

A close-up photograph of vibrant green cannabis leaves with serrated edges, filling the background of the slide. The lighting is soft, highlighting the texture of the leaves.

Drug Free Australia series – Media suppression of alarming cannabis harms

Episode 2 – Cannabis and cancer

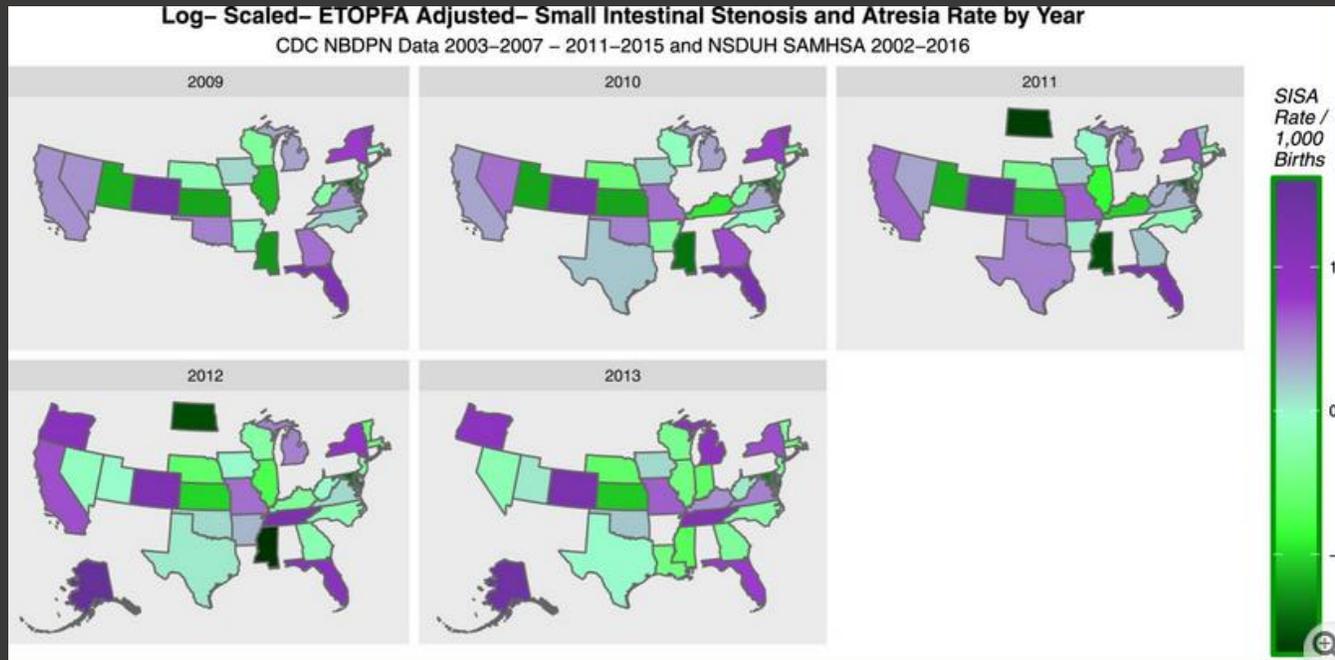
Differing cannabis use

- USA States and European countries – differing regimes
 - all cannabis prohibited
 - cannabis use decriminalised
 - medicinal cannabis use legalised
 - recreational cannabis use legalised
- All with differing:
 - population percentages using cannabis
 - THC and other cannabinoid levels
 - disease burden



Population studies

- 50 States in the USA



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Geotemporal and causal inferential epidemiological overview and survey of USA cannabis, cannabidiol and cannabinoid genotoxicity expressed in cancer incidence 2003–2017: part 1 – continuous bivariate analysis

[Albert Stuart Reece](#) & [Gary Kenneth Hulse](#)

Archives of Public Health 80, Article number: 99 (2022) | [Cite this article](#)

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[Research](#) to this article was published on 30 March 2022

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Abstract

Background

The genotoxic and cancerogenic impacts of population-wide cannabinoid exposure remains an open but highly salient question. The present report examines these issues from a continuous bivariate perspective with subsequent reports continuing categorical and detailed analyses.

