Brief Report

Dispensing Medical Advice: San Francisco Bay Area Budtender Recommendations for Pain and Sleep Relief

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Christine Hoang,[1] Louisa M. Holmes,[2*] & Pamela M. Ling[1]
[1]Center for Tobacco Control Research & Education, University of California San Francisco
[2]Departments of Geography and Demography, and the Consortium on Substance Use and Addiction, The Pennsylvania State University

ABSTRACT

Objective: Evidence regarding the efficacy of various forms of cannabis and cannabinoid concentrations is limited, and cannabis industry regulatory infrastructure is still in development. Meanwhile, most US states have legalized medical or adult use cannabis. This study aimed to understand what advice cannabis budtenders in the San Francisco Bay Area were providing to customers for pain and sleep trouble – two of the conditions most cited as reasons for using cannabis medicinally. **Method:** We visited 35 of 42 cannabis dispensaries in Alameda and San Francisco Counties in California, and using a "secret shopper" approach, asked the budtenders for recommendations on products, dosage, and strains to best alleviate pain and sleep trouble. **Results:** For pain relief, budtenders showed a strong preference for topicals (77.1%), while edibles were most indicated for sleep trouble (60.0%). Reasons provided included budtender personal experience and product effectiveness. Cannabidiol (CBD) was endorsed most often for pain relief in high CBD:THC ratios (28.6%), 1:1 ratios (28.6%), and CBD alone (22.9%). For sleep relief, tetrahydrocannabidiol (THC) alone was most recommended (34.3%). When asked about cannabis strains for pain, 85.7% of budtenders did not express a preference, but for sleep, 57.1% of budtenders selected indica. **Conclusions:** This study illustrates that budtenders in the Bay Area have specific ideas about cannabis uses, including types, concentrations, and strains, despite a lack of evidence for most recommendations. Future research should prioritize study of topical preparations of cannabis for pain, edibles for sleep, and tinctures for both, which budtenders regularly recommended to customers.

Key words: = cannabis; marijuana; commercial determinants; substance use; health policy

Cannabis consumption is legal for medical or adult use in 38 states, seven territories and the District of Columbia (NORML, 2021). According to medical cannabis registries, nearly 240 million people in the US are eligible to access cannabis for medicinal purposes (Marijuana Policy Project, 2021), and in the 24 states with adult use legalization, anyone over 21 may purchase cannabis. Those aged 18-20 may also purchase cannabis in some of those states with a physician's recommendation (e.g., California, Louisiana), a medical recognition card (e.g., Washington), or if they have a qualifying medical condition (e.g., Illinois, Maryland). Qualifying conditions differ by state. Cannabis purveyors, however, need not have specialized medical training to offer advice to customers on the best forms of cannabis for any ailment, ideal cannabinoid concentrations, or

Corresponding Author: Louisa M. Holmes, PhD, Pennsylvania State University, 375 Steam Drive, University Park, Pennsylvania 16802. Phone: (814) 865-3433. Email: lmholmes@psu.edu

efficacy for illness. Prior studies have found that just over 50% of budtenders in states with adult use cannabis laws report having received any training, and training content tended to focus on the details of the cannabis laws themselves rather than the state of cannabis science (Carlini et al., 2022; Haug et al., 2014; LoParco et al., 2024; Peiper et al., 2017). Yet prior research has also demonstrated that budtenders (cannabis dispensary sales associates) tend to offer advice freely despite lack of medical training or sufficient evidence supporting the effectiveness of cannabis for chronic conditions, such as sleep disorders or recurring pain (Carlini et al., 2022; Peiper et al., 2017).

According to a recent report, only three conditions demonstrate "modest" evidence of benefit from cannabis treatment – chemotherapy-induced nausea, clinically-diagnosed chronic pain reduction, and reducing spasticity related to multiple sclerosis (National Academies of Sciences Engineering & Medicine, 2017). There is not yet sufficient evidence to determine the therapeutic effects of cannabis for other conditions, nor is there clear evidence on required dosage, mode of ingestion, cannabinoid concentration, or the necessary duration of consumption to achieve a therapeutic outcome (Cannabis Policy Research Workgroup, 2018; National Academies of Sciences Engineering & Medicine, 2017). In the absence of evidence or consistent regulation of the cannabis industry, budtenders have become the de facto providers of information regarding cannabis usage, dosage, and consumption.

