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Predictors of Psychedelic Experience: A Thematic Analysis

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ABSTRACT

Research on the therapeutic potential of psychedelic substances is expanding. A limitation within this field is the unpredictability of individual responses to psychedelics. Better understanding of factors predicting psychedelic experience is essential to clinical progress and wider harm reduction frameworks. Ketamine, MDMA, LSD and psilocybin were selected for comparison due to their promising therapeutic effects and different mechanisms of action. This study aimed to (a) identify factors that produce positive and adverse psychedelic experience, and (b) compare these potential predictors across four psychedelic substances. A thematic analysis was conducted on twenty-two first-person reports of psychedelic use (six per substance), sourced from the Erowid database. This revealed three external predictors (nature, music, and preparation) and three internal predictors (understanding, mind-set, and motivation). Each factor identified contained two sub-themes that further elucidated meaning and impact. Nature and music emerged as potential tools for de-escalating adverse reactions to psychedelics. Substance-specific perceptual and sensorial effects were also examined. Finally, the importance of, and interrelationship between, preparation, mind-set, understanding, and motivation was examined as common themes that emerged. The broader clinical and sociological implications are discussed, with reference to developing harm reduction frameworks. These findings constitute an early step in developing a more nuanced understanding of factors shaping psychedelic experience.

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Introduction

The resurgence of clinical research into psychedelics offers a paradigm shift for treating mental disorders (Schenberg 2018). Research investigating the therapeutic potential of psychedelics is rapidly expanding (for a review see Brekke et al. 2020). Psychedelics are a class of psychoactive substances altering perception, mood, cognition, and sensory processing (Schenberg 2018). Psychedelics can provide rapid and enduring improvements for multiple mental health disorders (Mitchell et al. 2021; Roseman, Nutt, and Carhart-Harris 2018).

Whilst promising, individual responses to psychedelics vary (Haijen et al. 2018). This concerns researchers and clinicians who, despite controlling dosage and environment, have little way of knowing an individual's reaction ahead of time (Aday et al., 2021). Understanding factors that may predict patient outcomes is crucial in progressing the therapeutic application of psychedelics (Aday et al., 2021). Participants often call upon a "sitter" to ensure safety during their experience, usually a friend or acquaintance rather than a trained practitioner. Given the publicized return of

psychedelic research and widespread coverage of their health benefits, psychedelic use for self-therapeutic purposes is predicted to rise (Pilecki et al. 2021). As unsupervised use expands, knowledge of factors predicting adverse experiences is needed to inform development of public harm reduction frameworks.

Non-pharmacological factors are important in determining positive and adverse reactions in the acute consumption phase (see Hartogsohn 2016). These variables can be decomposed into internal or external predictors (Carhart-Harris et al. 2018). This distinction developed from the concept of "set and setting" (Sessa et al. 2014). Internal predictors or "set," describe psychological variables, including expectations, intentions, and prior mood. External predictors or "setting," describe contextual variables, such as the physical space where consumption occurs. Despite widespread acceptance of these concepts, persistent components of internal and external environment remain relatively unknown in the medical/scientific literature. Better understanding of these predictors, by identifying, categorizing, and exploring the relationship between them, is needed (Breksema et al. (2020).

Despite the recent abundance of quantitative research on psychedelics, it often centers on health-related outcomes, rather than understanding subjective patient experience (see Luoma et al. 2020). Quantitative approaches enable determination of treatment efficacy (Barrett, Preller, and Kaelen 2018), whereby qualitative or combined mixed methods approaches show promise in portraying the rich phenomenal landscape of the psychedelic experience.

Analyzing subjective accounts of psychedelic experience could enable increased understanding of factors mediating experience quality (Haijen et al. 2018). Qualitative inquiry enables description of nuances and complexities of participants' internal experiences. Thematic analyses highlight patterns within these experiences (Michael, Luke, and Robinson 2021). Swogger, Hart, and Erowid et al. (2015) and Baggott (2015) examined qualitative outcomes in the use of Kratom and MDMA, whilst Hase et al. (2022) demonstrated subjective markers such as the influence of emotional state in across multiple substances. However, more work is needed around predictors of positive/negative subjective experience (although see Strickland, Garcia-Romeu, and Johnson 2020). Limited work has examined subjective accounts across substances within a single study. Examining more than one substance under the umbrella of a single research question offers opportunities for cross-comparison of themes or factors.

