

Article

Detecting Critical Information Needs in Online Communities About Opioid Use for Pain Management: A Mixed-Method Study

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Abstract

Background: Online communities such as Reddit can reveal critical information needs (CINs) among people who discuss opioid use for chronic or acute pain under conditions of stigma and uncertainty. **Methods:** We used a mixed-method design to analyze 3428 unique Reddit posts from 1 January to 31 December 2022. Sentence-BERT embeddings and K-means clustering identified eight dominant themes, followed by qualitative analysis of a random subsample of 400 posts. **Results:** The most prevalent theme was seeking alternatives to opioids for pain relief (28.00%), followed by medications for chronic pain (19.84%) and kratom use experiences (14.64%). Qualitative findings showed recurrent concerns about addiction, stigma in clinical encounters, withdrawal, treatment access, and peer-to-peer discussion of kratom, tianeptine, cannabis, and other substitute substances. **Conclusions:** The study suggests an unmet need for accessible, nonstigmatizing, and clinically grounded information on pain management, tapering, and lower-risk alternatives to opioid use. These results have implications for addiction prevention, harm reduction, and patient-facing communication strategies for clinical practice and community health.

Keywords: addiction prevention; chronic pain; harm reduction; information seeking; online health communities; opioid use; social media; thematic analysis



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1. Introduction

People need to find, understand, and act on critical information to carry out day-to-day life, protect their health and safety, and participate in social life. These critical information needs (CINs) are valued for their timeliness, relevance, and accessibility, and are available and applicable to groups that face barriers such as stigma, limited resources, or low institutional trust [1–3]. Information on health and welfare is central to CINs; however, institutional stigma within health systems and the media can reduce the supply of critical communication, while internalized stigma can dampen information seeking and the expression of needs [4]. There are also cultural barriers related to the translation and transmission of guidelines for opioid treatment [5]. For populations vulnerable to

stigma or cultural barriers, information needs unmet by local media, clinical contexts, and in-person networks may drive people to digital spaces, such as online communities, to seek information with fewer constraints.

Seeking critical medical information online concerning opioid use for pain management is clinically relevant. Stigma related to opioid use disorder often creates barriers to treatment for people using opioids [6]. A nationally representative public health opinion survey in 2017 found that respondents expressed high levels of stigma towards individuals using prescription opioids, where “higher levels of stigma were associated with greater public support for punitive policies and lower support for several public health-oriented policies” [6] (p. 462). This highlights the need to understand the types of CINs people seek at the intersection of opioid use and pain management, given the systematic disadvantages associated with unmet information needs. Virtual communities provide a space for individuals to openly discuss sensitive topics often withheld in traditional medical settings. While clinical records document opioid prescriptions and formal treatments, they fail to capture patients’ psychological struggles in daily life. By analyzing these online interactions, researchers can identify CINs absent from routine clinical encounters and address patient concerns that healthcare professionals may overlook.

To investigate the nature of the CIN in online communities about opioid use for pain management, this paper analyzes Reddit posts collected via Pushshift. With more than 116 million daily active users and billions of annual posts and comments [7], Reddit is a well-suited online platform to observe such discussions about health information. Its anonymity feature also captures authentic accounts of drug experiences, making it one of the most popular web-based social media platforms to study drug-related epidemics [8].

1.1. Contextual Background

The opioid epidemic is a significant public health concern affecting millions of people through overprescription, addiction, and opioid-related deaths. Opioid use disorder (OUD) affects over 2.1 million people and has contributed to over 120,000 deaths worldwide each year [9]. A large percentage of those with opioid use disorder were first introduced to opioids to treat their chronic pain. One study found that 35% of their sample with OUD experienced chronic pain before being treated with opioids [10]. Those with OUD to manage chronic pain experience a high level of stigma, which often prevents individuals from seeking professional care and treatment [11,12]. Those using opioids to treat chronic pain may feel like they have to hide their treatment from family, friends, and physicians for self-protection from judgment [13], reducing their information seeking from sources where personal identity is recognized. Research shows individuals coping with health concerns often turn to online communities for information and support when they experience social isolation and lack adequate offline support [14,15]. Patients considering, living with, or recovering from opioid use for pain management likely turn to online communities for critical information seeking and support.

1.2. Online Community Affordances and Critical Information Needs

Understood as the possibilities for action that a technology offers users based on both its design and the users’ abilities, goals, and context, affordances provide a theoretical framework for understanding how technologies enable, constrain, or invite people to engage [16–20]. This framework has been integrated into understanding social media and online communities, the digital space “where people come together to get and give information or support, to learn, or to find company.” [21] (p. 348). There are a variety of online communities, including but not limited to discussion forums (e.g., Reddit, WebMD Communities), public groups on Facebook and Instagram, networked and issue publics

from hashtags on X/Twitter and Bluesky, Q&A sites (e.g., Quora, Stack Exchange), and app message groups [22–24]. Some of these platforms provide affordances like anonymity and searchability, which may induce a buffer effect for patients living with chronic conditions, such as cancer and substance use disorders [25–27]. Investigating online communities and discussion platforms can inform our understanding of how people exchange medical information with others, examine the quality and range of information, and identify misinformation and misperceptions, all operating within the constraints of platform affordances [28–30]. Understanding these spaces is pivotal to developing evidence-based health communication strategies and interventions.

In the realm of opioid use and pain management, previous research finds that patients who are prescribed an opioid for chronic pain management have lowered anxiety and reduced risks for opioid misuse after participating in an online support community [31]. Features like flexibility (access any time), anonymity, peer credibility, and self-paced participation of online communities are preferred for participants who misuse opioids [32]. Online communities joined by “similar others” reduce feelings of stigma and facilitate help-seeking and authentic discussion for patients who are recovering from opioid use disorders [33]. Moreover, sharing lived experiences of opioid use unveils effects of treatment not captured in clinical encounters or ignored by formal medical advice. For individuals without in-person support, online communities offer a cost-effective way to access the information they need, though with the risk of encountering misinformation. However, anxiety caused by a lack of information can be significantly mitigated by interacting with peers or with others in the online community.

