

Research Article

Cannabis use and co-use in tobacco smokers and nonsmokers: prevalence and associations with mental health in a cross-sectional, nationally representative sample of adults in Great Britain, 2020

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Background and aims: In Great Britain, cannabis and tobacco are commonly used substances, both independently and together. Use of either substance is associated with mental health problems, but prevalence of co-use within these populations is unknown. We aimed to 1) estimate prevalence of cannabis use, frequency of use and routes of administration (ROA) among tobacco smokers and non-smokers and 2) investigate mental health problems amongst non-users, tobacco-only, cannabis-only and co-users of both substances.

Design: Cross-sectional national online survey (Action on Smoking and Health) fielded in February–March 2020.

Setting: Great Britain

Participants: Adults in Great Britain aged ≥ 18 year ($n = 12,809$)

Measurements: Tobacco use status (smoker [daily or non-daily] or non-smoker [never or ex-smoker]), cannabis use frequency (never to daily), detailed ROAs of cannabis, self-reported treatment for mental health disorders (depression, anxiety, and any). Statistically weighted prevalence estimates were computed to ensure representativeness. Correlates were assessed using chi-squared tests and logistic regression.

Findings: In Great Britain in 2020, 7.1% of the sample had used cannabis in the past year. Tobacco smokers had greater odds of using cannabis in the past year (21.9%) and using cannabis daily (8.7%) than non-smokers (past-year: 4.7%; aOR=10.07, [95% CI: 8.4–12.0]; daily: 0.7%; aOR=24.6, [95% CI: 17.96–35.55]). Co-administration with tobacco was common (46.2% of non-smokers, 80.8% of tobacco smokers). Co-users reported the highest prevalence of any treatment for mental health problems (54.2%) in comparison to cannabis-only (45.8%), tobacco-only (33.2%) and non-users (22.7%; all $p \leq 0.05$).

Conclusion:

Approximately one in 13 adults in Great Britain reports having used cannabis in the past year, approximately four times as many among cigarette smokers as non-smokers. Co-administration of cannabis and tobacco, via smoking, appears to be common, including among self-identified non-smokers. Mental health problems appear to be particularly common among dual users.

Introduction

Globally, approximately 219 million people use cannabis and 1.1 billion use tobacco¹. Two and a half million individuals in England and Wales used cannabis in the last year according to the Independent Review of Drugs^{2,3}. Cannabis use increased by 16% between 2016/17 and 2018/19² and is now one of the most cited problematic substances amongst those entering substance misuse treatment in the UK². In Europe, cannabis is the primary drug cited by first-time clients entering substance misuse services, increasing by 76% in the last decade⁴. In contrast, an estimated 7.7 million UK adults smoke tobacco; prevalence in 2018 was 14.7%⁵. Tobacco smoking remains the leading cause of preventable ill health⁵. Both cannabis and tobacco smoking are associated with mental health disorders^{6–9}. Estimates suggest 34% of people with depression and 29% of people with anxiety in the UK smoke tobacco⁵, both significantly higher than the population prevalence.

Cannabis and tobacco are commonly used together worldwide, by the same individuals, and in the same period^{10–16}. In the UK and Europe, it is also common to co-administer cannabis with tobacco in the same product (a joint/spliff). Data from a sample of illicit drug users collected in 2014 suggests 77.2% of past-year cannabis users in the UK mix cannabis with tobacco¹¹. The harms of cannabis are exacerbated by its relationship with tobacco¹⁷, and co-users are at greater risk of poorer health-related, psychiatric, psychosocial and cessation outcomes for both substances^{18–20}.

Whilst nationally representative data exist on cannabis and tobacco use individually, data regarding the vast overlap of these substances, and its relationship to mental health, is rare in Great Britain. Our aim was to generate estimates of cannabis prevalence in the population, as well as within tobacco users and non-tobacco users by providing a detailed assessment of frequency of use, routes of administration (ROA) and the prevalence of mental health disorders amongst co-users, exclusive cannabis and tobacco-only groups and non-users.

