporation, College Station, TX, USA) for Windows. For all analyses, a *P* value (two-tailed) of < 0.05 was considered to indicate statistical significance.

## Results

### Descriptive characteristics

Characteristics of the study population for the full sample and by cannabis use are presented in table 1. The weighted prevalence of experiential cannabis use was 18.3% for the combined surveys,

**Table 2** Multivariable analysis of factors associated with being a recent or current cannabis user compared with an experiential user<sup>a</sup>

Variables	Level	Recent use vs. experiential use		Current use vs. experiential use	
		Odds ratio	95% CI	Odds ratio	95% CI
Gender	Male vs. female	1.16	0.89–1.52	2.12	1.56–2.90
Age group (years)	Reference: 35+				
	25–34	1.53	1.09–2.13	1.90	1.35–2.69
	15–24	3.79	2.44–5.89	5.33	3.36–8.44
Marital status	Reference: married/cohabiting				
	Divorced/separated/widowed	1.18	0.60–2.33	1.84	1.01–3.36
	Single/never married	1.61	1.17–2.21	1.22	0.88–1.68
Region	Dublin vs. outside Dublin	1.00	0.78–1.29	1.38	1.06–1.79
Education	Reference: completed third level				
	Completed secondary	1.07	0.81–1.41	1.09	0.81–1.46
	Primary/none	1.17	0.75–1.84	1.94	1.30–2.91
Employment	Reference: employed				
	Unemployed	1.14	0.81–1.59	1.31	0.94–1.83
	Student	1.61	1.08–2.40	1.31	0.84–2.05
	Other	0.79	0.43–1.46	1.82	1.07–3.09
Housing tenure	Reference: owned				
	Rented	1.22	0.93–1.61	2.15	1.60–2.90
	Living with family/friends or other	1.04	0.68–1.60	2.39	1.55–3.69
Dependent children	Yes vs. no	0.45	0.33–0.63	0.48	0.34–0.66
Current tobacco use	Yes vs. no	2.05	1.59–2.64	4.68	3.47–6.30
Current alcohol use	Yes vs. no	1.99	1.35–2.92	1.70	1.18–2.45
Attitude <sup>b</sup> (should be legal)	Yes vs. no	2.21	1.71–2.85	6.38	4.68–8.70

a: Multivariable multinomial logistic regression; all variables adjusted for each other and year of data collection.

b: Believe that cannabis should be legal for recreational purposes.

**Table 3** Univariate analysis of factors associated with cannabis abuse or dependence among current cannabis users<sup>a</sup>

Variables	Level	Cannabis abuse or dependence <i>n</i> = 166	No cannabis abuse or dependence <i>n</i> = 236	Odds ratio	95% CI
		<i>n</i> (%)	<i>n</i> (%)		
Gender	Male vs. female	139 (83.7)	176 (74.6)	1.77	1.06–2.93
Age group (years)	Reference: 35+				
	25–34	28 (16.9)	62 (26.3)	1.49	0.86–2.58
	15–24	64 (38.6)	95 (40.3)	2.06	1.19–3.57
Marital status	Reference: married/cohabiting				
	Divorced/separated/widowed	40 (24.1)	85 (36.0)	0.94	0.34–2.64
	Single/never married	6 (3.6)	14 (5.9)	1.87	1.19–2.93
Region	Dublin vs. outside Dublin	120 (72.3)	137 (58.1)	1.01	0.68–1.51
Education	Reference: completed third level				
	Completed secondary	75 (44.9)	105 (44.5)	1.48	0.94–2.34
	Primary/none	53 (32.1)	118 (50.0)	4.15	2.35–7.33
Employment	Reference: employed				
	Unemployed	51 (30.9)	27 (11.4)	2.29	1.42–3.72
	Student	64 (38.6)	115 (48.9)	0.92	0.53–1.59
	Other	62 (38.0)	49 (20.9)	1.17	0.51–2.69
Housing tenure	Reference: owned				
	Rented	28 (16.9)	55 (23.4)	1.18	0.74–1.88
	Living with family/friends or other	11 (6.6)	16 (6.8)	0.96	0.54–1.70
Dependent children	Yes vs. no	33 (19.9)	53 (22.6)	0.83	0.51–1.35
Current tobacco use	Yes vs. no	32 (19.5)	53 (22.6)	1.41	0.84–2.36
Current alcohol use	Yes vs. no	139 (83.7)	185 (78.4)	0.44	0.25–0.79
Current anti-depressant use	Yes vs. no	134 (80.7)	214 (90.7)	1.01	0.48–2.12
Age at first cannabis use	<25 vs. ≥25 years	13 (7.8)	18 (7.6)	2.35	0.72–7.69
Attitude <sup>b</sup> (should be legal)	Yes vs. no	162 (97.6)	219 (94.8)	0.92	0.54–1.58
Ease of access to cannabis	Very easy or easy vs. difficult	138 (83.1)	198 (83.9)	1.79	0.99–3.25

a: Univariate binary logistic regression; displayed frequencies and percentages (in brackets) are weighted.

