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Harm reduction practises for users of psychedelic drugs: a scoping review

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Abstract

Psychedelic use in naturalistic settings in Australia is increasing. Although the risks and harms of psychedelics from a physical perspective are low, psychedelic drugs carry a unique psychological risk profile which is increased in uncontrolled settings. Harm reduction support services align with the Australian Government's Federal Drug strategy, which includes harm reduction as the third pillar in the overall harm minimisation approach to drug use for the period of 2017–2026. This study examined the harm reduction behaviours which users of psychedelics in naturalistic settings currently use, and any harm reduction interventions which have been developed for this population. A scoping review was undertaken using online databases, Psychinfo, Medline, CINAHL and Scopus. Articles were included if they explored or informed harm reduction practices for users of psychedelic drugs in naturalistic settings, which included articles that investigated motivations for psychedelic use. Twenty-seven papers were included, which contained only four intervention-based studies. Harm reduction or benefit enhancing strategies were categorised into three themes: before psychedelic use, during psychedelic experience and after the experience (integration). The review found that users of psychedelic drugs in naturalistic settings employ several different harm minimisation strategies, predominantly before and during use. Motivation for use, social setting and dosage amount were all found to influence the strategies used. There were a limited number of evaluated interventions for users of psychedelics in naturalistic settings, identifying the need for further research in this area. Challenges for harm reduction campaigns such as low uptake of drug checking services and low trust in government institutions were identified. Further research needs to consider the differing motivations of psychedelic users and recognise strategies that promote benefit enhancement and reduce risk.

Keywords Risks, Harm reduction strategies, Benefit enhancement, Naturalistic use, Hallucinogens, Psilocybin

Prevalence and usage

Psychedelic use in Australia is increasing. The National Household Drug Strategy survey found that there were sizeable increases in the use of hallucinogenic drugs in Australia between 2019 and 2023 with an increase from 300,000 to 500,000 people reporting recent use [1]. Specifically, people using psilocybin in the last 12 months increased from 0.9% of the population to 1.8%, effectively doubling during this time [1]. The increase in psychedelic use is not limited to Australia; the Global Drug Survey 2022 also highlighted significant increases in psychedelic use internationally, including the UK, Canada and in the USA [2]. For example, in the year ending March 2023, psychedelic use had increased from 0.7 to 1% of the population in England [3]. This compared with 3.1% (estimated 8 million) of Americans who reported using psilocybin in 2023 [4].

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Psychedelic use in Australia is an evolving landscape and there are several factors which may have influenced the rise in psilocybin use during this period. Firstly, in February 2023 the Therapeutic Goods Administration (TGA) announced a rescheduling of psilocybin from a Schedule 9 (a prohibited substance of the Poisons Standard) to Schedule 8, allowing its prescription for Treatment Resistant Depression (TRD), in conjunction with psychotherapy [5]. The decision was made based on evidence that psilocybin, when taken in conjunction with psychotherapy in a controlled environment, may be therapeutically beneficial [5]. The TGA also stated that when taken in this environment, the benefits to public health and patients, are greater than the risks [5]. Australia is the first country in the world to formally recognise psilocybin as a medicine with therapeutic potential. Interestingly, there were over 6000 public submissions to the TGA in support of the rescheduling, indicating large scale public support for the decision to make psilocybin available for therapeutic use [5].

Further, there has been a rise in the visibility of psychedelics and their potential therapeutic benefits in mainstream society. For example, Michael Pollen's novel 'How to change your mind: the new science of psychedelics' was developed into a Netflix series in 2022, making this research available and digestible for broader public audiences. A review of google search term trends from 2018 to 2022 found a significant increase in google searches for 'psilocybin 'and 'psychedelic therapy' during this period, indicating public interest in the topic is growing [6]. It appears that the TGA re-scheduling decision, the increase in mainstream availability of information, and growing public interest in psychedelics, particularly psilocybin, has coincided with increased use in naturalistic settings. It is also possible that the TGA decision may have influenced the social acceptance and public interest in psilocybin in Australia.

Potential harms

Given the increased usage in non-medical settings, strategies to minimise the potential harms of psychedelics are becoming increasingly more salient. Psychedelic drugs carry a unique psychological risk profile when compared with other categories of drugs, due to their distinct perceptual and physiological effects [7]. Based on a review of the potential risks of psilocybin, it appears that from a physiological perspective, the risk is low: psilocybin has been found to be safe for human ingestion when taken at the appropriate dosage and not in conjunction with alcohol or other drugs [8, 9]. The lethal dose for psilocybin is 1000 × that of an effective therapeutic dose, which is 25 mg, [10] meaning the risk of overdose is extremely low [11]. The potential risks of psilocybin are more likely to be psychological in nature and involve harm to self or others through dangerous behaviour [12] or having a challenging experience which may involve distressing emotions such as fear, anxiety or paranoia [13]. Adverse psychological reactions including increase in suicidal intentions and behaviours, particularly at higher doses, have been reported in clinical trials of psilocybin assisted therapy for depression [14]. These findings indicate that even when the experience is well managed, psychedelic experiences do carry an (albeit small) risk of worsening an individual's mental health.

The risks associated with psilocybin use can be minimised with adequate harm reduction strategies including preparation and deliberate consideration of circumstances which are more likely to create a safe and favourable experience [15]. Clinical settings provide the appropriate screening, medical support and controlled environmental conditions for psilocybin ingestion to be facilitated in a safe way, to reduce the risk of negative psychological reactions [16]. However, when taken in naturalistic settings the risk of possible harm may be greater. The use of psilocybin in combination with other substances in naturalistic settings has been linked with longer term negative consequences, and higher doses have been associated with more challenging experiences known as "bad trips" and emergency department admissions [17]. People who take psilocybin in naturalistic settings may use it for different intentions including self-treatment, self-expansion but also hedonistic motives such as for fun or escapism which may give rise to more risk-taking behaviour such as taking higher doses or mixing with other substances. Some studies have also found higher doses and poly substance use were related to difficult experiences, and enduring negative psychological symptoms including suicidality have been reported [18–20]. Although extremely rare, reports of death following ingestion in naturalistic settings have occurred [21]. Conversely, there is also evidence to suggest that taking psychedelics in naturalistic settings can produce enduring positive changes to wellbeing [22]; and decreases to depression and anxiety [23]. Understanding which strategies are used to decrease the risk of possible harm but also enhance the potential benefits of psychedelic use in naturalistic settings is important for informing future interventions which aim to support people who use psychedelic drugs.

The need for appropriate harm minimisation support for users is becoming increasingly more salient, given the reported increases in psychedelic usage. In the historical context of public health, harm reduction has focussed on reducing the negative consequences of drug use, as opposed to promoting abstinence or eliminating use [24]. Harm reduction support services align with the

Australian Government's Federal Drug strategy, which includes harm reduction as the third pillar in their overall harm minimisation approach to drug use in Australia for the period of 2017–2026 [25]. Within a clinical framework, harm reduction approaches extend to respecting the individual's autonomy and values, whilst helping them to engage in conscious and informed decision making [26]. Specifically, harm reduction for users of psychedelics may include education about both the risks and *potential benefits* of psychedelic use, involving specific strategies designed to maximise the benefit of the psychedelic experience, making benefit enhancement a component of psychedelic harm reduction [27]. In clinical practise, there are ethical and legal considerations which guide harm reduction practises [27]. However, understanding what harm reduction practises are currently employed by users of psychedelic drugs in naturalistic settings, what influences use of these strategies, and the outcome of any interventions which have been undertaken may inform future harm reduction efforts in both clinical and public health settings.

A scoping review has been selected as an appropriate tool to systematically map the current research aims and identify the current gaps in knowledge.

The current study

To assess the current state of the literature regarding psychedelic harm reduction practices, this scoping review addressed the following two questions:

1. What harm reduction practices are users of psychedelics employing, and what factors influence use of these practices?
2. What harm reduction interventions have been implemented for people who take psychedelics in naturalistic settings and what are the outcomes of these interventions?

Methods

Design

The design of this review has been informed by Arksey and O'Malley [28], following their six-step process: (1) identifying the research question, (2) identifying relevant studies (3) study selection, (4) charting the data, (5) collating, summarising and reporting the results and (6) consultation. This study has been developed as a scoping review of the literature, which has been considered an appropriate approach to collate evidence, identify knowledge gaps and clarify key concepts of health-related research [29]. Reporting of this study has been guided by the Preferred Reporting Items of Systematic and Meta- Analyses Extension for Scoping Reviews (PRISMA- ScR) checklist [30]. See Appendix A.

Search strategy

In consultation with a faculty librarian a systematic search was conducted on 11 June 2024. The search was conducted through the following electronic databases: PsychINFO, Medline (Ovid) and CINALH, SCOPUS. Two search terms and variations were used: "psychedelic drugs" and "harm reduction." (Variations: "harm" or "damage" or "risk" "reduc*" or "minimi*" or "decres*" or "diminish" OR "benefit" or "advantage" or "enhanc*" or "maximi*; "Psychedelic Drug" or "Hallucinogen" or "Bufotenine" or "Lysergic Acid Diethylamide" or "Mescaline" or "Peyote" or "Phencyclidine" or "Psilocybin" or "Methylenedioxyamphetamine" or "DMT" or "Dronabinol" or "Harmine" or "Ibogaine" or "N'N Dimethyltryptamine") (See Appendix B for full search term strategy). Additionally, citations maps were evaluated and the 'cited by' search tools were used when available to identify relevant articles.