A central feature of online communities is the encouragement of narration. The cathartic effect of sharing experiences and stories online is beneficial for health and well-being [34] and is strongly associated with patient outcomes [35]. When guided appropriately, patients can gain knowledge about coping with their risky behaviors [35]. Scholars also found that reading others’ stories online is an effective passive approach for learning from others’ experiences, with personal narration providing an engaging and compelling information frame [35].

Nevertheless, narration is not the only type of self-disclosure. Self-disclosure can take forms beyond storytelling, including basic queries and detailed questions pertaining to one’s own experience. Indeed, research finds that OUD-related online communities are question-driven with question subtypes (e.g., withdrawal, lifestyle, drug testing) that relate to genres of interactions [36]. Therefore, it is essential to explore topical groups within online communities before conducting an in-depth analysis of their clinical value.

RQ1: What are the emergent topics of opioid use and pain management in online communities?

Online communities such as Reddit are important spaces for understanding concerns regarding the use of opioids to treat chronic/acute pain. The use of opioids can cause a variety of side effects, and many users turn to anonymous online communities, such as Reddit, for advice on issues including constipation, weight loss, and sweating [37]. Examining this discourse can help inform the understanding of side effects and concerns that users may not feel comfortable sharing in healthcare settings. Previous research has explored a variety of discourse types related to opioid use and pain management on Reddit. Many discussions center on harm reduction, side effects, and quitting. A study conducted by Graczyk et al. [38] assessing 100 palliative care patients found that 43 expressed concerns with treatment surrounding opioid treatments, with fears of addiction, side effects, or death. Individuals who experience pain (especially those with life-threatening conditions) note having concerns with pain, the cause, and the ability to control it, where opioid medications may simultaneously express feelings of fear.

As online communities embrace users from a variety of health conditions—from mild to severe—it is suspected to contain a gamut of concerns regarding opioid use for pain management. These online conversations highlight the desire for shared experiences, validation, and connections among those with opioid use experiences in online communities. They also reflect efforts to seek knowledge about pain management and opioid misuse—critical information needs—among people who may face stigma for these queries from friends and family, as well as in healthcare settings. Surfacing concerns about using opioids to treat chronic pain can inform platform moderators and public health officials about what kinds of information to share.

RQ2: What are the concerns about using opioids to treat chronic/acute pain discussed in the online community?

There are also newer, emerging substances discussed on Reddit that may open more avenues for misinformation and public concerns. Substances such as kratom and tianeptine are a source of other common questions on Reddit [36]. The literature has focused on the use of alternative substances for opioid withdrawal and found that cannabis was frequently discussed as a tool for symptom management within recovery subreddits [39]. Exploration of discussions surrounding kratom, tianeptine, and cannabis for pain or withdrawal management, especially when framed as an alternative to opioid use, should be a focus of any inquiry into online communities. Additionally, medications such as buprenorphine, which are commonly prescribed and have been proven to be an effective treatment for opioid use disorder, often generate concern in the Reddit community. An analysis of Reddit discourses shows that there is a distrust of buprenorphine providers and pharmaceutical companies, as well as a desire to be completely substance-free [40]. Therefore, it is valuable to focus on these treatment discourses, particularly those focusing on alternative pain and withdrawal management strategies, that take place in digital spaces. Moreover, the present study adopts a qualitative analysis to examine what has been discussed as alternative strategies and the discrepancies between online discourse and current scientific evidence regarding opioid alternatives.

RQ3: What are other alternative strategies, instead of opioid use, being discussed to treat chronic/acute pain and manage opioid withdrawal?

When talking about opioid use, the topic of street drugs or illicit use of opioids often arises. Costello et al. [41] note that common reasons for disclosing use are to give advice, receive advice, and to provide background information regarding behaviors surrounding illicit drug use. However, interactions between posters, lurkers, and repliers in online communities can reinforce some norms about using illicit medication for pain management, amplifying dangerous misinformation. Existing research indicates that college students tend to overestimate the prevalence of illicit drug use among their peers, and such misperceptions of peer behavior are linked to normative misunderstandings that may encourage imitation [42,43]. The perceived norms about drug use, which may be distorted, also predict subsequent substance use behaviors and amplify the norms [42]. Therefore, our study aims to investigate the nuanced patterns surrounding discussion about illicit opioid use, which may range from giving and receiving advice to less normatively desirable exchanges concerning drug use.

RQ4: What other illicit medications are being discussed in relation to opioid use and pain management, and how are other illicit drugs discussed in the online community?

As noted above, misperceptions are also likely to surface in online opioid discourse. For example, misperceptions about medication-assisted treatment for opioid use disorder (MOUD) prevail on Reddit. A common theme is that MOUD is using one drug to replace the other [44]. Other misconceptions include statements about risk susceptibility, medication addictiveness, and preexisting conditions [45]. Discredited claims can deter patients from

seeking appropriate treatment and lead to deterioration in their conditions. Another misconception is the stigmatization of opioid use when it is working effectively as a pain management strategy. Many clinicians express concern about patients seeking medication for use beyond pain relief, which can lead to physicians under-prescribing or discontinuing an opioid prescription. For example, stigma by health professionals toward patients requesting opioids has led to strained patient–provider relationships, shorter visits, and unsatisfying clinical encounters [46]. Understanding the types of misinformation circulating online can give health professionals clues about appropriate information corrections.

RQ5: What kinds of inaccurate, contested, or potentially unsafe treatment advice emerge in these discussions, and how are those claims framed?

We define critical information needs in this study as urgent, actionable, and consequential health-information needs that emerge when individuals must make treatment-related decisions under conditions of stigma, uncertainty, or institutional distrust. We conceptualize Reddit as an affordance-rich environment in which anonymity, persistence, and peer interaction make such needs more readily articulable. In this framework, RQ1 maps the agenda of expressed needs, while RQ2–RQ5 examine how those needs are narrated, negotiated, and sometimes addressed through advice about treatment, withdrawal, and harm reduction.

