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Substance Use Trends in Rave Culture:
A Natural Language Processing and Thematic Analysis of Reddit Discussions

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Abstract

Background:

Substance use within nightlife environments such as raves, music festivals, and EDM events presents a growing public health concern. These settings often normalize the use of psychoactive substances, particularly MDMA, LSD, and ketamine, integrating drug use into the cultural experience. For many, especially LGBTQ+ individuals and racial minority youth, rave spaces serve as sites of community and liberation. However, associated risks include emotional distress, physical harm, and long-term neurological effects. Traditional surveillance systems often overlook these contexts, calling for alternative, community-informed approaches to substance use monitoring and harm reduction.

Methods:

This study used a mixed-methods approach to analyze narratives from the r/aves subreddit, a digital community with over 498,000 members. The quantitative analysis applied natural language processing (NLP) techniques, including tokenization, frequency distribution, and TF-IDF, to identify common substances and temporal trends. A domain-specific dictionary was developed to capture slang and abbreviations. Posts were selected using keyword filtering and manual review. The qualitative component involved thematic analysis of fifty posts explicitly referencing MDMA use and post-rave experiences, focusing on emotional tone, physical symptoms, harm reduction strategies, and psychological reflections.

Results:

MDMA was the most frequently mentioned substance, with post-volume peaking from May to August, likely aligning with festival season and academic breaks. LSD, ketamine, and cocaine also appeared but less frequently. High co-occurrence of harm reduction terms such as “hydration,” “test kit,” and “5-HTP” reflected community awareness. Qualitative findings revealed consistent descriptions of sadness, anxiety, mental fog, and social withdrawal following MDMA use, commonly referred to as “Tuesday Blues.” Coping strategies included nutrition, sleep, exercise, and peer advice, but few posts mentioned formal mental health services. Some users described adverse reactions and concerns about substance adulteration, emphasizing the need for accessible drug-checking and broader education.

Conclusion:

Reddit provides real-time insight into the lived experiences of substance use in rave culture. These findings highlight the importance of culturally grounded, peer-informed public health strategies. Incorporating these perspectives into outreach and education may improve harm reduction efforts and support for underserved populations often excluded from traditional prevention systems.

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Chapter 1: Introduction

The World Health Organization reported that 35 million people suffer from substance use disorders. This figure includes the use of illicit substances, which are estimated to cause approximately 0.5 million deaths annually (WHO, 2019). In the United States, substance use remains a pressing public health concern, particularly among adolescents and young adults. National estimates suggest that one in four high school students report recent use of at least one substance, with polysubstance use becoming increasingly common (Volkow et al., 2021)

While alcohol and cannabis remain the most frequently used substances, the nonmedical use of prescription drugs, hallucinogens, and synthetic drugs is also on the rise (Yang et al., 2023). These trends highlight the shifting landscape of substance use among youth, underscoring the need for continuous surveillance and prevention efforts. Recreational use among young people often begins in social or nightlife settings, where the social context may downplay or normalize risky behavior, obscuring the severity of health implications (Feltmann et al., 2021).

While overdose death rates have recently declined for people ages 15-34, substance use continues to rise and has brought significant public health consequences (Spencer et al., 2024). Even among individuals who do not meet the criteria for substance use disorders, recreational use is linked to numerous adverse outcomes, including increased rates of infectious disease, mental health challenges, and mortality (Feltmann et al., 2021). Injuries and poisoning are two of the leading causes of substance-related death, placing a substantial burden on emergency departments and the broader healthcare system. For example, emergency room visits due to substance use rose by 45%, from 2.93% of total visits in 2013 to 4.25% in 2018. These statistics are driven mainly by stimulant, sedative, and hallucinogen use (Beckerleg & Hudgins, 2022).

Of particular concern is the nonmedical use of prescription medications, which remains prevalent among adolescents and young adults in the U.S. According to recent national surveillance, roughly 1 in 10 adolescents have reported misusing prescription drugs, including opioids, stimulants, and tranquilizers (Volkow et al., 2021). This misuse often occurs in social contexts and is frequently driven by curiosity, academic pressure, or the desire for altered states of consciousness (Yang et al., 2023). The risk for drug dependency is elevated through repeated misuse, particularly as social environments may normalize or reinforce such behaviors (Perkins & Berkowitz, 1986). Mixing different substances or encountering adulterated drugs further raises the likelihood of overdose, contributing to severe health consequences beyond immediate fatality (CDC, 2024).

There is emerging public health discourse on the role of the entertainment industry, including raves, dance festivals, and nightclubs, as a context where substance use is prevalent. Social norms within these environments often encourage drug use and sexual experimentation, which contributes to the normalization of polydrug use among rave attendees (Hunt et al., 2010). Since the 1990s, psychoactive substances such as ecstasy (MDMA), methamphetamine, ketamine, and LSD have maintained strong associations with rave and dance culture in the United States and globally. The use of MDMA and other club drugs in these settings rose sharply beginning in 1998 (Hunt et al., 2009). Although the underground rave movement in the United States peaked in the early 2000s, the electronic dance music (EDM) scene has expanded into a global mainstream industry valued at approximately 7.2 billion dollars (Watson, 2019). EDM festivals now serve as commercial successors to early rave events. Corporations frequently sponsor these festivals, local authorities regulate them, and public or government-owned venues host them. These events draw large crowds and often coincide with high rates of synthetic drug use, drug-related injuries, and recurring incidents of overdose and death

(Palamar & Keyes, 2020).

Rave culture originated in England in the late 1980s (Nast, 2023). The word "rave" describes certain styles of parties that are associated with electronic music. It became further defined by its underground spirit, communal energy, and endurance-based events held in repurposed spaces such as warehouses, skate parks, or a farmyard. Raves have a history of being legally restricted due to licensing rule violations, primarily due to the use of illegal substances. This history reflects a culture rooted in rebellion, where participants temporarily inhabit an alternate reality with relaxed social norms and a sense of temporal disconnection. It often requires endurance as it continues through the night into the morning as if time does not exist. Based on this free-spirited origin of the rave culture, it further developed in the United States (Nast, 2023).

As it spread to the United States, it merged with American musical innovations deeply rooted in Black communities. It evolved with the invention of techno music in Detroit and house music from Chicago that involves DJs (Nast, 2023). Techno was invented by a group of Black artists in the 1980s and rapidly globalized. These subcultures emphasized altered states of consciousness, futuristic soundscapes, freedom of expression, and social mixing. Over time, raves evolved into spaces of belonging and resistance, particularly for racial and sexual minorities (Mereish, E. H. (2019). The scene became especially meaningful to many Asian American youths who struggle as model minorities and are often neglected in cultural contexts. They embraced rave culture as both a form of self-expression and a subcultural identity as well (Hunt et al., 2010).

Common substances in rave settings include MDMA, methamphetamine, and LSD (Gahlinger, 2004). Each of these drugs produces distinct psychoactive effects. MDMA, a stimulant and psychedelic hybrid, elevates energy and tactile sensitivity while enhancing

feelings of euphoria, emotional closeness, and sexuality. It primarily acts on brain cells to increase serotonin levels. MDMA is most often consumed in tablet form, typically containing 50 to 150 milligrams, though it may also be crushed and snorted (Drug Enforcement Administration, 2020). As a well-known party drug, it is frequently used in combination with alcohol, marijuana, and LSD. Street formulations, however, often lack purity and may contain substances such as methamphetamine, ketamine, or cocaine (Sevigny et al., 2024). Methamphetamine acts as a powerful stimulant, increasing physical activity and inducing euphoria (Yasaei & Saadabadi, 2023). LSD produces perceptual distortions and hallucinations (Mount Sinai, 2024). These substances are often combined either purposefully to intensify effects or unintentionally due to unregulated drug markets (Sevigny et al., 2024). The resulting combinations can produce unpredictable physiological outcomes and significantly elevate health risks (Akbar et al., 2011). Evolving drug compositions and emerging patterns of use highlight the urgent need for improved surveillance efforts.

Popular media frequently reflects and reinforces these substance use patterns. The HBO series *Euphoria*, identified as the most tweeted television show of the decade with over 34 million tweets in the United States, illustrates adolescent substance use, mental health challenges, and nightlife culture (Gierzynski et al., 2024). Many viewers report that the series makes them feel represented, demonstrating its cultural relevance and emotional resonance. Despite this, the show's portrayal of substance use risks glamorization, often lacking a corresponding public health framework that adequately conveys associated harms (Gierzynski et al., 2024).

Raves operate simultaneously as spaces of refuge and sites of vulnerability, particularly for marginalized communities. Queer, transgender, and racial minority youth, including Black and Asian American individuals, frequently participate in rave culture to escape broader social

exclusion and discrimination (Halkitis & Palamar, 2008). These events provide a sense of belonging and expression, yet they also expose participants to elevated risks of substance misuse (Hunt et al., 2009). Culturally competent harm reduction resources remain limited for these groups, exacerbating health inequities. Research on substance use among Asian American populations remains particularly sparse, often overlooked due to pervasive racial stereotypes and systemic neglect (Hunt et al., 2010). Addressing substance use within rave environments presents a critical opportunity to reduce disparities and enhance harm reduction efforts for underserved populations.

The intersection of rave culture, substance use, and marginalized identities represents a critical yet understudied area of public health. As recreational drug trends continue to evolve within nightlife environments, the demand for real-time, culturally responsive surveillance and harm reduction strategies becomes increasingly urgent. Online forums and social media platforms now serve as dynamic spaces where rave participants exchange information, recount personal experiences, and circulate harm reduction advice. These digital environments offer valuable opportunities for public health monitoring and early intervention (Sarker et al., 2019). This thesis addresses this gap by analyzing Reddit discussions through natural language processing and qualitative thematic analysis. Reddit, a platform composed of user-generated forums called subreddits, enables anonymous, candid discussions on sensitive topics and facilitates conversations on sensitive topics such as drug use, mental health, and nightlife culture. This openness supports the emergence of unfiltered, community-driven insights (Sarker et al., 2019).

