THE LANCET
Psychiatry

REVIEW | VOLUME 9, ISSUE 9, P736-750, SEPTEMBER 01, 2022

Association of cannabis potency with mental ill health and addiction: a systematic review

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Published: July 25, 2022 • DOI: https://doi.org/10.1016/S2215-0366(22)00161-4 •

Summary

Cannabis potency, defined as the concentration of Δ^9-tetrahydrocannabinol (THC), has increased internationally, which could increase the risk of adverse health outcomes for cannabis users. We present, to our knowledge, the first systematic review of the association of cannabis potency with mental health and addiction (PROSPERO, CRD42021226447). We searched Embase, PsycINFO, and MEDLINE (from database inception to Jan 14, 2021). Included studies were observational studies of human participants comparing the association of high-potency cannabis (products with a higher concentration of THC) and low-potency cannabis (products with a lower concentration of THC), as defined by the studies included, with depression, anxiety, psychosis, or cannabis use disorder (CUD). Of 4171 articles screened, 20 met the eligibility criteria: eight studies focused on psychosis, eight on anxiety, seven on depression, and six on CUD. Overall, use of higher potency cannabis, relative to lower potency cannabis, was associated with an increased risk of psychosis and CUD. Evidence varied for depression and anxiety. The association of cannabis potency with CUD and psychosis highlights its relevance in health-care settings, and for public health guidelines and policies on cannabis sales. Standardisation of exposure measures and longitudinal designs are needed to strengthen the evidence of this association.

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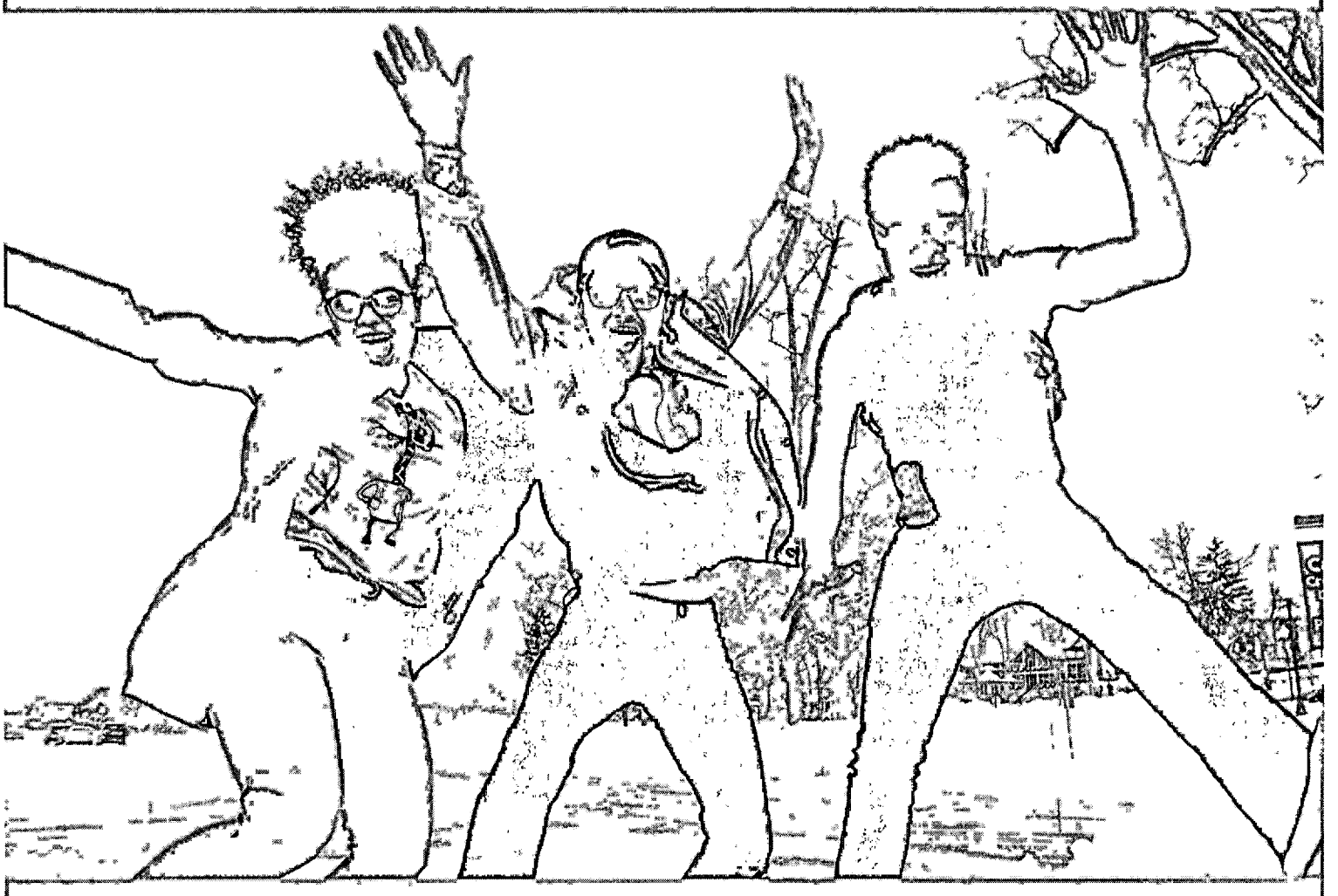
MODEL ORDINANCE REGULATING LOCAL CANNABIS RETAIL SALES & MARKETING IN CALIFORNIA