2. Materials and Methods

2.1. Data Collection

Data were collected from Pushshift, a historical Reddit archive linked to Reddit’s native API, via Academic Torrents in 2023. Pushshift has been widely used in social media research since 2015 [47]. We retrieved messages (posts and comments) containing eight seed terms—opiate, opioid, painkiller, pain medication, pain reliever, pain relief, pain manage, and pain management—together with available metadata: username, subreddit, number of comments per post, post score, URL, link ID, and timestamp. To focus on discussions relevant to pain management and opioid use, we first selected posts with more than 30 comments. Using the all-MiniLM-L6-v2 embedding model [48], we computed the semantic similarity between each post and eight reference sentences, retaining posts whose maximum similarity to any of the eight reference sentences was at least 0.60. We selected the 0.60 threshold mainly because studies find it captures broad topical relevance while not requiring strict semantic equivalence [49]. Specifically, empirical research shows that applying a 0.6 similarity threshold efficiently strips away duplicate text data without the risk of accidentally discarding useful, unique content [49]. The eight reference sentences are presented in Appendix A. All duplicate posts were removed.

2.2. Analytical Strategies

The study combines computational and qualitative methods to identify topical patterns and interpret their meanings. Automated text mining maps themes across a large corpus, while qualitative analysis provides “thick description” for contextual interpretation of those patterns [50]. Combining these lenses serves as a form of triangulation that can strengthen the robustness of the findings and surface latent meanings in linguistic patterns [51]. Following computational grounded theory, we use inductive computational exploration to map the landscape of the content and then refine its interpretive meaning through qualitative close reading [52].

Specifically, we represented each retained post using Sentence-BERT sentence embeddings and applied K-means clustering to identify semantically similar topical groupings. SBERT was used because dense sentence embeddings can capture contextual similarity beyond exact keyword overlap, including paraphrase and synonymy [53]. We then used

K-means to partition posts into subthemes (“topical trends”). Because K-means assigns every post to a cluster, the resulting groups should be interpreted as analytic partitions of the retained corpus rather than as an automatic distinction between signal and noise. To determine the optimal number of clusters (K), we evaluated K values from 10 to 20 using Euclidean distances between clusters, with larger distances indicating better separation. Because K = 11 yielded the highest distance, we used an 11-cluster solution for the next phase of analysis. A clinical domain expert then reviewed the 11 clusters and interpreted the subthemes through a medical lens. Namely, the expert evaluated the clusters for conceptual redundancy, merging those that encompassed the same underlying clinical construct (e.g., “treatment for opioid use disorders” and “medication for opioid withdrawal”) into a unified category. Conceptually similar subthemes were subsequently merged, producing the final eight-cluster model used to answer RQ1.

To answer RQ2–RQ5, two co-authors randomly selected 400 posts (11.7% of the retained corpus) for close qualitative reading. The sample accounted for more than 10% of the corpus and was intended to support thematic saturation [54]. The two coders independently reviewed the sampled posts and extracted content relevant to the eight finalized themes. Common patterns in their notes were then synthesized into the interpretive conclusions reported below. Figure 1 summarizes the integrated computational–qualitative workflow.

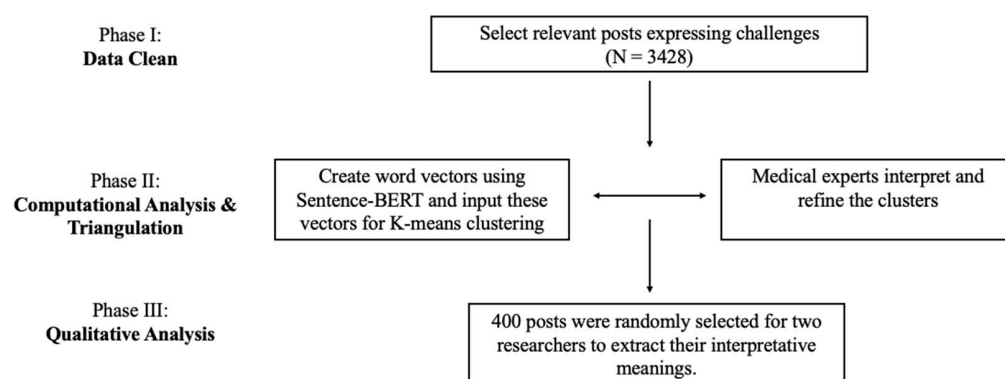


Figure 1. Overview of analytical workflow.

3. Results

3.1. RQ1

Table 1 presents the triangulation results of computational mining and medical experts’ evaluation. As shown in the table, the most frequently discussed topic is seeking alternatives to opioids for pain relief, accounting for 28.00% of the total discussion volume. The following two most discussed topics are general medication for treating chronic pain (19.84%) and kratom use experiences (14.64%), indicating information needs related to pain treatment. Notably, discourse on the healthcare system’s role in the abrupt discontinuation of opioid medications accounts for roughly 10.15% of the conversation, making it the fourth most prominent topic. Another non-medication-related topic is the struggles, family disputes, and challenges of relationship management when coping with pain and opioid use (8.63%).

Table 1. Topics and descriptions from computational analysis and medical experts' curation.

Topic	Description	Topic Proportion
The role of the healthcare system in the abrupt discontinuation of opioid medications	Messages discuss the unintended consequences due to the rapid reduction in opioid prescriptions that relate to patients' inadequate help tapering off opioid medication, access to adequate pain management, or coping with lingering pain.	10.15%
Legal medication for treating opioid dependence	Messages discuss the FDA-approved medications for opioid dependency, opioid addiction, or opioid use disorders, such as methadone, buprenorphine, and extended-release naltrexone.	3.97%
Illegal medication for treating opioid dependence	Messages discuss misusing the medication or are intended to resume illicit opioid use.	5.95%
Medication for treating chronic pain	Messages discuss using medications, including opioids and other substances, for pain management.	19.84%
Kratom and substance use experiences	Messages discussing individuals' experiences mostly with kratom, opioids, and other substances for pain management and addiction recovery.	14.64%
Cannabis for pain management and mental health	Messages explore cannabis use for chronic pain relief, anxiety, and conditions like autism and ADHD. Mentions of CBD, THC, and Delta-9 THC are included.	8.81%
Exploring pain-relief alternatives and strategies	Messages reveal individuals seeking effective pain-relief alternatives such as herbal supplements, dietary adjustments, acupuncture, and massage. Messages emphasize a preference for natural, non-pharmaceutical options to avoid addiction and side effects.	28.00%
Struggles and resilience in health and relationships	Messages discuss individuals battling immense personal challenges, from struggling with healthcare system failures and substance use, to coping with mental health issues and allegations in family disputes.	8.63%

Data Source: Retrieved Reddit data through Pushshift (<https://pushshift.io/signup>) and accessed by 8 April 2023; Data curation: Fan (Ellie) Yang, Kylee Kohlhoff, and Randy Brown.

