



Research Paper

Frequently asked questions about dabbing concentrates in online cannabis community discussion forums

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ABSTRACT

Background: “Dabbing” involves vaporizing a “dab” of cannabis concentrate on a heated “nail,” passing the vapour through a water-pipe rig or portable pen device, and inhaling the vapour. While some cannabis industry media claims that this process is cleaner, safer, and more effective for getting high, medical and public health sources raise concerns about residual solvents and pesticides, unexpectedly intense effects, and rapid increases in tolerance. The aim of this study is to characterize the content of questions about dabbing posed in cannabis and dabbing-specific forums on the Reddit social media platform, as well as comment responses to these questions. **Methods:** We conducted a content analysis of one year (2017) of information-seeking user-generated posts to three Reddit online cannabis community discussion forums (“subreddits”) that contained the terms “dab” and “question.” We also examined post engagement and the types and sentiment of information exchanged in the comment responses.

Results: Across 193 dabbing question posts, the most frequently asked question content was about types and logistical use of devices and related equipment (38%) and comparisons of cannabis products (32%), followed by questions about the step-by-step process of getting high (18%), legal issues (17%), and health concerns (13%). Nearly every post had a response (98%), with a median 5 comments per post and few negative (i.e. hostile, condescending, or trolling) comments (4%). Source of advice or information was stated in about a quarter (26%) of comment responses, with the overwhelming majority of this information (89%) coming from disclosures of personal experience vs. web or commercial sources.

Conclusion: People seeking advice online about dabbing inquired most often about logistics of use, but less often about health, tolerance, and legal risks. These findings may be used to inform public health efforts and health practitioner education as cannabis becomes increasingly legal and accessible.

Introduction

An increasingly popular method of cannabis consumption referred to as “dabbing” involves vaporizing a “dab” of cannabis concentrate of up to 60–90% THC content on a heated quartz, ceramic, or titanium “nail,” passing the vapour through a water-pipe rig, and inhaling the vapour through a mouthpiece (Al-Zouabi, Stogner, Miller, & Lane, 2018; Loflin & Earleywine, 2014; Miller, Stogner, & Miller, 2016; Stogner & Miller, 2015). Recent research on dabbing has found that people who dab report more extreme physiological and psychological effects and fewer “hits” needed to achieve the same or greater high than with smoking cannabis flower (Cavazos-Rehg et al., 2016; Chen, Zhu, & Conway, 2015; Daniulaityte et al., 2015; Loflin & Earleywine, 2014). One study examining motivations for dabbing vs. cannabis flower use

found that people who dabbled regularly reported doing so more for experimentation than coping or anxiety relief (Sagar, Lambros, Dahlgren, Smith, & Gruber, 2018).

Online media from the emerging cannabis industry states that this process can be cleaner, safer, and more effective for getting high than the process of smoking, particularly from the lack of combustion in dabbing (Leafly, 2017). However, medical researchers have raised concerns about residual solvents and pesticides (Raber, Elzinga, & Kaplan, 2015), delivery of harmful chemical by-products (Meehan-Atrash, Luo, & Strongin, 2017), unexpectedly intense effects (Chan et al., 2017), and rapid increases in tolerance (Loflin & Earleywine, 2014). Medical case reports of psychosis, uncontrolled vomiting, and cardiotoxicity (damage to the heart) following dabbing or potent concentrate use have also been published (Alzghari, Fung, Rickner, Chacko,

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& Fleming, 2017; Keller, Chen, Brodsky, & Yoon, 2016; Pierre, Gandal, & Son, 2016; Rickner, Cao, Kleinschmidt, & Fleming, 2017). Much of this previous research has focused on health and tolerance risks of dabbing or concentrate use. This includes reports of increased tolerance among adults who reported using dabs (Loflin & Earleywine, 2014) and physical and psychological health effects including confusion, rapid heartbeat, lung pain, and paranoia among young adults who reported cannabis concentrate use (Cavazos-Rehg et al., 2018). Other research has also found that people who used concentrates were more likely to also report more frequent cannabis use (Daniulaityte et al., 2017; Meier, 2017), cannabis use disorder (Cinnamon Bidwell, YorkWilliams, Mueller, Bryan, & Hutchison, 2018; Meier, 2017), and lifetime depression and anxiety (Chan et al., 2017). Additionally, both survey and social media research has found that cannabis concentrates use is reported more often in U.S. states where cannabis is legal medicinally or recreationally (Borodovsky, Crosier, Lee, Sargent, & Budney, 2016; Daniulaityte et al., 2017; Krauss, Rajbhandari, Sowles, Spitznagel, & Cavazos-Rehg, 2017; Zhang, Zheng, Zeng, & Leischow, 2016).

As smartphones and internet access become more ubiquitous, people are increasingly spending time online sharing, seeking, and absorbing information. While research examining substance use trends has been conducted using social media platforms like Twitter and Facebook, user accounts on these platforms are often connected to one's real life identity, which may lead to greater self-censoring of substance use behaviour than in online venues where platform users can be more anonymous. Given the illegality and stigma of substance use, online forums and communities that facilitate anonymity have become a notable place for people who use substances to access information and advice and to share experiences (Barratt, 2011; Enghoff & Aldridge, 2019). The knowledge shared in these online venues often contains information outside of what is found in the medical literature yet may be of value to health care practitioners (Wax, 2002) and drug policy researchers (Enghoff & Aldridge, 2019). Perceptions of health and safety risks may be viewed quite differently by those with lay lived experience knowledge than by those with medical and public health expertise (Shim, 2005). Previous research examining information exchanged in drug-specific forums has reported on, among other topics, risks and risk-mitigation strategies for use of ketamine (Tackett-Gibson, 2008), desired effects of nonmedical use of bupropion (Anderson et al., 2017), and comparisons of relative harms from cannabis and alcohol (Månsson & Ekendahl, 2013).