We focus on four substances: psilocybin and lysergic acid diethylamide (LSD; both "classic" serotonergic psychedelics), 3,4-methylenedioxymethamphetamine (MDMA; an entactogen), and ketamine (a dissociative anaesthetic). Psilocybin, MDMA, ketamine and LSD reliably alter psychological state, with different mechanisms of therapeutic action (De Gregorio et al. 2020). This cross-section, featuring a common entheogen/s, empathsogen, and dissociative, allowed for meaningful interpretation between substances.

We analyzed participant accounts of psychedelic use, aiming to (a) identify factors in both positive and adverse experiences, and (b) interpret these factors across the four substances. We were guided by the question: what are the internal and external variables of subjective experience during psychedelic use?

Method

Participants

First-person, written accounts, downloaded from the "experience vaults" in the Erowid (2020) database were sampled. Erowid is a "member-supported organization" providing experiential accounts of psychoactive

substance use and provides publicly accessible user reports. Participant gender was the only reliably reported demographic information. Gender was supplied by participants as part of a response-header and was not explicitly associated with any contextual factors in the actual reports. Participants ranged from novice to experienced psychedelic users. Although no active recruitment of human participants occurred, permission to use the dataset as a public domain resource was approved by the RMIT STEM College Human Ethics Advisory Network (CHEAN). Written permission to reprint excerpts was received from Erowid.

Procedure

Reports from Erowid were already anonymized and associated with report ID numbers. Only reports from Erowid's reviewed and edited collection were considered, and a separate search was conducted for each substance within this collection. The resulting report list was read and screened using exclusion criteria. Reports were excluded if based on a distant psychedelic experience; were outside the 1000–4000-word limit (to ensure a sufficient yet manageable amount of data for thematic analysis); had unspecified dosage; involved a secondary substance (e.g., marijuana); or indicated a medical purpose for substance use (i.e., administered by a doctor for pain relief). Finalized reports were screened to ensure equal gender balance of participants in each substance category, as this was the only available demographic variable (see Sanz et al. 2018). Twenty-two reports (11 female) remained for the final analysis. Given the strict inclusion criteria, only five reports within LSD (2 female) and MDMA (2 female) remained.

Materials

Selected reports were uploaded to NVivo v. 12 (Castleberry 2014), a software package designed for qualitative and mixed-methods research. NVivo was used to highlight and conceptualize themes. As participants documented their own doses, the quality and composition of the substances could not be determined.

Design

A thematic analysis on reports was conducted following Braun and Clarke's (2006) protocol (see Figure 1). Theoretically flexible, this approach can be adapted to research questions that combine exploratory and confirmatory approaches (Braun and Clarke 2006). Our analysis is partially confirmatory, as it was conducted in the existing paradigm of "set and setting" (i.e.,

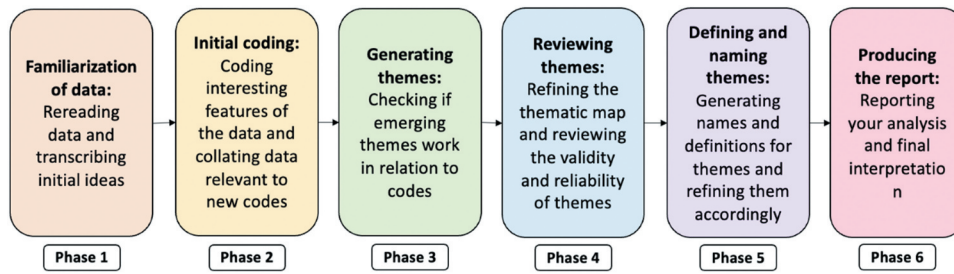


Figure 1. An illustration of Braun and Clarke’s thematic analysis approach for developing themes from qualitative data. Note. Adapted from Braun and Clarke (2006), p 87.

internal, and external factors; Hartogsohn 2017). It was also exploratory, as pre-set themes within these two categories were not predetermined. A realist paradigm was adopted that assumed a straightforward relationship between participants’ language and meaning.