3.2. RQ2

Our analysis indicates that a common concern is the accessibility of medication, along with fear and uncertainty surrounding opioid use. Several posts highlight concerns of addiction, stereotypes associated with opioid use, and negative labeling, such as being perceived as a “junkie” or “addict.” Specifically, there are four primary types of concerns. To protect user anonymity, all illustrative excerpts below are analytic syntheses rather than verbatim quotations. These paraphrased exemplars preserve the meaning and discursive function of the original posts but should not be read as exact reproductions.

Concerns of Addiction

There are several posts focusing on addiction as a key concern related to opioid use. One poster writes about how they have experienced pain for several years, tried a variety of pain-relief medications, and were not aware of Suboxone or buprenorphine prior to taking it, and are afraid of taking it after reading more about it, highlighting fear surrounding the use of opioid-related medications. Another member mentions the openness to any (drug) option and only worries about the addiction by-effect. These examples demonstrate how users seek community advice on managing the aftereffects of illicit substance use (i.e., stimulants) while also expressing concerns about addiction to other drugs.

Concerns of Stigmatization from Physicians and Social Groups

Redditors also express concern about negative stereotyping from physicians and social groups, with numerous posts highlighting stigmatization and the perceptions of opioid use in the U.S. One member describes how those facing addiction are often treated as inferior, especially once they enter treatment, then asks why they should be treated this way. The poster attributes the unfair treatment to stigmas about methadone. Another post pushes back against the idea that addiction is a moral shortcoming, arguing that addicts do not deserve what they experience simply because they are addicts, reflecting broader societal attitudes that associate addiction with negative perceptions. Many posts indicate a general hesitancy in seeking physicians' expertise due to views/bias, addiction history, and fear of having medications withheld.

Concerns of Withdrawal and Relapse Risks of Addictive Substances

Withdrawal is another concern frequently described by users, particularly regarding the uncertainties about symptoms and the challenges of abstaining from opioid use. Users who are first prescribed opioids, unable to get opioids, or on MOUD express concerns about negative withdrawal symptoms. One user asks about the withdrawal effects from Suboxone, showing the longing when facing this problem and seeking advice from others. Posting in this space allows other users, who understand the original poster's situation, to offer empathy and support to those feeling isolated or overwhelmed.

Concerns of Legality and Geospatial Barriers

Several countries have legal restrictions that limit access to opioid medications, creating barriers for individuals using them for pain control. Users express concerns with laws in countries that may have these restrictions in place, with one poster stating the difference in regulation for prescription in Thailand and asking about the way to access the medication when traveling between countries.

3.3. RQ3

Our analysis reveals that kratom, cannabis, herb supplements, and other non-opioid medicines are discussed as alternatives to opioids. One post inquires about the differences between kratom and opioids. The poster considers trying kratom but worries about its addictive effect, like other opioids. Providing accurate information to such queries is critical, as clinical evidence contradicts claims of kratom's non-addictive nature [55]. Habitual kratom use results in physical dependence, severe withdrawal syndrome (kratom use disorder), and significant toxicity risks compounded by unstandardized dosing and contamination with heavy metals [55]. It is very likely that scientifically accurate information is absent from these discussion threads, given the prevailing online narrative that kratom, as a natural botanical, is inherently safer than pharmaceutical interventions and devoid of addictive properties [56].

Redditors also seek information about which medications are most effective, such as methadone versus Suboxone or cannabis versus kratom. For example, one poster asks about whether to use methadone or Suboxone when recovering from an injury. Something else to note is that many users already use one (or more) of these alternatives. For instance, several users report regularly using cannabis alongside opioids. However, research does not support the use of cannabis as a standalone treatment for OUD and finds that opioid use remains equally prevalent on days when individuals use cannabis compared to days they do not [57]. It is therefore unclear whether these users received accurate information or were subjected to misinformation.

One specific term that is frequently mentioned in this set of posts is the term "taper," which describes the process of transitioning from frequent use to gradually cutting down on medications as a way of reducing intake without going cold turkey (while accounting for the risk of relapse).

3.4. RQ4

There were a few posts soliciting illicit medication. A handful of posts highlight opioid use as a recreational substance for “personal effects and experiences” rather than for pain management. This can indicate potential forms of drug abuse, defined by the National Institute on Drug Abuse as “taking a prescription drug to get a pleasant or euphoric feeling” especially at higher doses than prescribed [58]. One member asks about whether to take opiates with soda, which captures several layers of discourse surrounding illicit drug usage in the online environment. The user describes enjoying “rush/nodding” the most, referring to a state of semi-consciousness resulting from opiates, which itself poses risks to health and safety, highlighting the misuse of opioids.

Though a few posts implicate some Redditors’ pursuit of illicit drugs, one unique finding was the discussion surrounding fentanyl, where fentanyl is notably perceived negatively compared to other types of opioids. For example, one poster states that fentanyl is detrimental to his/her family and friends. Another user emphasizes that fentanyl is one of the strongest drugs to exist, warning that using oxy may lead to exposure to fentanyl. This finding highlights the awareness and dangers surrounding illicit drug use in the context of fentanyl (for its potency and overdose risks).

3.5. RQ5

Rather than demonstrating misinformation as a systematically verified category, the data show a substantial volume of peer-to-peer lay guidance, dosage comparison, and potentially unsafe advice-seeking about opioids and adjacent substances. Posters often seek and offer advice, asking other users for comparisons between medications (including dosages), tips for taking medication, and recommendations. Specific dosages and medications are prescribed for users based on their medical needs and conditions, which is antithetical to seeking advice or tips for opioid dosage online. While several posts acknowledged addiction and the adverse effects of opioid use, some undermine the impact that misuse of prescription opioids can have when taken incorrectly without adequate information. One post that exemplifies the importance of using opioids correctly and discloses that when taken correctly with physician-provided instructions, opioids can significantly help with chronic pain, but are not good to take recreationally without guidance.

