




A Scoping Review of Research in Naturalistic Studies with Psychedelics

Laura C. Carvalho, Jorge Encantado, Hannes Kettner, Christopher Timmerman, Diogo Veiga & Pedro J. Teixeira

To cite this article: Laura C. Carvalho, Jorge Encantado, Hannes Kettner, Christopher Timmerman, Diogo Veiga & Pedro J. Teixeira (28 Jun 2025): A Scoping Review of Research in Naturalistic Studies with Psychedelics, Journal of Psychoactive Drugs, DOI: [10.1080/02791072.2025.2520221](https://doi.org/10.1080/02791072.2025.2520221)

To link to this article: <https://doi.org/10.1080/02791072.2025.2520221>

 View supplementary material [↗](#)

 Published online: 28 Jun 2025.

 Submit your article to this journal [↗](#)


 Article views: 210

 View related articles [↗](#)

 View Crossmark data [↗](#)



A Scoping Review of Research in Naturalistic Studies with Psychedelics

Laura C. Carvalho MSc ^a, Jorge Encantado PhD^a, Hannes Kettner MSc^{b,c}, Christopher Timmerman PhD^b, Diogo Veiga PhD^a, and Pedro J. Teixeira PhD^a

^aCentro Interdisciplinar para o Estudo da Performance Humana (CIPER), Faculty of Human Kinetics, University of Lisbon, Cruz Quebrada, Portugal; ^bCenter for Psychedelic Research, Imperial College London, Kensington, UK; ^cPsychedelics Division, Neuroscape University of California, San Francisco, USA

ABSTRACT

Psychedelic research has traditionally focused on controlled, clinical settings to evaluate the therapeutic potential of substances such as psilocybin. However, in recent years, there has been growing interest in naturalistic research, which explores psychedelic use in real-world settings. This review aims to critically analyze trends in naturalistic psychedelic research, focusing on sample demographics and the diversity of contextual factors across different settings. A systematic search in PubMed, PsycINFO, and Web of Science was conducted, including studies that involved the use of classic psychedelics in real-world settings. Two reviewers independently screened articles and extracted data on both sample and setting characteristics. A total of 103 studies were included, most of which employed a cross-sectional survey-based design ($n = 54$), with sample characteristics being widely reported, albeit with considerable variability across studies. Ayahuasca was the most frequently studied substance (66%), and ceremonial settings were the most commonly reported (35.9%). While sample characteristics were widely reported, there was significant variability. Specific contextual components, such as music, were often underreported, with longitudinal studies providing the most comprehensive details. This review highlights the need for systematic reporting standards in naturalistic psychedelic research to maximize its complementary value alongside clinical trials.

ARTICLE HISTORY

Received 28 January 2025
Revised 11 April 2025
Accepted 19 May 2025

KEYWORDS

Psychedelics; real-world data; setting; naturalistic research

Introduction

Scientific research with psychedelics has been mainly focused on understanding their effects in the mind and brain, as well as their therapeutic potential for mental health conditions. This led to a considerable number of studies conducted in clinical and controlled settings. Various systematic reviews have been conducted to synthesize findings in particular areas of interest such as the safety and efficacy of the use of psychedelics for the treatment of mental health conditions (e.g., depression and substance disorders) in the context of psychedelic-assisted psychotherapy (Andersen et al. 2021; Haikazian et al. 2023; Nikolin et al. 2023; Sicignano et al. 2024). Since randomized controlled trials are the gold standard to establish the safety and efficacy of most treatments, they are still needed to establish strong evidence regarding the therapeutic potential of psychedelics. However, this research design alone cannot capture the full spectrum of psychedelic experiences' effects. One of the main limitations of these controlled settings is the lack of ecological validity where findings

might not fully translate to real-world applications (Carhart-Harris et al. 2022). One barrier to generalization stems from the strict recruitment criteria in clinical trials, which limit sample heterogeneity (Bouchet et al. 2024; Hughes and Garcia-Romeu 2024). Additionally, the implementation of clinical trials involving psychedelics poses unique challenges, related to safety and risk management, as well as complex regulatory requirements and the historical stigma associated with these substances (Barnett 2025; Barnett et al. 2024; Barnett, Parker, and Welleff 2022).

Naturalistic research plays a vital role in complementing clinical findings by exploring psychedelic experiences in real-world settings. By studying the effects of psychedelic experiences in contexts where they are most frequently used, this approach enables researchers to address a wider range of research questions and include more diverse samples. This type of research can shed light on how psychedelics are used outside of the therapeutic context, helping researchers study how various setting-related factors, such as social

dynamics, rituals, and cultural influences, affect outcomes (Hartogsohn 2017). Broadening naturalistic research is also suited for data collection to include a more diverse range of measures of psychological well-being, lifestyle behaviors, and to study the interplay between psychological and physical health. Provided that this more pragmatic research is designed with sufficient methodological rigor, it can offer insights with greater ecological validity than controlled clinical trials by reflecting real-world use (Carhart-Harris et al. 2022).

In part due to the limited availability of clinical settings for the use of psychedelics (e.g., psychedelic-assisted therapy), there has been a notable increase in their use in naturalistic settings whether for enhancing well-being, exploring consciousness and spirituality, or addressing mental health issues (United Nations Office on Drugs and Crime 2023). According to the 2020 special report on psychedelic use by the Global Drug Survey, there has been an increase, over the past 6 years, in the use of (“classic”) psychedelics, such as LSD, DMT-containing ayahuasca and psilocybin mushrooms, and also MDMA and ketamine (“atypical” psychedelics). The percentage of respondents reporting LSD use increased from 8.5% in 2015 to 21% in 2020 (Winstock et al. 2021). The same trend applies to “magic mushrooms” with an increase from 8.6% in 2015 to 16.1% in 2020 (Winstock et al. 2021). In the most recent report on psychedelic use – the Global Psychedelic Survey (2024) – of English-speaking adults (worldwide) reporting lifetime use, 80.1% reported past-year psychedelic use (once every 1–5 months). The most common psychedelics used were psilocybin (90.8%), LSD (72.7%) and MDMA (70.7%), mainly for personal growth (85.2%), general well-being (69.9%) and recreational motives (61.1%) (Lake and Lucas 2024).