Phase 1 involved becoming familiar with the content and narratives of the data. In Phase 2 preliminary concepts were noted and used to generate initial codes. This involved a dual deductive-inductive process (Braun and Clarke 2006) where coding was based on the data, and performed with awareness of overarching internal and external categories. Phase 3 involved theme searching, by clustering initial codes according to thematic

similarity. Higher-order themes were assigned as either “internal” or “external” factors, and remaining themes clustered underneath them. In Phase 4, we reviewed all themes and sub-themes. Distinct concepts were expanded, and redundant themes were merged or discarded. This enabled identification of distinct and comparable concepts across all reports. Based on themes in Phase 4, we finalized definitions of each theme and sub-theme in Phase 5. In Phase 6 we reported final interpretations. To maximize interrater-reliability, two other researchers generated initial codes that were compared and discussed to highlight any discrepancies in initial conceptualization; this was done at both Phase 1→2 and

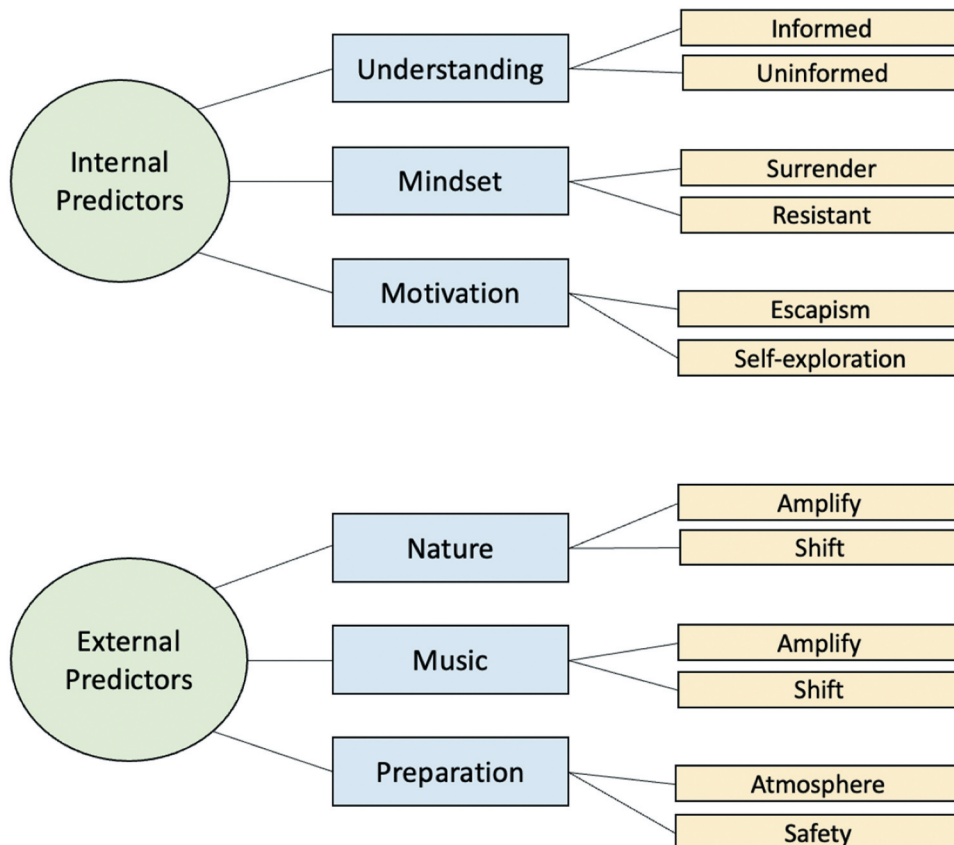


Figure 2. Themes and sub-themes within predictors of experience.

5→6 to ensure interpretation of the data were consistent across the three researchers involved in the project.

Results

External factors

External factors originated outside of the person and involved qualities of the environment impacting them. Emergent external predictors were nature, music, and preparation (see Figure 2).