This thesis is guided by the following central research question: *What are the current trends in substance use within rave settings, and how can platforms like Reddit inform real-time surveillance, mental health support, and harm reduction strategies?* This study focuses

on four main objectives to address the research question: identifying the most frequently discussed substances within the online rave community; understanding the lived experiences of populations that use recreational substances as shared in online discussions; examining the emotional and physical impacts of substance use following rave events; and evaluating the potential of natural language processing (NLP) and Reddit data to inform harm reduction strategies.

The structure of this thesis is as follows. Chapter 1 provides an overview of substance use trends and explores their intersections with cultural identity and public health. Chapter 2 offers a review of the existing literature, focusing on harm reduction approaches, the evolution of rave subcultures, and the emerging role of social media platforms in substance use surveillance. Chapter 3 outlines the study's methodology, including data collection from Reddit, NLP techniques, and qualitative thematic analysis. Chapter 4 presents the study's findings, including both quantitative and qualitative insights. Finally, Chapter 5 discusses the implications of these results for harm reduction, identifies key limitations, and provides recommendations for future public health research and practice.

Chapter 2: Literature Review

Epidemiology of substance use

Substance use is deeply intertwined with social and cultural environments, particularly in nightlife and music-centered settings like raves, festivals, and clubs. This section reviews how these contexts normalize drug use and outlines the demographic groups most vulnerable to its consequences. In these spaces, substance use is often normalized or even expected, forming a core part of the experience. The music, lighting, communal energy, and atmosphere of escape often facilitate experimentation with psychoactive substances such as MDMA, LSD, and ketamine, which are commonly used to enhance sensory perceptions and maintain energy throughout long events (Hunt et al., 2009).

Young adults, especially those between the ages of 18 and 25, are among the most vulnerable populations in these settings. Developmentally, this group is more likely to engage in risk-taking behavior and be influenced by peer norms (McCabe et al., 2022). Additionally, individuals from marginalized communities, including LGBTQ+ youth and racial minorities, may find affirmation, identity, or escape within rave culture, further increasing their exposure to environments where substance use is prevalent (Halkitis & Palamar, 2008). As introduced in Chapter 1, these communities are particularly vulnerable. Prior studies suggest that these intersecting vulnerabilities heighten the risk of overdose, psychological distress, and long-term dependence (Halkitis & Palamar, 2008).

Despite the high-risk nature of these environments, access to harm reduction strategies remains limited. While some festivals and nightlife venues have implemented onsite drug testing, hydration stations, or educational outreach, these efforts are inconsistent and often underfunded (Akbar et al., 2011). Many young people rely on peer-led or informal sources for

safety information, such as online forums, which may perpetuate misinformation. The absence of structured harm reduction in these settings continues to place vulnerable individuals at greater risk (Feltmann et al., 2021).

Social Norms Theory and Substance Use Behavior

Social Norms Theory explains that individuals shape their behavior based on their perceptions of what their peer group considers typical, acceptable, or encouraged (Perkins & Berkowitz, 1986). These perceptions can focus on behavioral norms, such as what others do; attitudinal norms, such as what others approve of; or social approval, such as what authority figures tolerate. Within rave environments, participants often use substances like MDMA to signal belonging, participation, and immersion. The widespread perception that "everyone is doing it" creates internal pressure to conform rather than reflect observation.

Young adults respond especially strongly to these dynamics because they continue to develop cognitive functions related to risk evaluation, impulse control, and identity (Perkins & Berkowitz, 1986). Many overestimate the prevalence of substance use, which contributes to increased personal use. In environments where MDMA appears common, participants internalize the behavior as standard. This normalization transforms perception into practice, encouraging individuals to engage in behavior they believe to be socially expected. On online spaces such as Reddit, users describe drug use as a core part of their event experience rather than an outlier. This normalization informs expectations and strengthens the shared cultural identity that surrounds rave participation. These perceptions can significantly influence behavior, especially in social environments like raves, where identity, freedom, and community are central to the experience.

This theory framed the focus of this study on perceived peer norms and their influence

on substance use behavior, which guided both the research question and thematic analysis. Based on this theory, the analysis paid close attention to how users described drug use in Reddit posts as normalized or expected at raves and how they navigated peer pressure, group behavior, or acceptance within the community. This helped the research identify not only the substances discussed but also the social dynamics that perpetuate their use and how those relate to both risk and harm reduction practices.

Harm Reduction in Nightlife and Festival Environments

Public health organizations and grassroots groups have developed harm reduction strategies for nightlife settings. These include drug-checking tents, educational booths, peer support teams, and rest areas where participants can hydrate and recover. Organizations such as DanceSafe and The Loop have provided these services at festivals and events across the United States and the United Kingdom. These interventions can significantly reduce risks when implemented consistently and with adequate resources (Perkins & Berkowitz, 1986).

However, most festivals lack comprehensive harm-reduction services. Many event organizers do not provide these resources due to limited funding, legal liability concerns, or reputational fears. This reluctance prevents meaningful partnerships between public health professionals and event planners. Without access to consistent support, participants must manage risks on their own (Palamar & Keyes, 2020).

Traditional drug prevention campaigns also fail to connect with people in these settings. Many rely on abstinence-based messaging or adopt tones that feel judgmental or disconnected from participants' lived experiences. As a result, people often dismiss these efforts as irrelevant. This communication gap fosters mistrust and pushes festival attendants to seek advice from informal sources, particularly online platforms. Although peer-to-peer information can help fill

knowledge gaps, it also spreads inaccuracies and unverified practices when it lacks grounding in evidence-based harm reduction (Palamar & Keyes, 2020).

Drug Misrepresentation and MDMA Trends

MDMA remains a prominent substance in rave culture due to its ability to enhance empathy, emotional closeness, and energy. However, misrepresentation in the unregulated drug market presents an escalating public health concern. Between 1997 and 2023, researchers found that many tablets sold as MDMA actually contained methamphetamine, synthetic cathinone, or other potent stimulants. These substitutions often produce unexpected and more dangerous physiological responses, including cardiac strain, hyperthermia, and long-term neurotoxicity (Sevigny et al., 2024).

Understanding how MDMA and methamphetamine affect the brain helps clarify the risks posed by such misrepresentation. MDMA primarily increases serotonin release, resulting in heightened emotional connection, sensory pleasure, and euphoria (Drug Enforcement Administration, 2020). Methamphetamine, by contrast, triggers an intense release of dopamine, which produces extreme stimulation, impulsivity, and a significantly higher risk of addiction and psychosis (Yasaei & Saadabadi, 2023). Although the two substances may induce similar euphoric effects in the short term, their mechanisms and long-term consequences differ substantially. Users who believe they are consuming MDMA may unknowingly experience methamphetamine's more neurotoxic and addictive properties, increasing their vulnerability to harm (Sevigny et al., 2024).

Most users cannot accurately determine the contents of what they consume. In the absence of accessible and reliable drug-checking tools, individuals often depend on pill appearance, brand names, or word-of-mouth reports. These strategies provide limited and

unreliable information. The inability to verify a substance's composition elevates the risk of overdose, mainly when users mix substances without awareness of potential interactions (Sevigny et al., 2024).

Users frequently describe these uncertain and harmful experiences on platforms such as Reddit. Posts detail adverse effects, emotional crashes, and symptoms more consistent with methamphetamine than MDMA. These accounts serve as informal warnings that help identify emerging risks in real-time (Yang et al., 2023). Public health professionals can monitor such discussions to detect shifts in substance trends and tailor harm reduction messaging accordingly, allowing for earlier interventions before more severe health outcomes arise.

Previous Intervention Measures and the Emergence of Digital Data Sources

Harm reduction efforts in nightlife and festival environments have included a variety of interventions aimed at minimizing the health risks associated with recreational substance use. Onsite drug testing services have enabled attendees to verify the contents of their substances, reducing the likelihood of consuming unknown or dangerous adulterants (Palamar & Keyes, 2020). Hydration stations and designated rest areas have provided support for individuals at risk of heatstroke, dehydration, or physical exhaustion during prolonged exposure to intense stimuli and crowded conditions.

Educational campaigns have attempted to inform young adults about the potential risks of drug use and encourage safer decision-making. These efforts have employed public service announcements, peer education, and social marketing techniques to improve knowledge and promote behavior change. At the policy level, some governments and municipalities have introduced stricter regulations for nightlife venues, including enhanced

security protocols and increased law enforcement presence. However, these top-down strategies have produced inconsistent outcomes. In some cases, heavy policing has led to the displacement of events into more clandestine spaces, further complicating harm reduction efforts (Palamar & Keyes, 2020).

A significant barrier to the effectiveness of traditional public health interventions lies in the foundational values of rave culture. Many participants view these spaces as expressions of freedom, community, and resistance to institutional control (Palamar & Keyes, 2020). The underground origins of rave culture, with its emphasis on autonomy and resistance to authority, often hinder the effectiveness of structured public health messaging. Attempts to impose formal interventions without acknowledging these cultural dynamics face resistance or disengagement. These challenges highlight the need for alternative, culturally sensitive approaches that involve the community and respect the social significance of these environments.

Digital platforms have emerged as a promising alternative for monitoring and responding to substance use trends. Reddit, in particular, has gained importance as a tool for real-time public health surveillance. The platform's forum-based design allows users to share personal stories, seek harm reduction advice, and discuss emerging drug trends with relative anonymity (Graves et al., 2022). According to data from Statista, user engagement on Reddit rose from 1.2 billion interactions in 2018 to a projected 3.49 billion by 2026. This growth reflects the platform's increasing relevance as a space for public dialogue and collective knowledge exchange (Ceci, 2024).