Methods

Design and Procedure

We conducted analyses of data from a cross-sectional, national, online survey carried out in Great Britain between 17th February – 11th March 2020. The survey is commissioned annually by the charity Action on Smoking and Health (ASH) and included questions relevant to cannabis and tobacco co-use for the first time in 2019. Selected findings have been published^{21–23}. The 2020 survey used a panel of over 1,630,000 UK adults maintained by the market research company YouGov Plc which abides by British Polling Council and ESOMAR (World Association of Opinion and Marketing Research Professionals) guidelines. To represent the national profile of adults over 18 years old (including people without internet access), YouGov statistically weight data by respondents' age, sex, social class, region, level of education, and ethnicity to ensure representativeness in relation to the population. Weights are validated by 3 key sources: 2011 Census; large scale probability surveys; and population estimates from the Office for National Statistics (<https://yougov.co.uk/about/panel-methodology/>) such that the data is representative of these. The YouGov Panel members were emailed an invitation to participate without information on survey content. YouGov employ an automated sampling system, which allocates respondents to surveys based on quota, and other, requirements. When respondents receive the link, it is not in relation to a specific survey – only when respondents click the link that they are allocated to a specific survey by the system. Of those who started this survey, 97% completed it. Panel members consent to completing surveys in return for a modest financial incentive. Additional ethical approval was not sought due to this pre-existing consent. Recodes and analyses for the present manuscript were run by the authors using data collected by YouGov.

Sample

A sample of 12,809 people completed the survey and responses were weighted to be representative of the adult population.

Measures

Socio-demographics: Age (18–24; 25–34; 35–44; 45–54; 55+), sex (men, women), and socioeconomic status (AB: higher or intermediate managerial, professional and administrative, C1: supervisory, clerical, junior managerial, administration or professional, C2: Skilled manual workers, DE: semi and unskilled manual workers, state pensioners, trainees, never workers and long-term unemployed). Ethnicity (white vs. black and ethnic minority (BAME)), location (England, Scotland or Wales (based on home postcode)), education (Low: no certifications/ GCSEs & equivalents, Medium: A-levels & equivalents/ technical qualifications below degree, or High: university degree or above).

Tobacco smoking status: “Smoking in this survey refers to all burnt tobacco products. It does NOT include e-cigarettes. Which of the following statements BEST applies to you?” Responses were: I have never smoked; I used to smoke but I have given up now; I smoke but I don’t smoke every day; I smoke every day. This was treated as “Non-smokers” (never and ex-smokers) and “Smokers” (non-daily and daily smokers) for analysis as the groups did not vary significantly on relevant variables.

Frequency of cannabis use: “In the last 12 months, how often have you used marijuana/ cannabis in ANY WAY?” Responses were: I have never used cannabis; I have used cannabis, but not in the past year; less than once a month; about once a month; about once a week; daily; prefer not to say; don’t know. Past-year cannabis users defined as those using “less than monthly” or greater for analysis.

Route of administration: “Which option best describes your use of cannabis over the past year?” Responses were: smoked it without tobacco; smoked it with tobacco e.g. (joints/spliffs) or in a blunt (cigar); vaped it in liquid form in an e-cigarette or other vaping device; used a vapouriser to heat the leaves or dried plant material; used a vapouriser to heat hash oil; dabbed concentrates such as shatter, budder, or wax; consumed it in food or drinks; some other way; prefer not to say; don't know. Participants ticked the options that applied to them.

Mental health: “The following questions are about your health. We understand that this is a highly sensitive topic and would therefore like to remind you that any information you give is strictly confidential and will be used for research purposes only. Some questions asked may not necessarily apply to you. In the last 12 months, which of the following conditions, if any, have you *had any treatment or taken any prescribed medication for*? Please select all that apply.” Responses were: depression; anxiety; obsessive compulsive disorder; panic disorder or phobia; post-traumatic stress disorder; psychosis;

personality disorder; attention deficit hyperactivity disorder; an eating disorder; alcohol misuse or dependence; drug misuse or dependence; problem gambling; none of these; prefer not to say; don't know. Participants ticked all options that applied to them. The last three were exclusive i.e. only available if none of the others were ticked.