Nature

Being surrounded by nature was a consistent, impactful theme. Specific location was not a factor, just overall sensory input that nature provided. Two sub-themes captured this impact: nature's capacity to *amplify* and *shift* participants' psychedelic experience.

Amplification describes the enhancement of participants' sense of meaning and symbolism. For example, *"the sky . . . was so . . . full of meaning"* ("Andrash" (M) Report ID: 19,711). The content and qualities of nature stimulated psychological processes such as self-reflection: *"rays of sunlight . . . illuminated particles in the air. Moved by unseen forces . . . these small particles also were lives, propelled every which way and completely without control"* ("Tim K" (M) Report ID: 83,544). Nature amplified (felt) internal meaning, encouraging absorption in the external surroundings. This facilitated a dynamic push and pull of being inspired by one's surroundings, and then pulled inwards to self-reflection: *"I looked off into the distance at the ocean. I snapped back to reality momentarily and realized that I had briefly become one with the ocean. Then I remembered that somewhere deep down I am me and that I have a life outside of this new world."* ("Imaginary" (M) Report ID: 104,360)

Nature could also *shift* participants' emotional state. The apparent mechanism of this involved focusing away from psychological processes, and toward sensory experience: *"I knew how easy it would be to forget everything and watch the sky . . . until the end of time"* ("Spooky" (M) Report ID: 69,866). This provided grounding effects, bringing participants into an immersive bodily experience of the external world; *"beauty enveloped me, rolled over me like a wave"* ("Spooky" (M) Report ID: 69,866). Nature thus emerged as a grounding force alleviating ruminative thought processes. For example, *"I began to get relatively frightened . . . [my friend] suggested getting back to the beautiful lookout point . . . after a few minutes, we came to the same gorgeous spot as before . . . and the paranoid*

thoughts instantly dispersed" ("DayTripper" (M) Report ID: 80,588).

Music

Music could *amplify* and *shift* participants' psychedelic experience. Amplification was linked to sonic and lyrical aspects of music. Sonically, music provided a synesthesia-like effect, inducing elaborate visual and tactile hallucinations that elevated participants' sense of awe and beauty; *"I started speaking words from the . . . album . . . I could often taste, feel the words that I spoke during this part of the experience"* ("Phaeton" (M) Report ID: 90,988).

Lyrics could also *shift* participants' psychological state, acting as circuit-breakers for negative thought patterns. During acute distress, lyrics provided a form of guidance that seemed to reach out to them directly; *"I was . . . fighting off overwhelming fear of life, and then I heard some lyrics from his lovely voice . . . 'You can't run from the world because there's nowhere to run' . . . It was such a gentle song . . . right time, right place. It got better from there"* ("Kaleidobunny" (F) Report ID: 35,388).

Preparation

Preparation describes how actively participants curated their environment to support their intended experience. Here, the sub-themes of *atmosphere* and *safety* emerged. Preparing the atmosphere involved intentionally choosing the physical setting, *"[we] began walking to . . . our designated tripping spot . . . a clearing in the woods [that was] beautiful and completely secluded"* ("Tim K" (M) Report ID 83544). Atmosphere varied across reports and did not uniformly predict experience. Rather, participants' ability to anticipate their needs and prepare the atmosphere was most important. Participants passively preparing the atmosphere reported more stressful settings; *"normally we trip in my house, but tonight we were in his . . . and I didn't feel all that relaxed in this place"* ("Kaleidobunny" (F) Report ID: 35,388).

The *safety* sub-theme describes risk management strategies implemented before the experience. These were external measures that could ensure safety, in the event of incapacitation or psychological vulnerability. For example, choosing a trusted, sober companion, *"my husband . . . would be right beside me the whole time"* ("H.Love" (F) Report ID: 91,431), or preparing a safe, alternative course of action, *"earlier that day we wrote our address on a piece of paper and took it with us. If we wanted to go home before we sober up, we could hand the paper to the cab driver, and he would handle the rest."* ("Normal" (F) Report ID: 7528).

Internal factors

Internal predictors encompassed qualities of participants' mental and emotional state impacting their psychedelic experience. Emergent internal predictors were understanding, mind-set and motivation.