b: Believe that cannabis should be legal for recreational purposes.

while the weighted prevalence of recent and current cannabis use was 3.0% and 3.3% of participants, respectively. Within the subset of recent and current users, 33.1% reported a CUD defined as either cannabis abuse or dependence; 41.3% of current users indicated a CUD.

### Factors associated with recent and current cannabis use

Univariate analysis demonstrated sociodemographic, behavioural and attitudinal factors associated with recent and current cannabis use when compared to experiential cannabis users ([Supplementary](#)

**Table 4** Multivariable analysis of factors associated with cannabis abuse or dependence among current cannabis users<sup>a</sup>

Variables	Level	Odds ratio	95% CI
Gender	Male vs. female	2.01	1.13–3.57
Age group (years)	Reference: 35+		
	25–34	1.88	1.04–3.39
	15–24	4.22	2.11–8.46
Education	Reference: completed third level		
	Completed secondary	1.28	0.78–2.10
	Primary/none	3.62	1.93–6.77
Employment	Reference: employed		
	Unemployed	1.43	0.55–3.73
	Student	0.44	0.21–0.90
	Other	1.54	0.90–2.65

a: Multivariable binary logistic regression; all variables adjusted for each other and year of data collection.

table 1). We then constructed a multivariable model on the same subset of participants to determine the independent contribution of each factor.

In multivariable analysis, recent cannabis use was associated with a number of factors (table 2). Users under 35 years of age had an increased odds of reporting recent use; for example, users aged 15–24 years were almost four times (OR = 3.79, 95% CI: 2.44–5.89) more likely to be recent cannabis users. Interestingly, gender was not an independent factor significantly associated with recent cannabis use. Recent users were more likely to be single, having never married (OR = 1.61, 95% CI: 1.17–2.21) and to be students (OR = 1.61, 95% CI: 1.08–2.40). Recent cannabis users were less likely to have dependent children and more likely to be current users of tobacco and alcohol. A positive attitude towards cannabis legalization was also significantly related to recent use (OR = 2.21, 95% CI: 1.71–2.85). Housing tenure was not associated with recent cannabis use.

With regard to current use, males displayed a 2-fold (OR = 2.12, 95% CI: 1.56–2.90) increased likelihood of being current cannabis users compared to females. Associations between younger age and current use were noticeably strong, with subjects aged 15–24 years showing 5-fold (OR = 5.33, 95% CI: 3.36–8.44) increased odds of being current cannabis users. In addition, current users were more likely to be divorced/separated/widowed (OR = 1.84, 95% CI: 1.01–3.36). The education variable was significantly related to current use, with participants who had lower educational attainment having approximate 2-fold increased odds (OR = 1.94, 95% CI: 1.30–2.91) of being current cannabis users. With regard to housing tenure and region, current users were more likely to rent their accommodation (OR = 2.15, 95% CI: 1.60–2.90) when compared to owning their property, to live with family/friends or other (OR = 2.39, 95% CI: 1.55–3.69) and to reside in Dublin (OR = 1.38, 95% CI: 1.06–1.79). Current cannabis users were less likely to have dependent children and more likely to be current users of tobacco and alcohol. In addition, attitude towards cannabis legalization was strongly related to current use, with participants who believed that cannabis should be legal for recreational purposes displaying 6-fold increased odds of being current cannabis users (OR = 6.38, 95% CI: 4.68–8.70).

### Factors associated with CUD among current cannabis users

Tables 3 and 4 present univariate and multivariable associations between factors and CUD among current cannabis users. In multivariable analysis, gender, younger age and lower educational attainment remained significantly related to CUD. Key findings were that the odds of having a CUD were higher amongst males (OR = 2.01, 95% CI: 1.13–3.57), participants aged 25–34 years (OR = 1.88, 95% CI: 1.04–3.39) and those aged 15–24 years of age (OR = 4.22, 95% CI: 2.11–8.46) and individuals who had very low educational levels

(OR = 3.62, 95% CI: 1.93–6.77). Participants experiencing cannabis abuse or dependence were also less likely to be students (OR = 0.44, 95% CI: 0.21–0.90). The *c* statistic for the multivariable model was 0.70 (95% CI: 0.64–0.76), indicating that the model had moderate ability at discriminating cases from non-cases.