Study selection

Both quantitative and qualitative studies were eligible if they explored or informed harm reduction practices for users of psychedelic drugs in naturalistic settings, which included articles that investigated motivations for psychedelic use. Inclusion criteria were: peer reviewed journal articles with primary data collection, peer reviewed opinion papers, hypothesis or theory articles; all date ranges up until June 11, 2024 (date the most recent search was executed), full text available, articles involving psychedelic harm reduction. Exclusion criteria were articles without full text availability, grey articles, and articles describing use or harm reduction strategies for drugs which are not classic psychedelics such as cannabis, ketamine, MDMA etc. Articles which discussed challenging experiences or harms of use but did not reference harm reduction strategies to mitigate these were excluded from the review, however, they were used to inform the background and rationale of the review. The primary author screened all study titles and abstracts before conducting a full text screening. Each individual article underwent full review based on inclusion/ exclusion criteria and were checked by a second reviewer. As the scoping review questions identified are descriptive, a formal critical appraisal tool was not used at this stage.

Charting the data

To address the research questions, the following details were extracted from each article: Author(s), title, year, study design, sample size and participants, outcome

measures, key findings from results and intervention details (for the four relevant intervention studies).

Collating, summarising and reporting of results

To summarise the data, qualities of the studies were included, and themes were identified and reported. To address question two, details were given regarding the aims of each intervention, the qualities of the intervention and any evaluation results. Studies were allocated based on relevance to each question posed by the review. Once articles were categorised, the primary author coded the data, identifying relevant themes.

Results

Characteristics of included studies

In total, 1522 documents were identified through the search strategy (See Fig. 1: PRISMA Flow Diagram). After duplicate articles were removed ($n=427$), the remaining ($n=1095$) titles and abstracts were reviewed and screened for inclusion. From this review, articles were excluded based on irrelevance to this study ($n=959$). The remaining articles (n = 136) were sought for retrieval, and full text review. Full text records could not be retrieved for some records ($n=20$). After articles were retrieved and the full texts reviewed against exclusion criteria, 27 studies remained in the full data set. Of the 27 included studies, 11 were quantitative, nine were qualitative, six were mixed methods and one was an opinion paper (See Table 1: characteristics of included studies).

Question 1: What harm reduction strategies were employed by users of psychedelic drugs and what factors impact use of these strategies?

There are interchangeable terms used within the psychedelic harm literature, including 'harm reduction strategies,' 'protective behavioral strategies,' and 'benefit enhancing strategies.' This review has selected the use of 'harm reduction strategies' to encompass any strategy which is used for the purpose of reducing potential harm or enhancing potential benefit of psychedelic use. An extensive range of harm reduction or benefit enhancing strategies are reported by people who take psychedelic drugs in naturalistic settings [51, 53].

The strategies have been grouped and then themed according to time they are undertaken: (1) Preparatory strategies: knowledge seeking, mindset, setting, safety, body; (2) During the psychedelic experience: emotional support, music, modifying the environment and (3) After the experience (integration). The frequency of reported themes across the three time points is illustrated in Fig. 2. Further, use of these strategies is influenced by key factors which are presented and discussed according to themes identified. Although these themes have been presented in temporal order, some strategies are used across multiple time points. For example, whilst strategies which focus on 'setting' related variables have been categorised as *preparatory,* making changes to the 'setting' *during* the psychedelic experience was also identified as a key theme. Strategies which fall under the theme of 'mindset' were also used across multiples time points (See Fig. 2).

Preparatory strategies (before drug taking)

Knowledge seeking

Knowledge seeking was identified as a common preparatory strategy in 16 out of the 27 studies. Users of psychedelic drugs in naturalistic settings seek knowledge about the substance they are taking, including dosage recommendations, safe usage practises and suitable settings for ingestion [37, 43, 46, 51, 53]. Knowledge was sought from several sources including the users' own experiences, from friends, online forums, and academic peer reviewed articles [36, 46]. Interestingly, users reported being less likely to seek information from their health care providers, and government sources of information were less likely to be trusted than other sources [32]. The authors suggested that this is likely due to historical misrepresentation from government agencies regarding the true risks of psychedelic substances [32]. Participants who were informed through their knowledge seeking of what to expect from the psychedelic experience, felt more capable of navigating through a challenging experience [43], whilst users with little prior knowledge were more likely to report adverse outcomes [20, 40].

Mindset

A focus on cultivating a helpful mindset before engaging in drug taking was reported in 13 out of the 27 studies. Mindset encompassed different aspects such as mood prior to taking, expectations and intentions. Mindset focussed strategies included adopting a state of surrender, or an allowing of the experience characterised by trust, ease, relaxation, calm and acceptance [20, 43, 44]. It was identified that a mindset characterised by fear, negativity, overwhelm or resistance was associated with greater instances of a challenging emotional experience or "bad trip" [20, 38, 50]. There were several specific strategies reported which fall under the theme of mindset including meditation prior to the experience; setting an intention for the experience, trying to relax one's mind, avoiding taking the substance if in a negative mood, reminding self not to fight the experience and talking with friends or a guide about hopes and expectations for the experience [35, 53].

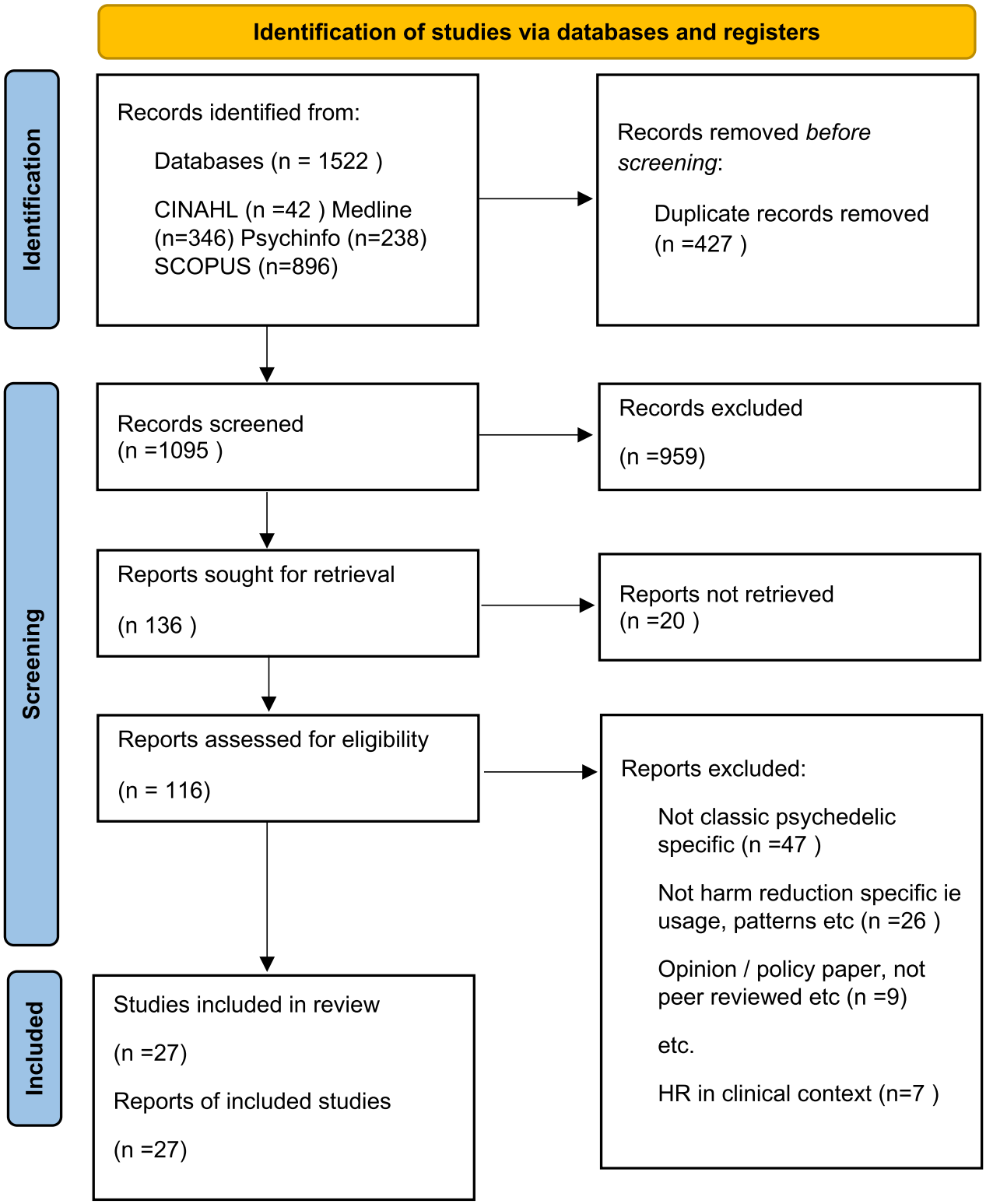

Fig. 1 PRISMA 2020 flow diagram for new systematic reviews which included searches of databases and registers only