Understanding

Understanding describes participants' knowledge of the physical and psychological effects of the substance. Its first sub-theme highlighted *informed* participants, who had developed understanding before consumption. These participants could use this knowledge in navigating challenging aspects of the experience. For example, "I started thinking that it was good that I had . . . done my research, because . . . I was completely incapacitated . . . I knew that ketamine did not depress the respiratory centre of the brain, so that whatever happened, I would keep breathing" ("H.Love" (F) Report ID: 91,431). The second sub-theme captured *uninformed* participants, who underestimated or unaware of the intensity and duration of psychedelic effects. One reported, "I was very enthusiastic about acid and felt cavalier about its use" yet once the substance took effect, it was "definitely more than I was prepared to handle . . . I was very, very scared, and was having a panic attack" ("Tim K" (M) Report ID 83544). They more often became overwhelmed and tended to resist their experience. This exacerbated their distress; "The sensation was so strong . . . that it took me by surprise. I was terrified . . . It was not what I had expected . . . I tried to fight the trip and hold on to what remained of my ego" ("Imaginary" (M) Report ID: 104,360).

Mind-set

Mind-Set encompassed participants' preexisting thoughts, emotional state and beliefs. The first sub-theme was a *surrendered* mind-set, characterized by feelings of trust, ease and acceptance. It largely reflected participants' general state of being at the time but could be cultivated deliberately. For example, "I listened to some [music] . . . which usually puts me in a 'transcendental' mood . . . and did a couple of relaxation breathing techniques. I was in an apartment with [a friend] where I felt secure and at ease" ("Phaeton" (M) Report ID: 90,988). The second sub-theme was a resistant mind-set, characterized by anxiety, hesitation, and fear. For example, one participant reported that before the trip, "my days and nights consisted of an endless struggle to escape from reality . . . every waking moment was full of pain" ("PinkFlower" (F) Report ID: 50,799). This content influenced subsequent experience, whereby "it all took a turn for the worse . . . I remembered

how depressed I was [about] the direction my life had taken. I . . . began crying uncontrollably . . . my mind became so consumed . . . that nothing was going to help" ("PinkFlower" (F) Report ID: 50,799).

Motivation

Motivation described the reasons for consumption. Two sub-themes emerged. Firstly, participants motivated by *escapism* used the substance to avoid their reality; "I purchased the shrooms and arranged to eat them with another friend of mine . . . it would be a nice escape from the horrible reality I was living" ("PinkFlower" (F) Report ID: 50,799). Participants motivated by *self-exploration* exhibited curiosity, "eager[ness] to feel something new and profound" ("Imaginary" (M) Report ID: 104,360). They aimed to embrace the experience, driven by a desire for deeper self-understanding.

Substance-specific effects: frequency analysis

Each psychedelic facilitated specific perceptual and physical changes, appearing to moderate how relevant the predictors were. Amongst participants with limited mobility, the impact of nature on their overall experience was reduced. Many perceptual and physical effects are well established (see Aday et al., 2021); however, we explored them here to examine how each predictor has different impacts on the experience, depending on the specific substance.

Many participants described an altered capacity to physically move during the acute experience. *Limited mobility* was most prevalent amongst ketamine users (80%); "I could not even hold myself up in the slightest and my legs kept slipping and I collapsed onto the bed" ("K Katina" (F), ID: 72,620). Mild physical limitation was associated with psilocybin (35%), often due to loss of coordination, or vertigo. *Enhanced mobility* was an increased capacity and desire for physical movement; "I ended up just stretching . . . effortlessly . . . This is normally pretty difficult for me . . . but at this point it felt amazing." ("Newrainbowchild" (F), ID: 85,912). It was most commonly reported by MDMA users (74%), less frequently by psilocybin users (8%) and not at all in LSD and ketamine reports.

Sensory distortions

Visual distortions and hallucinations were common amongst LSD (41%) and psilocybin (24%) users and were largely stimulated by nature; "The trees were swaying animatedly . . . They began transforming into billions of detailed rainbow fragments put together masterfully." ("Tim K" (M) Report ID 83544). Ketamine-induced visual hallucinations (29%) were internal experiences.