In a related trend, across the United States, the legal framework for psychedelic use is going through a revision process. For example, in the States of Oregon and Colorado, voters’ initiatives have resulted in changes in the legislation that facilitates the access to legal psilocybin-assisted interventions by healthy citizens, and also, in some cities, allowing personal unsupervised use. This evolving landscape coincides with data from the nationally representative National Survey on Drugs Use and Health (2015–2018; USA) which reveals a 56.4% increase in LSD use (Yockey, Vidourek, and King 2020) and approximately 9.7% of the Americans reporting lifetime use of psilocybin mushrooms (Yockey and King 2021).

The increase in the non-therapeutic use of psychedelics led to an increment in studies conducted in naturalistic settings. These studies explore a range of themes, such as associations between (naturalistic) psychedelic use and mental health or substance misuse (Garcia-

Romeu et al. 2019; Johnson et al. 2017a), physical health (Simonsson, Sexton, and Hendricks 2021; Simonsson, Osika et al. 2021), perceived quality of life, well-being, and lifestyle behaviors (Kohek et al. 2022; Ona et al. 2019).

It is noteworthy that psychedelics have been used for millennia in indigenous cultures worldwide (Samorini 2019), largely for spiritual and personal development and to fight or prevent illnesses (Nichols 2016), suggesting a natural proclivity of the human species to access expanded states of consciousness, and making it likely that the use of psychedelics will continue outside the modern clinical context.

Considering the increase in research in naturalistic psychedelic use, and the importance of real-world evidence in the scientific process, it is both relevant and timely to describe and critically analyze characteristics and trends associated with naturalistic psychedelic research. Contrary to clinical studies, real-world observational studies present a larger variability in the contexts in which psychedelic experiences take place, known as the *setting* (Hartogsohn 2017). These extrapharmacological factors are considered essential for the therapeutic effects of psychedelic-assisted psychotherapy (Carhart-Harris et al. 2018) and should also play a key role in shaping the effects of experiences in naturalistic settings (Hartogsohn 2017). Some of these components, with a long history and relevance amongst ceremonial indigenous practices, include the music played, the rituals performed, the presence and role(s) of others in attendance (including someone guiding the experience), and the physical and cultural context where the experience takes place. Since psychedelic effects are heavily influenced by the context in which they occur, naturalistic research provides a valuable opportunity to explore the diversity of these environments. However, to fully capitalize on this potential, it is essential that the specifics of these contexts are systematically reported. A systematic evaluation of sample demographics and setting-related factors within naturalistic psychedelic research should inform future studies in several ways, namely strengthening efforts to standardize reporting it should read across studies so that data are more effectively grouped and analyzed in comparative review studies. Furthermore, it may help to identify important gaps in research, ensuring that significant information is appropriately reported.

Purpose of the present study

The main goal of this study is to systematically review and map naturalistic psychedelic research using “classic”

psychedelics by identifying and describing sample demographics and characteristics of the psychedelic experience (the setting). For the purpose of this study, naturalistic observational studies were considered as those where there was no, or very minimal, interference with the experience by the researchers, and the study was conducted in a setting that was a “real life” setting or opportunity. Typically, these are observational, non-controlled study designs, especially regarding setting and location, substance(s), and dose(s) used. More specifically, it was our aim to:

- (1) Describe the demographic characteristics of the participants;
- (2) Describe the psychedelic used and the settings of use (e.g., traditional setting; secular ceremonial setting; non-ceremonial setting);
- (3) Identify specific components of the naturalistic context reported (e.g., music, guidance, format [group/individual]).

Method

Protocol and registration

The present scoping review was conducted following the extension for Scoping Reviews guidelines (PRISMA-ScR) (Tricco et al. 2018) from the Preferred Reporting for Items Systematic and Meta-Analyses (PRISMA). The registered protocol is available at Open Science Framework repository (OSF) <https://osf.io/n34eh/>.

Eligibility criteria

The studies included met the following inclusion criteria: i) observational design; ii) conducted in a “real life” setting (i.e., not a controlled experimental study in laboratory, hospital, or clinical environment); iii) at least one of the substance(s) studied was/were classic psychedelics (lysergic acid diethylamide [LSD], mescaline, psilocybin, and N,N dimethyltryptamine [DMT]); iv) used a quantitative methodology and analysis (including mixed-method approaches); and v) included experienced and naive psychedelic users, regardless of their self-reported (or diagnosed) healthy/diseased status. Only peer-reviewed articles published in English after the year 2000 were included. Exclusion criteria were (i) studies with participants age under 18; (ii) studies with qualitative data only; (iii) studies whose focus was not on psychedelic substances; (iv) and studies reporting microdosing practices.

Search strategy

The literature search was conducted in April 2023 and updated in February 2024 using three major databases: PubMed, PsycINFO, and Web of Science. Search terms were a combination of two categories: i) psychedelic substances, and ii) study design and setting (search terms and information on excluded studies are available at Supplementary_file_1).

Selection of sources of evidence

The process of article selection was performed using the CADIMA software. Duplicates were removed, and the screening of the remaining articles was conducted first by title and abstracts, and then full texts. Two authors (LCC, JE) independently screened all articles and identified potentially eligible studies based on title and abstract. Full-text reviews were conducted for the manuscripts selected, following pre-specified inclusion/exclusion criteria. In the second phase, the same two authors independently reviewed the full text of all pre-selected studies. Disagreements in each screening phase were resolved by a third author (PJT).

Data charting process

Given that there is no previously developed taxonomy for the reporting of naturalistic studies with psychedelics, the authors collaboratively created a data-charting form to identify the variables to be extracted. The taxonomy used was developed drawing from the authors' expertise and latest research in psychedelics. For each included study, the following information was extracted and categorized into two main categories: i) general study characteristics: study name, authors, year of publication, study aim, study design, sample characteristics (nationality/ethnicity, education, age, gender), population recruited (healthy/clinical, naïve/experienced), sample size; and ii) components of the naturalistic setting of the psychedelic experience: psychedelic substance (classic psychedelics: psilocybin, LSD, mescaline, ayahuasca, DMT), setting category and specific contextual features, namely: format (group, individual), guidance, music, sensory experiences, rituals performed, bodily-based practices, description of the physical context, other substances used during the experience, and preparation and integration practices.

The studies included were then organized into four categories, according to their study design (see Table 1): i) Population-based, cross-sectional – studies that used data from population databases; ten studies were included in this category; ii) Self-selected, cross-

Table 1. Studies included organized by category of study design.

