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Insights into public use and attitudes of cannabidiol (CBD) in England, Wales and Northern Ireland: secondary analysis of an official statistic consumer survey, Food and You 2

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ABSTRACT

Introduction Cannabidiol (CBD) is a naturally occurring phytocannabinoid found in *Cannabis* plants. CBD is used for skin care, pain, anxiety and insomnia. There is a growing range of CBD products and formulations on the market, which have been driven by the increased demand for CBD products. The aim of this study was to identify knowledge and use of CBD products among adults in England, Wales and Northern Ireland; exploring patterns of CBD use of different products and characteristics associated with awareness and use of CBD.

Methods The current research analysed data from the Official Statistics survey, Food and You 2 (n=13 879), Wave 1 (2020), Wave 3 (2021) and Wave 7 (2023). A series of binary logistic regression models were used to identify the characteristics associated with CBD awareness and use. Cluster analyses examined CBD product usage and how consumers decide on a suitable dose/serving.

Results It was identified that 61.9% of respondents had heard of CBD, and of those who had heard of CBD, 17.1% had used CBD in the previous 12 months. The characteristics associated with CBD awareness and use are not uniform. How CBD users decide on a suitable dose/serving varies, with some using a combination of methods, others relying on pack instructions alone or not thinking about this issue.

Conclusions This research offers novel insight into the awareness and use of CBD products across England, Wales and Northern Ireland, providing an evidence base for policymakers to better understand and monitor CBD awareness and use.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Cannabidiol (CBD) is a naturally occurring phytocannabinoid which is used to treat a range of conditions. Recent Food Standards Agency policy changes aim to regulate CBD businesses while ensuring consumer safety.

WHAT THIS STUDY ADDS

⇒ This research identifies demographic characteristics associated with awareness and use of CBD products across England, Wales and Northern Ireland, patterns of product use and how decisions about a suitable dose/serving vary across consumers.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ These insights provide an evidence base for policymakers to better understand and monitor CBD awareness and use across the UK. We suggest the need for better education for consumers and healthcare professionals.

INTRODUCTION

Cannabidiol (CBD) is a naturally occurring compound classified as a cannabinoid, derived from the cannabis plant (*Cannabis sativa* L). Unlike tetrahydrocannabinol (THC), the primary psychoactive component of cannabis that produces the sensation of being 'high' and is linked to increased risks of addiction and psychosis, CBD is non-psychoactive and does not induce these mind-altering effects.[1 2] Both CBD and THC act on the endocannabinoid system, which has a role in regulating the central nervous system; hence, these cannabinoids can modulate physiological and psychological effects.[3] CBD binds to cannabinoid receptors CB1 (found in the central nervous system) and CB2 (found in immune cells), which in turn modulate a variety of physiological responses such as pain sensation and stress.[4] A systematic analysis and meta-analysis of CBD randomised clinical trials concluded that CBD has relatively few serious adverse effects; however, potential interactions with some medications (eg, clobazam, sodium valproate) were noted. It was highlighted that the CBD doses used in the trials studied were higher than those of health foods or supplements, meaning that the risk of adverse

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interactions may be lower.[5] CBD has been deemed safe for use as it is not associated with psychostimulating effects; thus, the popularity as a supplement has been rising.[6 7]

CBD has been associated with several key medicinal benefits including relief of chronic pain, inflammation, acne, anxiety and insomnia.[8 9] Schilling *et al*[10] conducted an online survey (n=253) of patients suffering from chronic pain in the USA and found that 62% of respondents had used CBD products, with 59% having used CBD to treat pain and reduce other pain medications prescribed. There is growing clinical evidence that supports the use of CBD for various conditions. The use of CBD in epilepsy has been well studied with clinical evidence to support its use,[11] such that a regulated medicine (Epidiolex) is now available on the National Health Service in the UK. Epidyolex contains highly purified CBD and is now available on prescription in the UK for rare forms of epilepsy such as Lennox-Gastaut syndrome and Dravet syndrome.[12] Khan *et al*[13] found CBD had useful effects in mental health disorders such as anxiety, autism spectrum disorder (ASD), attention deficit hyperactivity disorder, insomnia and post-traumatic stress disorder. Some more chronic and serious mental health disorders such as schizophrenia and bipolar disorder have shown some benefits, but evidence remains insufficient. McDonagh[14] identified 18 randomised placebo-controlled trials in which CBD was administered for chronic pain; the review concluded CBD had short-term benefits but evidence in the long term was lacking. A systematic review by Ranum *et al*[15] identified marginal improvements in insomnia, while a pilot randomised controlled trial by Narayan *et al*[16] found the improvements in sleep were comparable to the placebo group.