Limited prior research with budtenders and dispensary customers has found that customers rely on budtender advice and deem the recommended products as largely effective, although the budtenders do not view health education as their responsibility (Bachhuber et al., 2019; Carlini et al., 2022). One survey of California budtenders found that those who had been formally trained for their positions actually viewed medical decision-making as less important than budtenders who had not received training and were also less likely to have a "patient-centered philosophy," wherein patients were involved in the decision-making process about which cannabis products to use, compared to a "budtender-centered philosophy," wherein the customer followed the budtender recommendations. This suggests that budtenders without formal training are more likely those engaging with customers on questions of medical efficacy, at least in California (Peiper et al., 2017).

California legalized medical cannabis in 1996 followed by adult use cannabis in 2016, operationalized in 2018. Within California, 16.3% of adults reported using cannabis in the past 30 days, according to 2020 California Health Interview Survey data, and among the highest risk group for cannabis use, youth and young adults, 27% of 18–26-year-old residents of Alameda and San Francisco Counties (the study area) reported using cannabis in the prior month, and more than 50% of teens reported past month use (Holmes et al., 2016; UCLA Center for Health Policy Research, 2020). More than 40 dispensaries have opened in Alameda and San Francisco Counties alone since the state began issuing adult use licenses in 2018, and the COVID-19 pandemic corresponded to an uptick in dispensary sales (Ling et al., 2022; Vangst et al., 2020). For this study, we visited 35 dispensaries in Alameda and San Francisco Counties using a "secret shopper" approach to gain understanding of how budtenders give medical advice and their reasons for doing so.

METHODS

We obtained a list of all cannabis dispensaries in San Francisco and Alameda Counties using Weedmaps and Yelp and verified their current operation by calling dispensaries and accessing their websites. We developed a standardized data collection instrument informed by consultation with the Alameda and San Francisco County Health Departments and drawing on the cannabis literature and pilot visits to cannabis retailers in both counties wherein one of the study leaders observed retailer environments (Supplementary Material). We programmed the instrument into ESRI's Survey123 Connect software (ESRI, 2024) and research staff used the Survey123 app on their smart devices to enter data in the field.

In 2020, using a "secret shopper" method, we trained eight research staff members to act as data collectors to visit all cannabis dispensaries located in the two counties. The research staff were young adults, some of whom were enrolled in university as undergraduate or graduate students and the others had recently graduated with bachelor's or

master's degrees. We were unable to complete data collection because California implemented COVID-19 shelter-in-place orders on March 15, 2020, before we visited all 42 dispensaries. This study therefore includes data from 35 dispensaries – 13 in Alameda County and 22 in San Francisco County. Research staff attended an in-person training in which study authors (LMH, PML) presented on cannabis forms, strains, delivery modes, devices, and cannabinoid types and concentrations and trained the staff on taking field notes and engaging in participant observation. Research staff also practiced alternating between interviewing each other and recording data with the data collection instrument. During the training they also made pilot visits to nearby dispensaries to practice using the instrument. Researchers who visited a dispensary during training were not assigned to that dispensary for data collection. The study was exempt per the UCSF Human Research Protections Program.