Here we focus on Reddit, a popular user-driven web content rating and discussion platform designed around communities called "subreddits." While Reddit does not focus exclusively on substances, information about cannabis use and other substances is exchanged in designated forums. We also selected Reddit given the website's popularity, public availability of its data and indexing in search engines, the platform's stated focus around topic-specific and user-created communities, and its growing user base. In early 2018, Reddit was the 4th most popular website in the United States and 6th most popular website in the world with over 4 million daily users, 59% of visitors from the United States, and 14% of traffic coming from Google.com (Alexa.com, 2018). Under a pseudonym account name, Reddit users can post web links and text or image content, leave comments, and promote ("up-vote") or demote ("downvote") content posted by other users. Subreddit communities have platform- and subreddit-specific rules regarding content and civility that are enforced by community moderators. People with accounts on the platform are also able to customize the topics and communities displayed via subscribing or unsubscribing to subreddits. Thus, the platform facilitates breaking down of barriers between expert and novice, and the primary gatekeepers to what information is shared and most visible are the moderators and participants themselves (Massanari, 2015).

At least several dozen public cannabis-related subreddits exist, with varying levels of activity and popularity, covering cannabis in general, cannabis growing and production of products, as well as subreddits for

people trying to quit using (Sowles, Krauss, Gebremedhn, & Cavazos-Rehg, 2017) or cutting back on cannabis use. Subreddit rules prohibit cannabis sales, enforced by moderators and automated tools. A recent content analysis of cannabis and opiate subreddits observed that banter (e.g., jokes, repartee, and discussions of daily life) was the most prevalent type of content on both subreddits. Disclosure of illicit drug use was the next most common category, followed by 'instruction and advice' and references to drug culture. While instances of instruction and advice were less common in the opiate subreddit than in the cannabis subreddit, illicit substance use was disclosed in both substance subreddits in order to give advice, get information, or provide context (Costello, Martin, & Brinegar, 2017).

In a quantitative examination of keyword occurrence in a cannabis subreddit, we recently reported an increase in relative volume of user-generated posts mentioning novel forms of cannabis use on Reddit, especially for dabbing, and furthermore found that two of the most common terms used in dab posts were "first" and "question." (Meacham, Paul, & Ramo, 2018). We also found that when people posted how 'high' they were on a user-created numerical scale from 1 to 10, the average 'subjective highness' was greater in posts that mentioned dabbing vs. posts that mentioned smoking (Meacham et al., 2018).

The aim of the present study is to characterize the content of questions about dabbing posted in cannabis and dabbing-specific forums on the Reddit social media platform, as well as the comment responses to these questions. Specifically, we sought to describe: (1) what kinds of advice do people seek about dabbing in Reddit online forums and (2) how do others on these forums engage with those seeking advice?

Methods

We conducted a keyword search and content analysis of one year (January 1 – December 31, 2017) of user-generated posts to three Reddit online cannabis community discussion forums ("subreddits") that contained the terms "dab" and "question." We conducted a one-year search to collect a sufficient yet manageable number of posted questions to examine. We focused on 2017 given the legal changes for recreational use of cannabis in the United States from 2012-2016. The three subreddits were related to cannabis in general, questions about cannabis, and dabbing.

This study was approved by the University of California San Francisco Institutional Review Board. All posts analysed are publicly available and no usernames of post authors were analysed or reported. Quotations are slightly altered to reduce chances of deductive disclosure of individuals who made the posts or comments (Costello et al., 2017).

Identifying and coding questions

In early 2018, we conducted a review of public cannabis subreddits from a "multireddit" list of cannabis-related subreddits linked from the sidebar of the most popular cannabis subreddit. After reading through a list of all cannabis-related subreddits, we focused on subreddits that, based on their title and description, were likely to contain content about dabbing or were specific to information seeking about cannabis. This included: a general cannabis subreddit (hereafter called *CANNA-BIS*), a subreddit for people asking questions about cannabis (hereafter called *QUESTIONS*), and several subreddits related to cannabis concentrates. In the last category, we determined that most of these subreddits were related to the production of concentrates or concentrate use via vaping, leaving one that focused specifically on use via dabbing (hereafter called *DABBING*). Potential other subreddits not included were for quitting or moderating use, contained humorous or artistic content to view while high, were for specific subpopulations based on age or gender, or were focused on growing cannabis. This focus on the

CANNABIS, *QUESTIONS*, and *DABBING* subreddits resulted in approximately 220,000 potential posts from 2017, with the majority (90%) from the general cannabis subreddit. Given the overwhelming popularity of this subreddit in terms of post volume and subscribers, and thus the greater chances that this information may be found by Redditors or via a general web search, we did not adjust for the dominance of posts from this subreddit in our content analysis.

To identify posts containing questions about dabbing, the search function on those subreddits' sidebar was used, with search terms of "question" and "dab" in the general cannabis subreddit, "dab" in the question subreddit, and "question" in the dabbing subreddit. Results posted between January 1, 2017 and December 31, 2017 were examined, and the question posed and number of "karma points" and comments were also recorded. Karma points are a net-endorsement summary of total "upvotes" minus total "downvotes." Posts and comments with more karma points are filtered to the top of a subreddit or thread, thus gaining more visibility. Numbers of karma points and comments were recorded as markers of low to medium engagement (e.g., an agreement or preference for content) (Neiger et al., 2012).