Methods

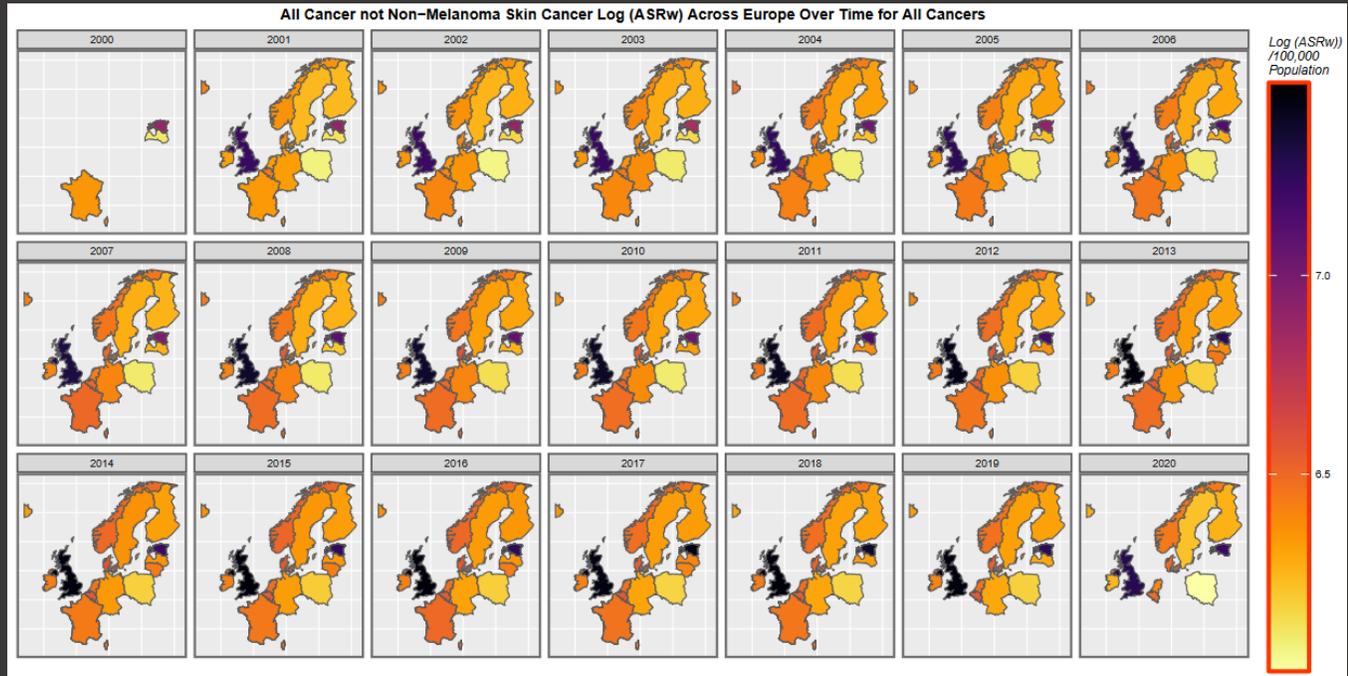
Age-standardized state census incidence of 28 cancer types (including "All (non-skin) Cancer") was sourced using SEER*Stat software from Centres for Disease Control and National Cancer Institute across US states 2001–2017. It was joined with drug exposure data from the nationally representative National Survey of Drug Use and Health conducted annually by the Substance Abuse and Mental Health Services Administration 2003–2017, response rate 74.1%. Cannabinoid data was from Federal seizure data. Income and ethnicity data sourced from the US Census Bureau. Data was processed in R.

<https://archpublichealth.biomedcentral.com/articles/10.1186/s13690-022-00811-8>



Population studies

- 27 countries in Europe



> *J Xenobiot.* 2023 Jul 18;13(3):323-385. doi: 10.3390/jox13030024.

Cannabis- and Substance-Related Carcinogenesis in Europe: A Lagged Causal Inferential Panel Regression Study

Albert Stuart Reece ^{1,2}, Kellie Bennett ^{1,2}, Gary Kenneth Hulse ^{1,2}

Affiliations + expand

PMID: 37489337 PMCID: PMC10366890 DOI: 10.3390/jox13030024

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Abstract

Recent European data facilitate an epidemiological investigation of the controversial cannabis-cancer relationship. Of particular concern were prior findings associating high-dose cannabis use with reproductive problems and potential genetic impacts. Cancer incidence data age-standardised to the world population was obtained from the European Cancer Information System 2000-2020 and many European national cancer registries. Drug use data were obtained from the European Monitoring Centre for Drugs and Drug Addiction. Alcohol and tobacco consumption was sourced from the WHO. Median household income was taken from the World Bank. Cancer rates in high-cannabis-use countries were significantly higher than elsewhere (β -estimate = 0.4165, $p = 3.54 \times 10^{-115}$). Eighteen of forty-one cancers (42,675 individual rates) were significantly associated with cannabis exposure at bivariate analysis. Twenty-five cancers were linked in inverse-probability-weighted multivariate models. Temporal lagging in panel models intensified these effects. In multivariable models, cannabis was a more powerful correlate of cancer incidence than tobacco or alcohol. Reproductive toxicity was evidenced by the involvement of testis, ovary, prostate and breast cancers and because of the myeloid and lymphoid leukaemias implicated occur in childhood, indicating inherited intergenerational genotoxicity. Cannabis is a more important carcinogen than tobacco and alcohol and fulfills epidemiological qualitative and quantitative criteria for causality for 25/41 cancers. Reproductive and transgenerational effects are prominent. These findings confirm the clinical and epidemiological salience of cannabis as a major multigenerational community carcinogen.