The rising public interest in CBD continues to increase the demand and supply of CBD products on the market.[17] Much of the interest in the medicinal, culinary and cosmetic use of CBD has been promoted by social media, influencers and celebrity endorsements[8] as well as increasing social acceptance and legalisation of cannabis-derived products.[18] The global CBD market value is forecast to grow from its current value of US$11.16 billion to US$202.45 billion by 2032[19]; while in the UK, the CBD market is currently valued at approximately £245 million.[18] The emergence and growth of CBD has increased in recent years, with CBD being made available in a variety of products and formulations such as oils, creams, sprays, gummy bears and capsules. But while new CBD products keep entering the market virtually unchecked, effective regulatory control of these products has stayed far behind. As a result, unknown risks about long-term effects remain unaddressed, especially in vulnerable groups such as children, the elderly, and the chronically or terminally ill.[20]

There remains some confusion about the difference between CBD and cannabis;[8] research suggests that at least a third of people do not know much about CBD.[21] Under UK law, namely the Misuse of Drugs Regulations,[22] cannabis and cannabinol derivatives are classed as schedule 1 controlled drugs or class B drugs under the Misuse of Drugs Act 1971. Under the same regulations, CBD is classed as a schedule 4 controlled drug under the criteria[21] that it is in a metered dose, mucosal mouth spray pump, at a concentration of 30 mg/mL, with the ratio of CBD to THC between 0.7 and 1.3.[22 23] CBD as an extract of cannabis, on its own, is not a controlled drug; however, the process of extraction and separation from the cannabis plant may result in the extraction of other prohibited cannabinoids into the CBD isolate, particularly psychoactive cannabinoids.[24] To address this risk, the Government sought advice from the Advisory Council on the Misuse of Drugs, who recommended that controlled, non-CBD cannabinoids such as THC should not exceed 50 mcg per unit of consumption (ie, a single serving) in CBD products.[25] CBD products are readily sold in pharmacies and other health and general stores online and on the high street; however, the growth and production of CBD is under stringent restrictions in line with the Misuse of Drugs Act (1971).[22] To cultivate, possess and supply cannabis, one must obtain a licence from the UK Home Office or Secretary of State (section 7, Misuse of Drugs Act, 1971). Furthermore, on extraction and production of CBD products, their supply and sale are further regulated by the Food Standards Agency (FSA)[26] as novel foods. For suppliers to sell CBD products as novel foods, the product/s must be authorised by the FSA after meeting the requirements of joint UK and European Union (EU) regulations (Regulation (EU) 2015/2283, 2015), which specify the criteria for inclusion in the novel foods list. The question as to whether CBD is a medicine or food supplement is much debated. The FSA have identified it as a novel food substance.[27] Products which do not make a medicinal claim can be sold as food supplements. In England and Wales, CBD was granted novel food status by the FSA in 2019, whereas in Northern Ireland CBD food products are aligned with EU legislation (Regulation (EU) 2015/2283).[27] CBD products which make a medicinal claim and are used as a medicine require a product licence (marketing authorisation) before they can be sold and supplied in the UK (Medicines and Healthcare products Regulatory Agency (MHRA).[28] The MHRA[29] clarified that products containing CBD used for medicinal purposes, which make a medicinal claim, will be classified as a medical product as defined by The Human Medicine Regulation 2012.[30]

With the clinical evidence enhancing the literature available on CBD, and the ease of accessing a range of CBD products available, it leads to the question as to who is using CBD and how. There is no research to date that has explored the awareness and product usage practices of CBD products with a large-scale, nationally representative survey of adults (Official Statistics) across England, Wales and Northern Ireland. Research typically focuses on specific subgroups of the population.[8 10 31] The current research aims to identify knowledge of CBD and use of CBD products among adults in England, Wales

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and Northern Ireland. The research outlines three key objectives: to identify which individual characteristics are associated with awareness and use of CBD (Ob1), to explore the patterns of CBD use for different products (Ob2) and to investigate how respondents decide on a suitable dose/serving of CBD products (Ob3).