Post titles and content were reviewed by two substance use researchers who are active users of the Reddit platform (MM, JC). First, 213 posts collected via keyword search were read to identify the question or questions being posed. Posts that were not questions about dabbing were removed ($N = 20$), leaving 193 posts. The content of these questions was then coded into categories using an inductive content analysis approach. This approach is used to describe a phenomenon, avoiding preconceived categories and allowing categories and insights to emerge from the data (Hsieh & Shannon, 2005). One coder (MM) reviewed a sample of the last 50 posts of 2017 to create and then apply an initial coding list, until codes were repeated, each question had a code, and no new codes were added. Questions were then sorted by code, and coding categories were refined further, either by applying sub-codes to broad categories or combining less common codes into a broader category. The original codebook included the following 9 categories: device, product, drug tests and travel, health concerns, tolerance, getting high, cutting back, costs, other. These codes were applied to the rest of the posts. A second coder (JC) reviewed a random twenty percent subset of posts following the coding guide developed by the first coder. Cohen's kappa was calculated for each code, as codes were not mutually exclusive. Kappa for device, product, health concerns, cost, and tolerance was 0.50 to .90, indicating moderate to almost perfect agreement (McHugh, 2012). Kappa values for getting high and cutting back were under 0.20, indicating only slight agreement, so these codes were re-examined. Differences in codes applied were discussed via email exchanges, and the coding guide was updated. Specifically, the coding definition for one category, "getting high," was broadened to include questions about any of the steps in the procedure of dabbing required to feel the intense effects of this mode of use. Additionally, "cutting back" and "tolerance" were combined into one code, a "newbies" code was added, and the "other" code was removed. The final codebook included 8 categories (device, product, process of getting high, legal concerns, health concerns, costs, tolerance, and newbies).

Coding comment responses

To examine the content of the comment responses to the questions posed in the posts, the urls of the previously identified posts were revisited. Two researchers (MM, SR) reviewed subsets of 15–20 posts and comment responses, noting general impressions of the content and structure. Instead of coding the content as was done with the question posts (as the content was likely be similar to what was in the posts), several other notable aspects of a response to the questions were recorded. Over the course of weekly in-person meetings, additional notable features were added to the original codebook for the purpose of coding comments. In examining the content of comments, we focused

on four qualitative features: (1) whether the source of information was stated, and if so, from where; (2) whether readers or the original poster was directed to a particular resource, and if so, where; (3) whether harm reduction advice was given, and if so, what; and (4) negative sentiment (i.e. hostile, condescending, or trolling). Harm reduction advice was defined as responses intended to minimize harmful effects of dabbing.

We also recorded quantitative engagement features at both the post level and the comment level. At the post level, we noted the number of karma points and comments, as well as the number of unique commenters (i.e. account usernames) per post. We also noted whether the original poster ("OP") who posed the question to the subreddit was one of the commenters (OP/non-OP). At the comment level, we noted the number of karma points per comment as well as whether the comment was in reply to the post, or in reply to another comment.

Two posts were initially withheld from comment review as they were quite large threads requesting submissions of questions in the comments. One post solicited questions about cannabis, and received with 56 comments with 452 karma points, but only contained one mention about dabbing (specifically about how to store concentrate products for dabbing). The other post soliciting questions from people new to dabbing had 77 comments with 10 karma points. The questions posted as comments in this thread were coded using the question content codebook, and comment responses to these questions were coded with the comment response codebook. An additional 9 posts could not be accessed again online and were likely deleted in between the initial post content review and subsequent comment content review.

Each of two researchers coded the comments for half the posts. A random twenty percent of posts (39 posts, 140 non-OP comments) were coded by both researchers and compared. Cohen's Kappa was calculated for sentiment, source of info, referral, and harm reduction advice coding categories (.83, .57, .86, .51, respectively), indicating moderate to almost perfect agreement (McHugh, 2012).

Finally, given vastly differing subscriber and contributor sizes as well as community norms from subreddit to subreddit, we also examined differences in number of karma points, comments, and contributors, as well as quality of comments. This quantitative information was compared across the three subreddits using Kruskal-Wallis test of difference in medians (for non-normal distributions) and Fisher's exact test of difference in proportions (with small cell sizes), with posthoc tests to determine pairwise differences using a Bonferroni correction of multiple testing (Field, Miles, & Field, 2012).

Results

Of 213 posts screened via keyword search, we excluded 20 posts as they included questions that were not about dabbing, leaving 193 posts that fit the search criteria. We also noted that several questions referred to dabbing with a portable pen, even though some definitions of dabbing require use of a dab rig device to distinguish it from vaping concentrates.

A majority of the posts ($n = 127$, 66%) were from the general cannabis subreddit, while 6 were from the cannabis questions subreddit, and 59 were from the dabbing subreddit (Table 1). The 193 question posts about dabbing received a median of 2 "karma points" (IQR: 1–3) and 5 comments (IQR: 3–7). Nearly every post (98%) was replied to by a median of 3 unique commenters per post (IQR: 2–5). The original poster responded in the comments for 61.0% of posts.

Across the three subreddits, questions posted in the smaller *QUESTIONS* and *DABBING* subreddits had significantly more karma points per post than those in the larger *CANNABIS* subreddit (adjusted p 's < .05). The question posts to the *DABBING* subreddit received significantly more comments than posts in the *CANNABIS* subreddit (adjusted $p = .01$). Unique commenters per post were not significantly different across subreddits and percent of posts replied to and engaged

Table 1
Overview of volume and engagement with 193 dabbing question posts in three online cannabis discussion communities (subreddits).