4. Discussion

This mixed-method study maps how Reddit users discuss opioid use, pain management, and treatment uncertainty, showing that these forums surface critical information needs among people who may encounter stigma in clinical and interpersonal settings. Because Reddit combines anonymity, persistence, and visible peer interaction, it offers a useful window into concerns that may be underreported in clinics or offline networks, including addiction risk, withdrawal, medication access, and alternative pain-management strategies.

The study contributes to research on online self-disclosure and health communication by linking topic prevalence to the interpretive frames through which users describe pain, stigma, and treatment seeking. Substantively, the findings suggest that public health and clinical communication should more directly address nonaddictive pain-management options, tapering support, medication-related stigma, and the frustrations patients experience when care is interrupted or distrustful. The large volume of questions about opioids, withdrawal, and alternative strategies also highlights an opportunity for community health departments and healthcare providers to offer timely, accessible guidance through consultation, education, and harm-reduction resources. Failing to address these needs may allow

misconceptions and unsafe peer-to-peer advice to circulate more widely, influencing both posters and lurkers.

A notable finding is the centrality of the healthcare system itself in these discussions. Posters frequently describe strained clinical encounters, abrupt discontinuation of opioid medications, payment or access barriers, and perceived suspicion from clinicians. These narratives suggest that treatment communication is experienced not only as an information gap but also as a relational and institutional problem. Results from the present study point to a need for clinical programs that are better aligned with the concerns of people seeking help for chronic pain and opioid-related problems, or they will seek options outside those settings.

Taken together, analyzing Reddit posts provides healthcare providers with a look at the “hidden transcript” of chronic pain management. When patients are in the clinic, power dynamics and the fear of being labeled “drug-seeking” or non-compliant often lead patients to hide their concerns. Being able to post on Reddit anonymously can reveal what patients are reluctant to disclose during clinical encounters. For example, our study finds patients are expressing their “tapering anxiety” and seeking peer advice on how to cope with an impending cut-off. These findings indicate that providers should clearly detail the criteria and consequences of opioid dosage changes and set up a shared, expected goal for opioid treatment.

Another clinical imperative is to address the misinformation patients encounter online. Rather than adopting an authoritative stance that stifles dialogue, providers can acknowledge patients’ online information-seeking and ask questions such as, “What have you heard online about using opioids?” Such inquiry allows the provider to correct misinformation without invalidating the patient’s proactive engagement in their care management.

This study is not without limitations. The primary challenge lies in the incomplete and inconclusive nature of the data obtained from the Reddit API. Because the API only allows sampling without randomization, the posts we analyzed may not represent the full spectrum of online discourse. The demographic bias of Reddit users may also limit the generalizability of the findings. Future research can address the two limitations by integrating parallel collections from other social media platforms, such as X, Instagram, and TikTok, to verify pattern consistencies. Further research should also expand this pool of content for close examination or use a wider range of computational linguistic techniques to parse and categorize the large corpus of content. A potential avenue for future studies is the use of researcher-guided computational keyword selection and machine learning classification to enhance the accuracy and reliability of data processing [59]. By outlining a four-step protocol for keyword selection and data retrieval, the WordPPR method systematically optimizes the robustness and precision of social media data collection [59].

Another limitation involves the subjective validation of the K-means clusters. Although a clinical expert consolidated clusters sharing the same clinical construct, we did not involve a second clinician to establish inter-rater reliability. Additionally, the classification adopts mutually exclusive categories; consequently, posts encompassing multiple topics were constrained to a single label. Future research could incorporate additional analytical steps—such as prompt-driven algorithms—to better identify posts containing multiple clinical constructs. We also did not perform a reliability test for qualitative analysis, though qualitative research for reductive purposes is not strictly necessary and is inherently subjective [60].

Overall, the study shows that social media analysis can identify unmet informational and relational needs around opioid use for pain management. Combining computational clustering with qualitative interpretation provides both breadth and contextual depth. The findings can inform addiction-prevention, harm-reduction, and patient-education

strategies that offer clearer guidance on pain treatment, tapering, withdrawal, and safer alternatives. Future research can compare online discussions with clinical patient-reported outcomes. Online discussions supplement self-reported outcomes by capturing patients' lived experiences that standardized clinical investigations often miss. This integration proves particularly beneficial for health conditions where the fear of stigmatization impedes candid disclosure or where temporal constraints during medical appointments preclude a comprehensive understanding of the patient. For example, our study reveals that Reddit users expressed concerns about the abrupt discontinuation of opioid medications and seeking illegal medications, which can inform providers to discuss those issues during their clinical visit. These findings underscore the imperative for clinicians to proactively address such critical concerns during patient consultations. Ultimately, synthesizing online discussions with established clinical metrics empowers researchers to advocate for more holistic, patient-centric measurement paradigms in healthcare.

5. Conclusions

This study identifies critical information needs that surface when people discuss opioid use for chronic and acute pain in online communities. The most salient needs concern alternatives to opioids, medications for chronic pain, and experiences with kratom and other substitute substances. These needs are routinely entangled with concerns about addiction, withdrawal, stigma in clinical encounters, and abrupt discontinuation of prescribed care. Reddit's affordances of anonymity, persistence, and peer interaction make these needs visible, complementing evidence captured in clinical settings or surveys.

The findings indicate that addiction prevention, harm reduction, and patient-facing communication would benefit from materials that are accessible and non-stigmatizing, particularly around tapering, lower-risk alternatives, and the realities of medication-assisted treatment. Ongoing attention to online community discourse can help health systems and community organizations anticipate emerging concerns and respond with timely, trustworthy guidance. Just as importantly, the prominence of healthcare-system frustrations in these posts suggests that information provision alone may be insufficient.

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Informed Consent Statement: Data were collected from Pushshift, a historical Reddit archive linked to Reddit's native API, via Academic Torrents in 2023. Pushshift has been widely used in social media research since 2015. The IRB deemed our study exempt, so informed consent was not needed.