The surge in Reddit activity demonstrates the value of social media as a culturally embedded and rapidly evolving source of information. Unlike traditional surveillance systems, which often rely on retrospective reporting or clinical encounters, Reddit provides

access to ongoing discussions that capture lived experience and peer perspectives. This immediacy allows public health professionals to identify risks as they emerge and respond with timely, community-informed strategies. As such, Reddit not only serves as a site for ethnographic exploration but also functions as a dynamic data source capable of informing harm reduction, education, and early intervention efforts.

Digital Ethnography and Reddit as a Research Tool

Reddit functions as a decentralized digital space where users exchange information across a wide variety of topics, including drug use in nightlife settings. Subreddits such as r/aves create a peer-supported community where users post trip reports, discuss drug combinations, and offer harm reduction tips. Compared to other social media platforms, Reddit supports more extended, reflective discourse. Anonymity encourages users to share emotional struggles and physical symptoms without fear of judgment.

These posts form a valuable dataset. Users frequently discuss how they manage hydration, navigate comedowns, and plan for safe substance use. This information documents how people adapt to challenges and care for themselves and others in high-risk environments. Researchers can study these patterns to better understand real-time behaviors and needs.

Reddit provides access to candid and organic conversations. These discussions occur without influence from researchers, institutions, or moderators, offering an unfiltered view of how individuals talk about drug use and risk. The content reveals cultural values, emotional experiences, and peer-led strategies that might not surface in traditional data collection settings.

Natural language processing (NLP) allows researchers to analyze unstructured text from online platforms in large volumes. Using techniques such as tokenization, frequency analysis, and term frequency-inverse document frequency (TF-IDF), researchers can identify

which substances are most discussed, track new terminology, and analyze emotional responses (Sarker et al., 2019). These tools make it possible to recognize emerging risks before they appear in clinical data.

Ethical Considerations in Social Media Research

Using Reddit data for public health research requires careful ethical attention. Although posts are public, they often contain sensitive reflections on trauma, identity, and substance use. Users may perceive their participation as private or community-based. Researchers must protect anonymity, use data responsibly, and avoid interpretations that stigmatize or misrepresent people (Sarker et al., 2019).

This responsibility becomes more urgent when studying marginalized communities. Many LGBTQ+, and racial minority participants describe rave culture as a space where they can express themselves and experience healing. These environments provide an escape from discrimination and an opportunity to connect with others who share similar challenges. Public health interventions must preserve this function while reducing risks.

Ethical digital research involves transparency, informed data use, and efforts to involve communities in the research process. By engaging users and aligning research with their needs, scholars can ensure that findings empower communities rather than exploit them. Culturally sensitive approaches improve trust and encourage collaboration across sectors.

Research Question, Objectives, and Justification

This study investigates the following research question: *What are the current trends in substance use within rave settings, and how can platforms such as Reddit inform real-time surveillance, mental health support, and harm reduction strategies?* This question responds to growing concerns about the limitations of traditional surveillance methods and the need for

more culturally responsive approaches to understanding drug use in high-risk social environments.

Four specific objectives guide the study. The first objective identifies the substances most frequently discussed in online rave communities. The second objective explores how MDMA users describe their experiences, including motivations, effects, and patterns of use. The third objective focuses on the emotional and physical consequences that participants report following rave events. The final objective evaluates how natural language processing and Reddit-based discourse can support harm reduction and enhance early detection of substance-related risks.

These objectives address urgent public health concerns by analyzing data generated by the populations most affected. Online forums such as Reddit offer continuous access to unfiltered narratives that traditional data sources often overlook. Community-generated content provides unique insight into shifting drug trends, lived experiences, and the informal strategies that individuals use to mitigate harm. Through a mixed-methods approach that integrates computational analysis with qualitative thematic review, the study captures the complexity of substance use behavior. It identifies opportunities for public health systems to intervene more effectively and equitably.

Chapter 3: Method

This study focused on Reddit to explore substance use trends in the rave scene. This popular forum-based social media platform allows users to post content and engage in discussions, often anonymously. This structure makes Reddit a valuable space for exploring honest, unfiltered conversations about sensitive topics like drug use. The anonymity and conversational style of Reddit posts provide rare insight into the lived experiences of people involved in rave culture.

Specifically, content was collected from the subreddit r/aves, which has over 498,000 members. This highly active community frequently shares personal experiences, harm reduction advice, and reflections on mental health and substance use. According to Statista, Reddit has seen rapid growth in user engagement. This increase underscores Reddit's expanding role as a global forum for discussion, making it not only culturally relevant but also a powerful tool for real-time public health surveillance and research (Ceci, 2024).

Quantitative Analysis

Natural Language Processing: Frequency Distribution

This study used natural language processing (NLP) techniques to identify trends in substance use and risk-related discussions on Reddit. NLP refers to a computational approach that enables machines to process and analyze large volumes of human language. By converting unstructured text into structured data, NLP extracts patterns, detects themes, and supports automated classification of content. These techniques prove especially valuable for public health research, as they allow for the rapid analysis of real-time, community-generated data that traditional surveillance methods may not capture.

Data was collected from Reddit using its public Application Programming Interface

(API), ensuring compliance with the platform's terms of use and data collection guidelines. Reddit's Public Data API provides open access to publicly available content without requiring special permission. This research further focused on subreddit, a smaller community within Reddit that focuses on a specific topic to observe the discussion on rave culture closely. The main subreddit accessed with API under Reddit is 'r/aves,' where rave attendees share their experiences and information about raves. The data extracted from posts and comments related to rave culture and substance use are securely stored in a NoSQL as NoSQL is a database to manage the large and unstructured nature of the data. The data collection process focused on non-real-time content that is focused on archived posts rather than live feeds to ensure data stability and analytic depth.

The textual data underwent multiple preprocessing steps to prepare it for analysis (Sarker et al., 2019). The text was standardized by converting it to lowercase, removing stopwords, URLs, usernames, non-alphanumeric characters, and punctuations. The data-cleaning process further included spelling correction, duplicate entries, and stemming. Stemming is a process that reduces words to their root form by removing suffixes to standardize different morphological forms of the same word. This is a step that reduces words to their root forms so that variations like "dancing" and "danced" are treated the same. Non-English content was excluded from the dataset to ensure relevance to the research context. After this process, the cleaned text was broken down into individual words; in other words, it went through tokenization to facilitate subsequent analysis. A custom dictionary was developed to identify slang, street names, and abbreviations specific to rave culture and substance use, such as "Molly," "XTC," and "Tuesday Blues," to ensure domain-specific relevance (Appendix A, Figure A1). Custom dictionaries increase the accuracy of NLP by including culturally specific language. These additions improve analysis and help researchers understand the local context.

When combined with qualitative methods, NLP creates a comprehensive approach that captures both numerical trends and social meaning.

To quantify the textual content, the term frequency-inverse document frequency (TF-IDF) was employed to measure the importance of words about the dataset. TF-IDF identified and quantified prominent phrases and drug mentions across Reddit posts. This approach enabled the detection of shifts in substance use themes and terminology over time. Between January 2022 and December 2023 each post was timestamped to allow for temporal analysis. Temporal trends in substance mentions were visualized using line graphs to display changes in the frequency of specific drug-related terms and thematic keywords over time. These visualizations highlighted seasonal patterns and shifts in discussions related to substance use. Line graphs allowed for month-by-month comparisons, enabling the identification of peaks in mentions potentially corresponding with major electronic dance music events.

To ensure the validity of the results, data quality checks were conducted to remove duplicates, spam, and irrelevant content. The reliability of findings was further evaluated by comparing detected trends with known patterns in drug use and harm reduction behaviors documented in existing literature. This approach ensured that the visualized trends accurately reflected broader substance use dynamics within the online rave community. NLP helps quantify these shifts and can alert public health practitioners to changes in drug availability or perceived safety.

Qualitative Analysis

Thematic Analysis

Thematic analysis was conducted to identify dominant themes across the dataset, focusing on substance use behaviors, harm reduction strategies, and emotional and physical

consequences of drug use. The six-phase framework developed by Braun and Clarke (2006) guided this process: familiarization with data, generation of initial codes, theme searching, theme review, theme definition and naming, and report production. When annotated datasets were unavailable, manual annotation was used to extract relevant information such as drug types, reported effects, and harm reduction practices. Posts were sorted into thematic domains reflecting experiences like euphoria, anxiety, injury, recovery, and peer support.

A targeted subset of posts was selected for deeper analysis based on the prominence of MDMA-related terms, including "Molly," "MDMA," and "Ecstasy." These keywords were frequently identified in the quantitative phase. An initial set of 38 posts was filtered using these terms. The posts were exported to Excel for close reading. During the review, a recurring theme centered on "Tuesday Blues," describing the emotional and psychological crash following MDMA use (Chiah & Zhong, 2021). A secondary search focused on posts explicitly referencing this term added 12 more entries. In total, 50 posts were examined to assess MDMA-related narratives and the emotional aftermath of use.

All posts analyzed were publicly available and de-identified. Non-English content, duplicates, and irrelevant posts were excluded. A manual, close-reading method prioritized emotional tone, self-reported symptoms, harm reduction advice, and community support. No automated coding software was used. The analysis emphasized the language and perspective of users, particularly how they expressed complex emotional states. Many narratives featured overlapping feelings such as euphoria, sadness, and anxiety. This multidimensional emotional tone provided insight into how users interpret and cope with the consequences of substance use.

Among the analyzed posts, Post 039 and Post 040 offered especially detailed insights, each containing over 100 replies. These threads described recovery processes, shared harm reduction practices, and highlighted the difficulty of transitioning back to daily routines after

intensive rave experiences. These qualitative findings added interpretive depth to the quantitative results by illuminating lived experiences and communal strategies for managing risk. The analysis centered on user interpretation and avoided clinical or diagnostic framing, maintaining a culturally grounded perspective on substance use in rave culture.

Chapter 4: Result

Quantitative Analysis

To explore substance use-related discussions over time, data were analyzed using NLP methodology by month and year. Figure 1 lists the specific substances mentioned each month from January 2022 to December 2023. Figure 2, the primary focus of this analysis, presents the monthly count of each substance and its normalized value relative to the total number of posts that month. The latter figure illustrates the relative increase in the number of posts related to the substances of interest within the same subreddit.