Self-selected, cross-sectional (<i>n</i> = 54)	Population-based, cross-sectional (<i>n</i> = 10)	Self-selected, true prospective cohort (longitudinal) (<i>n</i> = 34)	Self-selected, pseudo-prospective (before-after) cross-sectional (<i>n</i> = 5)
Agin-Liebcs et al. (2021)	Black et al. (2023)	Aday et al. (2024)	Daldegan-Bueno et al. (2022)
Amada and Shane (2022)	Chan et al. (2022)	Agin-Liebcs et al. (2022)	de la Salle et al. (2022)
Ambrosini, Pariset, and Biolcati (2023)	Jones et al. (2023)	Barba et al. (2024)	Evens et al. (2021)
Apud Peláez (2020)	Jones (2023)	Barbosa, Giglio, and Dalgarrondo (2005)	Garcia-Romeu et al. (2020)
Barbosa et al. (2016)	Jones and Nock (2022a)	Bohn et al. (2022)	Kervadec et al. (2024)
Barbosa et al. (2018)	Jones and Nock (2022b)	Bouso et al. (2012)	
Barrett, Johnson, and Griffiths (2017) [study 1]	Han et al. (2022)	Close et al. (2020)	
Barrett, Johnson, and Griffiths (2017) [study 2]	Korman (2023a)	Domínguez-Clavé et al. (2019)	
Barsuglia et al. (2018)	Korman (2023b)	Domínguez-Clavé et al. (2022)	
Byrne et al. (2023)	Perkins et al. (2022)	Frecska et al. (2012)	
Simonsson et al. (2023)		González et al. (2020)	
Cummins and Lyke (2013)		Gonzalez et al. (2021)	
Daldegan-Bueno et al. (2022)		Jiménez-Garrido et al. (2020)[study 2]	
Davis et al. (2019)		Van Oorsouw et al. (2021)	
Davis, Barrett, and Griffiths (2020)		Van Oorsouw, Toennes, and Ramaekers (2022)	
Davis et al. (2021)		Kettner et al. (2021)	
David et al. (2023)[study 1]		Kiraga et al. (2021)	
David et al. (2023)[study 2]		Uthaug et al. (2018)	
Durante et al. (2021)		Uthaug et al. (2019)	
Erritzoe et al. (2019)		Uthaug et al. (2021)	
Fábregas et al. (2010)[study 1]		Uthaug, Lancelotta, Szabo, et al. (2020)	
Fábregas et al. (2010)[study 2]		Kiraga et al. (2022)	
Forstmann et al. (2020)		Mans et al. (2021)	
Garcia-Romeu et al. (2019)		Mason, Hendricks et al. 2019	
Glynos et al. (2022)		Nayak et al. (2023)	
Glynos et al. (2022)		Simonsson et al. (2023)	
Halpern et al. (2008)		Simonsson, Osika et al. (2023)	
Harris and Gurel (2012)		Pallavicini et al. (2021)	
Jiménez-Garrido et al. (2020)[study 1]		Perkins et al. (2022)	
Johnson et al. (2017b)		Ruffell et al. (2021)	
Kaasik and Kreegipuu (2020)		Soler et al. (2016)	
Kavenská and Simonová (2015)		Trichter, Klimo, and Krippner (2009)	
Kjellgren and Norlander (2000)		Weiss et al. (2023)	
Kohek et al. (2022)		Weiss et al. (2023)	
Kvam et al. (2023)			
Longo et al. (2023)			
Lukačovič and Uthaug, Lancelotta, Ortiz Bernal, et al. (2020)			
Lukačovič and Masaryk (2021)			
Matzopoulos et al. (2022)			
Mian, Altman, and Earleywine (2020)			
Nikolaidis et al. (2022)			
Nour, Evans, and Carhart-Harris (2017)			
Simonsson et al. (2023)			
Ona et al. (2019)			
Orłowski et al. (2022)			
Orłowski et al. (2023)			
Ortiz Bernal et al. (2022)			
Perkins et al. (2021)			
Pontual et al. (2022)			
Qiu and Minda (2023)			
Savoldi, Roazzi, and de Oliveira Sales (2023)			
Sepeda et al. (2020)			
Sweat, Bates, and Hendricks (2016)			
Williams et al. (2021)			

sectional – studies employing online or in-person surveys at a single time point and asking participants to retrospectively report on previous psychedelic

experiences; fifty-four studies were included in this category; iii) Self-selected, pseudo-prospective (before-after) cross-sectional – studies where participants were

asked to complete questionnaires based on their recollection of both pre- and post-psychedelic experience; five studies were included in this category; iv) Self-selected, true prospective cohort (longitudinal) – studies that employed repeated measures, before and after a psychedelic experience; thirty-four studies were included in this category.

Based on the current literature, six categories were established a priori to classify the settings in which the psychedelic experience occurred: i) Traditional setting – a context where the experiences happened in a ceremonial setting, are conducted by traditional guides (shamans), and follow traditional rituals. These ceremonies take place within the communities where these practices originated, or elsewhere but with members of those communities participating as guides; ii) Secular ceremonial setting – a context where the experience happens in a secular ceremonial setting that may incorporate the same elements and/or practices and rituals of traditional settings (usually called “retreats”); iii) Non-ceremonial setting – a context where the experience happens in a non-ceremonial setting with or without a guide, typically in a small group, or individual session with no particular practices or rituals, or the ones that exist do not systematically incorporate

traditional practices); iv) Religious setting – a context where the experience happens within a religious practice and the substance is taken as a sacrament. These ceremonies typically occur in places of worship; v) Unstructured setting – a context where the experience happens in a festival, gathering or party, or without an external structure, as the case of individual experiences or groups of friends or acquaintances, often for recreational and/or self-development or spiritual purposes; vi) Not described – when there is no characterization of the setting but the information of at least one psychedelic experience in the participant lifetime.

Results

Study selection

Following the removal of duplicates, a total of 1467 citations were identified. Among these, 1289 were excluded based on title and abstract, leaving 178 full-text articles to be retrieved and evaluated for eligibility. Out of these, 79 were excluded when applying inclusion/exclusion criteria. Ultimately, 99 articles met the eligibility criteria and were included in this review, resulting in 103 unique studies (Figure 1).