Statistical analysis

In all analyses, data were weighted by age, sex, social class, region and level of education. Prevalence of cannabis use, frequency of use, ROA and mental health outcomes were assessed using valid percentages overall and split by tobacco smoking status. We conducted 2x2 chi squared (χ^2) test of independence to compare the proportion of tobacco smokers and non-smokers across cannabis use frequency categories and to compare prevalence of ROAs of cannabis by tobacco smoking status. Significance was assessed with $p \leq 0.05$. Cramer's V is reported as a measure of the strength of association using traditional thresholds for effect sizes (small: $V=0.1$, moderate: $V=0.3$, large: $V=0.5$)²⁴.

We applied adjusted logistic regression models, controlling for age (18–24, 25–39, 40–49, 50–65, 65+), sex, education (low, mid, high), ethnicity (white vs. BAME), GB location (England, Wales, Scotland) and social grade (AB, C1, C2, DE) to assess the association between tobacco smoking status (smoker vs. non-smoker) and cannabis use frequency status versus never used cannabis (e.g. daily vs never, weekly vs. never). Significance was assessed for all models using Wald test statistics with $p \leq 0.05$ and by assessing non-overlapping confidence intervals (CIs). No model selection processes were utilized.

As prevalence for treatment for many mental health disorders was low, we restricted our results to the most prevalent responses: “depression”, “anxiety” and “none of these” which was inverted into “any mental health problem” i.e. those who said yes to any of the preceding conditions. We used χ^2 tests to compare four groups: non-tobacco smokers and non-cannabis users (non-users), tobacco smokers (who did not use cannabis), cannabis users (who did not use tobacco) and a co-using sample (those who reported being a tobacco smoker and had used cannabis in the past year). Column proportions were compared using Bonferroni-corrected pairwise tests.

“Don't know” and “prefer not to say” responses were excluded throughout thus some totals do not equal 100%. Percentages calculated from cells with under 50 individuals are subject to a larger degree of uncertainty. These results should be considered exploratory, as the analysis presented here was not pre-registered. A preprint of this article before peer review can be accessed online (<https://www.qeios.com/read/2F4AQ1>)²⁵.

Results

Overall, 13.9% (95%CI: 13.9–14.9%) of the sample were tobacco smokers and 43.3% (40.1–46.5%) of cannabis users were tobacco smokers. Social grade was numerically comparable across the full sample and the subsample of past-year cannabis users. Visual inspection shows age and gender were skewed towards younger males in the cannabis-using sub-sample compared to the full sample (Table 1).

Cannabis use among tobacco smokers and non- tobacco smokers

Overall, 28% (95%CI: 27.2–28.8%) of respondents had ever used cannabis, 7.1% (6.7–7.5%) had used cannabis in the past year, 3.1% (2.8–3.4%) used less than monthly, 3.9% (3.6–4.2%) were using at least monthly, 1.2% (1.0–1.4%) were using weekly and 1.8% (1.5–2.0%) were using daily. Of past-year cannabis users [$n=904$], 44.5% (41.3–47.7%) were using less than once per month, 13.4% (11.2–15.6%) were using about monthly, 17.1% (14.6–19.6%) were using weekly, and 25% (22.2–27.8%) were using daily (Table 1).

Amongst those identifying as non-tobacco smokers [$n=11025$], 24.5% (23.7–25.8%) reported ever using cannabis of which, 19.9% (19.2–20.6%) reported using cannabis, but not in past year. 4.7% (4.3–5.1%) reported past-year use, 2% (1.7–2.3%) reported at least monthly use, 1.3% (1.1–1.5%) reported at least weekly use, and 0.7% (0.5–0.9%) were daily users (Table 2).

Within the tobacco smokers [$n=1781$], 49.8% (47.5–52.1%) had ever used cannabis, 27.8% (25.7 – 29.9%) had used cannabis, but not in the past year. 21.9% (20.0–23.8%) were past-year users, 15.5% (13.8–17.2%) were at least monthly users, 13.1% (10.9–15.3%) at least weekly users and 8.7% (7.4–10.0%) were daily cannabis users (Table 2).