Table 1 Characteristics of included studies

Title	Year	Authors	Study aim/s	Study design and methods	Participants/samples	Outcome measures	Key findings
Quantitative studies							
Substance use, harm reduction attitudes and behaviours among attendees if nature rave parties in Israel [31]	2023	Bonny-Noach et al	To Investigate patterns of use, harm reduction attitudes and behaviours among Israeli nature rave party attendees	Quantitative- Cross sectional online survey	1206 people who attended nature rave parties between 18 and 60	(i) Demographics and characteristics of participants (ii) Substances used during rave parties (iii) harm reduction attitude questionnaire (iv) harm reduction behaviours	44.4% used LSD, 23.9% used psilocybin; large proportion of participants held positive attitudes towards harm reduction interventions (up to 94.1% for some strategies). A significant but weak association found between harm reduction behaviours (use of drug checking) and attitudes. Although attitude towards harm reduction practises such as drug checking was positive, harder to implement harm reduction behaviours in this setting (not substance specific))
Tripping into the unknown: exploring the experiences of first time LSD users through the global drug survey insights [32]	2024	Baxter et al	To understand the motivations, planning, experiences, and perceptions of individuals engaging in LSD use for the first time	Quantitative Cross-sectional online survey	3340 respondents who had used LSD in the previous 12 months, taken from Global Drug Survey	(i) participant demographics (ii) consumption behaviours (iii) Acquisition, form and dosage (iv) Setting and social accompaniment (v)Mindset (vi) Polysubstance use (vii) Knowledge and expectations of LSD (viii) Harm reduction strategies (iix) characteristics of Emergency Medical Treatment (EMT) Seekers)	Feelings of fear reported by most, 64.1%, high reported levels of excitement before use (97.7%), 17 individuals needed Emergency Medical Treatment (EMT). Health care professionals and treatment services were among the less frequently used sources of information. Setting of use predominantly at home (30.3%) or friends house (26%). 50.3% used trip sitter on their first time. Online drug forums most common source of information (59%). Less than a 3rd reported taking test dose first

Table 1 (continued)

Title	Year	Authors	Study aim/s	Study design and methods	Participants/samples	Outcome measures	Key findings
In naturalistic psychedelic use, group use is common and acceptable [33]	2023	Byrne et al	To evaluate perceived benefits and harms of naturalistic psychedelic use in diverse settings, with and without guidance/ supervision	Quantitative- Observational, cross sectional online anonymous survey	578 previous users of classic psychedelics, adults	(i) demographics of participants (ii) Mental health intentions and outcomes associated with psychedelic use (iii) Physical harm or danger associated with psychedelic use (iv) group versus solo use comparisons (v) formal versus informal settings (vi) number of uses and outcomes	No association was found between group versus solo use and reports of worsening psychiatric symptoms. No significant different association between group use and solo use and report of physical danger or harm. Ie harm not increased in group settings. Across groups, all likely to find psychedelic use helpful versus harmful. For the goal of improving mental health use in solo setting was more common than group setting and associated with more subjective symptom improvement. Less than 2% of participants reported harms from psychedelic use
Patterns of recreational drug use and harm reduction strategies amoung women at music festivals: The case of Hungary and Poland [34]	2021	Kender-Jeziorska	To examine drug use patterns and applications of harm reduction measures by women attending music festivals in Hungary Poland	Quantitative, cross sectional via anonymous online survey	510 online survey respondents, women aged between 14 and 56 who have attended music festivals (s)	(i) Demographic characteristics of participants (ii) Patterns of drug use in festival settings (iii) substance knowledge and harm reduction methods including use of trip sitter and drug testing services	1/3 used LSD at music festivals, one in 5 used psilocybin mushrooms. Only 1/10th used 'heavy doses.' 66% of drug users never tested substances, older women tended to test drugs and ensure trip sitter present. Consumption of higher doses was negatively correlated with having a sober companion. Moderate correlation between drug testing and trip sitter presence. Most women used two drugs (combination) of drugs and alcohol)

Table 1 (continued)

Title	Year	Authors	Study aim/s	Study design and methods	Participants/samples	Outcome measures	Key findings
Psychedelic Communitas: Intersubjective experience during psychedelic group sessions predicts enduring change in psychological wellbeing and social connectedness [35]	2021	Kettner et al	To assess to acute relational experiences of perceived togetherness and shared humanity, to investigate psychosocial mechanisms of psychedelic ceremonies and retreats. Validation of adapted Communitas Scale tool	Quantitative, Prospective observational design, online survey measured at 5 time points: (i) baseline: 2 weeks prior to psychedelic experience (ii) 3 h before, (iii) day after experience (iv) day after leaving retreat location (v) 4 weeks after end of ceremony or retreat	886 online survey respondents who planned to attend psychedelic retreat or ceremony	(i) demographics of participants (ii) experience details (iii) Warwick—Edinburgh Mental Wellbeing Scale (WEMWBS) (iv) Social Connectedness Scale (v) Quick Inventory of Depressive Symptomatology (QIDS-SR-16), (vi) Speilger Trait-State Anxiety (STAI) (vii) Warm Tolerance subscale of the Interpersonal Tolerance Scale (IPTS) (viii) Modified Tellegen Absorption Scale (MODTAS) (ix) Psychedelic predictor scale (x) Identity Fusion scale. Post experience measurement: subjective psychedelic experience, subscales from Altered States of Consciousness Questionnaire (ASC-VE); Mystical Experience Questionnaire (MEQ), Challenging Experience Questionnaire (CEQ), Perceived Emotional Synchrony (PESC), Communitas Scale, self constructed scale to measure impact of emotional support	Validation of proposed measure of communitas (intense togetherness and shared humanity); which significantly predicted enduring increases in psychological wellbeing and social connectedness. Enduring prosocial benefit from taking psychedelic in a guided collective setting (benefit enhancement). Acute experience communitas was most significantly predicted by perceived emotional support during the ceremony, making emotional support a priority for collective psychedelic use to enhance psychological wellbeing and social connection

Table 1 (continued)

Title	Year	Authors	Study aim/s	Study design and methods	Participants/samples	Outcome measures	Key findings
How do learn more about this? Utilisation and Trust of psychedelic information sources among people naturalistically using psychedelics [36]	2023	Kruger et al	To characterise and describe information sources utilised by psychedelic users and to better understand the perceptions of those sources by surveying participants in a psychedelic advocacy event, groups or online discussion forums	Quantitative, observational cross-sectional design anonymous online survey	1221 users of psychedelics	(i) Demographic characteristics of participants (ii) past psychedelic use, frequency of use and strength of doses (iii) sources of psychedelic information	Most common source of info was their own experimentation and experiences. Only 4.83% of participants reported seeking information from their primary health or medical care provider. Older participants more likely to seek information from psychedelic therapists. More participants thought that the popular media understated the benefits and overstated the risks of psychedelics, Lowest level of trust was government agency sources. Peer reviewed journals most trusted source of information. High degree of information seeking
Microdosing psychedelics: motivations, subjective effects and harm reduction [37]	2020	Lea et al	To describe the motivations, dosing practises, short term perceived benefits and unwanted effects, and harm reduction practises of people microdosing psychedelics	Quantitative, observational cross-sectional design, online anonymous survey	525 respondents who were currently microdosing psychedelics	(i) Microdosing information: substances, frequencies, dose, knowledge sources (ii) The Severity of Dependence Scale (SDS) (iii) Perceived benefits and negative/unwanted effects	Motivation for use largely therapeutic (40.4%), spiritual development and enhanced cognitive performance. Harm reduction information largely obtained from online forums, most common harm reduction practises: not microdosing when not feeling well, avoiding alcohol and caffeine, not microdosing in new or unfamiliar settings, avoiding driving). use of home testing kits encouraged for harm reduction given the difficulties with consistent dosage

Table 1 (continued)

Title	Year	Authors	Study aim/s	Study design and methods	Participants/samples	Outcome measures	Key findings
Development of a digital intervention for psychedelic preparation (DIPP) [38]	2024	McAlpine et al	To develop and refine a self-directed Digital Intervention for psychedelic preparation (DIPP),	Mixed methods- study 1 qualitative Initial Intervention development. Qualitative- in depth interviews. Study 2 Intervention component refinement, workshops with participants of psychedelic retreats HR strategies used: preparation strategies including knowledge seeking, mindset setting, safety planning	Study 1- 19 participants, 3 months post psilocybin retreat. Study 2. 28 participants on the last day of psilocybin retreat	Study 1: Themes identified: (i) knowledge/ expectation, (ii) Intention/ preparation, (iii) psychophysical-readiness and (iv) safety -planning. Demographic information obtained. Study 2: Identification of preparation elements with high perceived value of users	Study 1: Theme 1: Knowledge- expectation; subthemes: acquiring knowledge about the science and history of psychedelics, acquiring information about subjective psychedelic effects, undertaking experiential mind- body exercises; Theme2: Psychosocial readiness: subthemes: promotion of relaxed and regulated psychophysical state, cultivating present moment awareness, cultivating awareness of body sensations, optimising overall physical health. Theme 3 Intention-preparation, subthemes: identifying motivations for using psychedelics, establishing intentions. Theme 4: Safety-planning, subthemes: cultivating trustful relationships, verifying retreat and staff credibility, preparing in experience support, preparing post support integration plan Study 2: i) specific preparatory behaviours and strategies identified under each theme. Meditation also identified as predominant preparatory behaviour. Barrier to implementation was information overload, structured guidance for coping strategies and expectation management. DIPP: three week digitally accessed intervention with four modules aligned to the 4 themes- meditation as harm reducing strategy