FEBRUARY 2021



2ND EDITION

Getting it Right
·from the Start·

Advancing Public Health & Equity in Cannabis Policy

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Support

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Acknowledgements
We gratefully acknowledge the extensive contributions of Ted Mermin, JD, Leslie Zellers JD, Michael Colantuono, JD and others. This Model Ordinance was adapted in part from ChangeLab Solutions and the California Department of Public Health's Model Tobacco Retail License Ordinance and "plug-ins," which have been adopted by cities and counties across the State of California. We acknowledge and appreciate their important contributions, although they are not responsible for the content. We also thank the many individuals who contributed time and comments during the development process.

Note

The legal information provided in this model ordinance does not constitute legal advice or legal representation. For legal advice, readers should consult an attorney in their state.

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Introduction

Cannabis, like alcohol and tobacco, is an addictive substance that should not be treated as an ordinary commodity in the marketplace.[1] While decriminalization is a useful tool, an unfettered commercial framework should not be the substitute. Rather, where sale is legalized, cannabis regulation should be grounded in public health protection and a primary goal should be to establish a legal market while at the same time mitigating and preventing harm through careful regulation. This means ensuring that emerging commercial interests do not outweigh the need for healthy environments for youth to flourish. While illegality did not keep youth from using cannabis, the rapid heating of the new cannabis market is leading it to "boil over," exposing young people to increasingly potent and addictive products and intensive marketing. That overheating is happening today – youth marijuana use has reached its highest levels in 35 years, daily use and use during pregnancy are climbing, and a vaping epidemic has swept the nation.

As a community, we have a collective responsibility to protect children and youth from harm to the developing brain. Of particular concern is the impact of legalization on youth below age 25, because research suggests that use among youth carries special risks to the developing brain that are not present for older adults. For example, daily use of cannabis by high school students halves the high school graduation rate;[2] and daily consumption of cannabis with over 10% THC – virtually the entire California market today, is associated with a fivefold increase in odds of developing psychosis, a heartrending burden for families and an expensive and complex burden for communities.[3] Vaping of cannabis by youth 18-22 doubled in a single year between 2017 and 2018, young adult marijuana use is at a 35-year high, and daily marijuana use amongst 8th, 10th and 12th graders has also risen precipitously.[4] In a single year, the vaping epidemic, driven by these vast increases in use and dangerously designed products, hospitalized over 2,700 and killed 68.[5]

This public health-focused Model Cannabis Retail Sales and Marketing Ordinance was first published in 2017, along with model local taxation ordinances, to help local California jurisdictions respond more safely to the legalization of adult-use cannabis approved by voters in 2016, while recognizing the revenue concerns of local government. Those initial recommendations were widely shared with all cities and counties, public health authorities and community organizations.