Bivariate associations in Table 2 show there were more tobacco smokers in each cannabis use frequency group than non-tobacco smokers. Adjusted odds ratios show that the association between tobacco smoking status and cannabis use frequency became stronger the more frequently cannabis was used. Tobacco smokers have 10.07 ([8.4–12.0]; $p \leq 0.001$) times greater odds of being a past-year cannabis user in comparison to non-smokers and had 24.6 ([18.0–33.6], $p \leq 0.001$) times greater odds of being a daily cannabis user in comparison to non-smokers (Figure 1).

Routes of administration and co-administration

Of past-year cannabis users ($n=904$), 75.9% (73.1–78.7%) of people reported *at least* one method of smoking cannabis, either with (61.1%; [57.9–64.3%]) or without (27.1%; [24.2–30.0%]) tobacco. 21.1% (18.4–23.8%) reported having used some type of vaporizer (Table 1). Bivariate associations in Table 3 suggest a significantly greater proportion of tobacco smokers (88.3%; [85.1–91.5%]) had used a smoked (combustible) method of administering cannabis than non-smokers (66.5%; [62.4–70.6%]). There were opposite patterns with non-smokers who mostly used cannabis without tobacco. A greater proportion of tobacco smokers were co-administrators (Table 3). There was no significant difference between the proportion of people who vaped cannabis overall. More non-tobacco smokers than tobacco smokers were using dry-herb vaporisers, consumed cannabis in food and drink and used alternative methods.

Mental health outcomes (Figure 2)

Rates of treatment for depression were highest in co-users (32%; [27.4–36.6%]) of cannabis and tobacco, comparable across exclusive cannabis-only (18.3%; [15.0–21.6%]) and tobacco-only (20.3%; [18.1–22.5%]) categories, and lowest in non-users of both substances (12.3%; [11.7–12.9] ; $\chi^2(3)=178.91$, $p\leq 0.001$, $V=0.12$) with a similar pattern reporting treatment for anxiety ($\chi^2(3)=144.82$, $p\leq 0.001$, $V=0.11$) (Figure 2). For those reporting treatment for “any mental health problem”, non-users of both substances reported the lowest percentage (22.7%; [21.9–23.5%]), followed by tobacco-only smokers (33.2%; [30.6–35.8%]) then cannabis-only users (45.8%; [41.5–50.1%]). No significant pairwise difference emerged between the cannabis-only group and the co-using group (54.2%; [49.3–59.1%]; $\chi^2(3)=361.80$, $p\leq 0.001$, $V=0.17$) for treatment for any mental health problem.[1] Prevalence details can be found in Table S1.

Discussion

This study is the first to examine cannabis and tobacco co-use and its association with mental health problems in a nationally representative sample of over 12,000 adults in Great Britain. The findings indicate higher rates of past-year cannabis use amongst tobacco smokers compared to non-tobacco smokers, higher rates of tobacco use amongst cannabis users compared to non-cannabis users and high rates of daily cannabis use across the sample. We found greater self-reported treatment for mental health problems amongst cannabis users, tobacco users and co-users in comparison to non-users and a significant association between cannabis use and depression is highlighted. This study is one of the first of this scale to use detailed exploration of co-use types, revealing tobacco exposure amongst cannabis users which is often missed in population prevalence surveys¹⁶ and provides new insights into non-combustible cannabis use.

Tobacco smokers at higher risk of cannabis use

Tobacco smokers reported past year cannabis use at a much higher rate than non-tobacco smokers and had ten times the odds of past-year cannabis use compared to non-smokers. The association between tobacco smoking status and cannabis use frequency increased across frequency of use. In this sample, tobacco smokers had 24.6 times greater odds of being a daily cannabis user, compared to non-tobacco smokers which aligns with previous research¹⁶. This survey is not able to determine if the association is causal or the result of common risk factors, however better understanding of this relationship would aid strategies to both reduce tobacco and cannabis consumption.

Forty-three percent of past-year cannabis users identified as tobacco smokers, whereas the population level of tobacco smoking in 2018 was 14.7%⁵, and 13.9% in this sample. This suggests that tobacco smoking in past-year cannabis users is roughly three times that of the population. This prevalence is comparable to the 44.4% tobacco smoking prevalence in adults presenting to community treatment for alcohol²⁶, although respondents in this study were not necessarily treatment-seeking. Of note, one in four past-year cannabis users reported daily cannabis use; this is far higher than previous estimates suggesting 1 in 10 used daily^{2,3}. This suggests daily use may be more prevalent than previously thought and requires careful monitoring in the future since it is associated with greater risk of harms²⁷.