As shown in Figure 1, initial NLP analysis showed an upward trend in the total number of substance-related posts over time. However, recognizing that this might be influenced by an overall increase in the number of posts, a normalization step was taken. Each substance's monthly mention count was divided by the total number of posts for that month. This normalization, dividing the number of substance mentions by the total number of posts per month, provided a relative measure of discussion frequency that allowed for more accurate comparisons over time.

As shown in Figure 2, after normalization, a distinct seasonal pattern emerged. Mentions of most substances consistently peaked during the summer months, particularly from May to July, with the highest number of posts observed in July. This trend declined afterward, suggesting a seasonal pattern of substance-related discussions. These findings imply a possible link between increased online discussion and the festival and rave season, which typically occurs during the summer.

During the analysis, Molly appeared most frequently, both in absolute and normalized terms. This prevalence suggests its prominence within rave or nightlife contexts.

Figure 1. Monthly Substance Mentions from January 2022 to December 2023

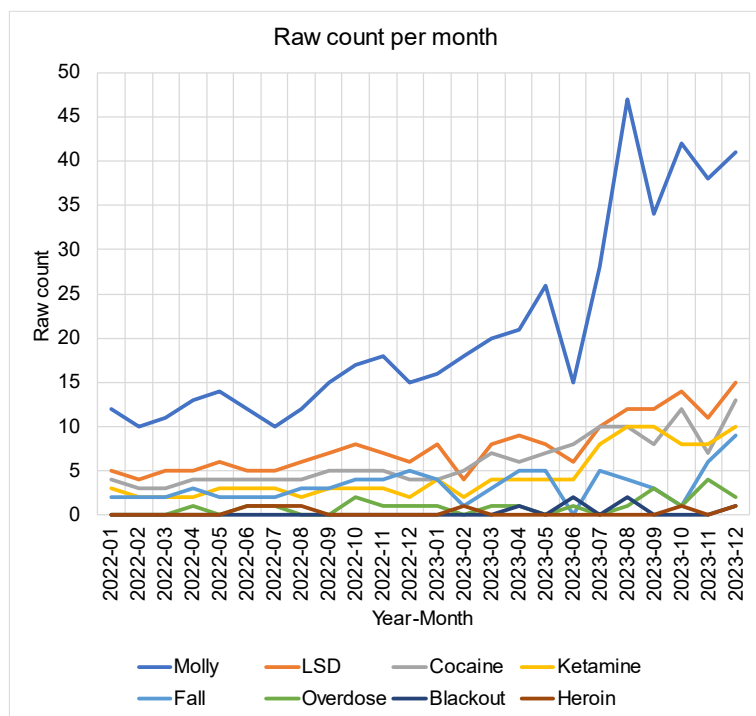
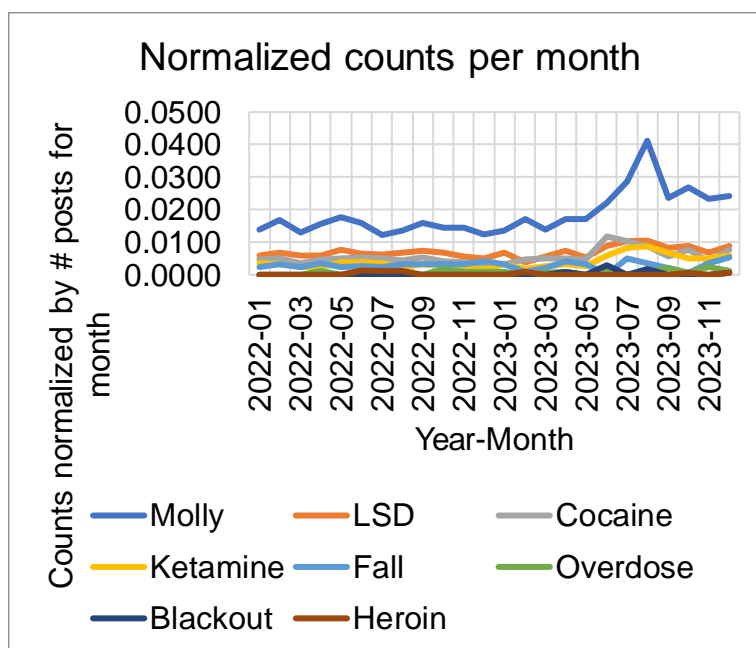


Figure 2. Normalized Monthly Substance Mentions on r/aves from January 2022 to December 2023



Qualitative Analysis

Building on the descriptive NLP quantitative analysis, this study subsequently analyzed text-based narrative data from 50 Reddit posts that explored experiences related to post-rave depression ("Tuesday Blues"), post-rave symptoms, and injury prevention strategies. The text-based dataset featured diverse perspectives from festival attendees discussing the physical and emotional aftermath of raves. Three major themes were identified: *Post-Rave Depression and Tuesday Blues*; *Post-Rave Symptoms and Psychological Impact*; and *Injury Prevention and Harm Reduction Strategies*. Figure 3 presents the distribution of posts across these themes. Representative posts and summaries for each theme are provided in Appendix B (Tables B1–B3).

Figure 3. Distribution of Reddit Posts by Identified Theme (N = 50)

Themes	Posts, n(%)
Post-Rave Depression & Tuesday Blues	13(34)
Post-Rave Symptoms & Psychological Impact	13(34)
Injury Prevention & Harm Reduction Strategies	12(32)

Theme 1: Post-Rave Depression and Tuesday Blues

This theme refers to the emotional and psychological aftermath experienced by many festival and rave attendees, often referred to as “Tuesday Blues”, a colloquial term describing the emotional crash that typically occurs a few days after the event, especially following the use of substances like MDMA. This theme was identified in 13 posts (34% of the 50 total posts). The emotional crash often intersected with sensory and social challenges.

Mood Crashes describe significant emotional downturns experienced after a rave.

Participants frequently described emotional lows following raves, often characterized by mood crashes, exhaustion, and difficulty reintegrating into daily life. One participant expressed, *"I had the best night of my life at the festival, but now I feel like I'm in a deep hole I can't climb out of"* (Post_008). Another stated, *"I can't explain it, but every time I come back from a rave, I feel like nothing in normal life is exciting anymore"* (Post_025). These posts highlight the emotional void and anhedonia often associated with post-rave experiences.

Sensory overload describes the lingering physiological effects after exposure to loud music, lights, and crowds. One participant shared, *"I still hear the music playing in my head, full volume blasting. It won't stop"* (Post_023), hinting at persistent sensory processing disturbances that may extend beyond emotional symptoms. This suggests a neurological component to post-rave experiences that warrants further study.

Social Reintegration Challenges highlight the difficulties individuals face when returning to everyday routines and social environments. Several posts described feeling disconnected with others. One user explained, *"I went back to work and couldn't focus on anything. It's like my brain's still at the rave"* (Post_014). These difficulties underscore the lingering cognitive and emotional toll of festival experiences and suggest a gap in post-event support for attendees.

Theme 2: Post-Rave Symptoms and Psychological Impact

This theme captures the broader psychological and physiological impact experienced by individuals in the aftermath of raves, often following substance use. This theme was identified in 13 posts (34% of the 50 total posts). It is distinct from *Post-Rave Depression & Tuesday Blues*, which centers around mood disturbances likely tied to neurochemical imbalances such as serotonin depletion, often described as emotional lows or sadness following the euphoria of the rave.

In contrast, the *Post-Rave Symptoms and Psychological Impact* theme encompasses more diverse and acute psychological symptoms that resemble a hangover-like state, including hallucinations, memory gaps, paranoia, social anxiety, struggles with reintegrating into day-to-day life, and a general disinterest in routine environments. These symptoms reflect a deeper psychological disorientation beyond depressive moods.

Overuse and Unsafe Dosing highlights excessive or unregulated substance use. Many participants reported panic attacks, paranoia, and post-rave regret following MDMA or other substance use. One individual reflected, *"Two months after a gram of MDMA, I'm having severe panic attacks daily, shaking, and unable to think rationally. Did I permanently damage my brain?"* (Post_020). Physical Aftermath addresses the body's response to festivals and substance use. Users discussed the physical toll, such as nausea and exhaustion: *"I threw up all night after the festival. Is this normal?"* (Post_007). Lingering Mental Effects refer to ongoing psychological distress, including paranoia, anxiety, and impaired focus. These posts reflect the intense physiological and psychological distress that can follow substance use, as well as uncertainty about whether these symptoms are normal or signs of long-term harm. *Post-Festival Identity Reflections* explore users' uncertainty about their behavior or self-image following events. Individuals described replaying interactions and questioning how they were perceived. *"I keep replaying everything I said and did—did I embarrass myself? Do my friends think less of me now?"* (Post_015). These findings illustrate the need for greater awareness of post-rave withdrawal symptoms and potential mental health consequences, particularly for new or uninformed users.

Theme 3: Injury Prevention and Harm Reduction Strategies

Injury Prevention and Harm Reduction Strategies encompassed discussions about security checks, substance safety, and physical health risks at festivals. This theme was

identified in 12 posts (32% of the 50 total posts). Participants frequently sought advice on how to test substances, avoid overdosing, and prevent injuries. One user inquired, *"What are the best testing kits for 2cb, MDMA, and acid?"* (Post_016), highlighting the role of harm reduction in festival culture. Another shared concerns about security measures: *"Can I bring water with Liquid IV or Molly in it? Will they test it at the entrance?"* (Post_009). These posts raise questions about whether current security measures effectively reduce harm or inadvertently increase risky behaviors, such as overconsumption before entering a venue.

A harm reduction strategy discussed involved sipping MDMA-infused water over the night to maintain a controlled and sustained effect. One participant shared: *"For NYE I took a half of Molly at 8:30 and put the rest in my water pack. As the night went on, I was sipping on it and kept a very good high until 1. I highly recommend this method."* (Post_018). While security measures aim to prevent drug use, rave culture remains closely tied to substances like MDMA, suggesting that harm reduction education may be more effective than outright prohibition.