	Total	Subreddit			p-value ¹
		CANNABIS	QUESTIONS	DABBING	
Posts in 2017	220,331	218,185	316	1830	–
Dabbing question posts	193	127	6	59	–
As percent of all posts	.09%	.06%	1.9%	3.2%	–
Post commented on/replied to	97.9%	97.6%	100%	98.3%	.999
Karma Points per post (median, IQR)	2 (1,3)	2 (1,2)	4.5 (3,3.5)	3 (2,4)	< .001 ^a
Comments per post (median, IQR)	5 (3,7)	4 (2,7)	3 (1.5,3.8)	6 (3,10)	.004 ^b
Commenters per post (median, IQR) ²	3 (2,5)	3 (2,4)	2.5 (1.3,3.8)	5 (3,7)	.838
Original Poster responds in comments ²	61.0%	59.5%	50.0%	65.5%	.859

- Differences in medians calculated with Kruskal-Wallis test and differences in proportions calculated with Fisher exact test.
- Out of 182 comment-coded posts overall, 121 in the general CANNABIS subreddit, 6 from the QUESTIONS subreddit, and 55 from DABBING subreddit.
 - Pairwise differences in karma points per post: QUESTIONS, DABBING > CANNABIS.
 - Pairwise differences in comments per post: DABBING > CANNABIS.

Table 2
Description and proportion of content in 193 dabbing questions from three online cannabis communities (subreddits).

Content of Question Number (%)	Description	Examples
Device/Equipment 774 (38%)	Questions about what kind of device to get or make, how to use device, and how to repair or clean device	• "What's the proper way to use this? I've never used one with a globe before." • "Would it be possible to convert my gravity bong to work with dabs?" • "How do you keep your dab rig clean?"
Cannabis Product 661 (33%)	Comparisons of dabbing with flower or edibles or between different kinds of concentrates, or questions about specific types of concentrates	• "I want to try vaping dabs. My main question is will it be the same strength as using a rig and nail?" • "Any idea why my reclaim has shatter consistency?" • "So what is sauce exactly?"
Process of Getting High 335 (18%)	Refers to steps for achieving desired high (in terms of quality and/or intensity)	• "What do y'all tend to "feel" or generally sense while high, and what gets you there fastest?" • "What gets you higher – gravity bongs or dabs?" • "I'm having a tough time figuring out where to put the dab. Does it go on the edge? I'm worried I'm gonna burn myself. Any help is appreciated, thanks!"
Legal Concerns 333 (17%)	Questions about drug tests, detection of smoke or vapour, travel/transport with concentrate products	• "It's been three months since I've taken my last dab and I'm still testing positive for THC. Has this happened to anyone else?" • "How is the smell if I dab in my room and open the window?"
Health Concerns 226 (13%)	Experienced or anticipated physical or mental health effects	• "If I dab some high quality bho, live resin, or rosin, will it have the same effect (vasoconstriction) as smoking or the opposite effect (vasodilation)?" • "Why do I get anxiety if I smoke regular bud but not at all from dabs?" • "Are dabs safe to use? Is mold a possibility and how would I spot it?"
Costs 119 (10%)	Questions about specific prices for device or product, or about the general cost-effectiveness of dabbing vs. other methods of use	• "Is \$100 for 3.5 g of dabs a good price?" • "How economically sustainable are dabs?" • "I want a dab rig but it's expensive, right? I'm hoping for some advice. Can I use a bong and a torch?"
Tolerance 116 (8%)	Mentions "tolerance" or "t-breaks" or needing to use more to feel the same effect	• "I usually smoke at night to unwind and sleep but recently that has been very difficult to do without combining edibles and smoking. I smoked a blunt, took a dab, and vaped a bit but still felt sober." • "I've been taking a lot of dabs recently and I have noticed my tolerance to getting stoned on bud is much higher, if I stop with the oil and go to bud how long will it take to have my tolerance go down?"
Newbies 6 (3%)	Discloses being "new" or first time trying dabbing	• "I'm new to dabbing – any tips?" • "What is dabbing? What is wax/shatter? Can I do any of the aforementioned activities with bud? If not, how do I get wax/shatter from bud?"

with again by the original poster in the commenters did not differ significantly either (all $p > .05$).

Eight categories of question posts were identified, and each question post could be in multiple categories (Table 2). The most frequently asked question content was about types and logistical use of devices and related equipment (e.g., rigs, pens) (38%). For example, one poster had purchased specialized components but wasn't sure how to use them:

"I got a diamond knotted quartz banger and I'm a little confused on where to touch the dab and where to heat it. Do I heat up the knot and touch the dab to the knot? Or do I heat up the knot and touch it to the rim of the banger?"

The next most common question category regarded comparisons of products (e.g., various types of concentrates vs. bud/flower, quality of homemade vs. dispensary acquired) (32%). Several posters asked about how dabbing compared to other forms of cannabis use:

"What is more powerful, a strong edible or wax/dab? I ate an edible that ... made me change my way of thinking about potency. Is dabbing more

powerful than strong edibles?"

Other questions involved the step-by-step process of getting high using dabs (18%), legal issues (e.g. drug testing, transport across state lines) (17%), health concerns (e.g., respiratory effects, anxiety, vomiting) (12%), costs (10%), effects of dabbing on tolerance (8%), and requests for general advice for people new to dabbing (3%). Several people noticed an increase in their tolerance related to dabbing, for example:

"What are your tips for keeping a decent tolerance level so I won't have to take almost constant t-breaks or buy more wax? I know the obvious tip is to not consume all the time/load huge dabs every session. But any advice would be awesome. Thanks, guys."

Occasionally, a post would ask several questions at once, for example, this post that asks about health effects, which product to buy, costs of dab rigs, and general equipment needs:

"Will the cough always be this bad when you take a hit? If I want to

Table 3

Overview of engagement with 1127 comment responses to (182) dabbing question posts in three online cannabis discussion communities (subreddits).