METHOD

Data and sample

Food and You 2 is an Official Statistics survey commissioned by the FSA which measures consumers' food-related knowledge, attitudes and behaviours. Food and You 2 is a modular survey with the topics varying between different waves of data collection. The survey employs a sequential mixed-methods 'push-to-web' method with respondents initially receiving a postal invitation to complete the survey online. Those who do not complete the online survey are subsequently sent a postal version of the survey. Food and You 2 recruits a nationally representative sample of adults (aged 16+ years) across England, Wales and Northern Ireland for each wave of data collection (Wave 1, n=9139; Wave 3, n=6271; Wave 7, n=5812). Data from Food and You 2: Wave 1 (July–October 2020), Wave 3 (April–June 2021) and Wave 7 (April–July 2023) were used.[32] The questions related to awareness and use of cannabinoid products were asked in the online version of the questionnaire only (Wave 1, n=5936; Wave 3, n=4326; Wave 7, n=3617). The data from Wave 1, Wave 3 and Wave 7 were pooled to create a final analytical sample of n=13 879.

Outcome variables

The Food and You 2: Wave 1, Wave 3 and Wave 7 survey included questions about sociodemographics and cannabinoid awareness and use. The survey asked participants if they had heard of CBD and how much knowledge they had about the product. Responses that provided an affirmative response were recoded as 'yes, heard of CBD'; those who did not as 'no, not heard of CBD'. Participants who had heard of CBD (n=8585) were asked how often, if at all, they had used a range of cannabinoid products in the previous 12 months. Those who answered affirmatively for an individual product in the previous 12 months were recoded as 'yes, used product'; those who had not as 'no, not used product'. Respondents who answered 'don't know' or 'prefer not to say' were indicated as missing in the dataset, leaving an analytical sample of n=6345. Respondents who reported that they had used CBD in the previous 12 months were asked how they decide what a suitable dose or serving is (Food and You 2 Wave 7—Final Online Questionnaire Specification).[32]

Predictor variables

Key sociodemographic and socioeconomic variables were selected that we expected to be associated with use of cannabinoid products. The selected variables were grouped into thematic blocks relating to demographics, household composition and finances, and geographical factors. Geographical factors were included to offer insights into the geographical distribution of cannabinoid awareness and use, and where differences in the policies of devolved administrations may be associated with these factors (table 1).

The FSA definition of food hypersensitivity is '*a bad or unpleasant physical reaction which occurs as a result of consuming a particular food. There are different types of food hypersensitivity including a food allergy, food intolerance and coeliac disease*'.[33] The '65–74 years' and '75 years or over' age brackets were combined due to low counts in the groups. Similarly, ethnicity (ie, white vs other ethnic group), presence of a food hypersensitivity (ie, has a food hypersensitivity vs does not have a food hypersensitivity) and number of children in the household (ie, children in the household vs no children in the household) were recoded as binary variables due to low counts in the individual categories within these groups.

Data analysis

We estimated a series of logistic regression models to examine the relationship between sociodemographic factors and CBD awareness and use. The final models are reported here, and stages of model building results are available in the online supplemental material 1. A low correlation was identified between variables of interest, with a maximum Variance Inflation Factor (VIF) of 1.34, below the threshold value of 3.[34] We then provided descriptive analyses of how frequently respondents used different CBD products and the number of products that were used. A cluster analysis was conducted to identify which combinations of products were used by different groups of respondents. The frequency of use for each CBD product was scaled to a binary scale, indicating whether the respondent had used each listed product in the previous 12 months or not. We conducted a two-step cluster analysis with Schwarz's Bayesian Criterion to identify the number of subgroups in the data, providing an automated cluster analysis for large datasets containing categorical data.[35] Finally, we provided descriptives of the method that respondents use to decide on a suitable dose when using CBD products. Data were weighted to make them nationally representative (see the Food and You 2: Technical Report for further information). The data were analysed using IBM SPSS V.25.[36]

RESULTS

Descriptive statistics

Descriptive statistics show that across the combined waves of data (n=13 879), 61.9% of respondents had heard of CBD. Of those who had heard of CBD, 17.1% had used a CBD product in the previous 12 months. Both awareness (Wave 1, 59.9%; Wave 3, 60.8%; Wave 7, 66.3%) and use (Wave 1, 17.4%; Wave 3, 15.4%; Wave 7, 18.6%) of CBD products had increased between 2020 (Wave 1) and 2023 (Wave 7).