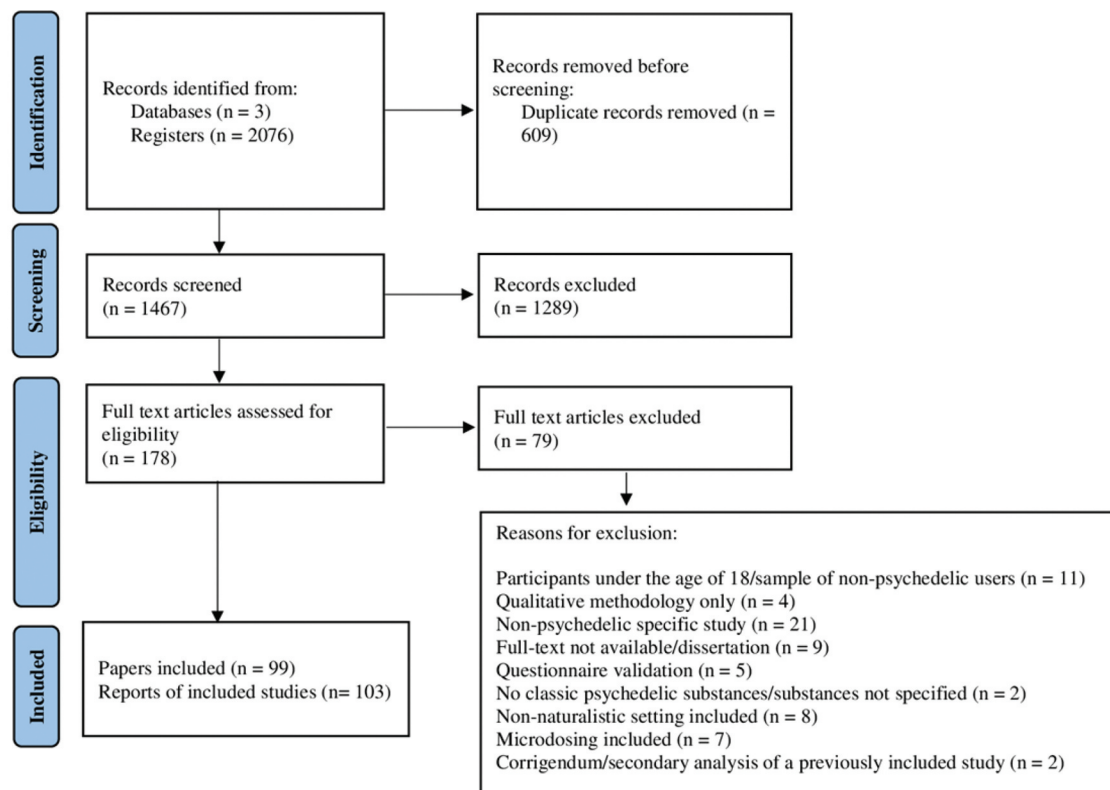


Figure 1. PRISMA flow chart.

Summary of results

To describe the sample of naturalistic studies, data was extracted regarding age, gender distribution, educational background and ethnicity or nationality (see Supplementary_file_2). Due to the extensive nature of the results, below we have provided a summary highlighting the most pertinent findings. Full, detailed results can be found in Supplementary_file_3.

Ninety-four studies (91.3%) provided information regarding participants' age. More specifically, 82 studies (87.2%) reported the sample mean age, ranging from 22.5 years as the lowest mean age to 54.2 years as the highest. Eight studies (8.5%) reported this information with age ranges, ranging from 18 to 20 years as the minimum age range, to 65+ years as the maximum age range. Two studies (2.1%) reported the median age of the samples.

The gender distribution of the sample was reported in ninety-four studies (91.3%). The percentage of female participants ranged from 10% to 91.5%, while the percentage of male participants varied between 6.8% and 90%. Additionally, 19 studies (18.4%) reported other gender identifications, ranging from 0.1% to 6.1%. In twenty-eight studies (29.8%) the percentage of female participants was higher, while male participants were at a higher percentage in fifty-six studies (59.6%). Additionally, in three studies (3.2%) the percentage of female and male participants was equal and in seven studies (7.4%) the gender with the higher percentage differed between study samples.

Information on the educational background of participants was provided in eighty-one studies (78.6%). Sixty-two studies (76.5%) reported this information resorting to a range of academic degrees, 15 studies (18.5%) in a single academic degree, three studies (3.7%) reported the mean of years of education and one study (1.2%) the median of years of education. Accounting for the studies that reported educational background in a range of academic degrees ($n = 62$), in fifty studies (80.6%) a higher percentage of participants had university studies compared to those without university studies. Conversely, seven studies (11.3%) reported a higher percentage of participants without university studies. Additionally, in four studies (6.5%) the distribution of participants with university or without university studies varied between study samples and in one study the percentage of participants with and without university studies was equal (1.6%). Thirty-four studies (33%) reported participants' ethnicity, 25 studies (24.3%) nationality/continent of origin and four studies (3.9%) reported both participants' ethnicity and nationality/continent of origin.

Finally, of the fifty-one studies (49.5%) that described the population, 40 studies (78.4%) reported experienced psychedelic users and eighteen studies (35.3%) naive users. Fourteen studies (27.5%) reported healthy participants, while a clinical population was reported in eleven (21.6%) studies. The following clinical conditions were reported: depression ($n = 5$; 45.5%), drug/substance use disorder ($n = 5$; 45.5%), anxiety ($n = 4$; 36.4%), obsessive-compulsive disorder ($n = 3$; 27.3%), dysthymia, past hypomanic episode, alcohol use disorder, past manic episode, suicide risk, antisocial personality disorder, social phobia, bulimia ($n = 2$; 18.2%), post-traumatic stress disorder, bipolar disorder, attention deficit hyperactivity disorder, eating disorder, personality disorder, schizophrenia, fibromyalgia and borderline personality disorder ($n = 1$; 9.1%). One study did not specify the clinical condition.

Considering all ($n = 103$) studies included in this review, ayahuasca was the psychedelic substance most frequently reported ($n = 68$; 66%). Psilocybin was reported in forty-seven studies (45.6%), LSD in thirty-five studies (33.9%), mescaline in twenty-nine studies (28.2%), DMT (not in ayahuasca) in twenty-seven studies (26.2%) and 5-MeO-DMT was reported in nineteen studies (18.4%). Most studies ($n = 64$; 62.1%) reported a single psychedelic substance and thirty-nine studies (37.9%) reported multiple psychedelic substances.