Two research staff members visited each dispensary and spoke to one budtender in each dispensary, indicating that they were relatively new cannabis consumers and seeking advice. Research staff asked a standard set of questions of each budtender, including the questions, "What do you recommend for pain relief?" and "What do you recommend for trouble sleeping?" Standard follow up questions were "Does THC concentration matter?" and "Does product type or mode of ingestion matter?" Field staff did not actually purchase cannabis products. Since device recording and photos were generally prohibited by dispensary staff and ownership, data collectors wrote detailed field notes about the conversation with budtenders immediately after exiting each dispensary. At the conclusion of the conversation, study staff went outside and immediately completed the field note template, which prompted them to record the look and feel of the dispensary environment, presence of signage and promotions, and responses to the standard questions. The two research assistants visiting the dispensary then compared notes and resolved inconsistencies or disagreements through discussion. The authors of this study reviewed the specific recommendations regarding product type, strength, cannabinoid composition, and strains, and calculated the percentages of budtenders making certain recommendations across all the dispensaries visited.

RESULTS

Table 1 shows the frequency with which budtenders recommended certain cannabis products for pain relief and trouble sleeping. Budtenders overwhelmingly recommended topicals (77.1%) to treat pain, followed by edibles (22.9%) and tinctures (20.0%). For trouble sleeping, 60% of budtenders recommended edibles, followed by tinctures (28.6%) and flower (20.0%). The most common reason budtenders recommended topicals for pain relief was due to their own personal experiences with the product (25.9%), that it did not get the consumer "high" (18.5%), or that it was the most effective product to address pain (14.8%). Edibles were deemed most effective for sleep (9.5%) and good for beginners (9.5%). However, many of the budtenders did not provide a particular reason for recommending edibles for sleep (85.7%) or for pain relief (25.0%). Tinctures were also endorsed for pain relief (42.9%) and based on personal experience (28.6%), though budtenders did not agree on whether they would get the consumer high (14.9% yes vs. 14.9% no). Flower was only suggested as a sleep remedy, and most budtenders did not specify a reason (43.0%).

Table 1. *Budtender Product Recommendations, 2019-2020 Bay Area Young Adult Health Study (N = 35 dispensaries)*

Recommendations for:	Pain Relief		Sleep Trouble	
Recommended type	***n***	**%**	***n***	**%**
Topicals	27	77.1	0	0.0
Edibles (including beverages)	8	22.9	21	60.0
Tinctures	7	20.0	10	28.6
Flower	0	0.0	7	20.0
Vape/pre-roll	0	0.0	2	5.7
None	7	20.0	6	17.1

Reason for recommending	*n*	%	*n*	%
Topicals	27		0	
Budtender personal experience	7	25.9	0	0.0
Does not get you high	5	18.5	0	0.0
Most effective	4	14.8	0	0.0
Does not show up on drug screen	1	3.7	0	0.0
No reason given	9	33.3	0	0.0
Edibles (including beverages)	8		21	
Most effective	3	37.5	2	9.5
Gets you high	2	25.0	0	0.0
Budtender personal experience	1	12.5	2	9.5
Does not get you high	0	0.0	1	4.8
Good for beginners	0	0.0	2	9.5
No reason given	2	25.0	18	85.7
Tinctures	7		10	
Most effective	3	42.9	2	20.0
Budtender personal experience	2	28.6	1	10.0
Does not get you high	1	14.3	0	0.0
Gets you high	1	14.3	0	0.0
Does not involve smoking	0	0.0	1	10.0
No reason given	2	28.6	6	60.0
Flower	0		7	
Budtender personal experience	0	0.0	2	29.0
Most effective	0	0.0	2	29.0
No reason given	0	0.0	3	43.0
Vape/pre-roll	0		2	
Budtender personal experience	0	0.0	1	50.0
Easy to use for beginners	0	0.0	1	50.0

Table 2 shows the types and ratios of cannabinoids recommended for pain and sleep relief, as well as suggested strains. High cannabidiol (CBD) to tetrahydrocannabidiol (THC) and ratios of 1:1 CBD:THC were indicated as equally appropriate dosages for pain relief (28.6%) and were recommended for sleep in some cases (11.4% and 20.0%, respectively). Alternatively, some budtenders recommended high ratios of THC:CBD for pain (14.3%) and sleep relief (8.6%). CBD alone was also advocated for pain 22.9% of the time and for sleep by 5.7% of budtenders. However, THC alone was most often endorsed for alleviating sleep trouble (34.3%). Of those budtenders who offered a dosage indication, 26.7% and 30.0% suggested the products they recommended were the most effective for pain and sleep, respectively. CBD was also said to ease inflammation (16.7%). Additionally, 16.7% of budtenders provided dosage advice that would prevent the consumer from getting high, which ranged from taking one gummy or using low-THC products to specific dosages between 5-10 milligrams of THC at most.