MDMA (6%) enhanced colors and lights, with few reports of distortion or hallucination. *Tactile sensitivity and distortions* were also reported; “I walked around the apartment touching things. I could have stood [in the kitchen] for hours playing in the cold, rushing water. It felt pure and beautiful running over my hands.” (“Cherrytree” (F), ID: 64,619). Imagined sensations of touch occurred most with ketamine (25%), whereas enhanced physical pleasure occurred most with MDMA users (67%). *Synesthesia* describes enhanced interconnectedness between senses, where stimulation of one produced effect in another; “I felt my body changing, and feelings, sounds, visuals and other sensations were now inextricably intertwined” (“Phaeton” (M) Report ID: 90,988). This occurred most with ketamine reports (47%), and LSD (39%). It was rarely associated with psilocybin (14%) and was absent for MDMA users. *Auditory distortions and hallucinations* occurred with ketamine (50%) and LSD (34%) and occurred with synesthesia; “I heard a roaring, deep ringing in my head, and soon a cacophony of sounds and sensation ensued, overwhelming me.” (“Phaeton” (M) Report ID: 90,988).

Mind-body connection

Psychedelics altered perceived integration between mind and body. *Dissociation* described decreased body awareness, with amplified awareness of personal consciousness; “I could not really locate where my body was. There was a definite body-mind split which made me exist thoroughly in thought.” (“Halcyon” (M) ID: 73,418). This was most common (62%) for ketamine, followed by psilocybin (31%), LSD (7%) but not for MDMA. *Connection* described bodily awareness; “I experienced all the good in life in a physical way. A hug wasn’t just a hug anymore, it was . . . followed with a physical sensation of love.” (“Anonymous” (M) Report ID: 111,464), and occurring mostly for MDMA (76%), but rarer for LSD (8%), psilocybin (8%) or ketamine (8%).

Discussion

Across all substances, music and nature amplified positive experience. Music and nature use is common in Indigenous ceremonial practices and ritual (particularly nature) is fundamental across cultures (Hartogsohn 2021), with music widely seen as facilitating physical and spiritual healing (Barrett, Preller, and Kaelen 2018). Research echoes the importance of both nature (Kettner et al. 2019) and music (Barrett, Preller, and Kaelen 2018) as integral aspects of the psychedelic “setting.” Neurologically, psychedelics induce a heightened sensitivity to context (Hartogsohn 2018), priming

individuals to find meaning (Hartogsohn 2018). Nature and music contain stimuli that interact with this neurological state, potentially enhancing experiential richness and meaning.

Both nature and music served as circuit breakers for distressing psychedelic experiences. These effects were noticeably dependent on the substance taken. For example, participants using MDMA reported no auditory distortions, but reported enhanced desire for physical movement and exploration, alongside heightened tactile sensitivity. Nature was more effective than music in grounding and reassuring these participants. Psilocybin and LSD were more variable, with different combinations of physical and sensory changes. The capacity for music or nature to shift their experience thus depended on individual responses to the substance. Ketamine users were more affected by music than by nature. The dissociation and limited mobility induced by ketamine, paired with enhanced auditory sensitivity and synesthesia, meant music could reach these participants when they became “unreachable.”

Identification of soothing factors during acute experiences may carry clinical implications. While music provides a tool to enhance and guide patient experience in clinical psychedelic research (Kaelen et al. 2018), participant report suggests it could also be a tool for de-escalation. As most research occurs indoors (Breeksema et al. 2020), ecologically-embedded sessions could add therapeutic value.

Participants with surrendered mind-sets before and during the acute phase reported more positive experiences, consistent with findings that willingness to surrender to the experience minimized adverse outcomes (see Carhart-Harris et al. 2018). Conversely, Russ et al. (2019) found that mental resistance prior to consumption strongly predicted participant distress.

Participants understanding possible physical, perceptual, and psychological changes in the acute phase could better navigate them, better anticipating challenging parts of the experience. This markedly impacted their mind-set, decreasing anxiety and resistance, and increasing confidence and surrender during these phases.

Preparation impacting participant experience was related to its effect on mind-set. When external factors (such as safety) were controlled, participants could release internal control and adapt to emergent experiences. Contrastingly, feeling uncomfortable or unsafe increased resistance to substance effects. Accounts reported here are consistent with prior work on psychedelics and attachment theory, which suggests more positive experiences tend to occur in environments that participants are accustomed to (Stauffer et al. 2020).