Regarding the setting of the psychedelic experience, for the studies that described at least one of the settings where the psychedelic experience occurred ($n = 64$), more than half ($n = 37$; 57.8%) reported a single setting, while twenty-seven studies (42.2%) reported multiple settings. Among all the studies included, the most reported setting was the secular ceremonial setting, in thirty-seven studies (35.9%). Twenty-five studies (24.3%) reported a religious setting, 19 studies (18.4%) a non-ceremonial setting, 16 studies (15.5%) a traditional setting, and ten studies (9.7%) an unstructured setting. Additionally, 48 studies (46.6%) did not report the settings of the psychedelic experience.

Concerning the reporting of the specific components of the setting, in the two study categories that report this information ("self-selected, cross-sectional" and "self-selected, true prospective cohort (longitudinal);" $n = 88$; 85.4%), 46 studies (52.3%) reported the format (group/individual) of the psychedelic experience, 39 studies (44.3%) the presence of a guide or facilitator, 16 studies (18.2%) reported preparation practices and fifteen studies (17%) integration practices. Furthermore, 22 studies (25%) reported the presence of music, seven studies (8%) of other sensory experiences, five studies (5.7%) of

rituals, two studies (2.3%) of bodily-based practices, 14 studies (15.0%) provided details of the physical context, and ten studies (11.4%) reported other substances used. Of the four categories, “self-selected, true prospective cohort (longitudinal)” studies typically provided the most comprehensive details of the naturalistic setting.

Discussion

This scoping review mapped current naturalistic psychedelic research regarding sample characteristics and setting components reported in studies published between January 2000 and February 2024. Specifically, the aim was to describe how naturalistic psychedelic research is being conducted, focusing on settings studied, environmental factors reported and participants. Besides the substances that were consumed, this review also addressed relevant characteristics of the setting, as well as other specific features such as the presence of a facilitator and the use of music. Additionally, we aimed to describe demographic characteristics of the samples in this type of research.

This systematic analysis points to two general observations regarding naturalistic psychedelic research. First, there is notable heterogeneity in naturalistic psychedelic research – specifically in what and how information is reported regarding sample and setting characteristics. Second, there is a lack of detailed descriptions of extrapharmacological components, particularly regarding the setting. Despite high heterogeneity, some general trends were identified regarding setting and contextual factors, and sample characteristics.

The variability in what was reported and how it was reported was most pronounced in the description of sample characteristics such as age, educational background, and gender. This variability limited the scope of possible analyses and consequently constrained conclusions about general sample characteristics of naturalistic psychedelic research. For instance, the descriptions of educational background and ethnicity in the samples differed widely across studies, rendering it unfeasible to provide an in-depth report on these characteristics. Nonetheless, a general trend toward educated and male participants was evident. Specifically, in fifty-six out of ninety-four studies that reported participants' gender, the percentage of male participants was higher. Moreover, among the sixty-two studies that reported educational background with a range of academic degrees, 50 studies indicated a higher proportion of participants with university-

level education. While these findings aligns with the criticism concerning the predominance of WEIRD samples in the majority of experimental research within psychedelic studies (van Elk and Fried 2023) – which would hinder the generalization of outcomes across gender, ethnic and educational groups – it may also be the case that psychedelics are predominantly used by these group.

While naturalistic research may have less control over sample characteristics, it is precisely within this setting that we may expect a more diverse population of psychedelic users. However, the rising phenomenon of shamanic tourism may contribute to this tendency of WEIRD samples in observational naturalistic studies. Since the 1990s, the term “ayahuasca tourism” has been used to describe the increasing number of tourists traveling to countries such as Peru and Costa Rica to participate in traditional ayahuasca ceremonies (Fotiou 2010; Kavenská and Simonová 2015). Participation in these retreats is often costly, further influencing the demographic makeup of the samples. Additionally, surveys promoted within psychedelic community circles may primarily target well-informed, educated and technologically literate individuals.

Concerning setting description, nearly half the studies did not specify all the settings where the substances were used. It is important to note that the level of description possibly differs considering the specific study design. Studies that relied on population datasets (“population-based, cross-sectional” studies) are constrained by the information available which, in most cases, lacks detailed setting descriptions. Among the studies included in this study category, none reported setting information beyond the psychedelic substance that was used. Conversely, the studies included in the “self-selected, true prospective cohort (longitudinal)” category offered more comprehensive data on setting characteristics, with only five studies not reporting such information. However, the level of detail remained generally low. Of the six setting components (music, sensory experiences, rituals, bodily-based practices, physical context, other substances), details regarding sensory experiences, rituals, bodily-based practices, and other substances were reported in ten or fewer studies. For instance, with respect to music, the studies that reported the use of ayahuasca were those that specified the type of music played. All other studies, with the exception of one, did not.

Failing to identify and report specific setting conditions results in an inability to generalize findings or to compare studies that assess similar outcomes. This can be particularly relevant in naturalistic psychedelic contexts, given that manipulating setting elements are

integral to both contemporary, traditional and religious traditions (Hartogsohn 2017) – extrapharmacological factors are likely to influence the acute and lasting effects induced by psychedelics and should therefore be accounted for (Haijen et al. 2018; Studerus et al. 2012). In a study analyzing the associations between setting characteristics and mental health and wellbeing during ayahuasca use, the results showed that the setting influenced the acute experience, integration difficulties, and overall outcomes (Perkins et al. 2021). Also, in a qualitative study aimed at assessing the role of music in the acute experience, and its impact on clinical outcomes, the results indicated a crucial role of music in both, and significant associations with mystical experience and insight (Kaelen et al. 2018). Similar to sample characteristics, naturalistic research often lacks control over setting components, however their measurement can significantly reveal the influence of setting variables over acute and enduring effects of psychedelics. These factors can be found to act as effect mediators or moderators, since the psychedelic experience is particularly influenced by the context in which it occurs (Carhart-Harris et al. 2018).