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Table 1 Summary of predictor variables and thematic block for model building (weighted)

Predictors		Frequency (n)	Percentage (%)	Thematic block
Age group	16–24	1780	12.9	Block 1: demographics
	25–34	2318	16.7	
	35–44	2198	15.9	
	45–54	2322	16.8	
	55–64	2091	15.1	
	65+	3132	22.6	
Gender	Male	6697	48.8	
	Female	7021	51.2	
Ethnicity	White	11 666	87.6	
	Mixed	223	1.7	
	Asian or British Asian	1007	7.6	
	Black or black British	290	2.2	
	Other	137	1.0	
Food hypersensitivity	No	11 197	83.7	
	Yes	2188	16.3	
Long-term health condition	No	4060	31.0	
	Yes	9024	69.0	
Banded annual income	<£19 000	2376	22.7	Block 2: household composition and finances
	£19 000–£31 999	2513	24.0	
	£32 000–£63 999	3536	33.7	
	>£64 000	2055	19.6	
NS-SEC	Managerial, administrative and professional occupations	7404	53.3	
	Intermediate occupations	1428	10.3	
	Small employers and own account workers	924	6.7	
	Lower supervisory and technical occupations	1103	7.9	
	Semiroutine and routine occupations	1566	11.3	
	Long-term unemployed or never worked	418	3.0	
	Full-time student	1036	7.5	
Children in household	No	9681	71.7	
	Yes	3826	28.3	
Number of adults in household	1	1738	12.9	
	2	7659	57.0	
	3+	4044	30.1	
Country	England	12 735	91.8	Block 3: geographies
	Wales	725	5.2	
	Northern Ireland	419	3.0	
Urban/rural	Urban	11 006	79.3	
	Rural	2873	20.7	

NS-SEC, National Statistics Socio-economic Classification.

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Heard of CBD

To address Ob1, we conducted a series of logistic regression models to identify the relationship between sociodemographic factors and awareness of CBD. The odds of having heard of CBD progressively decreased with increasing age with those aged 45 years and over having significantly lower odds of having heard of CBD compared with the youngest age bracket (45–54 years, OR 0.49 (95% CI 0.34 to 0.71); 55–64 years, OR 0.33 (95% CI 0.23 to 0.49); 65+ years, OR 0.23 (95% CI 0.16 to 0.34)). Women were significantly more likely to have heard of CBD than men (OR 1.51 (95% CI 1.23 to 1.71)). Respondents who were Asian or Asian British (OR 0.60 (95% CI 0.45 to 0.80)), Black or Black British (OR 0.51 (95% CI 0.29 to 0.89)) or of 'other' ethnic groups (OR 0.38 (95% CI 0.20 to 0.72)) had significantly lower odds of having heard of CBD than white respondents; however, those with mixed ethnicity did not differ from white respondents. Those with a food hypersensitivity (OR 1.31 (95% CI 1.10 to 1.55)) or a long-term health condition (OR 1.38 (95% CI 1.20 to 1.59)) were more likely to have heard of CBD than those without. The odds of having heard of CBD progressively increased with income (£19 000–£31 999, OR 1.05 (95% CI 0.987 to 1.27); £32 000–£63 999, OR 1.24 (95% CI 1.02 to 1.50); >£64 000 OR 1.38 (95% CI 1.10 to 1.72)). Those with an income over £32 000 had significantly greater odds of having heard of CBD. Those with children in the household (OR 0.74 (95% CI 0.63 to 0.87)) were significantly less likely to have heard of CBD than those without children. Respondents in Wales had higher odds of having heard of CBD compared with those in England (OR 1.18 (95% CI 1.04 to 1.39)); however, awareness did not significantly differ between Northern Ireland and England. National Statistics Socio-economic Classification (NS-SEC),[37] urban/rural and number of adults in the household were not associated with knowledge of CBD (table 2).