Use of non-combustible cannabis

Use of vaporised cannabis of any form in this study constituted ~20% of all cannabis use, and was slightly more common in non-tobacco smokers than tobacco smokers, consistent with avoidance of combustible products. Non-tobacco smokers had significantly higher prevalence of using dry-herb vaporisers as well as other alternative routes, whilst tobacco smokers only had a significantly higher prevalence of smoking cannabis with tobacco. Past-year dry-herb vaporisation was the most common type of vaporising (11.6%). Roughly 9% had used cannabis in an e-cigarette (liquid form). It is important to monitor the use of cannabis e-liquids given the recent outbreak of ‘e-cigarette or vaping associated lung injury’ (EVALI) in the US. The UK Medicines and Health Regulatory Agency have only reported two fatal EVALI cases, but 68 deaths occurred in the US^{28,29}. Eighty-six percent of these reports included THC and vitamin E acetate has also been identified as a cause²⁸. Though it should be noted that Vitamin E acetate is not permitted in e-

cigarettes in the UK or the EU, it is important to continue to monitor the chemical composition and prevalence of use of illicit THC e-liquids in the UK. Although it is expected that consumption of cannabis through vaporisers is less harmful than combustible tobacco, understanding this trend in the future is important. Population level statistics on edible cannabis preparations are not available in the UK. However, the rates found in this survey are similar to those seen in the 2017 International Tobacco Control Policy Evaluation Youth Tobacco and Vaping Survey completed in England³⁰.

Hidden Tobacco Exposure

Amongst past-year cannabis users who reported being tobacco smokers, 81% reported co-administration of both substances, and 90% reported a combustible form of cannabis use. Of note, nearly half of past-year cannabis users who self-identified as non-tobacco smokers reported co-administering cannabis with tobacco, and 67% reported a combustible form of cannabis use. Not only are these cannabis users exposed to the harms of combustible consumption, but they are also exposed to the harms of tobacco use, both for the duration of cannabis consumption but also to the risk of developing or maintaining tobacco dependence.

The practise of co-administering cannabis with tobacco, but not identifying as a tobacco user, has been found elsewhere^{10,30}. In qualitative studies, young cannabis users^{31,32} describe co-administration as facilitating burning, and this is how they learned to smoke cannabis. However, co-administration can increase the amount of THC uptake³³. Recent research suggests that UK-based, non-dependent, recreational users of co-administered cannabis and tobacco (but who do not necessarily smoke tobacco separately) include about 0.35g tobacco per joint, equivalent to roughly one third of a cigarette³⁴. This exposes participants to cotinine levels suggestive of moderate tobacco exposure, equivalent to that found in light/moderate cigarette smokers³⁵. This is an important observation because development of nicotine dependence symptoms has been observed in occasional (light and intermittent) smokers who do not smoke tobacco daily^{16,36}. Co-administration of cannabis and tobacco is not necessarily more acutely rewarding^{37,38}, but it does produce more negative acute cardiovascular effects³⁸ and is associated with chronic bronchitis even at low exposure³⁹. Co-administration is also associated with higher risk of dependence and poorer psychosocial outcomes^{40,41}.

Overall, this research suggests there is an additional but hidden level of tobacco exposure in tobacco smokers and non-smokers who use cannabis, with approximately 81% and 46% respectively reporting co-administration. This has implications for population-level estimates of tobacco prevalence. As tobacco use declines in the UK, this raises the possibility of an increasing group in the population exposed to combustible tobacco through cannabis consumption but poorly identified through mainstream surveys. In addition, smoking rates remain higher amongst those in high-risk populations who often experience psychiatric co-morbidities⁴². Since reducing tobacco smoking prevalence remains an important public health goal, cannabis users should be considered a vulnerable population where rates of tobacco smoking are both much higher than in the general population and potentially underestimated. Use of cannabis and tobacco should be considered concurrently in the development of policy, public health and treatment approaches²⁰.