Despite the absence of detailed setting descriptions, ayahuasca emerged as the most frequently reported psychedelic across all studies, except for those categorized as “population-based, cross-sectional” where psilocybin was the most commonly reported psychedelic. This aligns with most studies (76%) reporting a structured ceremonial setting – traditional, religious, or secular. Non-ceremonial and unstructured settings were the least frequently reported, totaling only twenty-nine studies. The prevalence of psychedelic use in structured settings possibly reveals that individuals are aware of how contextual/extrapharmacological variables shape the safety, quality, and outcomes of psychedelic experiences. This awareness may relate to the overall perception that psychedelics are mostly considered as psychologically safe among general populations (Roberts et al. 2020). This trend could also reflect a preference for studying structured psychedelic experiences, as it can facilitate access to participants and allow for more methodologically robust studies. Additionally, the prevalence of structured ceremonial settings, connected to a majority of reports of ayahuasca use, may also reflect the previously noted overrepresentation of WEIRD samples in observational naturalistic studies, as the financial and logistical costs associated with participating in such settings may limit access to individuals from higher-income or more educated backgrounds.

The combination of high heterogeneity with a lack of setting description constitutes an obstacle for comparison and systematization of results. The

development of evidence-based guidelines for data reporting in naturalistic psychedelic research would improve future efforts at synthesizing methodologies and summarizing results. Naturalistic research offers a distinctive avenue for exploring various psychedelic-related phenomena, capitalizing on its inherent diversity. By considering factors such as the type of music and context, researchers can investigate how these elements influence the psychedelic experience. Instead of viewing heterogeneity as a limitation, it can be seen as a cornerstone of this type of research, allowing for a broader and more accurate understanding of the effects of psychedelics in real life. However, to fully harness its potential, adherence to consistent reporting guidelines is essential.

Strengths and limitations

To our knowledge, this scoping review is the first systematic analysis of contemporary trends in naturalistic psychedelic research. Important gaps were identified within a substantial body of naturalistic research. The wide range of studies included allows for a comprehensive overview of key trends regarding the reporting of psychedelic experience characteristics, and demographic data.

In addition to common limitations of any review studies, such as the omission of relevant sources of information and the lack of assessment of methodological quality of the studies included, incorporating disparate study methodologies posed a significant challenge in the systematization of information. The high heterogeneity of the studies included hinders concise and comprehensive data reporting. Additionally, given that data was extracted solely from published studies, detailed information about setting components that may be available in unpublished sources (e.g., retreat websites), could have been missed.

Conclusion

This review systematically mapped current naturalistic psychedelic research, focusing on sample characteristics and key components of the setting such as substances consumed, physical and social context, and other features like music and bodily-based practices.

Considerable heterogeneity was displayed across studies, particularly in the reporting of sample and setting characteristics. Additionally, there is a notable lack of detailed descriptions of extrapharmacological components, especially regarding the setting in which substances were used, which limits the generalizability and comparability of findings. Regarding general trends

found, most studies often involved educated and male participants. Furthermore, ayahuasca emerged as the most frequently reported substance, typically used in structured ceremonial settings.

This work underscores the critical importance of enhancing reporting quality in naturalistic studies. By mapping demographic characteristics of current naturalistic research samples and the reporting of setting and contextual factors, it provides valuable insights that can guide researchers in making significant improvements.

As a result of the data charting process, this scoping review may be seen as a first initiative toward the creation of a comprehensive taxonomy for reporting key methodological and setting components. The taxonomy used here, developed based on the authors' expertise and current psychedelic research, is available at [Supplementary_file_4](#). To reach this goal, we intend to undertake a structured process for the development of reporting guidelines building upon the insights gained through the present review, and refining the proposed taxonomy to include key elements such as dosage and the reporting of adverse events. A validated taxonomy will provide researchers with a valuable tool for reporting key aspects of their studies, and facilitate the comparison and systematization of results from naturalistic psychedelic research.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

This work was supported by the Portuguese Foundation for Science and Technology under grant [UI/BD/151344/2021].

ORCID

Laura C. Carvalho MSc  <http://orcid.org/0000-0002-9607-1262>

References

- Aday, J. S., E. K. Bloesch, A. K. Davis, S. E. Domoff, K. Scherr, J. D. Woolley, and C. C. Davoli. 2024. Effects of Ayahuasca on gratitude and relationships with nature: A prospective, naturalistic study. *Journal of Psychoactive Drugs* 1–10. doi:10.1080/02791072.2024.231.
- Agin-Liebes, G., T. F. Haas, R. Lancelotta, M. V. Uthaug, J. G. Ramaekers, and A. K. Davis. 2021. Naturalistic use of mescaline is associated with self-reported psychiatric improvements and enduring positive life changes. *ACS Pharmacology and Translational Science* 4 (2):543–52. doi:10.1021/acspsci.1c00018.
- Agin-Liebes, G., R. Zeifman, J. B. Luoma, E. L. Garland, W. K. Campbell, and B. Weiss. 2022. Prospective examination of the therapeutic role of psychological flexibility and cognitive reappraisal in the ceremonial use of Ayahuasca. *Journal of Psychopharmacology* 36 (3):295–308. doi:10.1177/02698811221080165.
- Amada, N., and J. Shane. 2022. Self-actualization and the integration of psychedelic experience: The mediating role of perceived benefits to narrative self-functioning. *Journal of Humanistic Psychology*. doi:10.1177/00221678221099680.
- Ambrosini, F., L. Pariset, and R. Biolcati. 2023. Ayahuasca Ceremonies: Set and setting features across Italy and Colombia. *Drugs, Habits and Social Policy* 24 (4):351–71. doi:10.1108/DHS-06-2023-0021.
- Andersen, K. A. A., R. Carhart-Harris, D. J. Nutt, and D. Erritzoe. 2021. Therapeutic effects of classic serotonergic psychedelics: A systematic review of modern-era clinical studies. *Acta Psychiatrica Scandinavica* 143 (2):101–18. doi:10.1111/acps.13249.
- Apud Peláez, I. E. 2020. Personality traits in former Spanish substance users recovered with Ayahuasca. *Journal of Psychoactive Drugs* 52 (3):264–72. doi:10.1080/02791072.2020.1752960.
- Barba, T., H. Kettner, C. Radu, J. M. Peill, L. Roseman, D. J. Nutt, D. Erritzoe, R. Carhart-Harris, and B. Giribaldi. 2024. Psychedelics and sexual functioning: A mixed-methods study. *Scientific Reports* 14 (1):2181. doi:10.1038/s41598-023-49817-4.
- Barbosa, P. C. R., J. S. Giglio, and P. Dalgalarrodo. 2005. Altered states of consciousness and short-term psychological after-effects induced by the first time ritual use of Ayahuasca in an Urban Context in Brazil. *Journal of Psychoactive Drugs* 37 (2):193–201. doi:10.1080/02791072.2005.10399801.
- Barbosa, P. C. R., R. J. Strassman, D. X. da Silveira, K. Areco, R. Hoy, J. Pommy, R. Thoma, and M. Bogenschutz. 2016. Psychological and neuropsychological assessment of regular hoasca users. *Comprehensive Psychiatry* 71:95–105. doi:10.1016/j.comppsy.2016.09.003.
- Barbosa, P. C. R., L. F. Tófoli, M. P. Bogenschutz, R. Hoy, L. F. Berro, E. A. V. Marinho, K. N. Areco, and M. J. Winkelman. 2018. Assessment of alcohol and tobacco use disorders among religious users of ayahuasca. *Frontiers in Psychiatry* 9:136. doi:10.3389/fpsy.2018.00136.
- Barnett, B. S. 2025. Funding success of United States federal grant applications proposing to study therapeutic applications of psychedelics: A survey study. *Psychoactives* 4 (1):4. doi:10.3390/PSYCHOACTIVES4010004.
- Barnett, B. S., S. E. Parker, and J. Weleff. 2022. United States national institutes of health grant funding for psychedelic-assisted therapy clinical trials from 2006–2020. *International Journal of Drug Policy* 99:103473. doi:10.1016/J.DRUGPO.2021.103473.
- Barnett, B. S., M. F. Vest, M. S. Delatte, F. King IV, E. E. Mauney, A. J. Coulson, S. M. Nayak, P. S. Hendricks, G. R. Greer, and K. S. Murnane. 2024. Practical considerations in the establishment of psychedelic research programs. *Psychopharmacology* 242 (1):27. doi:10.1007/S00213-024-06722-6.