Use of CBD

To address Ob2, we conducted a series of logistic regression models to identify the relationship between sociodemographic factors and use of CBD. Due to the low sample size other ethnic group was excluded from the analysis. Use of CBD did not significantly differ by age, with the exception of those aged 55–64 years who had lower odds of having used CBD (55–64 years, OR 0.51 (95% CI 0.29 to 0.88)). Asian or Asian British respondents were less likely to have used CBD than white respondents (OR 0.44 (95% CI 0.23 to 0.84)). Those with a long-term health condition (OR 1.44 (95% CI 1.31 to 1.83)) were more likely to have used CBD than those without. Compared with those with an income of £19 000 or below, respondents in the higher income brackets had progressively lower odds of having used CBD (£32 000–£63 999, OR 0.65 (95% CI 0.46 to 0.91); >£64 000 0.56 (95% CI 0.37 to 0.86)). Those with children in the household (OR 0.81 (95% CI 0.61 to 0.9)) were less likely to have used CBD than those without children. Gender, NS-SEC, food hypersensitivity, children in the household, number of adults in the household, country and urban/rural were not associated with usage of CBD (table 2).

Patterns of CBD product use

Overall, it was observed that oils were the most used CBD product, followed by drinks. Conversely, the majority of respondents had never used medicinal, chewables, food, vapes and cosmetic CBD products. Respondents used an average of 2.38 different CBD products (SE=0.52, SD=1.68, median=2.00) in the previous 12 months (table 3).

A two-step cluster analysis to identify groups of respondents with different CBD product use behaviours identified three clusters. Cluster 1 (C1) (23.7%, n=218) consists of respondents who used CBD oils and no other CBD products in the previous 12 months. Cluster 2 (C2) (58.6%, n=539) consists of those who have used a wider range of products at moderate to low extent, with CBD drinks (49.6%) and oils (44.1%) being the most commonly used. Cluster 3 (C3) (17.7%, n=163) shows the greatest range and use of CBD products, with food, oils and drinks being used more than other product categories (table 4).

A Kruskal-Wallis test was used to establish if the mean number of products used differed by cluster (C1=1.00, SD=0.00; C2=1.99, SD=1.00; C3=5.10, SD=1.35), this demonstrated significant differences between clusters (χ^2 (2), (n=933)=533.32, p<0.001; mean rank C1=202.00, C2=450.39, C3=828.76). C1 had the lowest usage compared with C2 (p<0.001) and C3 (p<0.001), and C3 had the highest usage (C1 p<0.001; C2 p<0.001).

Method(s) used to decide on a suitable dose/serving

Respondents who reported that they had used CBD in the previous 12 months were asked how, from a list of options, they decided on a suitable dose. The most common method was to follow on-pack instructions (56.1%), followed by internet research (25.7%) and by monitoring the effect of the product and adjusting the dose as needed (24.1%) (see table 5).

A two-step cluster analysis was used to identify groups of respondents who use different methods to decide on a suitable dose/serving. Three clusters were identified: Cluster 1 (C1) (42.0%, n=420) consists of respondents who are more likely to use a range of methods and are the only cluster to report following doctors' advice (8.1%). Cluster 2 (C2) (23.2%, n=232) consists of those who are more likely to report that they don't think about suitable doses/servings (48.8%) or that this does not apply to the CBD products which they use (32.9%). Cluster 3 (C3) (34.9%, n=349) shows those who decide on a suitable dose/serving by following packaging or label instructions alone, and do not use additional methods (table 5).

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Table 2 Logistic regression models predicting awareness and use of CBD showing ORs and 95% CI (weighted)