Keywords: cancer; cannabis; carcinogenesis; causal inference; epidemiology; epigenotoxicity; genotoxicity.

PubMed Disclaimer

<https://pubmed.ncbi.nlm.nih.gov/37489337/>



US population

- Results for cancer types

- cigarettes 14
- alcohol use disorder 9

- Cannabis constituents (cannabinoids)

- THC 9
- Cannabidiol (CBD) 12
- Cannabichromene 6
- Cannabinol 9
- Cannabigerol 7

- Cannabis causal in 27 cancers in all in the US data

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Europe - population

- What the data shows

- “In multivariable models, cannabis was a more powerful correlate of cancer incidence than tobacco or alcohol.”
- “Reproductive toxicity was evidenced by the involvement of testis, ovary, prostate and breast cancers and because some of the myeloid and lymphoid leukaemias implicated occur in childhood, indicating inherited intergenerational genotoxicity.”
- 31 cancer correlations in the European data
- 25 in this journal study from July 2023

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Cannabis- and Substance-Related Carcinogenesis in Europe: A Lagged Causal Inferential Panel Regression Study

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Keywords: cancer; cannabis; carcinogenesis; causal inference; epidemiology; epigenotoxicity; genotoxicity.

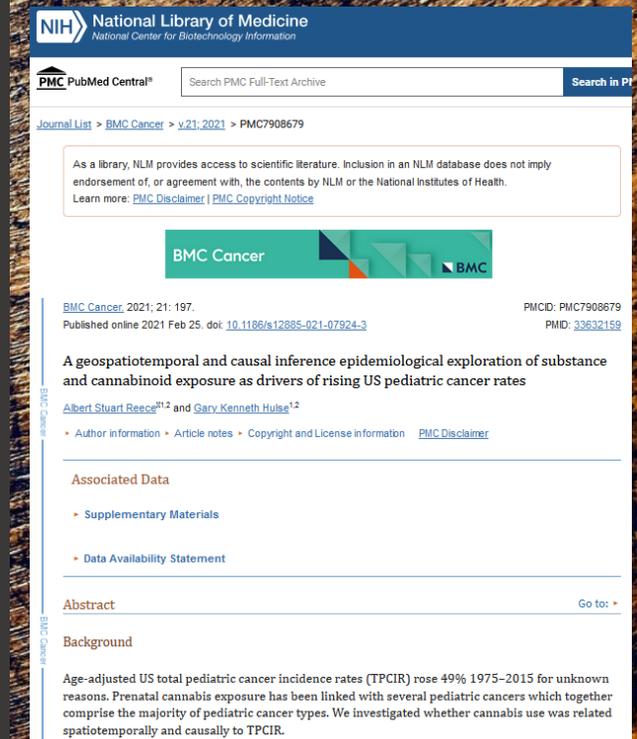
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Pediatric cancers

- **Study confirms earlier observations**
 - Parental cannabis use has been linked with acute lymphatic leukaemia, acute myeloid leukaemia, childhood astrocytoma, rhabdomyosarcoma and neuroblastoma.
 - Together these comprise 60–70% of the total cancers seen in children younger than 14 years and those between 15 and 20 years. **In such a context it becomes plausible that the rise in cannabis use since the 1960's may be a primary driver of total pediatric cancer.**



The screenshot shows the PubMed Central interface for a specific article. At the top, the NIH logo and 'National Library of Medicine' are visible. Below that, the 'PMC PubMed Central' logo and a search bar are present. The article title is 'A geospatiotemporal and causal inference epidemiological exploration of substance and cannabinoid exposure as drivers of rising US pediatric cancer rates'. The authors listed are Albert Stuart Reece and Gary Kenneth Hulse. The publication date is 2021 Feb 25. The article is categorized under 'BMC Cancer'. The abstract text is partially visible, starting with 'Age-adjusted US total pediatric cancer incidence rates (TPCIR) rose 49% 1975-2015 for unknown reasons. Prenatal cannabis exposure has been linked with several pediatric cancers which together comprise the majority of pediatric cancer types. We investigated whether cannabis use was related spatiotemporally and causally to TPCIR.'