Further Analysis focusing on Tuesday Blues

The theme of post-rave depression, commonly referred to as "Tuesday Blues," emerged as the most prominent finding in the qualitative review. To explore this theme in greater depth, a subset of 12 additional posts (Posts 39–50) was selected based on frequent references to emotional and physical recovery following MDMA use and participation in festival events. A detailed summary of these posts, their symptoms, and user-provided recommendations is available in Appendix B (Table B4). The focused analysis of these posts revealed several areas where harm reduction strategies could be strengthened, particularly in relation to mental health support and recovery planning. Posts 39 and 40 were notable due to their high levels of community engagement, each receiving over 100 replies. These posts

offered valuable insights into the emotional aftermath of MDMA use, including user-initiated harm reduction practices and reflections on long-term neurochemical recovery. The content underscored the need for targeted interventions that address the psychological effects experienced during the post-rave recovery period.

The focused analysis of posts referencing “Tuesday Blues” revealed three major patterns in how users experience and interpret the emotional aftermath of rave participation. Many individuals described feeling a profound emotional crash after the high of the event wore off. These emotional lows often included sadness, irritability, and difficulty reintegrating into daily routines. Users reported feeling emotionally flat, disconnected, or unmotivated in the days following MDMA use. This state was frequently linked to serotonin depletion and the abrupt transition from intense social and sensory stimulation back to everyday life.

In response to these experiences, users shared a range of strategies aimed at alleviating the negative effects. Common recommendations included staying hydrated, engaging in physical exercise, consuming nutrient-dense meals, and taking supplements such as 5-HTP, magnesium, or multivitamins. These suggestions often reflected a collective understanding of the physiological toll associated with MDMA use and a shared effort to support recovery. Posts emphasized the importance of preparation and recovery planning as key components of harm reduction, not only to lessen comedowns but to maintain emotional balance.

Conversations also reflected a growing concern about the long-term consequences of MDMA use. Some users questioned whether post-rave comedowns were simply temporary chemical imbalances or signs of deeper neurological harm. Discussions frequently touched on the potential for cognitive impairment, mood instability, and persistent changes in emotional regulation. Although some participants believed these effects were short-lived and manageable, others expressed anxiety about repeated use and the possibility of lasting brain changes.

These recurring experiences highlight how the online rave community engages with both the immediate and potential long-term consequences of MDMA use. The emotional and physiological challenges described by users underscore the need for accessible harm reduction resources, mental health support, and more public health attention to the hidden aftermath of festival drug use.

The term 'Suicide Tuesday' appeared frequently in posts, underscoring its recognition as a phenomenon within rave culture. The coding assignments for all posts included in this analysis can be found in Appendix B (Tables B5 and B6). Deeper diving into Post_039, users shared strategies for mitigating MDMA-related depressive symptoms, emphasizing proper supplementation such as 5-HTP, electrolytes, and vitamins, hydration, and exercise. Some discussed meal preparation techniques, such as making a warm meal in advance for post-rave recovery. A recurrent theme was reducing MDMA frequency to prevent long-term serotonin depletion. Many users provided harm reduction and recovery recommendations; *“Take 5-HTP for a few days post-roll and get proper sleep”* (Post_039), *“Eat electrolyte-rich foods like oranges and cucumbers”* (Post_039) and *“Exercise and avoid rolling too often to prevent severe comedowns”* (Post_039).

On Post_040, participants discussed detailed stories of emotional emptiness, loss of excitement, and social reintegration difficulties after raves. Some users discussed making impulsive life changes post-rave such as quitting jobs or ending relationships, reinforcing the importance of mental health awareness and intervention. One participant described the struggle, *“I have been to a couple of shows since and have some lined up for the year, but I am struggling to stay excited and happy unless I'm watching a set or something”* (Post_040). Another user acknowledged the difficulty of returning to normalcy, stating, *“Going to my first EDC weekend made me feel alive after so long! To me, it wasn't just about the comedown, but I wanted to*

leave my current life because I was miserable" (Post_040).

The findings emphasize that "Tuesday Blues," more widely known as "Suicide Tuesday," is a serious issue affecting many rave attendees. Social media platforms provide a space for rave attendees to exchange harm reduction strategies, yet the lack of evidence-based guidance leaves a gap in mental health support. Public health initiatives could play a crucial role in providing science-backed education, safer substance use practices, and mental health resources tailored for this overlooked community. A visual map of recurring narratives across themes is included in Appendix A (Figure A3), offering an integrative view of how users experience and interpret post-rave challenges.

Chapter 5: Discussion and Conclusion

Discussion

This research aimed to explore substance use trends in the rave scene by analyzing substance-related terms mentioned in Reddit posts. The r/aves subreddit was the explicit target to gain a deeper understanding of the narratives in substance used in rave settings, utilizing a combination of natural language processing (NLP) and thematic analysis. The findings revealed critical insider perspectives on both the psychological and physical aspects of substance use and how the online rave community engages in peer-driven harm reduction. These results highlight the need for more formal resources and evidence-based strategies to minimize the risks associated with rave culture. They also underscore the importance of cultural nuance and context in shaping effective public health interventions.

As discussed in the introduction, the results reflect an embedded cultural norm around MDMA use in rave settings. MDMA was mentioned far more frequently than other substances, with noticeable spikes in posts occurring between May and August. This outcome can likely correspond with the summer festival season and school breaks for younger populations. Further research is necessary to examine the reasons behind this seasonal spike and whether it correlates with real-world increases in use during festival periods. Although the specific relationship with the season and the high number of mentions need further research and investigation, previous studies grounded in Social Norms Theory have shown that peer perceptions strongly influence substance use behaviors. In this context, the seasonal surge and normalization of MDMA use suggest that festival and rave environments not only facilitate but also reinforce drug-taking behaviors through social norms. Furthermore, as rave culture becomes a safe and expressive space for historically marginalized communities, these norms

may become particularly embedded within specific demographics.

The results of this study are visualized through a conceptual model that synthesizes the thematic and temporal patterns uncovered in the analysis. This model illustrates the interconnected nature of post-rave experiences as observed through Reddit discussions, highlighting how emotional, physical, and behavioral dimensions of substance use overlap and evolve. It highlights three key thematic areas that emerged from both NLP-assisted analysis and close qualitative reading. A version of this conceptual model is presented in Appendix A (Figure A2), offering a visual summary of the emotional, physical, and behavioral experiences shared by rave participants, along with the harm reduction strategies they discuss in response.

The first theme, Tuesday Blues, also known as post-rave depression, encompasses emotional and psychological lows, including mood crashes, loneliness, and difficulty reintegrating into daily life. The second theme, Post-Rave Symptoms, includes both physical symptoms, such as nausea, fatigue, and sensory overload, and psychological symptoms, such as anxiety and paranoia. These were often associated with the use of MDMA and other psychoactive substances. Lately, the theme of Injury Prevention and Harm Reduction emerged, highlighting discussions around drug checking, hydration, supplement use, and strategies for managing both physical safety and emotional recovery. To conclude, these themes not only reflect the lived experiences of rave participants but also expose significant gaps in harm reduction services and mental health support, particularly for vulnerable communities.

This analysis suggests that "Tuesday Blues", also known as "Suicide Tuesday", is a widely recognized issue among rave attendees. While social media users exchange anecdotal remedies such as hydration, supplements, and exercise, there is a need for public health interventions offering science-backed, safer strategies for post-rave recovery. Furthermore, mental health support tailored to this population could fill an existing gap in post-festival well-

being initiatives.

Expanding on Key Findings for Public Health Relevance

Several findings from this study are directly relevant to public health programming and future research. For example, the prominence of Tuesday Blues posts indicates a significant emotional toll that follows rave participation and substance use. Tuesday blues has been a well-known phenomenon, but through this study, the findings showed that people started talking about it as 'Suicide Tuesday.' The evolution of the term shows elevated concern for this phenomenon or symptoms and potential severe mental health risks. Despite the increasing concern for the risk, there is a noticeable absence of posts referencing professional mental health care. The lack of mental health resources as a harm reduction strategy suggests that this population may not feel connected to or trusting of formal services. The posts that discuss the mental health struggles after the rave experience represent a critical gap in mental health outreach that public health initiatives should address.

Another notable finding was the discussion about mixing substances, both intentionally and unintentionally. Through the thematic analysis, rave attendees frequently described uncertainty about what they actually consumed and unexpected symptoms they had after the consumption. This discussion reflects both the inconsistent purity of drugs like MDMA and the risks of counterfeit pills. These discussions mirror public health concerns about drug misrepresentation, with prior studies showing that many supposed MDMA samples between 1997 and 2023 were actually methamphetamine. Despite this risk, few users seemed aware of the full implications of taking unknown substances, further emphasizing the need for education and access to drug-checking tools.

Moreover, harm reduction strategies shared among Reddit users were often detailed

and empathetic. The strategies range from hydration tips to sleep hygiene to advice on spacing out doses. However, these practices were peer-led and informally shared, highlighting the lack of institutional support and culturally tailored harm reduction messaging. In particular, many posts expressed appreciation for the rave scene as a source of joy, healing, and connection for marginalized users, including queer and racial minorities such as Asian American individuals. Raving provided a rare sense of community. Public health initiatives should not overlook the benefits of public health efforts. Interventions must avoid pathologizing the culture itself and instead focus on preserving its positive aspects while mitigating harm.

Public Health Implications

First, substance use trends shift rapidly, especially in nightlife and festival settings. While traditional research methods are still possible and valuable, they often lag. Even though studies have documented MDMA use in entertainment contexts, few have captured users' real-time, narrative-driven experiences. This study demonstrates the value of social media mining as a harm-reduction tool. Reddit provides timely access to public discourse and emerging trends that can inform more agile public health responses.