Predictors		Heard of CBD	Used CBD
Wave	1	**	*
	3	1.06 (0.92 to 1.23)	0.94 (0.71 to 1.25)
	7	1.38 (1.18 to 1.62)**	1.36 (1.02 to 1.81)*
Age group	16–24	**	*
	25–34	0.80 (0.55 to 1.17)	0.97 (0.58 to 1.63)
	35–44	0.69 (0.47 to 1.01)	0.72 (0.43 to 1.21)
	45–54	0.49 (0.34 to 0.71)**	0.70 (0.42 to 1.17)
	55–64	0.34 (0.23 to 0.49)**	0.51 (0.29 to 0.88)*
	65+	0.24 (0.16 to 0.34)**	0.63 (0.36 to 1.09)
Gender	Male	**	—
	Female	1.51 (1.23 to 1.71)**	0.87 (0.68 to 1.11)
Ethnicity	White	**	—
	Mixed	0.74 (0.44 to 1.22)	0.77 (0.24 to 2.47)
	Asian or Asian British	0.60 (0.45 to 0.80)**	0.44 (0.23 to 0.84) *
	Black or Black British	0.51 (0.29 to 0.89)*	0.91 (0.28 to 2.94)
	Other ethnic group	0.38 (0.20 to 0.72)*	†
Food hypersensitivity	No	*	—
	Yes	1.31 (1.10 to 1.55)*	1.20 (0.91 to 1.59)
Long-term health condition	No	**	—*
	Yes	1.38 (1.20 to 1.59)**	1.44 (1.31 to 1.83)*
Banded annual income	<£19 000	*	*
	£19 000–£31 999	1.05 (0.87 to 1.27)	0.84 (0.60 to 1.21)
	£32 000–£63 999	1.24 (1.02 to 1.50)*	0.65 (0.46 to 0.91)*
	>£64 000	1.38 (1.10 to 1.72)*	0.56 (0.37 to 0.86)*
NS-SEC	Managerial, administrative and professional occupations	—	—
	Intermediate occupations	0.91 (0.74 to 1.12)	0.75 (0.49 to 1.14)
	Small employers and own account workers	1.03 (0.81 to 1.32)	1.05 (0.64 to 1.72)
	Lower supervisory and technical occupations	0.94 (0.74 to 1.19)	1.44 (0.93 to 2.21)
	Semiroutine and routine occupations	0.75 (0.61 to 0.93)	0.92 (0.62 to 1.37)
	Long-term unemployed or never worked	0.65 (0.41 to 1.03)	0.94 (0.42 to 2.11)
	Full-time student	0.98 (0.60 to 1.60)	1.37 (0.71 to 2.66)
Children in household	No	**	—
	Yes	0.74 (0.63 to 0.87)**	0.81 (0.61 to 1.09)
Number of adults in household	1	—	—
	2	1.00 (0.84 to 1.18)	1.03 (0.77 to 1.40)
	3+	1.03 (0.83 to 1.27)	0.94 (0.64 to 1.40)
Country	England	*	—
	Wales	1.18 (1.04 to 1.39)*	0.84 (0.67 to 1.06)
	Northern Ireland	1.13 (0.99 to 1.28)	0.87 (0.67 to 1.11)
Urban/rural	Urban	—	—
	Rural	0.88 (0.76 to 1.02)	0.98 (0.74 to 1.31)

*p<0.05, **p<0.001.
†Group removed due to low-base size.

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Table 3 Frequency of CBD product use

Frequency	Percentage of respondents using CBD based on product type (n)						
	Drinks	Food	Oils	Chewables	Medicinal	Vapes	Cosmetics
Most days or every day	3.6% (38)	1.8% (19)	9.1% (97)	4.1% (44)	2.0% (21)	5.7% (61)	3.4% (35)
Several times a week	4.3% (45)	3.8% (39)	5.8% (62)	2.2% (23)	1.2% (12)	2.9% (31)	2.8% (30)
About once a week	2.6% (27)	2.6% (27)	3.8% (41)	1.4% (15)	2.4% (26)	1.9% (20)	3.1% (33)
Several times a month	3.4% (36)	1.6% (16)	8.7% (92)	1.4% (15)	1.2% (13)	1.9% (21)	2.3% (24)
About once a month	8.9% (94)	4.9% (51)	8.2% (88)	2.8% (30)	2.5% (27)	2.9% (31)	3.7% (39)
Once or a few times over the past year	27.1% (285)	17.2% (178)	30.7% (327)	12.5% (133)	7.6% (81)	10.3% (110)	9.8% (104)
Never	50.1% (528)	68.1% (708)	33.7% (360)	75.7% (807)	83.1% (884)	74.4% (797)	74.9% (792)

DISCUSSION

Overview of insights

This research provides the first insight into the characteristics associated with awareness and use of CBD, and patterns of use across England, Wales and Northern Ireland using nationally representative Official Statistics data. We observe three key findings; first, the individual characteristics associated with awareness (Ob1) and use of CBD (Ob2) are not uniform; second, oils are the most widely used CBD in England, Wales and Northern Ireland, however, the use of additional products varies between groups of users (Ob3); third, how CBD users decide on a suitable dose/serving is not consistent, with respondents (Ob3) using a combination of methods, relying on pack instructions alone, or not thinking about this issue.