Data Availability Statement: The analytic dataset supporting the findings of this study is available from the corresponding author, Dhavan Shah, upon reasonable request, subject to privacy and platform-use considerations. To protect user privacy, verbatim participant quotations were omitted from the manuscript. The quotations presented are researcher-generated analytic syntheses designed to preserve the meanings of the original posts while reducing the risk of identifying individual users. No AI-based or large language models were used to generate the synthesized quotations.

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Abbreviations

The following abbreviations are used in this manuscript:

CINs	Critical Information Needs
SBERT	Sentence-BERT
OD	Opioid Use Disorder
MOUD	Medication-Assisted Treatment for Opioid Use Disorder

Appendix A. Eight Reference Sentences

I am looking for support to cope with life challenges and mental stress.

I need help.

I am depressed about my life and angry about what happened to me.

I am anxious.

I use opioids/alcohol/tobacco/cannabis/vaping to cope with life difficulties and mental health.

I rely on pain medicine to live through challenges.

I use medications/medical treatment/substances for pain relief and pain management.

I have problems with my relationships.

References

- Choi, B.; Wang, L.C.; Kang, R.A.; Ho, I.Y.; Johnny, S.; Chaliparambil, R.; Chen, A.T. What Should I Do?: Information and Support Needs Relating to Substance Use on Reddit. *Subst. Use Misuse* **2025**, *61*, 989–998. [\[CrossRef\]](#) [\[PubMed\]](#)
- Friedland, L.A. Taking It to the States: The Origins of Critical Information Needs. *Ann. Am. Acad. Political Soc. Sci.* **2023**, *707*, 21–28. [\[CrossRef\]](#)
- Edgerly, S.; Xu, Y. Local-Level Information-Seeking in the COVID-19 Pandemic: A Repertoire Approach. *Ann. Am. Acad. Political Soc. Sci.* **2023**, *707*, 172–188. [\[CrossRef\]](#)
- Stangl, A.L.; Earnshaw, V.A.; Logie, C.H.; van Brakel, W.; Simbayi, L.C.; Barré, I.; Dovidio, J.F. The Health Stigma and Discrimination Framework: A global, crosscutting framework to inform research, intervention development, and policy on health-related stigmas. *BMC Med.* **2019**, *17*, 31. [\[CrossRef\]](#) [\[PubMed\]](#)
- Banks, D.E.; Brown, K.; Saraiya, T.C. “Culturally Responsive” Substance Use Treatment: Contemporary Definitions and Approaches for Minoritized Racial/Ethnic Groups. *Curr. Addict. Rep.* **2023**, *10*, 422–431. [\[CrossRef\]](#) [\[PubMed\]](#)
- Kennedy-Hendricks, A.; Barry, C.L.; Gollust, S.E.; Ensminger, M.E.; Chisolm, M.S.; McGinty, E.E. Social Stigma Toward Persons with Prescription Opioid Use Disorder: Associations with Public Support for Punitive and Public Health–Oriented Policies. *Psychiatr. Serv.* **2017**, *68*, 462–469. [\[CrossRef\]](#) [\[PubMed\]](#)
- Backlinko Team. Reddit User and Growth Stats. Backlinko. Available online: <https://backlinko.com/reddit-users> (accessed on 24 April 2026).
- Almeida, A.; Patton, T.; Conway, M.; Gupta, A.; Strathdee, S.A.; Bórquez, A. The Use of Natural Language Processing Methods in Reddit to Investigate Opioid Use: Scoping Review. *JMIR Infodemiology* **2024**, *4*, e51156. [\[CrossRef\]](#) [\[PubMed\]](#)
- Dydyk, A.M.; Jain, N.K.; Gupta, M. Opioid use disorder. In *StatPearls*; StatPearls Publishing: Treasure Island, FL, USA, 2024. Available online: <https://www.ncbi.nlm.nih.gov/books/NBK553166/> (accessed on 22 April 2026).
- Ellis, M.S.; Kasper, Z.; Cicero, T. Assessment of Chronic Pain Management in the Treatment of Opioid Use Disorder: Gaps in Care and Implications for Treatment Outcomes. *J. Pain* **2021**, *22*, 432–439. [\[CrossRef\]](#) [\[PubMed\]](#)
- Judd, H.; Yaughner, A.C.; O’sHay, S.; Meier, C.L. Understanding stigma through the lived experiences of people with opioid use disorder. *Drug Alcohol Depend.* **2023**, *249*, 110873. [\[CrossRef\]](#) [\[PubMed\]](#)
- Perugino, F.; De Angelis, V.; Pompili, M.; Martelletti, P. Stigma and Chronic Pain. *Pain Ther.* **2022**, *11*, 1085–1094. [\[CrossRef\]](#) [\[PubMed\]](#)
- Vallerand, A.; Nowak, L. Chronic Opioid Therapy for Nonmalignant Pain: The Patient’s Perspective. Part I—Life Before and After Opioid Therapy. *Pain Manag. Nurs.* **2009**, *10*, 165–172. [\[CrossRef\]](#) [\[PubMed\]](#)