Second, the mislabeling and adulteration of MDMA is a growing public health concern. Many Reddit users described experiencing effects inconsistent with what they expected, often unaware of the risks. The expressions of inconsistent experience call for broader education campaigns and on-site drug testing services to improve user awareness and safety.

Third, this study underscores the need for culturally relevant harm reduction strategies. Rave culture is a meaningful space of belonging. While this study focused primarily on the risks and emotional aftermath of substance use, many users also highlighted how raving made them feel alive, seen, and connected. Public health initiatives must respect this duality of joy and

vulnerability in the community. Harm reduction should not aim to suppress or surveil these communities but to support them while honoring the positive impact of the culture. Harm reduction is an inevitable approach to reach the broader population that uses substances. Considering the growing popularity of raves, it is hard to shut down the industry or force strict regulations.

Notably, it is critical to address the ethical considerations involved in using social media data. Even though Reddit posts are public, they often feel intimate and personal. Researchers and public health practitioners must strike a careful balance between mining these spaces for insights and preserving them as safe, expressive environments for users. An intervention or surveillance effort should be transparent, protective of user anonymity, and developed in partnership with the communities involved.

Limitations

As an exploratory study, there are several limitations to acknowledge. First, Reddit users do not represent the full spectrum of rave attendees, and the platform may skew toward younger, tech-savvy individuals. Posts are self-reported and, therefore, subject to exaggeration, bias, or inaccuracy. The analysis used specific keywords, which may have resulted in the exclusion of relevant posts written in other languages. By limiting the dataset to English-language content, the study excluded international and multilingual experiences. Finally, the qualitative portion was limited to 50 posts, which may not capture the full diversity of narratives within the community.

Future directions

This study identifies two main areas for action. First, public health efforts should support peer-led harm reduction, including drug checking, hydration education, and post-rave

recovery guidance. Collaborating with festivals, nightlife venues, and digital communities could enhance the reach and cultural relevance of these strategies.

Future research should expand to platforms like Twitter, Discord, and TikTok to capture different types of user experiences and demographics. Each platform serves a distinct community, and analyzing these digital spaces may reveal different discourse styles, risk perceptions, and harm reduction approaches. Moreover, integrating multimodal data, such as memes, videos, or images, could further deepen understanding of how substance use is communicated and normalized.

Longitudinal research is also needed to better understand the mental health impacts of repeated substance use and polysubstance combinations, particularly for marginalized groups. Tracking users' posts over time may reveal how perceptions and coping strategies evolve across multiple events or festival seasons.

Additionally, future studies should explore the role of AI-enhanced drug trend monitoring in public health infrastructure. Real-time dashboards powered by NLP and social media analytics could help health departments anticipate emerging risks and deploy timely interventions.

Finally, expanding the analysis to multilingual and international contexts is essential. Rave culture is global, and current insights primarily reflect English-speaking, Western-centric perspectives. Including non-English datasets would offer a more comprehensive view of how substance use is experienced and discussed worldwide.

Conclusion

This thesis investigated substance use trends within rave culture by analyzing user-generated content on Reddit, specifically posts from the r/aves subreddit. Using a mixed-

methods approach that combined natural language processing and thematic analysis, the study aimed to uncover how substance use is discussed, experienced, and managed within digital peer communities while mainly focusing on MDMA.

The results revealed that MDMA dominates conversations related to substance use in rave settings, with notable seasonal trends aligned with significant festival periods. These findings support the idea that MDMA use has become normalized within specific cultural subgroups, further reinforced by social norms and event-based behavior. The qualitative analysis offered a deeper view into the lived experiences of users, particularly around the phenomenon of "Tuesday Blues," which is a term used to describe the emotional and psychological crash that often follows MDMA use. In addition to mood disturbances, users described a range of post-rave symptoms, and they typically managed these symptoms using informal harm reduction strategies shared online for both physical and mental conditions.

This study contributes to the growing body of work that recognizes the value of social media data for public health surveillance, harm reduction, and understanding emerging drug trends. Reddit, as a space for peer-driven discourse, serves not only as a research tool but also as a virtual harm reduction hub. The insights gathered demonstrate that culturally grounded, community-informed interventions are essential, especially for marginalized groups that find connection, healing, and identity within rave culture.

Despite its limitations, this research offers a novel lens on how substance use is perceived and navigated in real-time. This finding underscores the urgent need for public health systems to integrate harm reduction into spaces they have often overlooked. As rave culture continues to evolve and grow, so too must the methods of understanding and supporting the people who participate in it.

Future research should expand into other platforms and explore multilingual perspectives. At the same time, public health programming must center community voices and preserve the positive aspects of rave culture that make it such a powerful outlet for expression, joy, and belonging. Ultimately, this work affirms that harm reduction is not simply about mitigating risk. Still, it is also about respecting culture, reducing stigma, and empowering people to take care of themselves and each other.

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Appendix A

Figure A1. Word dictionary for NLP

Molly	• 'molly', 'moly', 'mdma', 'ecstasy', 'tuesday blues', 'disco biscuit', 'beans', 'hug bug', 'xtc'
Cocaine	• 'coke', 'cocaine', 'cocain', 'nose beer', 'candy', 'snow', 'bump'
Ketamine	• 'k', 'ketamine', 'ketamin', 'ket', 'cat valium'
LSD	• 'lsd', 'acid'
Heroin	• 'heroin'
Blackout	• 'black out', 'blackout'
Fall	• "fall"

Figure A2. Conceptual Model of Post-Rave Experience and Harm Reduction Gaps

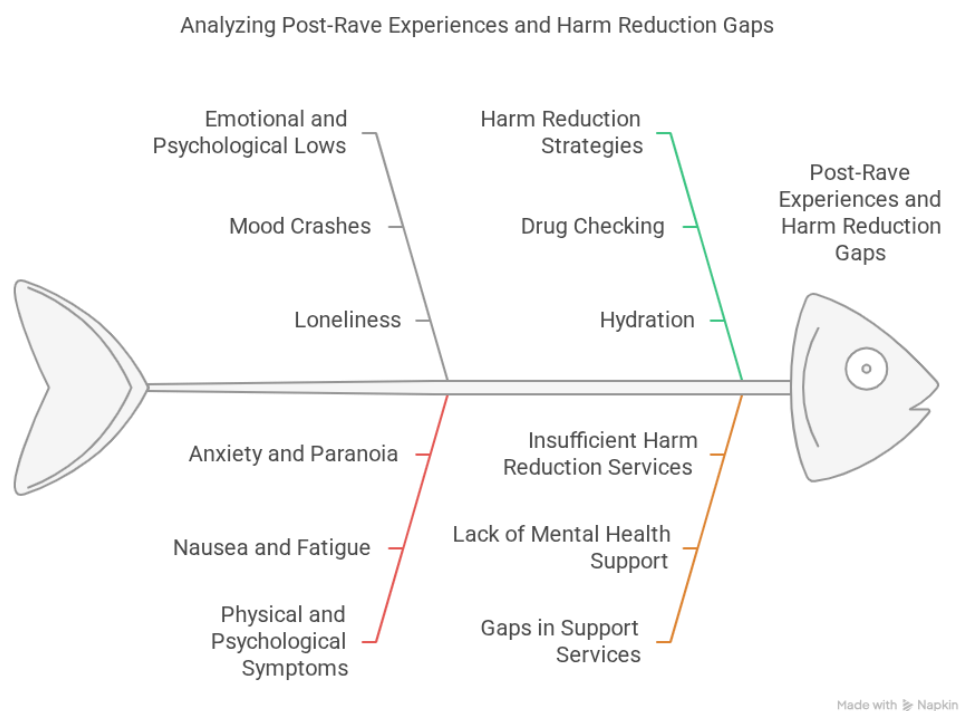
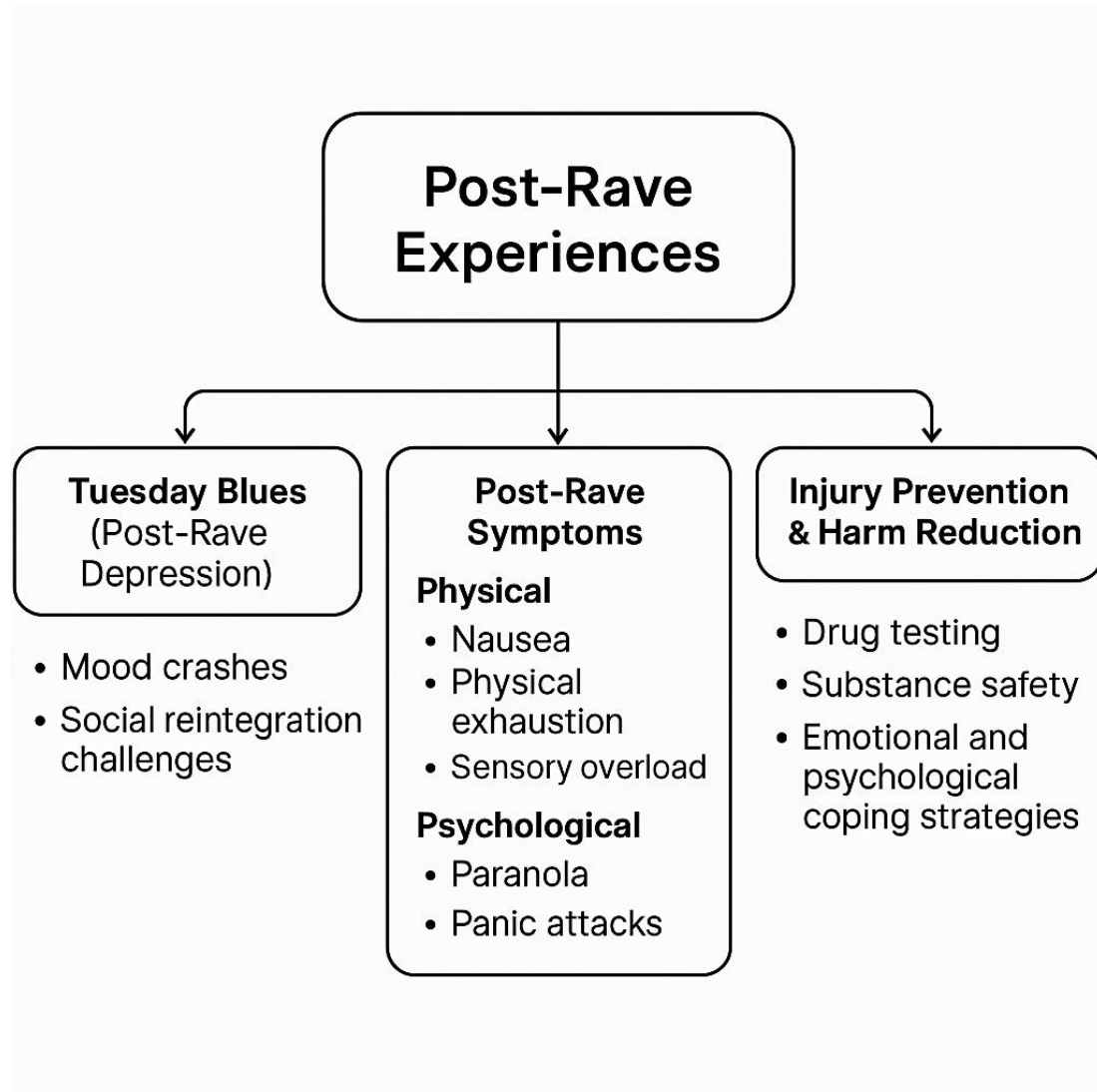