Table 1 (continued)

Title	Year	Authors	Study aim/s	Study design and methods	Participants/samples	Outcome measures	Key findings
Reducing the harms of non-clinical psychedelics use through a peer support telephone hotline [39]	2023	Pleet et al	To determine whether a helpline could reduce the risks for those experiencing difficulties during and after nonclinical psychedelics use	Quantitative, observational Pilot study- Collected data from Fireside (a psychedelic helpline run by volunteers). Anonymous post call survey to people who called the helpline + call logs completed by call takers HR strategies used: phone based peer support	848 anonymous survey responders who had called the psychedelic helpline + 4047 call logs from call takers	(i) offsetting the burden on emergency services (ii) De-escalating callers from distress (iii) reducing risks during psychedelic integration (iv) emotional content of caller's psychedelic experiences (v) taking psychedelics alone (vi) reported psychiatric conditions	Access to helpline may avert harmful outcomes. 65.9% of callers stated that helpline played significant role in de-escalating callers from emotional mental physical distress. 66.4% of respondents who contacted the helpline for past experiences stated that the conversation de-escalated them from psychological distress
Prevalence and associations of challenging, difficult or distressing experiences using classic psychedelics [20]	2023	Simonsson et al	To conduct exploratory research on the prevalence and associations of challenging, difficult or distressing experiences using classic psychedelics in naturalistic settings	Quantitative, cross sectional observational design. Online survey	613 lifetime users of classic psychedelics in the US	(i) Lifetime classic psychedelic use (ii) Challenging, difficult or distressing experiences including the Meditation-Related Adverse Effects Scale- Mindfulness Based Program (MRAES-MBP) (iii) Challenging Experiences Questionnaire (CEQ)	59.1% never had challenging, difficult or distressing experience, .9% reported impairment in functioning which lasted longer than 1 day, most common reported variables associated with challenging experiences were: no preparation, negative mindset, no psychological support, disagreeable social environment, disagreeable physical environment. Most helpful interventions: calming mind, changing location, asking for help from friend, changing social environment, smoking cannabis. 1 in 40 sought medical help in the days/ weeks following, one in 15 report thoughts of hurting self or others, major life event prior to experience were associated with higher odds of overall harm

Table 1 (continued)

Title	Year	Authors	Study aim/s	Study design and methods	Participants/samples	Outcome measures	Key findings
Contextual parameters associated with Positive and Negative Mental Health in Recreational Psychedelic Users [40]	2023	St Arnaud and Sharpe	To explore various relationships between contextual parameters of psychedelic use and mental health in recreational users	Quantitative Cross sectional design, online survey	511 adults who reported having previous experience with psychedelics	(i) Demographic characteristics of participants (ii) Drug use patterns and problematic psychedelic use—Alcohol, Smoking and Substance Involvement Screening Test (ASSIST) (iii) Drug use intentions (iv) Post use integration (v) Mental distress measured using K-6 (vi) Adjustment measured using Satisfaction with Life Scale and Scales of Psychological Wellbeing vii) The Quiet Ego scale; Adult Self transcendence Inventory; personal growth, purpose in life and autonomy subscales of Scales of Psychological Wellbeing	Increased frequency of psychedelic use is associated with lower mental distress higher adjustment and higher growth, peaking at 3–4 times per year, beyond this, frequency is associated with higher mental distress. Self-expansion most common reason for use- includes spirituality, creativity, to understand things differently and introspection. Lifetime use predicted adjustment. Group use negatively correlated with problematic use and frequency- groups use may protect against problematic use. Self-expansion motives predicted psychological adjustment and growth. Post use integration showed strongest associations with growth, highlighting importance of integration for maximum benefit
Qualitative studies							
Psychedelic pleasures: An affective understanding of the joys of tripping [31]	2017	Bohling	To understand the pleasures of psychedelic drugs, exploration of the affective modifications of the drug experience	Qualitative examination, data mapping	100 'trip reports' (50 of LSD users, 50 of psilocybin) from online internet forum (erowid.org)	mapping of 'affect'- the users' capacities to feel, sense, and act	Themes identified: (i) refigured feelings (fun, laughter, spiritual or mystical feelings, bliss, euphoria), (ii) changes sensations (bodily aspects, touch, hearing, feeling energy) (iii) altered activities (doing- dancing, exploring oneself or nature)

Table 1 (continued)

Title	Year	Authors	Study aim/s	Study design and methods	Participants/samples	Outcome measures	Key findings
Psychedelic Forum member preferences for carer experience and consumption behaviour: Can trip sitters help inform psychedelic harm reduction services [41]	2022	Engel et al	To evaluate 'trip sitter' preferences of psychedelic users	Qualitative- Thematic Analysis of online forums The Shroomery and DMT Nexus	Participants in online psychedelic care discussions. 244 posts relating to psychedelic consumers perceptions of harm reduction services	Identification of two key themes relating to trip sitting- experience level and remote sitting	80% commented on work life experience valued in psychedelic trip sitter. Preference for sitters with experience in non-ordinary states, knowledge of health and medical industry or psychedelic literature, who had prior experience with sitting. Move towards peer generated and led harm reduction with drug specific experience. Experienced trips sitter may reduce anxiety. 21% identified remote sitter-in another room/close by
Psychedelic discourses: a qualitative study of discussions in a Danish online forum [42]	2023	Holm et al	To explore user perspectives related to norms, beliefs, and practices concerning psychedelic substances from a Danish online forum. To identify the main ways in which people who use psychedelics talk about, understand and frame these substances	Qualitative Thematic analysis	Review of 1865 posts from 154 threads of online discussion on Danish psychedelic user-initiated forum	Identification of 5 distinct dominant discourses within the discussion threads	(i) Recreational- aiming for good or pleasurable experience; (ii) therapeutic-treatment, self-discovery, following certain guidelines in responsible way to achieve therapeutic outcome, self-directed. (ii) spiritual- discourse expressing belief that psychedelics and their spirits and knowledge are greater than oneself, and one's own ideas intentions; likely taken n ceremonial settings, connection to divine. (Iv) scientific reference to neurobiological effects, and evidence, sharing of scientific knowledge. (V) performance: improvement in performance such as creativity, effectiveness or social performance etc. Spiritual and therapeutic discourses were most dominant. Harm reduction and safety views likely to be different depending on discourse view of the user

Table 1 (continued)

Title	Year	Authors	Study aim/s	Study design and methods	Participants/samples	Outcome measures	Key findings
Predictors of Psychedelic Experience: A Thematic Analysis [43]	2023	McCartney et al	To identify factors that produce positive and adverse psychedelic experience, compare across different psychedelic substances to answer the question what are the internal and external variables of subjective experience during psychedelic use	Qualitative, thematic analysis	Twenty-two first person reported extracted from the 'experience vaults' in "Erowid."	Identification of the themes which impact positive and negative experiences: (i) Internal predictors: Understanding (informed, uninformed), Mindset (surrender, resistant), Motivation (escapism, self-exploration) (ii) External predictors: Nature (amplify, shift), Music (amplify, shift), Preparation (Atmosphere, safety)	Nature and music emerged as potential tools for de-escalation. Interrelationship between preparation, mindset understanding and motivation for use. External factors—nature and music was consistent impactful theme- ability to amplify and shift. Preparation- themes of atmosphere and safety emerged. Internal factors- understanding- knowledge of physical and psychological effects to help with navigating challenging aspects of experience, overwhelm and resistance creates panic/ distress. Mindset of surrender, secure at ease. Motivations for use- escape and self-exploration. Recommendation for specific role factors of preparation, understanding, mindset, understanding and motivation to minimise risk of adverse experiences

Table 1 (continued)