Preparation also related to understanding; participants anticipating possible drug impacts could implement better safety plans.

Participants motivated by self-exploration were more open to engaging unexpected or challenging material during their acute phase. This facilitated more meaningful experiences (see Haijen et al. 2018). Conversely, participants using psychedelics as reality escape usually sought avoidance of psychological material. Participants motivated by escapism rarely understood the substance enough to anticipate this effect, reporting more distress and negative outcomes.

The interconnected nature of these four factors points to the importance of holistic consideration by psychotherapists. Fortunately, harm reduction frameworks for psychedelics often reflect these inherent presumptions. For example, recent work offers a framework for supporting individuals taking psychedelics for self-therapeutic purposes (Gorman et al. 2021). Use of this framework enables clinician assistance with preparation, understanding, motivation and mind-set before the patient's acute psychedelic experience, and subsequent debriefing.

Yet, current frameworks across the United States and the European Union do not generalize to populations self-medicating *without* clinical guidance, even when psychedelic therapy is legally accessible (Pilecki et al. 2021). The high cost of treatment for groups who could benefit most remains an ethical concern (known as “inverse care”; Rea and Wallace 2021). Purchasing and using psychedelics at home is comparatively affordable, therefore harm reduction frameworks must expand beyond the clinician's office and be available for those financially limited to self-medication.

Public awareness of the importance of preparation, understanding, motivation and mind-set during psychedelic use, is relevant given current trends (Hase et al. 2022). More people are using psychedelics for self-therapeutic purposes, without clinical supervision (Pilecki et al. 2021). Public use of ketamine, MDMA, psilocybin and LSD has increased substantially (Andrews and Wright 2022; Holoyda 2020;). The main reason for usage is self-treatment of a professionally or self-diagnosed psychiatric condition .

Researchers attribute this trend to increased coverage of psychedelics' potential as therapeutic tools. Observing positive reports of psychedelic treatment is associated with increased likelihood of later personal use of psychedelics (Matzopoulos et al. 2021). Yet the translation of clinical research findings to mainstream media is often oversimplified (Carhart-Harris et al. 2018) and the importance of factors such as those identified here can be overlooked.

This is compounded by publications emphasizing therapeutic benefits of psychedelics for those already seeking therapy. Such populations may be more vulnerable to adverse effects of psychedelics which may amplify rather than ameliorate challenging psychological content. Those using psychedelics for self-treatment of mental health conditions were four times more likely to require emergency medical treatment, than those using them recreationally (Winstock, 2020).

These findings should prompt researchers and the media to emphasize that the therapeutic potential of psychedelics is highly reliant on setting. Conveying the specific role of factors such as preparation, understanding, motivation and mind-set, may minimize lower risk of adverse psychedelic experiences.

Generalizability of our findings is limited by non-probability sampling. Secondly, the Erowid reports were written independently of the study. Report content was limited to what each participant deemed relevant, so it was impossible to standardize the type of demographic details included. Future research could address this by replicating the thematic analysis using firsthand data collection. Michael, Luke, and Robinson (2021) sourced participants who *prospectively* intended to take the psychedelic substance of interest, for therapeutic or recreational use, in a personal setting. Semi-structured interviews were administered to participants during their acute experience. Finally, the strength of qualitative methodologies can be made more robust via a mixed method design that uncovers both quantitatively factorized predictors as well as intrasubjective factors. A follow up study showing confirmatory quantitative associations within predictors could thus be fruitful.

Here we identified subjective predictors of psychedelic experiences. Thematic analysis revealed three internal and three external predictors, each with specific sub-themes that highlighted their meaning. Nature and music emerged as potential tools for de-escalating adverse reactions to psychedelics. Analyzing four distinct psychedelic substances concurrently provided insight into how predictors emerged with each report and across reports. Understanding factors most prevalent in specific substances could enable practitioners to tailor set and setting and best support patients. The impact of preparation, mind-set, understanding, and motivation should be considered further and in more depth as research within this field matures.

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