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7908679/>



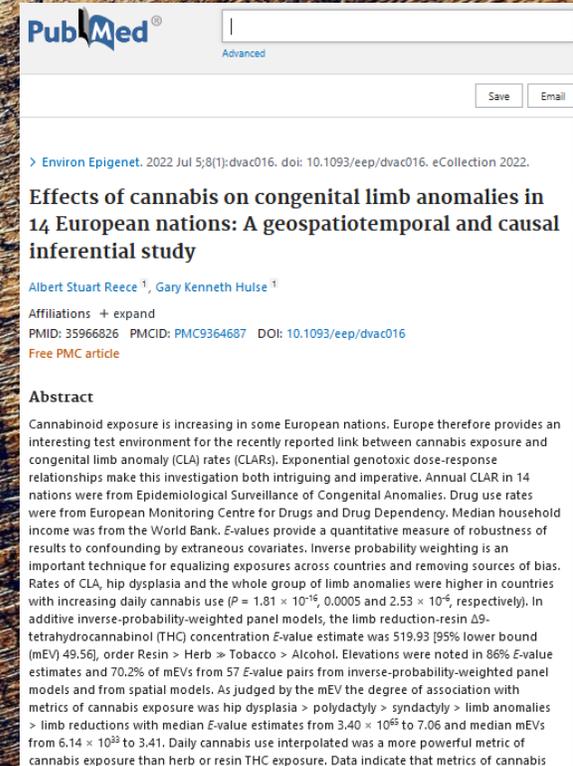
No difference?

- Medicinal and illicit cannabis have the same properties
 - in many cases medicinal use is more regular
 - medicinal cannabis can also have high THC concentrations
 - CBD preparations select for high concentrations



In the food chain

- Hemp used as fodder for cattle raises the question of cannabinoids passed to humans through the food chain
 - “It has been observed at the same time that French cows are also being born without limbs, thereby pointing directly to the food chain as the source of the environmental teratogen.”
 - “Similar reports have also come from Germany as cannabis use there rises; however, they are not rising in nearby Switzerland where cannabis products are not permitted in the food chain.”



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> [Environ Epigenet.](#) 2022 Jul 5;8(1):dvac016. doi: 10.1093/eep/dvac016. eCollection 2022.

Effects of cannabis on congenital limb anomalies in 14 European nations: A geospatiotemporal and causal inferential study

Albert Stuart Reece ¹, Gary Kenneth Hulse ¹

Affiliations + expand
PMID: 35966826 PMID: PMC9364687 DOI: 10.1093/eep/dvac016
[Free PMC article](#)

Abstract

Cannabinoid exposure is increasing in some European nations. Europe therefore provides an interesting test environment for the recently reported link between cannabis exposure and congenital limb anomaly (CLA) rates (CLARs). Exponential genotoxic dose-response relationships make this investigation both intriguing and imperative. Annual CLAR in 14 nations were from Epidemiological Surveillance of Congenital Anomalies. Drug use rates were from European Monitoring Centre for Drugs and Drug Dependency. Median household income was from the World Bank. *E*-values provide a quantitative measure of robustness of results to confounding by extraneous covariates. Inverse probability weighting is an important technique for equalizing exposures across countries and removing sources of bias. Rates of CLA, hip dysplasia and the whole group of limb anomalies were higher in countries with increasing daily cannabis use ($P = 1.81 \times 10^{-16}$, 0.0005 and 2.53×10^{-6} , respectively). In additive inverse-probability-weighted panel models, the limb reduction-resin Δ^9 -tetrahydrocannabinol (THC) concentration *E*-value estimate was 519.93 [95% lower bound (mEV) 49.56], order Resin > Herb > Tobacco > Alcohol. Elevations were noted in 86% *E*-value estimates and 70.2% of mEVs from 57 *E*-value pairs from inverse-probability-weighted panel models and from spatial models. As judged by the mEV the degree of association with metrics of cannabis exposure was hip dysplasia > polydactyly > syndactyly > limb anomalies > limb reductions with median *E*-value estimates from 3.40×10^{65} to 7.06 and median mEVs from 6.14×10^{23} to 3.41. Daily cannabis use interpolated was a more powerful metric of cannabis exposure than herb or resin THC exposure. Data indicate that metrics of cannabis

<https://pubmed.ncbi.nlm.nih.gov/35966826>



Next episode

- More detail in future episodes:

- Cannabis and cancer
- Cannabis and birth defects
- Cannabidiol (CBD), cancer and birth defects
- Cannabis and pain
- Cannabis and driving
- Hemp and psychoactive metabolites
- Cannabis and psychosis
- Cannabis and violence/homicide
- Cannabis and suicide
- Cannabis – its other harms