Title	Year	Authors	Study aim/s	Study design and methods	Participants/samples	Outcome measures	Key findings
Psychedelic substance use in the Reddit psychonaut community. A qualitative study on the motives and modalities [21]	2020	Pestana et al	To investigate motives and modalities of psychedelic substance use in the psychonaut community that is hosted on the Reddit platform, to inform harm reduction practises	Qualitative: content analysis and identification of themes	350 posts from Reddit of psychedelic substance users	Themes of motivations for use identified: (i) auto-gnosis (ii) Self-enhancement (iii) Identity (iv) other. Temporal dimension of modalities: before, during, after	Motivations: (i) Auto-gnosis- religious or spiritual practise, self-knowledge and investigation, self-medication (ii) Self enhancement (enhancing boredom, offsetting deficiency, increasing social contact, increasing sensation and pleasure, enhancing power (iii) identity- rebellion or alternative lifestyle, building person identity, expressing membership in a group. Modalities: Before: harm reduction advice: dosage, preparation, acquirement, intention, set and setting, good or bad, dieting, trip sitter, and not mixing substances, information: doing research, reading; During: set and setting: music versus silence, trip sitter versus solo and location. experience: positive versus negative, confusion, unity, ego death, overwhelming and surrender, harm reduction activities: meditation painting, calming audio, trip sitter; After: therapy support, community, journaling, abstinence, meditation and writing; experiences: positive versus negative, HPDD, suicide, better unity of mind and body, trauma- recovery, therapeutic, psychosis and addiction, recovery; impact: life changing, life questioning, turning vegetarian or vegan

Table 1 (continued)

Title	Year	Authors	Study aim/s	Study design and methods	Participants/samples	Outcome measures	Key findings
Socio-cultural and psychological aspects of contemporary LSD use in Germany [44]	2002	Prepeliczay	To learn more about the ways of coping with LSD induced altered states to gain a better understanding of the factors contributing to making these negative or positive experiences, in order to inform effective harm reduction measures	Qualitative- 26 narrative interviews, content analysis	26 lifetime users of LSD (had used 5 times or more) aged between 19 and 53)	General themes identified re: patterns of use, circumstances of use, reflections on drug use and drug experiences and subjective drug effects and acute consciousness alterations	Preparation and set setting considerations reported frequently. A third reported hedonistic motivations for use, a third linked to self-exploration or therapeutic purposes, some had both motivations, most popular settings were friends' houses or in nature. Largely positive experiences with positive impacts in behaviour reported. Recommendations for safer usage- not to be taken alone (take with non-drugged guide), supportive environment, encourage non-resistance, relax and allow, information made available to younger uses, anti-stress training such as techniques for relaxation to prepare for experience
"The junkie abuses, the psychonaut learns": A qualitative analysis of an online drug forum community [45]	2019	Rolando and Beccaria	To explore discussions about drugs and new psychoactive substances (NPS) on an Italian psychonauts online community in order to gain better understanding of the psychonauts profiles by scrutinising their main motives for consumption, which is mainly addressed to psychedelic drugs	Qualitative- content analysis of online threads	60 online threads on an online Italian psychonaut community, which had a purpose of providing harm reduction advice about psychedelics and other drugs	Main themes of conversation identified: Sharing experiences, sharing recipes or formulas, questions about substances affects	Three most frequent motive for use were learning, self-development and self-treatment. Personal development and spirituality referred to often

Table 1 (continued)

Title	Year	Authors	Study aim/s	Study design and methods	Participants/samples	Outcome measures	Key findings
Magic Mushroom use: A Qualitative Interview Study of Post Trip Impacts and Strategies for optimising experience [46]	2023	Shaw et al	To identify how people use magic mushrooms, what they perceive effects of such use to be, and the meanings that users attach to their experiences	Qualitative- semi structured in person interviews	20 adults (10 men and 10 women) aged between 19 and 24 who had used magic mushrooms within the past 3 months, residents of Victoria, Canada	Themes identified 1. Post trip impact: transformation and learning experiences Theme 2: methods used to optimise experience	Theme 1: Post trips impact: transformation characterised by long lasting, durable and immediate internal changes perceived as beneficial, Learning experiences, magic mushrooms elicited opportunities to engage in self-reflection, bad trips perceived as opportunities for growth. Theme 2: optimisation, research before taking (avoidance of government websites due to mistrust), use of 'trip journals' regarding dosing, peer support, women more likely to report preparation process which considered personal safety.' harm and risk perceptions accurate
Mixed methods/other							
Motives for use of serotonergic psychedelics: A systematic review [47]	2022	Basedow and Kuitunen	Understand and summarise motives for serotonergic psychedelic use	Systematic review of quantitative and qualitative reports	37 articles which assessed explicit motivation or reasons for use of a serotonergic psychedelics	Themes of motivations for psychedelic use and percentages of themes identified	Most common motives for SP use were desire to expand awareness (78% of included studies), followed by coping (67% and enhancement (57%). Suggestion for non-pharmacological ways to expand awareness as harm reduction (i.e. meditation/ breathwork)
Criss intervention related to the use of psychoactive substances in recreational settings- evaluating the Kosmicare Project at Boom Festival [48]	2014	Carvalho et al	To evaluate the relationship between substance use (unsupervised psychedelics) and mental health impact in a festival setting, and evaluate effectiveness of crisis intervention in reducing psychological distress	Mixed methods. (i) Quantitative- pre post measures using surveys. (ii) Qualitative: Perceptions of volunteer's experience with visitors obtained through short answer responses in addition to survey data HR strategy used: peer support to deliver cris intervention	176 participants who visited Kosmicare (crisis intervention for users of psychoactive substances) at Boom festival (Portugal)	(i) characteristics of Kosmicare visitors (ii) drug usage (iii) Pre- post mental state evaluation to measure effectiveness of intervention in reducing distress (iv) symptoms of the visitor (v) volunteer and visitor satisfaction with intervention process	40% presented with multiple drug use. High satisfaction with support received via intervention, stable over time. Pre post mental state evaluation showed statistically significant improvement supporting effectiveness Kosmicare in reducing mental distress

Table 1 (continued)

Title	Year	Authors	Study aim/s	Study design and methods	Participants/samples	Outcome measures	Key findings
The pleasure in context [49]	2008	Duff	Explore the pleasures of drug taking, how understanding lends to different discourse in drug policy or harm focus	Clinical opinion paper	N/A	N/A	Pleasures associated with drug taking not just physiological, extend to contextual elements- space, embodiment and practise. Set and setting discussion- different substances in different contexts will allow for 'different ways of being' in the world which may not be accessed when sober, sense of connection with others
Extended difficulties following the use of psychedelic drugs: a mixed methods study [50]	2023	Evans et al	To investigate difficult experiences persisting beyond 24 h after the pharmacological effects of taking a psychedelic have concluded. Specifically- the types of difficulties reported, the contextual social settings preceding the difficulties, the relationship between enduring difficulties and past trauma's, and mental health diagnosis	Convergent mixed methods study: observational cross sectional online survey + brief narrative descriptions	608 individuals who had taken psychedelics and experienced difficulties which negatively impacted them for more than one day post trip, aged over 18	(i) Demographics of participants (ii) The psychedelic experience- substance taken, dose knowledge, location (iii) Post experience difficulty duration and types (iv) Participant etiological interpretations: mental illness, childhood trauma (v) Continued consumption and attitudes to psychedelic drugs. Qualitative- themes: difficulties with social, perceptual, cognitive, emotional, existential, ontological, self-perception, somatic, experiences of psychotic episode	103 participants had extended difficulties lasting more than 3 years, 89.7% of participants who had ongoing challenges agreed with the statement that psychedelics were worth the risks involved. Emotional regulation difficulties the most frequent and persisting (76%). Challenging-ness of trip and unguided setting were both predictors of duration and range of extended difficulties. Shorter duration of difficulty predicted by knowledge of dose, drug reported difficulty during the psychedelic experience type and lower levels of difficulty during the experience. Reduced range of difficulty when taken in guided setting. Recommendations for self-soothing training as harm reduction strategy

Table 1 (continued)

Title	Year	Authors	Study aim/s	Study design and methods	Participants/samples	Outcome measures	Key findings
Use of benefit enhancement strategies among 5-MeO-DMT Users: Associations with mystical, challenging and enduring effects [51]	2020	Lancelotta and Davis	To examine the prevalence of using 14 benefit enhancing strategies among a large sample of people that use 5-Meo-DMT	Mixed methods cross sectional design. Online anonymous survey with categorical and open-ended questions	116 survey respondents who had used 5-MeO-DMT at least once	(i) 5- MeO- DMT survey (includes questions about type, usage, frequency, and reasons for use) (ii) Benefit enhancing strategies (iii) Mystical Experiences Questionnaire (MEQ) (iv) Challenging Experiences Questionnaire (CEQ) (v) Persisting Effects Questionnaire (PEQ) (vi) Demographics questionnaire	More than half used benefit-enhancing (BE) strategies. Set and setting strategies used by 85%, 4 BE strategies had positive association with mystical type experiences- meditated before, used ceremonial/ shamanic techniques, focused on intentions, and used with a guide. Intensity of challenging affect less amoung those who prepared music for session. 3 BE strategies associated with enduring effects- shamanic techniques, abstaining from alcohol and meditating prior to session
Safer tripping: Serotonergic Psychedelics and Drug Checking: Submission and Detection Rates, Potential Harms and Challenges for Drug Analysis [52]	2021	Hirschfeld et al	To investigate the presence and proportion of SP's as well as their alterations and analogues in drug checking samples, discuss physical and psychological harms associated with SP's detected by DC services	Literature review (Qualitative) of drug safety checking or 'pill checking.' HR strategy used: drug checking services	15 reports identified in searches	Results presented according to country: Netherlands, Spain, UK, Italy, Portugal, Belgium, Canada, Australia. (i) substances tested, frequencies and percentages (ii) adulterations found	Psychedelics constitute a low proportion of substances submitted to drug checking services (5%), presence of unexpected psychedelics in non-psychedelic samples, adulterations containing novel psychedelics were common. Amphetamine was most common adulterants in LSD samples in The Netherlands
Development of the protective strategies for psychedelics (PBS) scale: A novel inventory to assess safety strategies in the context of psychedelics [53]	2023	Maha Mien et al	Aims to address psychedelic use, specifically by developing a scale measuring protective strategies employed around use, called the Protective Strategies for Psychedelics Scale (PSPS)	Mixed methods. (i) preliminary study- used qualitative design, open ended response questions, thematically coded (ii) qualitative (PCA) for scale validation	434 adults with lifetime use of psychedelics	(i) participant demographics questionnaire (ii) psychedelic use- substance, frequency of sue, motivation for use (iii) development of PBS Scale (iv) PBSM scale and Protective Behavioural Strategies Survey (PBSS) for users who reported also using cannabis or alcohol	Development of 32 item scale, two sub factors- to capture both short- and long-term harm reduction strategies which psychedelic users employ to mitigate potential problems. Factors were (i) Mood/intention, substance, environment, scheduling (ii) Social, health and other substances. 80% of participants used some harm reduction strategies