Mental health

This study found that co-use of tobacco and cannabis was associated with higher rates of both depression and anxiety when compared to single-substance or non-use. When examining treatment for any mental health problem, in addition to a higher prevalence amongst co-users compared to non-users, cannabis use was associated with a significantly higher prevalence compared to tobacco use or no use.

Independently, both cannabis and tobacco use are known to be more common in those with mental health disorders⁶⁻⁹. When adjusting for pre-birth confounders, the association between cannabis and depression is stronger than that of tobacco and depression⁴³. Large scale, longitudinal, epidemiological research from the US suggests that past-month cannabis use is twice as common amongst people with depression than without⁴⁴. Our findings support a significant association between cannabis use and depression, and demonstrate a new finding of a significant relationship between co-use and depression.

As these data are cross-sectional, causality and directionality between tobacco and cannabis use and experience of a mental health problem cannot be inferred, but it is evident there is a close relationship between use, and co-use, of both substances and experience of such a problem. Our findings indicating a high prevalence of co-use suggest that attempts to address either cannabis or tobacco use amongst those with a mental health problem must consider use of the other substance. Evidence on optimising cannabis and/or tobacco dependence treatment in the context of co-use is currently lacking¹⁶, but it is clear this more vulnerable population requires specific clinical and research attention in tobacco, cannabis and co-use interventions. In addition, impact of use and co-use on mental health treatment outcomes also warrants attention.

Limitations

Limitations of this study include that some estimates are based on relatively small numbers of respondents, any percentage reported based on less than 50 individuals are subject to a larger degree of fluctuation. However, we have included these estimates because these are the first nationally representative

data focussed upon Great Britain. We have highlighted where this is the case, and have not made conclusions about these particular statistics. Therefore, they should be considered preliminary. Another potential limitation is the impact of the start of the COVID-19 outbreak, which coincided with data collection (Feb–March 2020), which may have influenced use of tobacco and cannabis in as yet unknown directions.

We acknowledge there is great variation in types of co-use including products which we not able to capture in this analysis, including sequential co-use and amount of use of each substance. Respondents may have misunderstood questions regarding edible cannabis products, as many CBD products utilise cannabis symbology in marketing strategies. However, our estimates seem similar to previous findings³⁰. In regard to treatment for mental health problems, the response “none of these”, was subsequently inverted into “any mental health problem”. Those who responded as “none of these” may have experienced another mental health problem not listed, though the frequency is likely to be low since we covered the most common mental health problems.

Conclusions

A representative survey of the adult population in Great Britain in 2020 found cannabis and tobacco co-use to be common. Tobacco smokers had ten times the odds of being a past-year cannabis user than non-smokers and 24 times the odds of being a daily cannabis user. Co-users of cannabis and tobacco had the highest prevalence of poor mental health and daily cannabis use compared with those using one or none of these substances.

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Figures

Figure 1: Adjusted odds ratio (aOR) of being a tobacco smoker based on cannabis use frequency category vs. never cannabis use. All models adjust for age, gender, education, ethnicity (white vs. BAME), GB location (England, Wales, Scotland) and Social Grade (AB, C1, C2, DE). Error bars represent 95% Confidence Intervals. All ORs are significant $p \leq 0.05$.

Figure 2: Prevalence of those who reported treatment for mental health disorders (depression, anxiety or ‘any mental health problems’) overall and across tobacco and cannabis using groups. Any of these” refers to those self-reporting experiencing: depression, anxiety, obsessive compulsive disorder; panic disorder or phobia; post-traumatic stress disorder; psychosis; personality disorder; attention deficit hyperactivity disorder; an eating disorder; alcohol misuse or dependence; drug misuse or dependence; problem gambling. Prefer not to say and don’t know responses not shown. *represents bonferroni-corrected p value < 0.05 comparing column proportions after chi-square test.

Table 1: Demographics (gender, age, social grade and tobacco use) of the whole sample and past-year cannabis users.