	Total	Subreddit			p-value ¹
		CANNABIS	QUESTIONS	DABBING	
Total comments	1127	649	20	458	–
Karma points per comment (median, IQR)	1 (1,2)	1 (1,2)	2 (2,3)	1 (1,2)	< .001 ^a
Comments not by Original Poster	857 (76%)	482 (75%)	16 (80%)	359 (77%)	.266
Negative comments ²	44 (4%)	20 (3%)	0 (0%)	24 (5%)	.492
Source of information stated ²	222 (26%)	109 (17%)	4 (20%)	109 (30%)	.041 ^b
Referral given ²	88 (10%)	49 (10%)	3 (19%)	36 (8%)	.462
Harm reduction advice ²	104 (12%)	58 (12%)	4 (20%)	42 (12%)	.540

1. Differences in medians calculated with Kruskal-Wallis test and differences in proportions calculated with Fisher exact test.

2. Out of comments not by original poster (non-OP comments).

a. Pairwise differences in karma points per comment: QUESTIONS > DABBING, CANNABIS.

b. Pairwise differences in proportion of comments stating source of information: DABBING > CANNABIS.

continue dabbing, what should I ask my dealer for: shatter, wax, or concentrates? Are all dab rigs really expensive or are there any out there for the average smoker? What other gear do you need to dab?"

The distribution of these content categories was fairly similar across the three subreddits, except that posts in the *DABBING* subreddit were less likely to be about legal concerns. While it is not possible to examine statistical differences in number of karma points or comments for these overlapping (and thus non-independent) content categories of question posts, all content categories except the cost category had a median of 2 karma points and 4–5 comments per post. The cost category, however, had slightly more karma points and comments, indicating potentially greater engagement with this category of question posts.

Of 1127 comments on 182 posts, roughly a quarter of comments were made by the original poster, either clarifying their question or expressing gratitude for the other commenters' response (Table 3). The original poster engaged in the comment section in 61% of posts and 24% of the comment responses.

Very few non-OP comments (4%) were negative and these comments tended to be the only comments with karma points below 0, or were in response to someone who left a negative comment. When commenters referred to their source of information (which was stated in 26% of non-OP comments), they usually contained disclosure of personal experience (89% of comments that gave source of information). Other sources included websites, local retailers, and friends. One in ten non-OP comments gave a referral, usually to particular websites or other subreddits, but also to particular retailer dispensaries or glass-blowers or named brands of concentrates. Of note, one commenter referenced a scientific article and two commenters suggested the original poster ask a doctor about their health concern.

Harm reduction oriented advice was brought up in 12% of comments, with general content areas related to the process of getting high, moderation in usage, and types of device/equipment and products. Harm reduction advice about getting high included using a small amount of product (*"Start small, really small. No, smaller than that"*) and taking low temperature dabs (by using an electronic nail that allows for better temperature control and waiting 15–60 seconds between heating the nail and inhaling the dab). Moderation advice included periodically taking tolerance breaks or "t-breaks" (*"It sounds like a t-break would do you some good"*) and avoiding both combustion (smoking) and dabbing to prevent tolerance from going up. Harm reduction advice about the types of products and devices included knowing their origins and qualities, cleaning the device regularly, using a glass carb cap, and using CBD strains to reduce anxiety. Several commenters noted that cannabis is still a drug and that the high potency of dabs may not be for everyone:

"As much as we all love pot, we need to remember it is a "drug", as much as I hate calling it that. You should only do what you are comfortable with and there is no shame in taking less or stepping out of a rotation.

Positive vibes!"

In the one separate thread soliciting questions specifically from people new to dabbing, 27 of 77 comments contained questions. Of these 27 questions, again a majority were questions about device (16 questions, 59.3%) or product (11 questions, 40.7%). The next most common category was questions from self-disclosed new users (6 questions, 22.2%). All other content areas except tolerance were brought up in 1–2 questions.

Across the three subreddits, comments in the smallest *QUESTION* subreddit received significantly more karma points than in the other two subreddits (adjusted p 's < .01), and comments in the *DABBING* subreddit were more likely to state a source of information than comments in the *CANNABIS* subreddit (adjusted p = .041).

Discussion

In this content analysis of questions posted about dabbing in cannabis-specific discussion communities on the Reddit platform, we found that questions were dominated by logistics of device use and product comparison, and that legal and health concerns were also raised, but less often. This research highlights how people discuss an intense and potent form of cannabis use in a pseudo-anonymous online setting, and in the process, are developing new technologies and cultures of substance use at a time of expanding legalization and commercialization of cannabis.

Findings here show that primary concerns were about device and product use. The device questions reflect that dabbing is novel form of administration and has multistep and multicomponent aspects that are unfamiliar to many. The product questions reflect the broad range of products available and the desire to understand how the effects of use compare between different products and forms of use. Many questions also regarded avoiding the effects of legal prohibition of cannabis at the federal level in the United States and most other countries in the world (e.g., urine drug testing for employment or probation). People posting in these discussion communities report some health concerns but mostly ask about logistics of use. Nearly every post received a response, with very few negative (i.e. hostile, condescending, or trolling) comments. Commenters stated source of information in about a quarter of comments, with the overwhelming majority of this information coming from personal experience. Referrals out of the subreddit for more information were to other online sources. Across three subreddits with varying sizes, there were few differences regarding responses to these questions posts. Of note, however, posts to the largest general *CANNABIS* subreddit did not receive the most karma points or comments, indicating that engagement may be slightly more likely in smaller subreddits with less competition between posts for attention.

Findings also support previous research that online platforms are a resource for people to openly support one another and share

information that they may not be able to find in their offline, “real life” informational networks. In the absence of a strong evidence-base about dabbing safety, people within substance-using communities rely on one another’s personal experiences to learn about use and risk. For emerging or new substances, people who use drugs are often the only people with personal expertise on how to use safely and effectively. These findings align with work by Boothroyd and Lewis that examined online drug scenes, revealing “a popular culture of ‘best practice’ rooted in experience” to generate “harm reduction from below” (Boothroyd & Lewis, 2016). Similarly, research by Tackett-Gibson on online discussions of ketamine use describes the “great confidence in the experience of other website members,” as well as narratives that “routinely emphasize controlled and moderate use” (Tackett-Gibson, 2008). That great confidence is certainly reflected in the present study, yet messages of moderate use, though present, were not routine. Indeed, questions about the process of getting high (and thus experiencing pleasure) were more common than ones about legal and health risks, a tension that was noted in Barrett et al.’s discussion of online environments as places where people recognize seeking both pleasure and safety (Barratt, Allen, & Lenton, 2014).