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Local jurisdictions made initial decisions whether (1) to do nothing, in which case retailers may apply for a state license to sell cannabis starting January 1, 2018; (2) to ban the sale of cannabis locally; or (3) to develop their own rules and regulations to govern the cultivation, production, sale and marketing of this product in their community. Alternatively, some communities decided to take more time to craft local policy through bans on recreational cannabis sales that were viewed as temporary.

Cities and counties have continued to gradually develop their approaches to cannabis commerce over the past three years. During that time 49% of California local jurisdictions, home to 57% of the population, opted to legalize sale of cannabis in some form, 48% allowing medical sales and 38% recreational.[6] Many of the recommendations of this model were adopted over the last two years in some communities. Of those allowing legal cannabis sales, 63% limited the number of dispensaries to an average of 1 per 19,000 residents, 86% did not allow on-site consumption, 27 jurisdictions required additional health warnings, 14% limited advertising or marketing in some way, however, only 5 created social equity programs in licensing and/or hiring. Contra Costa County banned flavored products for combustion or inhalation, and later banned all cannabis and tobacco vaping products. Mono County, Pasadena and Chula Vista prohibited cannabis-infused beverages or "canna-pops." Half of jurisdictions allowing cannabis commercial activity instituted taxes, one based on potency (Cathedral City). Jurisdictions also came up with important ideas not included in the first edition. The State of California partially over-rode local control through its regulations, allowing licensed delivery businesses to deliver anywhere in the state, regardless of local bans, a decision that was reversed in 2020 as a result of litigation. Similarly, an attempt by the state to weaken the prohibition on billboards on highways was also rejected by the courts in 2020.

This Ordinance was developed by the ***Public Health Institute's Getting it Right from the Start: Advancing Public Health & Equity in Cannabis Policy***, to help cities and counties reduce negative health impacts of legalization, protect youth, and promote equity. We hope that this model can help bring public health insights to those efforts and will encourage cross-sectoral collaboration with local public health and mental health experts, as well as those from education, law enforcement and other relevant fields.

Current state law and regulation, based on Proposition 64, provide only weak public health protections and in the absence of strong regulation at the local level, state law allows an exponential expansion of the legal cannabis industry. Fortunately, Proposition 64 allows local governments the freedom to adopt more protective regulations than state law in a number of areas. This model addresses the areas of retail sales and of marketing, which will have the most immediate and largest public health effects. The project has also made available model laws for a

[6] Silver LD, Naprawa AZ, Padon AA. Assessment of Incorporation of Lessons From Tobacco Control in City and County Laws Regulating Legal Marijuana in California. *JAMA Network Open*. 2020;3(6):e208393. doi:10.1001/jamanetworkopen.2020.8393.

local general tax on cannabis, and for a special tax.[7] While issues such as manufacturing quality control and pesticide residues are important, we are focusing on the large public health effects that will arise from the extent of use post-legalization, which will in turn be guided by the intensity of retailing and marketing and patterns of product diversification.

The original model was produced after in-depth interviews with dozens of stakeholders from local jurisdictions, community members, academic and research experts, regulators from other states, legal experts, community coalitions, dispensary owners, laboratory experts, manufacturers, clinicians working with addiction, and others. This model uses best available evidence from the fields of alcohol and tobacco control, the experience of states which legalized earlier than California, the massive scientific review completed in 2017 by the National Academy of Sciences to identify key evidence-based risks of cannabis consumption,[8] the peer-reviewed scientific literature, the recent advisory from the U.S. Surgeon General on Marijuana and the developing brain,[9] and advice received on best practices or needed best practices from experts interviewed. Key challenges identified include the declining popular perception of harm, growing evidence of the existence of clear and significant harms from use to several population groups, the extraordinary incentives present in California to expand consumption given the enormity of our state's crop and the fact that less than one-fifth is currently consumed in-state, and the challenge of keeping marijuana-related income in low-income communities. We have sought to address these challenges. In the revised ordinance, we have incorporated best practices that have been identified and adopted from our research reviewing the laws of all 539 California cities and counties, and those in use by other states and internationally. We have removed certain recommendations now reflected in state law or regulation.