14. Namkoong, K.; Shah, D.V.; Gustafson, D.H. Offline Social Relationships and Online Cancer Communication: Effects of Social and Family Support on Online Social Network Building. *Health Commun.* **2016**, *32*, 1422–1429. [[CrossRef](#)] [[PubMed](#)]
15. Turner, J.W.; Grube, J.A.; Meyers, J. Developing an Optimal Match Within Online Communities: An Exploration of CMC Support Communities and Traditional Support. *J. Commun.* **2001**, *51*, 231–251. [[CrossRef](#)]
16. Gibson, J.J. *The Ecological Approach to Visual Perception*; Houghton Mifflin: Boston, MA, USA, 1979.
17. Hutchby, I. Technologies, Texts and Affordances. *Sociology* **2001**, *35*, 441–456. [[CrossRef](#)]
18. Leonardi, P.M. When Flexible Routines Meet Flexible Technologies: Affordance, Constraint, and the Imbrication of Human and Material Agencies1. *MIS Q.* **2011**, *35*, 147–167. [[CrossRef](#)]
19. Faraj, S.; Azad, B. The materiality of technology: An affordance perspective. In *Materiality and Organizing: Social Interaction in a Technological World*; Leonardi, P.M., Nardi, B., Kallinikos, J., Eds.; Oxford University Press: Oxford, UK, 2012; pp. 237–258. [[CrossRef](#)]
20. Li, M.; Suk, J.; Zhang, Y.; Pevehouse, J.C.; Sun, Y.; Kwon, H.; Lian, R.; Wang, R.; Dong, X.; Shah, D.V. Platform affordances, discursive opportunities, and social media activism: A cross-platform analysis of #MeToo on Twitter, Facebook, and Reddit, 2017–2020. *New Media Soc.* **2024**, *28*, 119–147. [[CrossRef](#)]
21. Preece, J. Sociability and usability in online communities: Determining and measuring success. *Behav. Inf. Technol.* **2001**, *20*, 347–356. [[CrossRef](#)]
22. Boyd, D. Social network sites as networked publics: Affordances, dynamics, and implications. In *A Networked Self: Identity, Community, and Culture on Social Network Sites*; Papacharissi, Z., Ed.; Routledge: New York, NY, USA, 2010; pp. 39–58. [[CrossRef](#)]
23. Papacharissi, Z. Affective publics and structures of storytelling: Sentiment, events and mediality. *Inf. Commun. Soc.* **2015**, *19*, 307–324. [[CrossRef](#)]
24. De Choudhury, M.; Counts, S.; Horvitz, E. Social media as a measurement tool of depression in populations. In Proceedings of the WebSci'13: Web Science, Paris, France, 2–4 May 2013; pp. 47–56.
25. Mi, R.Z.; Yang, E.F.; Tahk, A.; Tarfa, A.; Cotter, L.M.; Lu, L.; Yang, S.; Sr, D.H.G.; Westergaard, R.; Shah, D. mHealth Engagement for Antiretroviral Medication Adherence Among People with HIV and Substance Use Disorders: Observational Study. *J. Med. Internet Res.* **2024**, *26*, e57774. [[CrossRef](#)] [[PubMed](#)]
26. Moon, T.-J.; Chih, M.-Y.; Shah, D.V.; Yoo, W.; Gustafson, D.H. Breast Cancer Survivors' Contribution to Psychosocial Adjustment of Newly Diagnosed Breast Cancer Patients in a Computer-Mediated Social Support Group. *J. Mass Commun. Q.* **2017**, *94*, 486–514. [[CrossRef](#)] [[PubMed](#)]
27. Yoo, W.; Namkoong, K.; Choi, M.; Shah, D.V.; Tsang, S.; Hong, Y.; Aguilar, M.; Gustafson, D.H. Giving and receiving emotional support online: Communication competence as a moderator of psychosocial benefits for women with breast cancer. *Comput. Hum. Behav.* **2014**, *30*, 13–22. [[CrossRef](#)] [[PubMed](#)]
28. Vest, J.R.; Kash, B.A. Differing Strategies to Meet Information-Sharing Needs: Publicly Supported Community Health Information Exchanges Versus Health Systems' Enterprise Health Information Exchanges. *Milbank Q.* **2016**, *94*, 77–108. [[CrossRef](#)] [[PubMed](#)]
29. Liu, J.; Niederdeppe, J. Misperceptions of the Prevalence of Health Conditions and Behaviors. *J. Health Commun.* **2020**, *25*, 903–916. [[CrossRef](#)] [[PubMed](#)]
30. Scales, D.; Gorman, J.M.; DiCaprio, P.; Hurth, L.; Radhakrishnan, M.; Windham, S.; Akunne, A.; Florman, J.; Leininger, L.; Starks, T.J. Community-oriented Motivational Interviewing (MI): A novel framework extending MI to address COVID-19 vaccine misinformation in online social media platforms. *Comput. Hum. Behav.* **2022**, *141*, 107609. [[CrossRef](#)] [[PubMed](#)]
31. Young, S.D.; Lee, S.-J.; Perez, H.; Gill, N.; Gelberg, L.; Heinzerling, K. Social media as an emerging tool for reducing prescription opioid misuse risk factors. *Heliyon* **2020**, *6*, e03471. [[CrossRef](#)] [[PubMed](#)]
32. Garrett, R.; Cumberland, W.G.; Chakravarthy, B.; Springer, S.; Young, S.D. A qualitative exploration of the potential role of using online social media support communities to increase initiation of Medications for Opioid Use Disorder (MOUD). *J. Subst. Use* **2023**, *28*, 880–886. [[CrossRef](#)] [[PubMed](#)]
33. Yang, E.F.; Kornfield, R.; Liu, Y.; Chih, M.-Y.; Sarma, P.; Gustafson, D.; Curtin, J.; Shah, D. Using Machine Learning of Online Expression to Explain Recovery Trajectories: Content Analytic Approach to Studying a Substance Use Disorder Forum. *J. Med. Internet Res.* **2023**, *25*, e45589. [[CrossRef](#)] [[PubMed](#)]
34. Chung, D.S.; Kim, S. Blogging activity among cancer patients and their companions: Uses, gratifications, and predictors of outcomes. *J. Am. Soc. Inf. Sci. Technol.* **2007**, *59*, 297–306. [[CrossRef](#)]
35. Merolli, M.; Gray, K.; Martin-Sanchez, F.; Lopez-Campos, G. Patient-Reported Outcomes and Therapeutic Affordances of Social Media: Findings from a Global Online Survey of People with Chronic Pain. *J. Med. Internet Res.* **2015**, *17*, e20. [[CrossRef](#)] [[PubMed](#)]
36. Laud, T.; Kacha-Ochana, A.; Sumner, S.A.; Krishnasamy, V.; Law, R.; Schieber, L.; De Choudhury, M.; ElSherif, M. Large-Scale Analysis of Online Questions Related to Opioid Use Disorder on Reddit. *Proc. Int. AAAI Conf. Web Soc. Media* **2025**, *19*, 1068–1084. [[CrossRef](#)] [[PubMed](#)]