## Discussion

In this study, we used data from Ireland's 2010–11 and 2014–15 National Drug Prevalence Surveys to determine variables related to recent and current cannabis use. In addition, we explored factors associated with having a CUD among current cannabis users. The weighted prevalence of experiential cannabis use for the combined surveys was found to be 18.3%, with 3.0% and 3.3% of participants indicating recent or current cannabis use respectively. Twenty-four percent of recent users and 41.3% of current users scored positive for a CUD—either cannabis abuse or dependence. In multivariable analysis, factors associated with both recent and current cannabis use included younger age, not having dependent children and current use of tobacco or alcohol. In addition, a positive attitude towards cannabis legalization was found to be significantly related to both recent and current use. Surprisingly, being male was only associated with current cannabis use. In multivariable analysis, male sex, younger age and lower educational attainment were significantly related to having a CUD.

Our findings are consistent with the literature,<sup>3,4</sup> which also report that males, adolescents and young adults, frequent users of tobacco and alcohol and people with a positive attitude towards legalization of cannabis are more likely to engage in using cannabis. In particular, the relationship between male gender and recurrent cannabis use has been observed in studies across Europe, the United States and Canada.<sup>4,20,21</sup> Over-representation of males among users is typical for illicit drugs. However, the EMCDDA have observed that cannabis users present one of the highest ratios of males to females among clients entering drug treatment in Europe, with nearly all member countries indicating that three-quarters or more of cannabis treatment entrants are male.<sup>20</sup> One possible explanation for these relationships is the increased risk-taking behaviours observed in males.<sup>22</sup> It has also been hypothesized that the effect of pregnancy on females may influence decisions to initiate or cease cannabis use.<sup>4,23</sup> However, further qualitative research, which explores perceptions of cannabis use across genders, is needed.

The relationship between younger age and recent and current cannabis use was noticeably strong in this study population. These findings are supported by other European studies; of the three million European daily cannabis users, roughly 70% are aged between 15 and 34 years with over 86% of clients entering treatment for cannabis as their primary drug being aged 34 years or less.<sup>20</sup> Peer influence and a reduced perception of the health risks associated with cannabis among adolescents and young adults are thought to be contributing factors.<sup>4,24,25</sup> Importantly, early initiation and regular cannabis use in adolescence has been found to be associated with numerous negative health outcomes including CUD, use of other illicit substances and mental health problems.<sup>26</sup>

There has been much debate around the liberalization of cannabis laws in Ireland and other countries. A campaign calling for decriminalization of all drug use in Ireland commenced in 2012<sup>27</sup> and legislation was passed in 2019 to allow for a Medical Cannabis Access Programme to come into operation in Ireland on a pilot basis for five years. It has been stated that changes in the legal status of cannabis may have negative and unintended consequences. In particular, there are concerns that permitting cannabis-based products for medical use may lead to increased recreational use by making the drug more widely available and by sending the message to the public that cannabis use is harmless.<sup>28,29</sup> As further research examining the impact of cannabis decriminalization or legalization is still needed,<sup>30,31</sup> in light of recent legislative changes in Ireland and



the higher prevalence of cannabis use among younger subjects,<sup>13</sup> usage rates among adolescents and young adults will be an important factor to monitor.

We observed that current cannabis users were more likely to have lower educational levels and were also more likely to be renting or living with family/friends or other, suggesting that lower socioeconomic status is related to frequency of cannabis use in Ireland. Data on socioeconomic status of frequent cannabis users are scarce and often contradictory.<sup>20</sup> A recent study from the Netherlands found frequent cannabis users to have, on average, higher levels of educational attainment than the general population.<sup>32</sup> In findings from two Australian studies, Copeland et al. and Reilly et al. observed that heavy or long-term cannabis users had levels of education and employment similar or higher than those of the general population.<sup>33,34</sup> A 2012 analysis of European Union treatment data found that 87% of cannabis users entering treatment were living in stable accommodation, with 60% having completed secondary education.<sup>20</sup> However, a French study of adolescents supports our finding on educational attainment that higher socioeconomic status has a protective effect against frequent cannabis use. Legleye et al. found that although young people from families with higher socioeconomic status had a greater risk of experiential cannabis use, they were less likely to engage in daily use of cannabis.<sup>35</sup>