In addition to the confidence placed in subreddit members by posing a question to an online audience of perceived experts, seeking information or advice in our study often contained a disclosure of use or intended use (Costello et al., 2017). The overwhelming citation of personal experience when providing a source of information shows how this disclosure of lived experience is a signal of credibility. Personal experience was usually referred to generally or from a recent incident – very rarely stating anything identifiable except whether the poster or commenter was in a legal state, which corresponds with Barratt’s findings of varied strategies in disclosure of use (Barratt, 2011).

Implications of these findings support calls for cannabis regulatory and public health efforts following legalization that address not just general use of cannabis, but novel informational needs addressing both pleasure and safety for an emerging spectrum of diverse products, potencies, devices, and routes of administration. Scientific evidence and accurate informational messaging is needed from non-industry voices regarding safe consumption recommendations (Fischer et al., 2017) and clarified legal regulations (Hanson et al., 2018). This may require innovative approaches to budtender training (Haug et al., 2016) and health practitioner education regarding what advice, if any, should be given to customers or patients regarding the use of dabbing vs. other forms of cannabis consumption. With respect to regulation, some have suggested that labelling (Vandrey et al., 2015), taxation, and advertising regulations may be drawn from alcohol and tobacco industries (Pacula, Kilmer, Wagenaar, Chaloupka, & Caulkins, 2014). This may include, for example, varying tax rates for different alcohol products based on alcohol content (e.g. beer vs. spirits) or the prohibition of tobacco advertising on television. However, excessive taxation and restrictions on advertising, product testing, and point of sale transactions may have the effect of pushing dabbing into underground production and distribution markets (Caulkins, Kilmer, MacCoun, Pacula, & Reuter, 2012). Thus overtaxing or overregulating may have unintended effects on the safety of use of these new products.

There are a number of limitations to this research. First of all, we only examined discussions of dabbing consumption but not production of concentrates for dabbing, which has been associated with health risks such as explosions and burns (Al-Zouabi et al., 2018). One major limitation of this study is that we do not have demographic or geographic information about who posted these questions, or about their previous cannabis use experience, so these findings may have limited generalizability to people who use cannabis more broadly (Enghoff & Aldridge, 2019). Nevertheless, data on Reddit users indicates that they tend to be English-speaking and primarily in the United States, United Kingdom, Canada, and Australia (Alexa.com, 2018). Furthermore, individuals who post about dabbing on this platform are likely to be more experienced using cannabis than the general population. Another

limitation is that we did not examine all questions posed about dabbing in these online communities (i.e. posts where a question was asked but the word ‘question’ was not used) and only examined one year of posts. With relatively few posts examined from the *QUESTIONS* subreddit, we may have been underpowered to assess statistical differences regarding quantitative engagement measures. Finally, we were not able to re-access about 5% of posts several months after initial post review, demonstrating that while most content remains online, a subset may disappear.

In summary, people seeking advice about dabbing in pseudonymous Reddit communities inquired most often about logistics of use, but less often about health, tolerance, and legal risks. Additional scientific research is needed on dabbing as an emerging method of use and its relative harms and benefits compared to other forms of cannabis use (vaping, smoking, edibles), in a way that is neither alarmist nor over-promoting. These findings may be used to inform the content of public health efforts and health practitioner education as cannabis becomes increasingly legal and accessible.

CRedit authorship contribution statement

Meredith C. Meacham: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Writing - original draft, Writing - review & editing. **Shim Roh:** Data curation, Investigation. **Jamie Suki Chang:** Data curation, Methodology, Writing - review & editing. **Danielle E. Ramo:** Conceptualization, Methodology, Resources, Supervision, Writing - review & editing.

Declaration of Competing Interest

None for Meredith Meacham, Jamie Chang, Danielle Ramo
Shim Roh, a research assistant on the study, is also employed as a technician by SC Labs, a cannabis testing laboratory.

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References

- Al-Zouabi, I., Stogner, J. M., Miller, B. L., & Lane, E. S. (2018). Butane hash oil and dabbing: Insights into use, amateur production techniques, and potential harm mitigation. *Substance abuse and rehabilitation*, 9, 91–101. <https://doi.org/10.2147/SAR.S135252>.
- Alexa.com (2018). *Reddit.Com traffic statistics*. Alexa.Com: Alexa.
- Alzghari, S. K., Fung, V., Rickner, S. S., Chacko, L., & Fleming, S. W. (2017). To dab or not to dab: Rising concerns regarding the toxicity of Cannabis concentrates. *Cureus*, 9(9), e1676. <https://doi.org/10.7759/cureus.1676>.
- Anderson, L. S., Bell, H. G., Gilbert, M., Davidson, J. E., Winter, C., Barratt, M. J., ... Dasgupta, N. (2017). Using social listening data to monitor misuse and nonmedical use of bupropion: A content analysis. *JMIR Public Health Surveill*, 3(1), e6. <https://doi.org/10.2196/publichealth.6174>.
- Barratt, M. J. (2011). Discussing illicit drugs in public internet forums: Visibility, stigma, and pseudonymity. *Paper Presented at the 5th International Conference on Communities and Technologies*.
- Barratt, M. J., Allen, M., & Lenton, S. (2014). PMA sounds fun": Negotiating drug discourses online. *Substance Use amp; Misuse*, 49(8), 987–998. <https://doi.org/10.3109/10826084.2013.852584>.
- Boothroyd, D., & Lewis, S. (2016). Online drug scenes and harm reduction from below as prhonesis. *Contemporary Drug Problems*, 43(3), 293–307. <https://doi.org/10.1177/0091450916654266>.
- Borodovsky, J. T., Crosier, B. S., Lee, D. C., Sargent, J. D., & Budney, A. J. (2016). Smoking, vaping, eating: Is legalization impacting the way people use cannabis? *International Journal on Drug Policy*, 36, 141–147. <https://doi.org/10.1016/j.drugpo.2016.02.022>.
- Caulkins, J. P., Kilmer, B., MacCoun, R. J., Pacula, R. L., & Reuter, P. (2012). Design considerations for legalizing cannabis: Lessons inspired by analysis of California’s