Table 1 (continued)

Title	Year	Authors	Study aim/s	Study design and methods	Participants/samples	Outcome measures	Key findings
Are you tripping comfortably? Investigating the relationship between harm reduction and the psychedelic experience. [54]	2022	Pamer and Maynard	To develop an understanding of frequently used psychedelic harm reduction practises in recreational settings and how their use relates to the psychedelic experience. Secondary aim was to characterise users first and most recent psychedelic trips to understand how harm reduction changes with experience	Mixed methods: cross sectional repeated measures online survey design. Use of Likert scale questionnaires and open ended questions	163 adults who had consumed psychedelics at least twice in their life	(i) Participant demographics and psychedelic use questionnaire (ii) Characteristics of first and most recent psychedelic experiences (iii) Harm reduction practises (iv) Challenging experience questionnaire (CEQ) (v) Emotional Breakthrough Inventory (EBI)	(i) Greater use of harm reduction practises for most recent versus first psychedelic experience, suggesting use of harm reduction increases with experience (ii) Use of harm reduction practises positively associated with EBI scores and negatively associated with CEQ scores (iii) Focus on 'set and setting' for enhancing positive affects

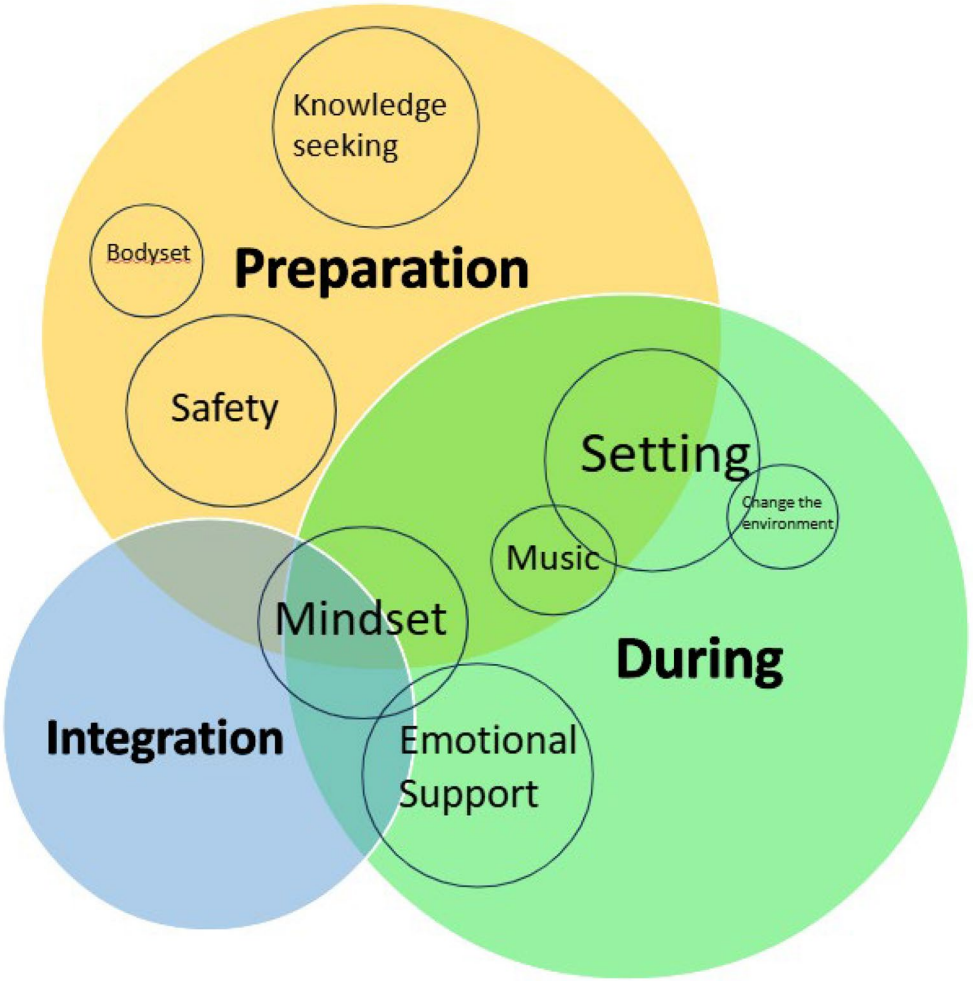

Fig. 2 Themes of Harm Reduction Strategies Identified. *Note*: This figure demonstrates the harm reduction themes identified. Themes are presented according to the three temporal stages of the psychedelic experience: preparation, during and integration. Circle size represents the frequency of each theme, with larger circles indicating the strategy is more frequently reported, and some strategies being used across multiple time points. The figure is designed to be illustrative in nature, and overlap between circles does not represent a quantitative relationship between variables or the amount of research in one area

Setting

Strategies which consider the physical environment or 'setting' in which the psychedelic experience takes place were reported in 16 out of the 27 studies. Users of psychedelics reported taking the drug in a diverse range of settings including at home, at friend's houses, at parties, festivals, at retreats or ceremonial settings [33–35]). The strategies adopted within this theme are likely to be related to the chosen setting. For example, users who reported having a psychedelic experience at home or with friends reported adopting strategies such as preparing a physically comfortable environment, having people present with prior psychedelic experience or having access to food and water [51, 53]. Consideration to the social setting was also reported as a commonly used strategy, with users placing emphasis on feeling safe and comfortable with other people who would be present for the psychedelic experience [37, 40, 54]. Conversely, users who took psychedelic drugs in festival or rave settings were less likely to report setting-orientated harm reduction practices [33].

Safety

Safety-focussed strategies were reported in 12 out of the 27 studies. Safety based strategies reported consideration of the substance itself, including making sure the drug was obtained from a trusted source, being 'careful' about dosage and using drug testing kits [31, 37, 53]. Other safety-focused strategies included telling a friend of planned use, planning travel arrangements for after the session to avoid driving, and not mixing the drug

with alcohol, and not dosing if feeling unwell [36, 51, 53]. However, several studies found that poly-drug use was also common suggesting not all users consider the increased risk of poly substance use when taking psychedelic drugs [31, 33].

Bodyset

A less common subset of strategies focussed on preparing the body and use of 'embodiment' strategies to prepare for the psychedelic experience. Five out of the 27 studies referred to strategies such as yoga, stretching, restricting one's diet, and abstaining from sex in the lead up to the psychedelic experience [35, 37, 51, 53]. These strategies were framed in the context of benefit enhancement, to maximise the positive outcomes of psychedelic use, as opposed to reducing potential negative side effects; and were more likely to be used to prepare for psychedelic consumption in a ceremonial setting [34, 35].

During the psychedelic experience

Emotional support

The most widely used strategy during the psychedelic experience for minimising harm was having access to some form of emotional support, which was highlighted in 16 out of the 27 studies. Emotional support varied in different contexts with some users reporting use of formal 'trip sitters' or guides [21, 33–35, 37, 41], while others reported gaining emotional support from either friends or other experienced users [31, 40, 44, 51, 53]. These guides and friends could be sober or also consuming the substances. Availability of perceived emotional support was associated with positive benefit of the experience [34, 46], while lack of psychological support was associated with more challenging experiences and/or adverse psychological outcomes such as fear, paranoia or anxiety [20, 38, 50]. Emotional support was also accessed through formal peer support services in two studies [49, 55].

Music

Use of music during the psychedelic experience to reduce distress was reported in four out of the 27 studies [43, 47, 51, 53]. Some users reported approaches such as preparing a specific playlist before the experience, and others found that changing the music during an experience could be a helpful de- escalation strategy to reduce strong uncomfortable emotions, due to its ability to amplify or shift emotional states [43].