N	Whole sample (N=12809)	% (95% CI)	Past-year cannabis users (N=904)	% (95% CI)
Gender (F)	6954	51.5 (50.6–52.4%)	385	42.6 (39.4–45.8%)
Age				
18–24	1441	11.3 (10.8–11.8%)	242	26.8 (23.9–29.7%)
25–39	3209	25.1 (24.3–25.9%)	386	42.7 (39.5–45.9%)
40–49	2165	16.9 (16.3–17.5%)	140	15.5 (13.1–17.9%)
50–65	3047	23.8 (23.1–24.5%)	90	10.0 (8.0–12.0%)
65+	2945	23.0 (22.3–23.7%)	46	5.10 (3.67–6.53%)
Social Grade				
AB	2913	22.7 (22.0–23.4%)	216	23.9 (21.1–26.7%)
C1	3905	30.5 (29.7–31.3%)	305	33.7 (30.6–36.8%)
C2	2692	21.0 (20.3–21.7%)	148	16.3 (13.9–18.7%)
DE	3297	25.7 (24.9–26.5%)	235	26.0 (23.1–28.9%)
Tobacco use				
Never smoked	6815	53.2 (52.3–54.1%)	239	26.4 (23.5–29.3%)
Ex-smokers	4210	32.9 (32.1–33.7%)	274	30.3 (27.3–33.3%)
[Non-smokers]	11 025	86.1 (85.5–86.7%)	513	56.7 (53.5–59.9%)
Non-daily smokers	540	4.20 (3.9–4.5%)	152	16.8 (14.4–19.2%)
Daily smokers	1243	9.70 (9.2–10.2%)	213	26.5 (23.6–29.4%)
[Smokers]	1783	13.9 (13.3–14.5%)	391	43.3 (40.1–46.5%)
Cannabis use			% *	
Never cannabis use	8805	68.7 (68.0–69.5%)	-	
Ever use but not in the past 12m	2688	21.0 (20.3–21.7%)	-	
Less than monthly*	402	3.10 (2.80–3.40%)	44.5 (41.3–47.7%)	
Once a month*	121	0.90 (0.74–1.14%)	13.4 (11.2–15.6%)	
Once a week*	154	1.20 (1.01–1.40%)	17.1 (14.6–19.6%)	
Daily*	227	18.0 (17.3–18.7%)	25.0 (22.1–27.8%)	
Routes of administration*				
Smoked without tobacco	245	1.91 (1.67–2.15%)	27.1 (24.2–30.0%)	
Smoked it with tobacco e.g. (joints/spliffs) or in a blunt (cigar)	553	4.31 (3.96–4.67%)	61.1 (58.0–64.3%)	
Smoked overall (at least 1 method) ^a	687	5.34 (4.95–5.72%)	75.9 (73.1–78.7%)	
Vaped it in liquid form in an e-cigarette or other vaping device	85	0.66 (0.52–0.80%)	9.4 (7.50–11.3%)	
Used a vaporiser to heat the leaves or dried plant material	105	0.82 (0.66–0.98%)	11.6 (9.51–13.7%)	
Used a vaporiser to heat hash oil	41	0.32 (0.22–0.42%)	4.6 (3.23–5.97%)	
Vaped overall (at least 1 method) ^a	191	1.49 (1.28–1.70%)	21.1 (18.4–23.8%)	
Dabbed concentrates such as shatter, budder or wax	44	0.34 (0.24–0.44%)	4.9 (3.49–6.31%)	
Consumed it in food or drinks	196	1.53 (1.32–1.74%)	21.7 (19.0–24.4%)	
Some other way	65	0.51 (0.39–0.63%)	7.2 (5.55–8.89%)	

Notes: AB – high/intermediate managerial, administrative, or professional; C1 – Supervisory, clerical and junior managerial, administrative or professional; C2 – Skilled manual workers; DE: Semi or unskilled manual workers; E – State pensioners, casual or lowest grade workers, unemployed with state benefits only. ^a “Smoked overall” and “vaped overall refers to use of at least 1 method, participants could have reported more than 1 within smoked or vaped. *N is equivalent for total sample and past 12-month cannabis users so only the % is presented in the past-year cannabis users

Table 2: Cannabis use status by tobacco use status. Bivariate associations represent each cannabis use category vs. never cannabis users