- Barrett, F. S., M. W. Johnson, and R. R. Griffiths. 2017. Neuroticism is associated with challenging experiences with psilocybin mushrooms. *Personality and Individual Differences* 117:155–60. doi:10.1016/j.paid.2017.06.004.
- Barsuglia, J., A. K. Davis, R. Palmer, R. Lancelotta, A. M. Windham-Herman, K. Peterson, M. Polanco, R. Grant, and R. R. Griffiths. 2018. Intensity of mystical experiences occasioned by 5-MeO-DMT and Comparison with a prior psilocybin study. *Frontiers in Psychology* 9:2459. doi:10.3389/fpsyg.2018.02459.
- Black, J. C., N. Schow, H. L. Burkett, M. Pena, J. S. Jewell, A. Czizik, A. A. Monte, and R. C. Dart. 2023. Comparing substance use consequences between Serotonergic Psychedelics, MDMA, and other drugs of abuse among United States adults with history of psychiatric illness. *International Journal of Mental Health and Addiction* 23 (2):1179–92. doi: 10.1007/s11469-023-01163-2.
- Bohn, A., M. H. H. Kiggen, M. V. Uthaug, K. I. M. van Oorsouw, J. G. Ramaekers, and H. T. van Schie. 2022. Altered states of consciousness during ceremonial san pedro use. *International Journal for the Psychology of Religion* 33 (4):309–31. doi: 10.1080/10508619.2022.2139502.
- Bouchet, L., Z. Sager, A. Yrondi, K. B. Nigam, B. T. Anderson, S. Ross, P. D. Petridis, and Y. Beaussant. 2024. Older adults in psychedelic-assisted therapy trials: A systematic review. *Journal of Psychopharmacology* 38 (1):33–48. doi: 10.1177/02698811231215420.
- Bouso, J. C., D. González, S. Fondevila, M. Cutchet, X. Fernández, P. C. Ribeiro Barbosa, M. Á. Alcázar-Córcos, W. S. Araújo, M. J. Barbanoj, J. M. Fábregas, et al. 2012. Personality, psychopathology, life attitudes and neuropsychological performance among ritual users of ayahuasca: A longitudinal study. *PLoS One* 7 (8): e42421. doi: 10.1177/02698811231215420.
- Byrne, K. J., S. Lindsay, N. Baker, C. Schmutz, and B. Lewis. 2023. In naturalistic psychedelic use, group use is common and acceptable. *Journal of Psychedelic Studies* 7 (2):100–13. doi:10.1556/2054.2023.00261.
- Carhart-Harris, R. L., L. Roseman, E. Haijen, D. Erritzoe, R. Watts, I. Branchi, and M. Kaelen. 2018. Psychedelics and the essential importance of context. *Journal of Psychopharmacology* 32 (7):725–31. doi:10.1177/0269881118754710.
- Carhart-Harris, R. L., A. C. Wagner, M. Agrawal, H. Kettner, J. F. Rosenbaum, A. Gazzaley, D. J. Nutt, and D. Erritzoe. 2022. Can pragmatic research, real-world data and digital technologies aid the development of psychedelic medicine? *Journal of Psychopharmacology* 36 (1):6–11. doi:10.1177/02698811211008567.
- Chan, G., T. Sun, C. Lim, W. S. Yuen, D. Stjepanović, B. Rutherford, W. Hall, B. Johnson, and J. Leung. 2022. An age-period-cohort analysis of trends in psychedelic and ecstasy Use in the Australian population. *Addictive Behaviors* 127:107216. doi:10.1016/j.addbeh.2021.107216.
- Close, J. B., E. C. Haijen, R. Watts, L. Roseman, and R. L. Carhart-Harris. 2020. Psychedelics and psychological flexibility – results of a prospective web-survey using the acceptance and action questionnaire II. *Journal of Contextual Behavioral Science* 16:37–44. doi:10.1016/j.jcbs.2020.01.005.
- Cummins, C., and J. Lyke. 2013. Peak experiences of psilocybin users and non-users. *Journal of Psychoactive Drugs* 45 (2):189–94. doi:10.1080/02791072.2013.785855.
- Daldegan-Bueno, D., L. O. Maia, C. M. Massarentti, and L. F. Tófoli. 2022. Ayahuasca and tobacco smoking cessation: Results from an Online Survey in Brazil. *Psychopharmacology* 239 (6):1767–82. doi: 10.1007/s00213-022-06063-2.
- Daldegan-Bueno, D., D. Révész, P. R. Morais, P. C. R. Barbosa, and L. O. Maia. 2022. Psychosocial and Drug Use assessment of regular vs. Non-regular ayahuasca users in a Brazilian sample: A web-based survey. *Substance Use and Misuse* 57 (7):1072–81. doi: 10.1080/10826084.2022.2063896.
- David, J., J. C. Bouso, M. Kohek, G. Ona, N. Tadmor, T. Arnon, Y. Dor-Ziderman, and A. Berkovich-Ohana. 2023. Ayahuasca-induced personal death experiences: Prevalence, characteristics, and impact on attitudes toward death, life, and the environment. *Frontiers in Psychiatry* 14:14. doi: 10.3389/fpsyg.2023.1287961.
- Davis, A. K., F. S. Barrett, and R. R. Griffiths. 2020. Psychological flexibility mediates the relations between acute psychedelic effects and subjective decreases in depression and anxiety. *Journal of Contextual Behavioral Science* 15:39–45. doi:10.1016/j.jcbs.2019.11.004.
- Davis, A. K., S. So, R. Lancelotta, J. P. Barsuglia, and R. R. Griffiths. 2019. 5-methoxy-N,N-Dimethyltryptamine (5-MeO-DMT) used in a naturalistic group setting is associated with unintended improvements in depression and anxiety. *The American Journal of Drug and Alcohol Abuse* 45 (2):161–69. doi: 10.1080/00952990.2018.1545024.
- Davis, A. K., Y. Xin, N. D. Sepeda, A. Garcia-Romeu, and M. T. Williams. 2021. Increases in psychological flexibility mediate relationship between acute psychedelic effects and decreases in racial trauma symptoms among people of color. *Chronic Stress* 5. doi:10.1177/24705470211035607.
- de la Salle, S., S. Gran-Ruaz, D. D. Davis, A. K. Davis, and M. T. Williams. 2022. Acute and enduring effects of naturalistic psychedelic Use Among indigenous Peoples in Canada and the United States. *Canadian Psychology* 63 (4):589–607. doi: 10.1037/cap0000338.
- Domínguez-Clavé, E., J. Soler, M. Elices, A. Franquesa, E. Álvarez, and J. C. Pascual. 2022. Ayahuasca May help to improve self-compassion and self-criticism capacities. *Human Psychopharmacology* 37 (1):e2807. doi:10.1002/hup.2807.
- Domínguez-Clavé, E., J. Soler, J. C. Pascual, M. Elices, A. Franquesa, M. Valle, E. Alvarez, and J. Riba. 2019. Ayahuasca improves emotion dysregulation in a community sample and in individuals with borderline-like traits. *Psychopharmacology* 236 (2):573–80. doi:10.1007/s00213-018-5085-3.
- Durante, L., R. G. Dos Santos, J. C. Bouso, and J. E. Hallak. 2021. Risk assessment of ayahuasca use in a religious context: Self-reported risk factors and adverse effects. *Brazilian Journal of Psychiatry* 43 (4):362–69. doi: 10.1590/1516-4446-2020-0913.
- Erritzoe, D., J. Smith, P. M. Fisher, R. Carhart-Harris, V. G. Frokjaer, and G. M. Knudsen. 2019. Recreational use of psychedelics is associated with elevated personality trait openness: Exploration of associations with brain