Modifying the environment

Changing the environment during the psychedelic experience was highlighted by four out of the 27 studies as a strategy to reduce psychological distress. Specific strategies included moving outside, changing location outside, going for a walk or changing the music [20, 21, 42, 43]. This finding aligns with previous suggestions from research in clinical settings which has found that sensitivity to context is increased whilst in the psychedelic state [56].

After usage (integration)

Seven out of 27 studies reported use of harm reduction strategies post psilocybin use, known as 'integration'. Compared to consideration given to preparation strategies, integration strategies were less commonly reported in naturalistic settings. Specific strategies reported included having a friend to talk to, keeping a 'trip journal' or writing after the session [37, 46, 51]. Further, one study found that higher use of integration strategies was predictive of psychological growth. Individuals who reported reflecting on their psychedelic experience, using their psychedelic experience as a learning opportunity, and incorporating learnings into daily life were more likely to report psychological growth, which encompassed self-development, purpose in life and autonomy [46]. These findings suggest that using integration focussed strategies may enhance the benefits of the psychedelic state by contributing to positive psychological outcomes post psychedelic use [21, 34, 35], suggesting this group of strategies may enhance the benefits of the psychedelic state [21, 44].

Factors that influence harm reduction strategies

Motive for use and social setting

Social setting and motivation for use were two key factors which were found to influence what harm reduction strategies were adopted. 12 of the 27 studies explored users' motivations for psychedelic use, with differing results depending on the samples being studied. Commonly reported intentions for use were self-expansion motives such as expanded awareness or learning about the self, self-treatment of mental health issues, self enhancement, or purely recreational and hedonistic intentions [21, 39, 48]. Research which focussed on recreational motivations discussed the 'pleasures' of the psychedelic state itself including fun, performativity, connection, and activities such as dancing [42, 47]. Other studies which highlighted self-expansion or self-treatment focussed more on the preparatory strategies and ways to enhance the benefits of the psychedelic state [35, 51]. These findings suggest that differing intentions for use may inform different harm reduction or benefit enhancing strategies.

The social setting in which the psychedelic state occurs is also likely to be related to the user's motivation for use and the strategies used to reduce potential harms. For

example, one study found an association between intention for self-treatment and greater likelihood of solo use [54]. Users attending psychedelic ceremonies report perceived benefit from use in a formally guided group setting, with intentions for use more likely to be self-expansion than for recreational or pleasure; and more consideration given to adequate preparation strategies [34, 35]. Studies which discussed psychedelic use in the context of hedonistic motivations such as fun or pleasure were associated with drug taking with friends or in festival settings, with more emphasis placed on the quality of the substance than adequate preparation or integration strategies [31, 33, 42]. Further understanding regarding the interplay between motivations for use, social settings and the strategies employed by users in these contexts can help to inform adaptive harm reduction interventions.

Dosage

Anticipated dosage was also found to be a factor influencing choice of harm reduction strategies employed. Two studies found that microdosing (taking sub perceptual doses) was more likely to be associated with a self enhancement intention [48] and was associated with safety strategies such as avoiding alcohol and caffeine or avoiding driving [36]. Dosage considerations also appeared in online psychedelic drug forums, with some users reporting they would be more likely to consider a 'trip sitter' when taking higher doses [21].

4.5.3 Question 2: What harm reduction interventions have been implemented for people who take psychedelics in naturalistic settings and what are the outcomes of these interventions?

Four articles referred to harm reduction interventions for users of psychedelic drugs. Two of the four articles described interventions for users whilst under the influence of psychedelic drugs, aimed at providing the necessary safety and emotional support to the user during the experience. The first article described and evaluated KomsiCare (KC), a crisis intervention service designed for a psychedelic user who may require support whilst attending Boom festival in Portugal [49]. The intervention goal was to support users who may be suffering psychological distress during their psychedelic state. Evaluative measures showed that approximately 50% of all episodes had resolved within 1–5 hours of arrival, suggesting the intervention was helpful for some people in reducing unwanted affective experiences such as fear, anxiety and sadness. A pre-post mental state examination found a reduction in psychological distress, confirming crisis resolution [49]. However, due to the study limitations it is unclear whether symptom reduction was due to the intervention itself or simply the effect of time. A second intervention used a telephone-based psychedelic hotline (Fireside Project), which aimed to reduce non-clinical risks through offering peer-based support [55]. Data was collected from callers to the hotline with 65.9% indicating the call to the hotline helped to deescalate their psychological distress [55]. Further, 29.3% of callers stated they may have been harmed if not for their conversation with the helpline [55]. Results of both interventions suggest that for some people, having access to emotional support either in person or via telephone can be helpful in reducing psychological distress, crisis symptoms and potential harm.

Drug checking as a harm reduction strategy is commonly used for 'ecstasy' pills (i.e., MDMA), and some studies have reviewed its application to classic psychedelics. The one study included in this review whilst not an intervention study, discussed drug checking as a harm reduction intervention in relation to submission and detection rates for psychedelics [52]. The review found that compared to other substances, submission of psychedelic substances for drug testing was low. However, in the substances that were tested such as Lysergic Acid Diethylamide (LSD) and 2CB (4-Bromo-2,5-dimethoxyphenethylamine), adulterants such as methamphetamines and fentanyl were found in rare cases. Such additional substances can cause adverse effects which may alter the harm profile of the psychedelic [52]. For example, methamphetamine use has been associated with long term effects such as stimulant induced psychosis [57]. The review also highlighted the challenges with drug testing of psychedelics including the accuracy and expense of the tests used [52]. Despite the challenges, these results indicate that substance impurity still poses a risk to users of psychedelic drugs and drug checking services may assist in identifying these impurities.

Another intervention aimed to provide users with substantial preparation prior to their psychedelic use [35]. Participants were questioned regarding their use of preparation activities and consulted regarding their opinion on the perceived benefit of the presented preparation and enhancement strategies. The outcome of these consultations was the development of a comprehensive 21-day online psychedelic preparation intervention covering 4 modules: knowledge–expectation, psychophysical–readiness, safety–planning, and intention–preparation [35]. The intervention highlighted describes a 'benefit enhancement' approach which extends psychedelic preparation to not just planning for safety, but also enhancing the positive outcomes of psychedelic experiences. However, there was no evaluation completed into the effectiveness of the intervention in reducing harm or enhancing benefits of the psychedelic experience.

Discussion

This review aimed at understanding the harm reduction behaviours of people who use psychedelic drugs in naturalistic settings, and to also identify any harm reduction interventions and the outcomes of these interventions. Overall, the review highlighted that broadly, people who use psychedelics do employ a range of strategies either aimed at reducing negative experiences (harm minimisation), optimising the psychedelic experience itself or enhancing the potential benefits (See Fig. 2; Table 2). These strategies, although based around common themes, may differ depending on the motivation for use, social setting in which the psychedelic experience occurs, and the experience level of the user.

Preparation strategies undertaken prior to the psychedelic experience were commonly reported by users and show alignment to historical and clinical research with psychedelic drugs. For example, many users employ strategies aimed at promoting a helpful *mindset* characterised by ease, acceptance and surrender; and consider the environmental, social (and cultural) *setting* before taking psychedelics. The concepts of set and setting when curating an optimal psychedelic experience are not new, dating back to the original period of Western psychedelic research from the 1950's [58]. This review extends the idea of 'set' by identifying that '*body set'* or preparing the body for the psychedelic experience is also a strategy used by people who take psychedelics in naturalistic settings. The importance of set and setting has also been supported by more recent clinical research examining the pharmacological mechanisms of psychedelics. Through activation of the 5-HT2A receptor, psychedelics create a brain state which is highly malleable and susceptible to both internal and external context [56]. When used in therapeutic settings for the purpose of mental health treatment, therapists also place high emphasis on ensuring that the patient has adequate psychological preparation, and the environmental setting is controlled and comfortable [59]. There is congruence in the literature that set and setting variables impart a strong influence on the psychedelic experience, and our review shows that users in naturalistic settings demonstrate behaviours which reflect an awareness of this.

In addition to considering of 'set and setting' prior to the psychedelic experience, this review has also found that purposefully altering some variables within the setting *during* the psychedelic experience is used to shift unwanted or challenging mental states or enhance positive states, thereby reducing psychological harms [51]. Changing the *music* or changing the environment entirely by moving into nature or going for a walk were found to be strategies used to amplify positive experiences or shift negative mood states. In this way, set and setting focussed strategies interact with one another to produce the psychedelic experience (See Fig. 2).