37. Almeida, A.; Conway, M.; Grelotti, D.J.; Gupta, A.; Frank, D.; Bórquez, A. Medication experiences in the treatment of opioid use disorders: Insights from Reddit. *Addiction* **2025**, *120*, 1610–1622. [CrossRef] [PubMed]
38. Graczyk, M.; Borkowska, A.; Krajnik, M. Why patients are afraid of opioid analgesics—Study on opioid perception in patients treated for chronic pain. *Pol. Arch. Intern. Med.* **2017**, *128*, 89–97. [CrossRef] [PubMed]
39. Meacham, M.C.; Nobles, A.L.; Tompkins, D.A.; Thrul, J. “I got a bunch of weed to help me through the withdrawals”: Naturalistic cannabis use reported in online opioid and opioid recovery community discussion forums. *PLoS ONE* **2022**, *17*, e0263583. [CrossRef] [PubMed]
40. Brown, S.-E.; Altice, F.L. Self-Management of Buprenorphine/Naloxone Among Online Discussion Board Users. *Subst. Use Misuse* **2014**, *49*, 1017–1024. [CrossRef] [PubMed]
41. Costello, K.L.; Martin, J.D.; Brinegar, A.E. Online disclosure of illicit information: Information behaviors in two drug forums. *J. Assoc. Inf. Sci. Technol.* **2017**, *68*, 2439–2448. [CrossRef]
42. McCabe, S.E. Misperceptions of non-medical prescription drug use: A web survey of college students. *Addict. Behav.* **2008**, *33*, 713–724. [CrossRef] [PubMed]
43. Perkins, H.W. Social norms and the prevention of alcohol misuse in collegiate contexts. *J. Stud. Alcohol Suppl.* **2002**, *14*, 164–172. [CrossRef] [PubMed]
44. ElSherief, M.; Sumner, S.A.; Jones, C.M.; Law, R.K.; Kacha-Ochana, A.; Shieber, L.; Cordier, L.; Holton, K.; De Choudhury, M. Characterizing and Identifying the Prevalence of Web-Based Misinformation Relating to Medication for Opioid Use Disorder: Machine Learning Approach. *J. Med. Internet Res.* **2021**, *23*, e30753. [CrossRef] [PubMed]
45. ElSherief, M.; Sumner, S.; Krishnasamy, V.; Jones, C.; Law, R.; Kacha-Ochana, A.; Schieber, L.; De Choudhury, M. Identification of Myths and Misinformation About Treatment for Opioid Use Disorder on Social Media: Infodemiology Study. *JMIR Form. Res.* **2024**, *8*, e44726. [CrossRef] [PubMed]
46. Garrett, R.; Young, S.D. The Role of Misinformation and Stigma in Opioid Use Disorder Treatment Uptake. *Subst. Use Misuse* **2022**, *57*, 1332–1336. [CrossRef] [PubMed]
47. Baumgartner, J.; Zannettou, S.; Keegan, B.; Squire, M.; Blackburn, J. The Pushshift Reddit Dataset. *Proc. Int. AAAI Conf. Web Soc. Media* **2020**, *14*, 830–839. [CrossRef]
48. Yin, C.; Zhang, Z. A Study of Sentence Similarity Based on the All-minilm-l6-v2 Model with “Same Semantics, Different Structure” After Fine Tuning. In Proceedings of the 2024 2nd International Conference on Image, Algorithms and Artificial Intelligence, Singapore, 9–11 August 2024; pp. 677–684.
49. Lozano, D.M.; Dementieva, D.; Fraser, A. Explainable Semantic Textual Similarity via Dissimilar Span Detection. In Proceedings of the Fifteenth Language Resources and Evaluation Conference (LREC 2026), Palma, Spain, 13–15 May 2026; pp. 2190–2210.
50. Humphreys, L.; Lewis, N.A., Jr.; Sender, K.; Won, A.S. Integrating Qualitative Methods and Open Science: Five Principles for More Trustworthy Research*. *J. Commun.* **2021**, *71*, 855–874. [CrossRef]
51. Wiedemann, G. Opening up to big data: Computer-assisted analysis of textual data in social sciences. *Hist. Soc. Res.* **2013**, *38*, 332–358. [CrossRef]
52. Nelson, L.K. Computational Grounded Theory: A Methodological Framework. *Sociol. Methods Res.* **2017**, *49*, 3–42. [CrossRef]
53. Ortakci, Y.; Borhan, B. Optimizing SBERT for long text clustering: Two novel approaches with empirical insights. *J. Supercomput.* **2025**, *81*, 950. [CrossRef]
54. Lacy, S.; Riffe, D.; Stoddard, S.; Martin, H.; Chang, K.-K. Sample Size for Newspaper Content Analysis in Multi-Year Studies. *J. Mass Commun. Q.* **2001**, *78*, 836–845. [CrossRef]
55. Eastlack, S.C.; Cornett, E.M.; Kaye, A.D. Kratom—Pharmacology, Clinical Implications, and Outlook: A Comprehensive Review. *Pain Ther.* **2020**, *9*, 55–69. [CrossRef] [PubMed]
56. Gomez, S. Kratom: Helpful Herb or Toxic Substance? Addiction Center. Available online: <https://www.addictioncenter.com/community/kratom-helpful-herb-toxic-substance/> (accessed on 24 April 2026).
57. Gorfinkel, L.R.; Stohl, M.; Greenstein, E.; Aharonovich, E.; Olfson, M.; Hasin, D. Is Cannabis being used as a substitute for non-medical opioids by adults with problem substance use in the United States? A within-person analysis. *Addiction* **2020**, *116*, 1113–1121. [CrossRef] [PubMed]
58. National Institute on Drug Abuse. *Misuse of Prescription Drugs Research Report*; NIDA: North Bethesda, MD, USA, 2020. Available online: <https://nida.nih.gov/publications/research-reports/misuse-prescription-drugs/overview> (accessed on 22 April 2026).
59. Zhang, Y.; Chen, F.; Suk, J.; Yue, Z. WordPPR: A Researcher-Driven Computational Keyword Selection Method for Text Data Retrieval from Digital Media. *Commun. Methods Meas.* **2023**, *18*, 332–348. [CrossRef]
60. Miles, M.B.; Huberman, A.M.; Saldaña, J. *Qualitative Data Analysis*; SAGE Publications: Thousand Oaks, CA, USA, 2014.

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