Most of the budtenders seemed to rely on personal experience when giving advice on cannabinoid concentrations and ratios for various products. For example, while several budtenders indicated that CBD-only products were effective for pain, in several cases they recommended higher doses of CBD as more effective. However, one budtender said that CBD can be ineffective for some people and steered the shoppers to THC-only products. Another advised that whether products included CBD or THC, all products induced sleep eventually. Dosage advice relied in part on budtender's experiences as well, with a couple of budtenders sharing personal stories of times that they had a "bad high." However, more frequently budtenders directed shoppers to

patient safety materials or websites, and in one instance suggested the shoppers should come back and speak to the registered nurse who consulted at the dispensary several times a week.

Regarding cannabis strains, most budtenders (85.7%) did not have a specific recommendation when asked about pain relief. Those that did all mentioned indica as the appropriate strain (14.3%), and for sleep, 57.1% suggested indica. Two budtenders also identified hybrid strains for sleep trouble. No one mentioned sativa in either case. The only reasons given for selecting indica or hybrid strains were that they were considered the most effective for pain or sleep and were fast acting.

Table 2. *Budtender Cannabinoid and Strain Recommendations, Bay Area Young Adult Health Study (N = 35)*

Recommendations for:	Pain Relief		Sleep Trouble	
	n	%	*n*	%
Recommended cannabinoids				
High CBD:THC ratio	10	28.6	4	11.4
1:1 CBD:THC	10	28.6	7	20.0
CBD only	8	22.9	2	5.7
High THC:CBD ratio	5	14.3	3	8.6
3:1 THC:CBD	3	8.6	0	0.0
Low CBD:THC ratio	1	2.9	0	0.0
THC only	1	2.9	12	34.3
CBN only	0	0.0	3	8.6
THCA only	0	0.0	2	5.7
No recommendation	5	14.3	6	17.1
Reason for cannabinoids recommendation (of those who provided recommendation)				
Most effective	8	26.7	9	30.0
CBD helps alleviate inflammation	5	16.7	0	0.0
THC helps alleviate pain	3	10.0	0	0.0
Gets you high	3	10.0	0	0.0
Budtender personal experience	3	10.0	1	3.3
Less psychoactive/does not get you high	0	0.0	5	16.7
THC is faster acting	0	0.0	1	3.3
CBD is calming	0	0.0	1	3.3
No reason provided	14	46.7	13	43.3
Strain recommendation				
Indica	5	14.3	20	57.1
Hybrid	0	0.0	2	5.7
None	30	85.7	15	42.9
Reason for strain recommendation (of those who provided recommendation)				
Most effective/fast acting	3	60.0	7	35.0
No reason provided	2	40.0	13	65.0

DISCUSSION

We saw clear patterns in budtenders' recommendations for treating pain and sleep trouble. Budtenders showed a strong preference for topicals in pain treatment and edibles for addressing trouble sleeping. They also strongly preferred indica strains for sleep trouble, and to a lesser degree, pain relief. Most of the budtenders offered dosage advice, though this ranged across

several cannabinoids and cannabinoid ratios. The most common reasons for providing specific advice were that the budtenders deemed a certain product to be the most effective for pain or sleep relief, or as a result of their own experiences with the products.

Chronic pain is the most common condition cited by patients for medical use of cannabis, and a 2015 systematic review of studies on cannabis for pain suggested modest efficacy (Whiting et al., 2015). This study suggests that topical forms of cannabis may gain popularity as they were frequently suggested for pain treatment, followed by tinctures. There have been studies on the effects of cannabinoids for pain reduction, but human studies have focused exclusively on flower without attention to topical or tinctures (National Academies of Sciences Engineering & Medicine, 2017). Additional research is needed, particularly on commercially available topical products and tinctures, to substantiate the broad therapeutic claims of pain relief that were found in this study.