Characteristics associated with CBD awareness and use

It was identified that age, gender, ethnicity, food hypersensitivity, long-term health condition, income and children in the household and country are associated with awareness of CBD. However, fewer characteristics are associated with use of CBD products. We observed that awareness and use of CBD products was more common for those who have a long-term health condition. This aligns with comparable surveys conducted outside the UK which demonstrate CBD was associated with poor health.[38] This echoes other existing research highlighting CBD is used to treat a range of physical and mental health conditions including chronic pain,[10] chronic illnesses,[39] stress, anxiety and sleep.[40 41]

In line with comparable nationally representative surveys conducted outside the UK,[42 43] we found that younger adults had greater awareness of CBD. Building on previous research conducted in the UK, which observed a broad age range of users, typically aged between 25 and 54 years,[41] we did not find any notable association between CBD use and age. These findings contrast with the majority of research conducted outside the UK, which shows CBD use is typically higher in younger adults,[31 43] except that conducted in Germany, which did not observe age-related differences. We suggest this is in part due to the low level of CBD users (4.3%) in Germany at the time of data collection.[42] Consequently, we suggest that despite regulatory differences across countries, younger adults appear to have consistently higher awareness of CBD.

We observe an interesting inverse relationship between income and awareness and use of CBD. A greater awareness was associated with higher incomes, but use was more prevalent in lower-income groups. A report by The Health Foundation[44] identified that people with lower incomes are more likely to report their health as 'bad' or 'very bad'; this, coupled with lower health literacy and higher incidence of chronic disease, could contribute to the differences seen in the use of CBD. Another reason for this association between income and use could be the lack of differentiation between CBD and THC. As suggested by Staples,[45] users can derive CBD and THC from cannabis. Their results demonstrated that at least 25% of participants who used both CBD and THC obtained their CBD intake from the smokable marijuana flower/cannabis. Furthermore, approximately 15% of these users reported purchasing from non-retail sources, citing 'friends' or 'a dealer'. Bhamra *et al*[8] also uncovered illicit sources that were used to obtain what people thought was CBD. Contributing to an existing body of research which demonstrates disparities in CBD awareness and use,[31 39 42] we observe that awareness of CBD was lower across many ethnic minority groups, with use being lowest in Asian or British Asian respondents.

Table 4 Clusters of product use

Product type	Percentage of product use by cluster (n)		
	Cluster 1 (C1)	Cluster 2 (C2)	Cluster 3 (C3)
Drink	0.0 (0)	49.6 (301)	99.5 (181)
Food	0.0 (0)	19.3 (117)	100.0 (181)
Oils	100.0 (206)	44.1 (267)	100.0 (181)
Chewable	0.0 (0)	18.6 (113)	65.7 (119)
Medicinal	0.0 (0)	14.2 (86)	45.3 (82)
Vapes/tobacco	0.0 (0)	27.4 (166)	47.5 (86)
Cosmetics	0.0 (0)	25.6 (155)	52.5 (95)

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Table 5 Clusters of method(s) used to decide on suitable dose/serving of CBD product

Product type	Total	Percentage of method(s) used by cluster (n)		
		Cluster 1	Cluster 2	Cluster 3
Internet research	25.7 (279)	59.2 (271)	3.3 (8)	0 (0)
Monitoring personal effects	24.1 (262)	55.5 (254)	3.3 (8)	0 (0)
Following packaging instructions or label	56.1 (608)	48.7 (223)	2.0 (5)	100.0 (380)
Following pharmacist/shop assistant advice	12.2 (132)	21.6 (99)	13.4 (33)	0 (0)
Doesn't think about it	11.1 (120)	0.0 (0)	48.8 (120)	0 (0)
Doesn't apply to products used	8.0 (87)	1.1 (5)	32.9 (81)	0 (0)
Following doctor's advice	3.4 (37)	8.1 (37)	0 (0)	0 (0)
Other	1.6 (18)	0 (0)	7.3 (18)	0 (0)

Despite the regulatory differences in CBD's novel food status between the devolved nations of England, Wales and Northern Ireland, we did not observe differences in CBD use. We note that awareness of CBD across England, Wales and Northern Ireland was lower than that in France[38 43], yet use (17.1%) was higher. In contrast, awareness and use across England, Wales and Northern Ireland are greater than that in Germany; however, the latter research coincided with policy changes relating to the approval of recreational CBD products.[42] We propose that the differences in legislation contribute to the country-level differences in awareness and use of CBD products. For example, the European Court of Justice overturned France's ban on CBD products and provided guidelines for sale in 2020, whereas the UK government only permitted CBD products as a novel food more recently, in 2023.