The high prevalence (41.3%) of CUD among current users found in our study is concerning but not unexpected, as research has demonstrated that greater frequency of cannabis use increases the likelihood of developing problematic use.<sup>36</sup> Consequently, these findings do suggest that health professionals should have a high level of suspicion regarding the possibility of a CUD where current cannabis use is reported. The relationships we observed between CUD and younger age and lower educational attainment are also important and likely related to life-course theory,<sup>4</sup> where illicit drug use declines as individuals assume the increased responsibilities which coincide with adulthood and employment, as adult work and family roles are generally incompatible with continued substance use.<sup>37</sup>

The association between lower educational levels and CUD may be particularly important. It has been suggested that high-quality employment and work stability indicate adult social bonds that may reduce substance use, law violation and other problem behaviours in adulthood.<sup>38,39</sup> Lower educational levels may lead to employment entailing low occupational status, part-time work hours and temporary work arrangements, which may in turn make it less likely that a subject will lower their cannabis use or reduce heavier use.<sup>37</sup> It has been noted that regular use of cannabis is just as likely to be symptomatic of problematic transitions as it is to be their cause. Thus, in situations where young people do not have the capacity to make transitions to higher status, they may become trapped in peer groups where cannabis use becomes a central focus, thus preventing them from making transitions to higher status roles. In their discussion on the impact of cannabis use on young people, Melrose et al. suggest that it is individuals who are caught in this spiral that are most at risk of developing more problematic levels and patterns of drug use.<sup>40</sup>

### **Strengths and limitations**

This research has several strengths. This is the first study to attempt to identify factors associated with patterns of cannabis use, and CUD, in Ireland using data from two population surveys. A further strength of this research is the large sample size which utilized data from two population studies that used the same field survey procedures and data collection methods and which were weighted and adjusted for the year of data collection; thus, our findings are generalizable to the whole population. We also used valid and reliable measures of cannabis abuse and dependence, defined using the DSM-IV, and Ireland is one of the first countries in Europe to include these variables in two general population surveys. Research on factors relating to patterns of cannabis use, abuse and dependence is

important for preventative work and for informing and assessing drug policy. Results from this study may help health professionals identify subgroups of individuals at greatest risk of progressing to, or who currently have, a CUD.

Despite these strengths, several limitations should be noted. The cross-sectional study design limits inference with regards to causality and precludes drawing conclusions regarding the temporal direction of relationships. Moreover, the use of self-reported questionnaires is subject to potential inaccuracies, recall and reporting bias, and residual confounding arising from imprecise measurement of variables should also be considered. Due to sample size constraints, we analyzed cannabis abuse and dependence together rather than as separate constructs. Research examining abuse and dependence separately may be warranted as abuse or dependence criteria may be differentially predictive of adverse outcomes. Finally, although we found significant relationships between variables and CUD in multi-variable analysis, the model itself demonstrated only moderate discrimination. Consequently, there are likely to be other factors related to CUD which we have not measured. Further research is required to identify these factors.

## **Conclusions**

In conclusion, the results from this study suggest that a high percentage of current cannabis users are at risk of cannabis abuse or dependence. Key findings indicate that males, adolescents/young adults and individuals with lower educational levels are more likely to be current users of cannabis and are at a greater risk of having a CUD. Given the potential public health implications of cannabis legalization, it is imperative that valid and reliable information on cannabis use, CUD and cannabis-related harm is collected in Ireland and other countries to ensure that the impact of any changes arising from cannabis legalization can be accurately measured. Findings from this study may be used to better inform public health efforts to improve prevention of CUD and in the identification and referral of CUD clients to appropriate treatment services.

## **Supplementary data**

Supplementary data are available at *EURPUB* online.

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*Conflicts of interest:* None declared.

## **Data availability**

The data used and analyzed for the purpose of this study are available from the corresponding author on reasonable request.

### **Key points**

- The weighted prevalence of experiential cannabis use was 18.3%, with 3.0% and 3.3% of participants indicating recent or current use respectively.
- 41.3% of current users indicated having a cannabis use disorder.
- Males, adolescents/young adults and individuals with lower educational levels are more likely to be current users of cannabis and are at a greater risk of having a cannabis use disorder.

- Given the potential public health implications of cannabis legalization, it is imperative that valid and reliable information on cannabis use and cannabis-related harm is collected to ensure that the impact of any changes arising from cannabis legalization can be accurately measured.
- Results from this study may help health professionals identify subgroups of individuals at greatest risk of progressing to, or who currently have, a cannabis use disorder.

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