Figure A3. Visual Map of Recurring Narratives in Post-Rave Discussions



Appendix B

Table B1. Summary of Theme 1. Tuesday Blues (Post-Rave Depression)

Common symptoms	Anxiety, emotional lows, regret, difficulty readjusting
Example Posts	<i>"Went to a festival last night, had an amazing time, but I still hear the music playing in my head. Like full volume blasting. Am I developing schitz or something?"</i>
	<i>"Two months after a gram of MDMA, I'm having severe panic attacks daily, shaking, and unable to think rationally. Did I permanently damage my brain?"</i>
	<i>"I used to do Molly a lot in my 20s to feel something. I just turned 31 and now want to go to raves. Is it too late for me?"</i>
	<i>"Post-rave ear remedies? Just got back home, ears are ringing really badly."</i>
Recurring Narratives	Mood crashes after MDMA or raving (dopamine depletion).
	Sensory overstimulation and lingering effects.
	Social reintegration struggles post-rave.
	Fear of long-term mental health effects

Table B1-1. Visualization of Theme 1. Tuesday Blues (Post-Rave Depression)



Table B2. Summary of Theme 2. Post-Rave Symptoms (Physical & Psychological)

Example Posts	<i>"Threw up all night after the festival. Is it normal? How do you guys deal with nausea?"</i>
	<i>"First time rolling, I took 500mg of Molly, and now I feel like I embarrassed myself in front of everyone."</i>
	<i>"I was rolling so hard, now every time I hear that one song, it brings me back."</i>
	<i>"Took too much molly and now my face is swollen—what alternatives are there?"</i>
	<i>"I still feel the music pounding in my head 24 hours later—what is this?"</i>
Recurring Narratives	Overuse and unsafe dosing (e.g., first-time users taking excessive amounts).
	Physical aftermath (nausea, exhaustion, dehydration).
	Lingering mental effects (music hallucinations, memory gaps, paranoia).
	Post-festival identity reflection (regret, social anxiety, fear of how one acted).

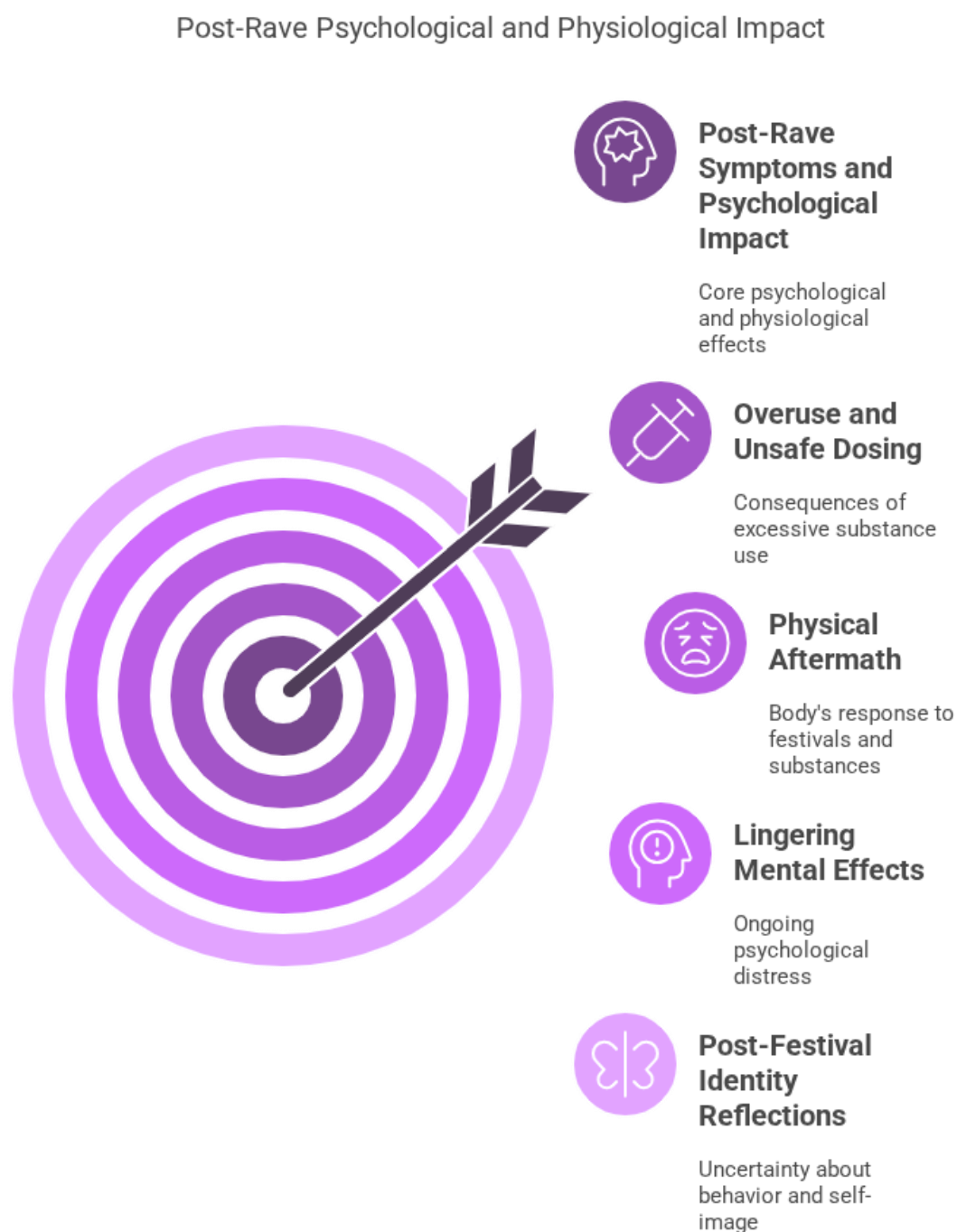
Table B2-1. Visualization of Theme 2. Post-Rave Symptoms (Physical & Psychological)

Table B3. Summary of Theme 3. Injury Prevention & Harm Reduction

Example Posts	<i>“Was drugged at a festival—how do I prevent this from happening?”</i>
	<i>“Security at festivals—what do they check? Can I bring water with Liquid IV or Molly in it?”</i>
	<i>“My dog sniffed me out at a UK rave—what are my legal rights?”</i>
	<i>“What are the best testing kits for 2cb, MDMA, and acid?”</i>
	<i>“I got into a fight while rolling too hard at a festival—how do I prevent this from happening again?”</i>
Recurring Narratives	Concerns about security checks and festival rules.
	Drug testing kits as a harm reduction strategy.
	Preventing accidental overdoses and misdosing
	Sexual safety and being drugged without consent.