Presence of an emotional support person during the psychedelic experience emerged as a widely used harm reduction strategy. People reported different forms of emotional support ranging from formal guides (most likely in ceremonial settings), trip sitters (either present or remote), or friends who had prior experience with psychedelics. Absence of emotional support was associated with negative outcomes [20]. From the limited formally evaluated harm reduction interventions for users

Table 2 Results of themes identified

Themes	Number of studies
Preparatory strategies	
1. Knowledge seeking	16 [20, 31, 32, 34, 36–38, 40–43, 46, 50, 51, 53, 54]
2. Mindset	13 [20, 21, 32, 33, 35, 38, 41, 43, 44, 46, 51, 53, 54]
3. Setting	16[20, 21, 31–33, 35, 37, 38, 43, 44, 46, 49–51, 53, 54]
4. Safety	12[21, 31, 32, 34, 37, 38, 43, 46, 51–54]
5. Body	5 [35, 37, 38, 51, 53]
During	
6. Emotional support	16 [20, 21, 31, 32, 34, 38, 40, 41, 44, 46, 49–51, 53–55]
7. Music	4[43, 49, 51, 53]
8. Modifying the environment	4 [20, 21, 43, 49]
Integration	
9. Integration	7 [21, 35, 38, 40, 46, 51, 54]
Factors that influence	
10. Motivation for use	12 [21, 33, 37, 38, 40, 42–45, 47, 49, 56]
11. Social setting	9[20, 32–35, 40, 44, 53, 54]
12. Dosage	6[21, 34, 37, 47, 51, 54]

of psychedelics, emotional support from a non-judgemental peer was found to reduce psychological distress and potential psychological harms in some cases [49, 55]. Emotional support in the form of a trusted therapist has also been indicated as a core component of psychedelic use in clinical settings, with emphasis placed on the importance of the therapeutic relationship during psychedelic preparation and dosing sessions [16, 59]. Considering these findings, harm reduction efforts for users of psychedelic should highlight an emotional support person being available during the psychedelic experience as a core component of reducing negative effects and promoting a positive experience.

Knowledge seeking as part of the preparation for a psychedelic experience was a commonly reported harm reduction strategy. Several online psychedelic community forums were identified which facilitated information and experience sharing between peers [39, 60]. Users reported being more likely to seek information from their own experiences, online forums, their peers and peer reviewed journal articles over other sources such as health practitioners or government sources. Harm reduction is currently included in the Australian Governments National Drug Strategy to 2027, so formal harm reduction interventions for users of psychedelic drugs are likely to be driven by government bodies or healthcare workers [25]. This is a challenge which may need to be considered in the development of harm minimisation campaign strategies, as our review suggests that harm reduction efforts may be more readily received if they are peer led or come from academic sources.

Integration strategies were used less frequently than those reported during preparation for an experience, and in the psychedelic experience itself. One study found that the use of integration strategies was associated with psychological growth, highlighting the importance of integration for enhancing psychological benefits post psychedelic use [44]. This finding shows congruence with clinical models of psychedelic assisted therapy, which includes integration as a key component of treatment required to improve psychological outcomes [61]. Comprehensive harm reduction campaigns should highlight the importance of integration strategies for maximising the benefits of a psychedelic experience, particularly in those users with self enhancement or self-treatment motivation for use.

Differing motivations and intentions for psychedelic use were identified, which appeared to interact with the social setting of drug ingestion and potential harm minimisation strategies identified. For example, one study found that those who had intentions for self-treatment were more likely to report having the psychedelic experience in a solo setting either with or without a sober guide [54]. This finding shows some alignment with the conditions curated in psychedelic assisted therapy, where the patient has the experience individually, under supervision of therapist, and is encouraged to focus their attention inward using eyeshades to reduce external distraction [16]. On the contrary, other users who report expansion intentions describe having the experience outside in nature, or in ceremonial settings with other participants present. Studies which focused on hedonistic motives for psychedelic use spoke about the pleasures of the experience itself, and the different ways of being and behaving with others and in nature, which may not be accessible to the individual when sober [42]. Harm reduction interventions which are flexible in nature and consider the intention and desired experience of the user may reach a broader range of people who take psychedelics in naturalistic settings.

Although users of psychedelic drugs seek information through a variety of sources, there has been limited formally evaluated harm reduction interventions developed and implemented for this population, highlighting a gap in the literature. Currently evaluated interventions have focussed on providing care during the psychedelic experience [49, 55]. Drug checking services, although still valuable for detecting adulterations in psychedelics appear to be more widely adopted for drugs such as cocaine or MDMA which may carry higher physical risk profiles, particularly when substance purity is compromised [52]. The digital preparation intervention developed through co-design with people who have taken psilocybin in naturalistic settings appears to be the most comprehensive intervention aimed to prepare users for their experience to date [35]. An evaluation of the effectiveness of this and other such interventions would be valuable in understanding whether these result in reduced negative outcomes and greater benefits. Harm reduction for users of psychedelics in natural settings which considers the importance of preparation, safety and support during the experience, and highlights the role of integration after the experience whilst considering the individual motivations of use is required.

Limitations

This review is limited in its inclusion criteria in that only harm reduction articles specific to users of psychedelic drugs were included. Examining harm reduction for other drug types may provide insight into the similarities and differences in the approaches taken to reduce adverse effects employed by users in naturalistic settings. A further limitation comes from the data analysed in this review. As this is a difficult population to study directly due to ethical and legal implications, several studies included have analysed data taken from online

psychedelic communities. It may be that people who post on such threads hold a view that is skewed either positively or negatively, making this a potentially biased source of information that is not reflective of the greater population of psychedelic users. This review was limited to harm reduction practises addressing acute harms of psychedelics. A more comprehensive review which also explores the longer-term risks of psychedelic use and corresponding harm reduction practises may be beneficial for future research. For example, understanding the implications of longer-term psychedelic use and any potential negative consequences to mental health over time, may assist in reducing potential harms for long-term users of psychedelics.

Conclusion

Harm reduction respects an individual's autonomy and values, whilst helping them to engage in conscious and informed decision making around drug use. Users of psychedelic drugs employ several strategies aimed to minimise adverse outcomes and increase benefits. Strategies selected are influenced by the individual's motivation for psychedelic use and the setting in which the experience takes place. However, there is a limited number of evaluated harm reduction interventions for users of psychedelic drugs to date. Further research which recognises the varying motivations of psychedelic users whilst recommending appropriate strategies for preparation, during the experience and post usage (integration) is needed. Given the unique psychological risk profile of psychedelics, and the rapid increase of users in Australia, the application and evaluation of specific harm reduction interventions for this population is urgently needed to reduce the risk of potential psychological harms.

Appendix A

Preferred reporting items for systematic reviews and meta-analyses extension for scoping reviews (PRISMA-ScR) Checklist

Section	Item	PRISMA-ScR checklist item	Reported on page #
Title			
Title	1	Identify the report as a scoping review	1
Abstract			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives	2
Introduction			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach	3–5
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives	6
Methods			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number	N/A
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale	7–8

Section	Item	PRISMA-ScR checklist item	Reported on page #
Information sources	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed	7–8
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated	7–8; Appendix 2
Selection of sources of evidence	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review	8
Data charting process	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators	8
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made	8–13
Critical appraisal of individual sources of evidence§	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate)	N/A
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted	8
Results			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram	Figure 1,
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations	Table 1, 8–9
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12)	N/A
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives	Table 1 and 2, Fig. 2, 9–16
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives	Table 2, 9–16
Discussion			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups	16–20
Limitations	20	Discuss the limitations of the scoping review process	20–21

Section	Item	PRISMA-ScR checklist item	Reported on page #
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps	21
Funding			
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review	N/A

PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.

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Appendix B

Data base search procedure

Database	Search term: harm reduction	Search term:psychedelic drugs
Psychinfo	(MAINSUBJECT.EXACT.EXPLODE("Harm Reduction") OR ((harm* OR damage* OR risk* OR distress*) NEAR/2 (reduc* OR minimi* OR decreas* OR diminish*)) OR ((benefit OR advantage) NEAR/1 (enhanc* OR maximi*))) AND	(MAINSUBJECT.EXACT("Psychedelic Experiences") OR MAINSUBJECT.EXACT("Bufotenine") OR MAINSUBJECT.EXACT("Mescaline") OR MAINSUBJECT.EXACT("Peyote") OR MAINSUBJECT.EXACT("Phencyclidine") OR MAINSUBJECT.EXACT("Lysergic Acid Diethylamide") OR MAINSUBJECT.EXACT("Psilocybin") OR MAINSUBJECT.EXACT("Psychedelic Drugs") OR "Hallucinogenic Drug*" OR Bufotenine OR "Lysergic Acid Diethylamide" OR Mescaline OR Peyote OR Phencyclidine OR Psilocybin OR "psychedelic drug*")
Scopus	((harm* OR damage* OR risk* OR distress*) W/2 (reduc* OR minimi* OR decreas* OR diminish*)) OR ((benefit OR advantage) W/1 (enhanc* OR maximi*))	hallucinogen* OR bufotenin* OR "Lysergic Acid Diethylamide" OR mescaline OR peyote OR phencyclidine OR psilocybin OR "psychedelic drug*" OR "Methylenedioxyamphetamine" OR "Dimethoxy-4-Methylamphetamine" OR dmt OR dronabinol OR harmine OR ibogaine OR "N,N-Dimethyltryptamine"

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CD was responsible for the data analysis and writing the review. CD prepared all figures and tables. All authors contributed to the editing of the review. All authors read and checked the final manuscript.

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Availability of data and materials
All data analysed in the current study are included in this published article (and its supplementary information files).

Declarations

Ethics approval and consent to participate
Not applicable.

Consent for publication
Not applicable.

Competing interests
The authors declare they have no competing interests.

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