	Non-Smokers (N=11025)	Smokers (N=1781)	Bivariate association
Never used cannabis	8059	746	
%	73.1%	41.9%	$\chi^2(1)=588.65, p \leq 0.001, V=0.22$
95% CI	72.3–74.0%	39.6–44.2%	
Ever used but not in the past12m	2191	496	
%	19.9%	27.8%	$\chi^2(1)=213.01, p \leq 0.001, V=0.14$
95% CI	19.1–20.6%	25.7–29.9%	
Less than monthly	288	114	
%	2.6%	6.4%	$\chi^2(1)=179.53, p \leq 0.001, V=0.14$
95% CI	2.3–2.9%	5.3–7.5%	
Once a month	78	43	
%	0.7%	2.4%	$\chi^2(1)=108.50, p \leq 0.001, V=0.11$
95% CI	0.5–0.8%	1.7–3.1%	
Once a week	75	79	
%	0.7%	4.5%	$\chi^2(1)=332.03, p \leq 0.001, V=0.19$
95% CI	0.5–0.8%	3.5–5.4%	
Daily	72	154	
%	0.7%	8.7%	$\chi^2(1)=874.35, p \leq 0.001, V=0.31$
95% CI	0.5–0.8%	7.4–10%	

Notes: % represents the number within the tobacco smoker group. Percentages calculated from cells with under 50 individuals are subject to a larger degree of fluctuation. Prefer not to say and don't know responses not shown.

Table 3: Routes of administration within past-year cannabis users stratified by smoking status. Bivariate associations represents those responding yes vs. no for each route. Data is also reported as a percentage of the whole cannabis-using sample and as a % of the whole sample.

Route of administration	Non-smokers (n=513)	Smokers (n=391)	Bivariate association
Smoked without tobacco % 95%CI	154 30% 26–34%	91 23.3% 19.1–27.5%	$\chi^2(1)=5.11, p=0.024, V=0.08$
Smoked it with tobacco e.g. (joints/spliffs) or in a blunt (cigar) % 95% CI	237 46.2% 41.9–50.5%	316 80.8% 76.8–84.7%	$\chi^2(1)=111.96, p\leq 0.001, V=0.35$
Smoked overall (at least 1 method) ^a % 95% CI	341 66.5% 62.4–70.6%	346 88.3% 85.1–91.5%	$\chi^2(1)=57.72, p\leq 0.001, V=0.25$
Vaped it in liquid form in an e-cigarette or other vaping device % 95% CI	45 8.8% 6.3–11.3%	30 10.2% 7.2–13.2%	$\chi^2(1)=0.544, p>0.05$
Used a vaporiser to heat the leaves or dried plant material % 95% CI	78 15.2% 12.1–18.3%	27 6.9% 4.4–9.4%	$\chi^2(1)=14.81, p\leq 0.001, V=0.13$
Used a vaporiser to heat hash oil % 95% CI	26 5.1% 3.2–7%	16 4.1% 2.1–6.1%	$\chi^2(1)=0.489, p>0.05$
Vaped overall (at least 1 method) ^a % 95% CI	120 23.3% 19.6–26.9%	72 18.4% 14.6–22.2%	$\chi^2(1)=3.301, p=0.069$
Dabbed concentrates such as shatter, budder or wax % 95% CI	25 4.9% 3–6.7%	19 4.9% 2.8–7%	$\chi^2(1)=0.00, p>0.05$
Consumed it in food or drinks % 95% CI	138 26.9% 23.1–30.7%	58 14.8% 11.3–18.3%	$\chi^2(1)=19.03, p\leq 0.001, V=0.15$
Some other way % 95% CI	49 9.6% 7–12.1%	15 3.8% 1.9–5.7%	$\chi^2(1)=11.02, p=0.001, V=0.11$

% = within each smoking status. Percentages calculated from cells with under 50 individuals are subject to a larger degree of fluctuation. Prefer not to say and don't know responses not shown. ^a “Smoked overall” and “vaped overall refers to use of at least 1 method, participants could have reported more than 1 within smoked or vaped.

[1] Prevalence of treatment for depression, anxiety and “any mental health” problem amongst smokers, regardless of cannabis use status was 22.4%, 20.4% and 40.2% respectively. Prevalence for depression, anxiety and “any mental health problem amongst past year cannabis use regardless of smoking status was 24.2%, 22.5% and 49.5%, respectively.

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