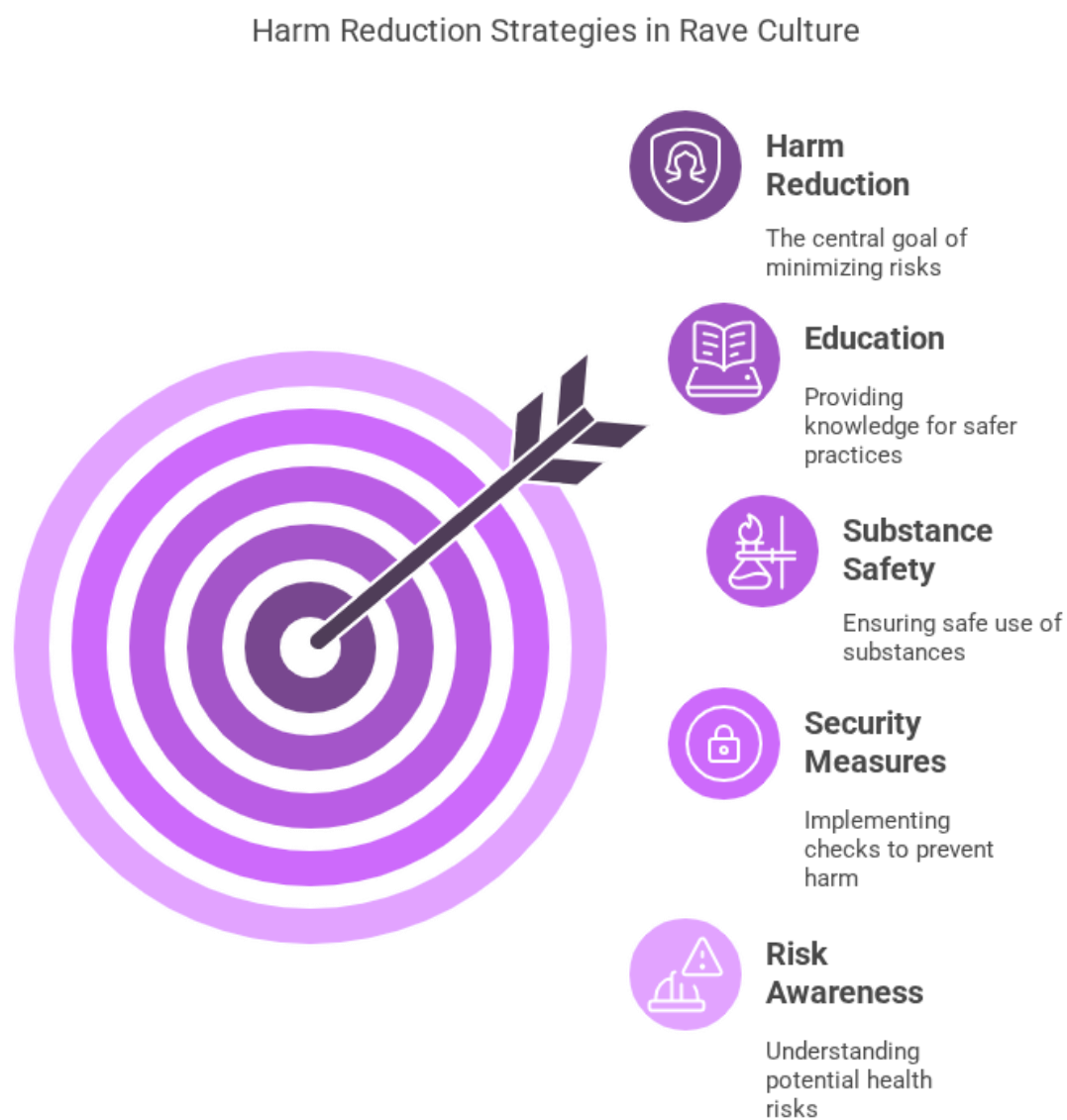
Table B3-1. Visualization of Theme 3. Injury Prevention & Harm Reduction

Table B4. Focused Analysis: Tuesday Blues (Posts 39-50)

Theme	Common Symptoms	Example Posts	Key Takeaway
Post-Festival Depression and Emotional Lows	Emotional lows, anxiety, difficulty adjusting back to routine, post-rave blues	<p><i>"Struggling to stay happy unless I'm at a show. Post-festival blues is real."</i></p> <p><i>"Went to my first EDC, now I feel like normal life is dull and meaningless."</i></p> <p><i>"How do you guys deal with post-show/festival depression?"</i></p>	Mood crashes post-rave are common; many struggle with reintegration into normal life.
Neurochemical Recovery and Harm Reduction Strategies	Serotonin depletion, exhaustion, hydration issues, harm reduction strategies	<p><i>"What's the best way to fight the MDMA blues and recover fastest?"</i></p> <p><i>"Does 5-HTP actually help with post-roll comedown?"</i></p> <p><i>"Is there a way to roll and not feel completely drained for the next few days?"</i></p>	Users rely on community-driven harm reduction strategies for recovery.
Concerns About Brain Damage and Long-Term Effects	Worries about long-term cognitive damage, oxidative stress,	<i>"Two months after rolling, I still feel off. Did I permanently</i>	Concerns about MDMA-related neurotoxicity and brain damage are widespread.

	neurological impacts	<i>damage my brain?"</i> <i>"My memory has been awful since I started rolling regularly. Is this normal?"</i> <i>"MDMA recovery – do supplements actually help prevent long-term damage?"</i>	
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Table B4-1. Visualization of Focused Analysis: Tuesday Blues

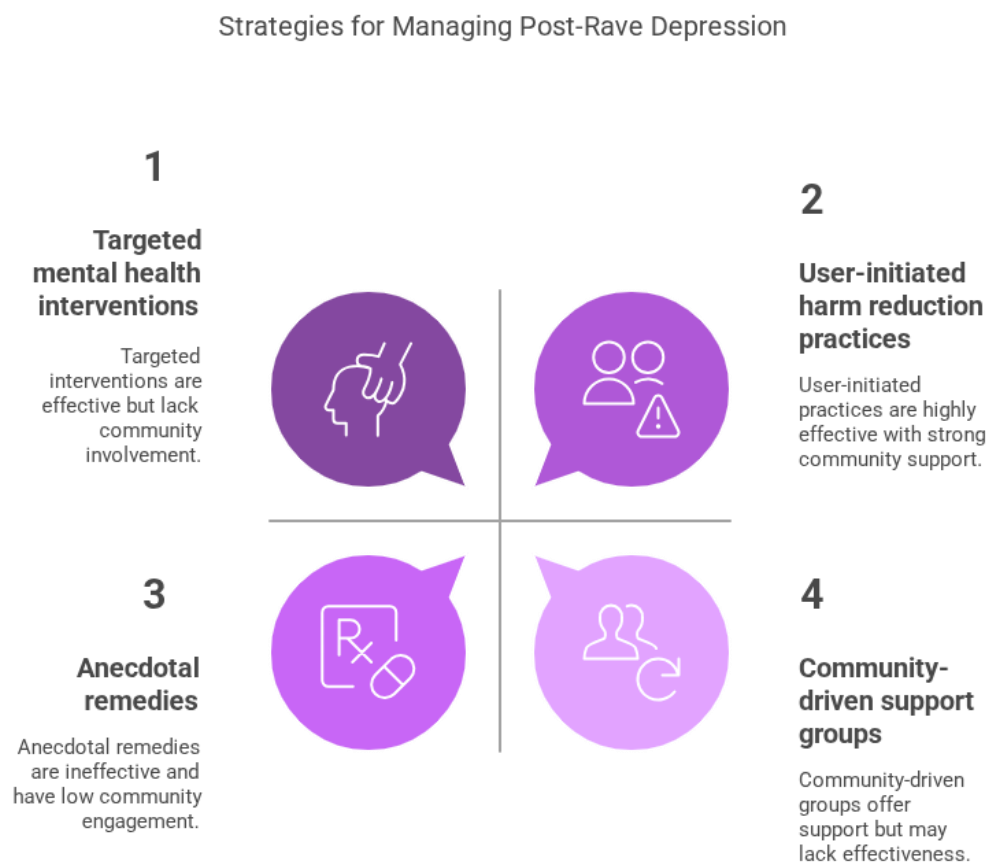


Table B5. Post-by-Post Theme Coding (Posts 1–38)

Post ID	Key Theme
Post_001	Post-Rave Depression & Tuesday Blues
Post_002	Post-Rave Symptoms & Psychological Impact
Post_003	Injury Prevention & Harm Reduction Strategies
Post_004	Post-Rave Depression & Tuesday Blues
Post_005	Post-Rave Symptoms & Psychological Impact
Post_006	Injury Prevention & Harm Reduction Strategies
Post_007	Post-Rave Symptoms & Psychological Impact
Post_008	Post-Rave Depression & Tuesday Blues
Post_009	Injury Prevention & Harm Reduction Strategies
Post_010	Post-Rave Depression & Tuesday Blues
Post_011	Post-Rave Symptoms & Psychological Impact
Post_012	Injury Prevention & Harm Reduction Strategies
Post_013	Post-Rave Depression & Tuesday Blues
Post_014	Post-Rave Symptoms & Psychological Impact
Post_015	Injury Prevention & Harm Reduction Strategies
Post_016	Post-Rave Depression & Tuesday Blues
Post_017	Post-Rave Symptoms & Psychological Impact
Post_018	Injury Prevention & Harm Reduction Strategies
Post_019	Post-Rave Depression & Tuesday Blues
Post_020	Post-Rave Symptoms & Psychological Impact
Post_021	Injury Prevention & Harm Reduction Strategies
Post_022	Post-Rave Depression & Tuesday Blues

Post_023	Post-Rave Symptoms & Psychological Impact
Post_024	Injury Prevention & Harm Reduction Strategies
Post_025	Post-Rave Depression & Tuesday Blues
Post_026	Post-Rave Symptoms & Psychological Impact
Post_027	Injury Prevention & Harm Reduction Strategies
Post_028	Post-Rave Depression & Tuesday Blues
Post_029	Post-Rave Symptoms & Psychological Impact
Post_030	Injury Prevention & Harm Reduction Strategies
Post_031	Post-Rave Depression & Tuesday Blues
Post_032	Post-Rave Symptoms & Psychological Strategies
Post_033	Injury Prevention & Harm Reduction Strategies
Post_034	Post-Rave Depression & Tuesday Blues
Post_035	Post-Rave Symptoms & Psychological Impacts
Post_036	Injury Prevention & Harm Reduction Strategies
Post_037	Post-Rave Depression & Tuesday Blues
Post_038	Post-Rave Symptoms & Psychological Impact

Table B6. Post-by-Post Theme Coding (Posts 39–50)

Post ID	Key Theme
Post_039	Neurochemical Recovery and Harm Reduction Strategies
Post_040	Post-Festival Depression and Emotional Lows Concerns About Brain Damage and Long-Term Effects
Post_041	Post-Festival Depression and Emotional Lows
Post_042	Post-Festival Depression and Emotional Lows
Post_043	Neurochemical Recovery and Harm Reduction Strategies
Post_044	Post-Festival Depression and Emotional Lows
Post_045	Concerns About Brain Damage and Long-Term Effects
Post_046	Neurochemical Recovery and Harm Reduction Strategies
Post_047	Neurochemical Recovery and Harm Reduction Strategies
Post_048	Post-Festival Depression and Emotional Lows
Post_049	Post-Festival Depression and Emotional Lows
Post_050	Neurochemical Recovery and Harm Reduction Strategies