Cannabis has been identified as a sleep aid for over a century, and there is evidence that cannabis use may decrease sleep latency and so might have a role in treating sleep disorders (Kesner & Lovinger, 2020). Alternatively, a recent analysis of nationally representative NHANES data found that recent cannabis use was associated with less optimal sleep duration (Diep et al., 2022). A systematic review of the evidence on sleep outcomes found small improvements in sleep among those using cannabinoids but significant risk of bias in the studies, and a 2019 systematic review of clinical trials on cannabis and sleep found small improvements but called for larger and more rigorous studies (Whiting et al., 2015). In our study, 60% of budtenders recommended edibles for alleviating sleep trouble, but like topicals and tinctures, little evidence currently exists on efficacy, dosage, or potential side effects of using edibles (National Academies of Sciences Engineering & Medicine, 2017).

The budtenders expressed a strong preference for indica forms of cannabis for sleep and, to a lesser extent, for pain. None of the budtenders cited sativa as a recommended strain for either condition despite the long historical use of sativa as an analgesic for pain (Russo, 2019). However, more than 51% of the budtenders did indicate high CBD:THC ratios or CBD alone for pain relief, citing in some cases its use as an anti-inflammatory agent, which does find support in the literature (Russo, 2019; Savage et al., 2016). The cannabinoids themselves provide another area ripe for additional research given the budtenders' willingness to offer dosage information to customers and because the distinction between indica and sativa is not particularly useful from a therapeutic perspective (Russo, 2019).

This study suggests that budtenders have the potential to be an influential resource for public health education on cannabis and its health effects. Our findings are consistent with prior research that found budtenders are committed to improving customer experience with cannabis and strive to help consumers avoid negative consequences (Carlini et al., 2022), although in contrast to the prior study, we found that budtenders did make recommendations related to health conditions when asked. We found that budtenders' recommendations for cannabis products were commonly made without specific reasons, and when reasons were given, they were most frequently based on general claims of superior efficacy or the budtender's personal experience. Given that budtenders are viewed as trusted sources of information who attend to customer needs as part of their work, this study suggests that efforts to educate budtenders about the state of the science and to establish professional guidelines for recommendations to consumers are needed.

This study has several limitations: first, the sample was limited to a small census of cannabis dispensaries in San Francisco and Alameda Counties, California, which are both locations with a longstanding history of cannabis use and decades of experience with medical marijuana legalization. Findings may not generalize to other geographic locations, although they are consistent with prior literature. In addition, budtender recommendations were based on recall by trained research staff using a "secret shopper" protocol that did not allow for verbatim recording, so data are subject to recall bias. We attempted to mitigate this through careful training, field note recordings immediately following dispensary visits, and triangulation between multiple researchers. Additionally, as our goal was for data collectors to engage budtenders in what might be a typical conversation held with a novice cannabis

customer and given our secret shopper approach, research staff did not pursue budtenders extensively on how they knew certain products were more effective than others beyond the reasons they provided, e.g., personal experience. Finally, our data are limited to interpersonal communications taking place within cannabis dispensaries, and we did not formally include other sources of marketing messages or health claims, such as on cannabis dispensary websites, which have been analyzed separately (Hoeper et al., 2022).

Conclusion

This study provides novel insight into informal therapeutic claims and recommendations that budtenders communicate to customers in cannabis dispensaries. Our findings suggest that research efforts on cannabis efficacy should prioritize the products most recommended and used for common medical complaints. These include topical preparations of cannabis for pain, edibles for sleep, tinctures for both, as well as indica strains of cannabis for sleep, and cannabis with high CBD:THC ratio for both conditions. Additional research would be enhanced by efforts to educate and work with budtenders to provide scientific evidence-based advice to consumers and to avoid unsupported and unsanctioned health claims.

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