Cannabis regulation at the local level has often been led by local officials trained in planning and economic development, with limited experience in public health regulation of a harmful product. Proliferation of a multitude of new forms of cannabis that are potentially more harmful, and new cannabis products that are attractive to youth, should not be permitted. Whatever economic benefit this new legal industry brings should be shared by the communities that have been most affected by the war on drugs.

This model is a broad "menu." It contains guidance for establishing a basic regulatory structure. It also provides models for specific policies in a number of areas such as density, pricing, allowable and prohibited products, and marketing. In some cases, the model ordinance presents "options" in red. Jurisdictions may

[7] Available at www.gettingitrightfromthestart.org.

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choose to adopt all, none, or some of its provisions. Some measures that might be useful from a public health perspective, such as limitations on advertising on electronic media (TV, radio, Internet, etc.), may be difficult or impossible to impose at the local level and are therefore not presented as options here. Because this is a new and evolving area of law, some of the advertising restrictions or required warnings discussed may be questioned, and, in part as a result of the unique legal situation of cannabis (which remains federally illegal), the outcome of potential challenges is as yet unclear. We have omitted certain regulatory possibilities in this area due to legal complexity for local government and ask that you contact us directly if you wish to learn more about options.

You may be told that any protections will only fuel the illegal market. We believe this is not true. The illegal market in our state is driven primarily by vast overproduction, several fold what is consumed in-state, and is primarily exported, although part is consumed in state. Until the incentive for overproduction and illegal export is gone, they are unlikely to disappear. What local governments who wish to legalize can realistically accomplish is to create a safer and legal way for residents who wish to produce or to buy cannabis products to do so legally. The illegal market will eventually diminish, but it won't be because communities refrain from taxing or adopting appropriate public health protections to cater to industry preferences or profitability.

We are happy to speak with you to discuss the reasoning behind model ordinance provisions, and we welcome your input. This is a living and evolving document that will grow with your local experience and emerging evidence in addressing this new challenge, so regular updating is expected. As occurred in tobacco regulation, we believe that innovation and leadership for best practices will bubble up from our cities and counties across the nation. We look to you to provide that leadership and share your experience.