- proposition 19. *Addiction*, 107(5), 865–871. <https://doi.org/10.1111/j.1360-0443.2011.03561.x>.
- Cavazos-Rehg, P. A., Krauss, M. J., Sowles, S. J., Floyd, G. M., Cahn, E. S., Chaitan, V. L., & Ponton, M. (2018). Leveraging user perspectives for insight into cannabis concentrates. *American Journal of Drug and Alcohol Abuse*, 44(6), 628–641. <https://doi.org/10.1080/00952990.2018.1436179>.
- Cavazos-Rehg, P. A., Sowles, S. J., Krauss, M. J., Agbonavbare, V., Grucza, R., & Bierut, L. (2016). A content analysis of tweets about high-potency marijuana. *Drug and Alcohol Dependence*, 166, 100–108. <https://doi.org/10.1016/j.drugalcdep.2016.06.034>.
- Chan, G. C. K., Hall, W., Freeman, T. P., Ferris, J., Kelly, A. B., & Winstock, A. (2017). User characteristics and effect profile of butane hash oil: An extremely high-potency cannabis concentrate. *Drug and Alcohol Dependence*, 178, 32–38. <https://doi.org/10.1016/j.drugalcdep.2017.04.014>.
- Chen, A. T., Zhu, S. H., & Conway, M. (2015). What online communities can Tell Us about electronic cigarettes and hookah use: A study using text mining and visualization techniques. *Journal of Medical Internet Research*, 17(9), e220. <https://doi.org/10.2196/jmir.4517>.
- Cinnamon Bidwell, L., YorkWilliams, S. L., Mueller, R. L., Bryan, A. D., & Hutchison, K. E. (2018). Exploring cannabis concentrates on the legal market: User profiles, product strength, and health-related outcomes. *Addict Behav Rep*, 8, 102–106. <https://doi.org/10.1016/j.abrep.2018.08.004>.
- Costello, K. L., Martin, J. D., & Brinegar, A. E. (2017). Online disclosure of illicit information: Information behaviors in two drug forums. *Journal of the Association for Information Science and Technology*, 68(10), 2439–2448.
- Daniulaityte, R., Lamy, F. R., Barratt, M., Nahhas, R. W., Martins, S. S., Boyer, E. W., ... Carlson, R. G. (2017). Characterizing marijuana concentrate users: A web-based survey. *Drug and Alcohol Dependence*, 178, 399–407. <https://doi.org/10.1016/j.drugalcdep.2017.05.034>.
- Daniulaityte, R., Nahhas, R. W., Wijeratne, S., Carlson, R. G., Lamy, F. R., Martins, S. S., ... Sheth, A. (2015). "Time for dabs": Analyzing twitter data on marijuana concentrates across the U.S. *Drug and Alcohol Dependence*, 155, 307–311. <https://doi.org/10.1016/j.drugalcdep.2015.07.1199>.
- Enghoff, O., & Aldridge, J. (2019). The value of unsolicited online data in drug policy research. *International Journal on Drug Policy*. <https://doi.org/10.1016/j.drugpo.2019.01.023>.
- Field, A., Miles, J., & Field, Z. (2012). *Discovering statistics using R*. Sage publications.
- Fischer, B., Russell, C., Sabioni, P., van den Brink, W., Le Foll, B., Hall, W., ... Room, R. (2017). Lower-risk Cannabis use guidelines: A comprehensive update of evidence and recommendations. *American Journal of Public Health*, 107(8), e1–e12. <https://doi.org/10.2105/ajph.2017.303818>.
- Hanson, K., Haggerty, K. P., Fleming, C. B., Skinner, M. L., Casey-Goldstein, M., Mason, W. A., ... Redmond, C. (2018). Washington State retail marijuana legalization: Parent and adolescent preferences for marijuana messages in a sample of Low-income families. *Journal of Studies on Alcohol and Drugs*, 79(2), 309–317.
- Haug, N. A., Kieschnick, D., Sottile, J. E., Babson, K. A., Vandrey, R., & Bonn-Miller, M. O. (2016). Training and practices of Cannabis dispensary staff. *Cannabis and Cannabinoid Research*, 1(1), 244–251. <https://doi.org/10.1089/can.2016.0024>.
- Hsieh, H. F., & Shannon, S. E. (2005). Three approaches to qualitative content analysis. *Qual Health Res*, 15(9), 1277–1288. <https://doi.org/10.1177/1049732305276687>.
- Keller, C. J., Chen, E. C., Brodsky, K., & Yoon, J. H. (2016). A case of butane hash oil (marijuana wax)-induced psychosis. *Subst Abus*, 37(3), 384–386. <https://doi.org/10.1080/08897077.2016.1141153>.
- Krauss, M. J., Rajbhandari, B., Sowles, S. J., Spitznagel, E. L., & Cavazos-Rehg, P. (2017). A latent class analysis of poly-marijuana use among young adults. *Addictive Behaviors*, 75, 159–165. <https://doi.org/10.1016/j.addbeh.2017.07.021>.
- Leafly (2017). *Dabbing 101: What are dabs and how are they made?* Retrieved December 4th, 2018, from <https://www.leafly.com/news/cannabis-101/what-are-cannabis-dabs-and-benefits-of-dabbing-marijuana>.
- Loflin, M., & Earleywine, M. (2014). A new method of cannabis ingestion: The dangers of dabs? *Addictive Behaviors*, 39(10), 1430–1433. <https://doi.org/10.1016/j.addbeh.2014.05.013>.