CBD product use and related practices

Previous research identified smoking CBD as the most common method of administration in France[43] and the USA.[10] In contrast, sublingual delivery was the most common method in the UK, with vaping and smoking being less common.[41] In line with Moltke and Hindocha,[41] this analysis identified that oils were the most widely used CBD product overall. Building on previous research, we demonstrate three different patterns of CBD product use: the largest group who are low to moderate users of a wide range of product types; the second largest group of users who exclusively use oil; and the smallest group who are high users of oils, food, drinks and moderate users of other products.

This research builds on understanding of how CBD users decide on a suitable dose by identifying that although following packaging instructions or labels is the most common method overall, three different groups of practices are observed. The largest group appears more engaged with monitoring the dose of CBD and uses a combination of methods to seek out related information; interestingly, this is the only group that stated they follow doctors' advice. Highlighting the importance of clear dosage guidance on pack, the second largest group rely solely on pack labelling to guide CBD dosage. The smallest group do not actively engage with deciding on a suitable dose.

This may be a cause for concern, not necessarily because of their lack of engagement but because of the fact that CBD is classified as a novel food product. For instance, herbal foods such as garlic have known benefits in cardiovascular health,[46] but there is no medically prescribed dose to achieve this benefit and as such those who are relatively health conscious may decide to add garlic as a regular ingredient in their food, which is not intrinsically problematic. The cause for concern arises when research is not conclusive on appropriate dosing,[47] thereby leaving people to make their own trial-and-error decisions. The consequences for this smaller group may include overdose, interactions with other drugs, gradual organ toxicity and potential long-term health effects.

CBD has been evidenced to be effective in the treatment of pain and anxiety, among other conditions/symptoms, yet has notably fewer associated adverse drug reactions (ADRs) and fatalities reported. Since 2010, a total of 896 suspected ADRs due to CBD, of which four were suspected to be fatal. Compared with a commonly used simple analgesic like paracetamol, which had 16.5k ADRs, of which 176 were suspected to be fatal. Further compared with the anxiolytic drug sertraline, with 20 549 suspected ADRs and 98 fatal outcomes. Though CBD products are generally well tolerated, there are associated risks and side-effects, especially when taken with sedatives or other medicines which modulate the central nervous system.[48] Given that only a minority of CBD users seek medical advice, we suggest an informational campaign should highlight the advantages of expert advice, especially in the case of drug interactions.

Strengths, limitations and recommendations

The main strength of the current research is that it uses a nationally representative dataset, giving insights on a larger population scale. Despite having such a large dataset, it was necessary to exclude the 'other ethnic group' group when identifying characteristics associated with CBD use, due to the small sample size. Consequently, the generalisability of the research is limited. In addition, the survey only asks a limited number of

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questions about CBD use and practices; thus, we have limited data regarding the method of administration used for some products; for example, oils can be administered as a tincture or topically. Similarly, the data show whether respondents have a long-term health condition or not; given that CBD products can be used to treat a range of physical and mental conditions, we offer limited insight into the health-related characteristics which use CBD across England, Wales and Northern Ireland.

A further strength of the current research is the survey being made available online as well as via post to those who were unable to complete it online. Additionally, the research is widely accessible to the general public on the regulator's website,[26] keeping them informed with up-to-date information. The survey asks about different methods to decide on a suitable dose or serving, with a response option which combines advice from pharmacists and shop assistants as a single category; consequently, it is not possible to conclude whether CBD users who selected this option are seeking advice from medical professionals or not.

Future research

This research contributes to a growing body of research which indicates that the patterns of CBD product use vary by country. The difference in CBD product use between countries highlights the need for country-specific research and consideration of wider product practices to identify potential public health impacts. Consequently, we propose that further research should identify the prevalence and practices of CBD use and how these vary by country. We propose that nationally representative samples should be used to provide insight into CBD usage within each country and comparative samples across different countries. In addition, there is a need to explore the motivations behind CBD use and how it relates to broader health behaviours including the concurrent use of prescribed medications.

CONCLUSION

This research offers novel insight into the awareness and use of CBD products across England, Wales and Northern Ireland. We observe disparities in awareness and use of CBD and demonstrate that patterns of CBD use and related practices vary across consumers. We suggest that targeted education and outreach may be needed to address disparities in CBD awareness and usage, particularly among older adults and minority ethnic groups.

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