Note to Readers

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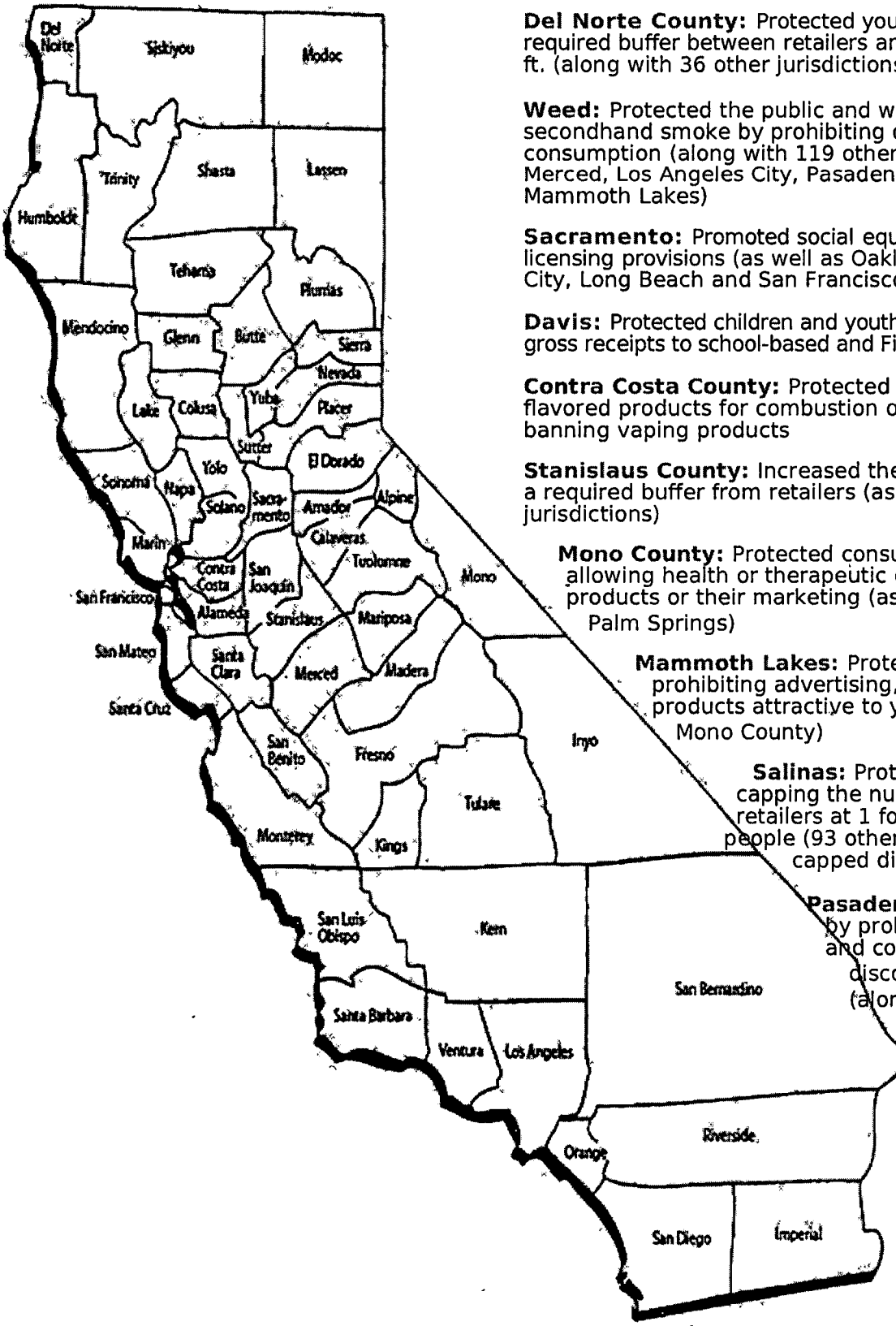
California Best Practices Map

Here are some examples of what your neighbors are doing to protect youth, public health and social equity



Del Norte County: Protected youth by increasing the required buffer between retailers and schools to 1,000 ft. (along with 36 other jurisdictions)

Weed: Protected the public and workers against secondhand smoke by prohibiting on-site consumption (along with 119 other places such as Merced, Los Angeles City, Pasadena, Sacramento and Mammoth Lakes)

Sacramento: Promoted social equity through equity in licensing provisions (as well as Oakland, Los Angeles City, Long Beach and San Francisco)

Davis: Protected children and youth by allocating 1% of gross receipts to school-based and First 5 programs

Contra Costa County: Protected youth by prohibiting flavored products for combustion or inhalation, and banning vaping products

Stanislaus County: Increased the number of sites with a required buffer from retailers (as well as 100 other jurisdictions)

Mono County: Protected consumers by not allowing health or therapeutic claims on cannabis products or their marketing (as did Palm Springs)

Mammoth Lakes: Protected youth by prohibiting advertising, packaging and products attractive to youth (along with Mono County)

Salinas: Protected youth by capping the number of licensed retailers at 1 for every ~32,000 people (93 other jurisdictions also capped dispensaries)

Pasadena: Protected youth by prohibiting promotions and coupons offering discounted cannabis (along with 4 others)

West Hollywood: Protected consumers by requiring cannabis-related health and safety training of dispensary staff (Long Beach, Pasadena, Mt. Shasta, Mammoth Lakes and Mono

County did, too)

Santa Ana: Informed consumers by requiring cannabis-related health risks information on signs or in handouts in dispensaries (along with 23 others, including San Francisco, San Jose, Culver City & Richmond)