- Månsson, J., & Ekendahl, M. (2013). Legitimacy through scaremongering: The discursive role of alcohol in online discussions of cannabis use and policy. *Addiction Research & Theory*, 21(6), 469–478. <https://doi.org/10.3109/16066359.2012.731115>.
- Massanari, A. L. (2015). *Participatory culture, Community, and play: Learning from Reddit*. New York: Peter Lang.
- McHugh, M. L. (2012). Interrater reliability: The kappa statistic. *Biochemia medica*, 22(3), 276–282.
- Meacham, M. C., Paul, M. J., & Ramo, D. E. (2018). Understanding emerging forms of cannabis use through an online cannabis community: An analysis of relative post volume and subjective highness ratings. *Drug and Alcohol Dependence*, 188, 364–369. <https://doi.org/10.1016/j.drugalcdep.2018.03.041>.
- Meehan-Atrash, J., Luo, W., & Strongin, R. M. (2017). Toxicant formation in dabbing: The terpene story. *ACS Omega*, 2(9), 6112–6117. <https://doi.org/10.1021/acsomega.7b01130>.
- Meier, M. H. (2017). Associations between butane hash oil use and cannabis-related problems. *Drug and Alcohol Dependence*, 179, 25–31. <https://doi.org/10.1016/j.drugalcdep.2017.06.015>.
- Miller, B. L., Stogner, J. M., & Miller, J. M. (2016). Exploring butane hash oil use: A research note. *Journal of Psychoactive Drugs*, 48(1), 44–49. <https://doi.org/10.1080/02791072.2015.1118173>.
- Neiger, B. L., Thackeray, R., Van Wagenen, S. A., Hanson, C. L., West, J. H., Barnes, M. D., & Fagen, M. C. (2012). Use of social media in health promotion: Purposes, key performance indicators, and evaluation metrics. *Health Promotion Practice*, 13(2), 159–164. <https://doi.org/10.1177/1524839911433467>.
- Pacula, R. L., Kilmer, B., Wagenaar, A. C., Chaloupka, F. J., & Caulkins, J. P. (2014). Developing public health regulations for marijuana: Lessons from alcohol and tobacco. *American Journal of Public Health*, 104(6), 1021–1028. <https://doi.org/10.2105/ajph.2013.301766>.
- Pierre, J. M., Gandai, M., & Son, M. (2016). Cannabis-induced psychosis associated with high potency "wax dabs. *Schizophr Res*, 172(1-3), 211–212. <https://doi.org/10.1016/j.schres.2016.01.056>.
- Raber, J. C., Elzinga, S., & Kaplan, C. (2015). Understanding dabs: Contamination concerns of cannabis concentrates and cannabinoid transfer during the act of dabbing. *Journal of Toxicological Sciences*, 40(6), 797–803. <https://doi.org/10.2131/jts.40.797>.
- Rickner, S. S., Cao, D., Kleinschmidt, K., & Fleming, S. (2017). A little "dab" will do ya' in: A case report of neuro- and cardiotoxicity following use of cannabis concentrates. *Clin Toxicol (Phila)*, 55(9), 1011–1013. <https://doi.org/10.1080/15563650.2017.1334914>.
- Sagar, K. A., Lambros, A. M., Dahlgren, M. K., Smith, R. T., & Gruber, S. A. (2018). Made from concentrate? A national web survey assessing dab use in the United States. *Drug and Alcohol Dependence*, 190, 133–142. <https://doi.org/10.1016/j.drugalcdep.2018.05.022>.
- Shim, J. K. (2005). Constructing 'race' across the science-lay divide: Racial formation in the epidemiology and experience of cardiovascular disease. *Social Studies of Science*, 35(3), 405–436.
- Sowles, S. J., Krauss, M. J., Gebremedhn, L., & Cavazos-Rehg, P. A. (2017). I feel like I've hit the bottom and have no idea what to do": Supportive social networking on reddit for individuals with a desire to quit cannabis use. *Subst Abus*, 38(4), 477–482. <https://doi.org/10.1080/08897077.2017.1354956>.
- Stogner, J. M., & Miller, B. L. (2015). The dabbing dilemma: A call for research on butane hash oil and other alternate forms of Cannabis use. *Subst Abus*, 36(4), 393–395. <https://doi.org/10.1080/08897077.2015.1071724>.
- Tackett-Gibson, M. (2008). Constructions of risk and harm in online discussions of ketamine use. *Addiction Research & Theory*, 16(3), 245–257. <https://doi.org/10.1080/16066350801983699>.
- Vandrey, R., Raber, J. C., Raber, M. E., Douglass, B., Miller, C., & Bonn-Miller, M. O. (2015). Cannabinoid dose and label accuracy in edible medical Cannabis products. *Jama*, 313(24), 2491–2493. <https://doi.org/10.1001/jama.2015.6613>.
- Wax, P. M. (2002). Just a click away: Recreational drug web sites on the internet. *Pediatrics*, 109(6), e96. <https://doi.org/10.1542/peds.109.6.e96>.
- Zhang, Z., Zheng, X., Zeng, D. D., & Leischow, S. J. (2016). Tracking dabbing using search query surveillance: A case study in the United States. *Journal of Medical Internet Research*, 18(9), e252. <https://doi.org/10.2196/jmir.5802>.