- serotonin markers. *Journal of Psychopharmacology* 33 (9):1068–75. doi:10.1177/0269881119827891.
- Evens, R., S. Reiche, R. M. Marek, D. U. Moon, R. E. Groß, A. Romanello, D. Jalilzadeh Masah, M. Scicchitano Böckheler, S. Gutwinski, C. Montag, et al. 2021. Psychedelic experiences during the Early COVID-19 Pandemic: Findings from an International online survey. *Frontiers in Psychiatry* 12:732028. doi:10.3389/fpsy.2021.732028.
- Fábregas, J. M., D. González, S. Fondevila, M. Cutchet, X. Fernández, P. C. R. Barbosa, M. Á. Alcázar-Córcoles, M. J. Barbanoj, J. Riba, and J. C. Bouso. 2010. Assessment of addiction severity among ritual users of ayahuasca. *Drug and Alcohol Dependence* 111 (3):257–61. doi: 10.1016/j.drugalcdep.2010.03.024.
- Forstmann, M., D. A. Yudkin, A. M. B. Prosser, S. Megan Heller, and M. J. Crockett. 2020. Transformative experience and social connectedness mediate the mood-enhancing effects of psychedelic Use in naturalistic settings. *Proceedings of the National Academy of Sciences of the United States of America* 117 (5):2338–46. doi: 10.1073/PNAS.1918477117.
- Fotiou, E. 2010. *From medicine men to Day Trippers: Shamanic tourism in Iquitos, Peru*. PhD diss., University of Wisconsin-Madison.
- Freckska, E., C. E. Móré, A. Vargha, and L. E. Luna. 2012. Enhancement of creative expression and entoptic phenomena as after-effects of repeated ayahuasca ceremonies. *Journal of Psychoactive Drugs* 44 (3):191–99. doi:10.1080/02791072.2012.703099.
- Garcia-Romeu, A., A. K. Davis, E. Erowid, F. Erowid, R. R. Griffiths, and M. W. Johnson. 2020. Persisting reductions in cannabis, opioid, and stimulant misuse after naturalistic psychedelic use: An online survey. *Frontiers in Psychiatry* 10:955. doi:10.3389/fpsy.2019.00955.
- Garcia-Romeu, A., A. K. Davis, F. Erowid, E. Erowid, R. R. Griffiths, and M. W. Johnson. 2019. Cessation and reduction in alcohol consumption and misuse after psychedelic use. *Journal of Psychopharmacology* 33 (9):1088–101. doi:10.1177/0269881119845793.
- Glynos, N. G., C. W. Fields, J. Barron, M. Herberholz, D. J. Kruger, and K. F. Boehnke. 2022. Naturalistic psychedelic use: A world apart from clinical care. *Journal of Psychoactive Drugs* 55 (4):379–88. doi: 10.1080/02791072.2022.2108356.
- Glynos, N. G., J. Pierce, A. K. Davis, J. McAfee, and K. F. Boehnke. 2022. Knowledge, perceptions, and use of psychedelics among individuals with fibromyalgia. *Journal of Psychoactive Drugs* 55 (1):73–84. doi: 10.1080/02791072.2021.2022817.
- Gonzalez, D., J. Cantillo, I. Perez, M. Carvalho, A. Aronovich, M. Farre, A. Feilding, J. E. Obiols, and J. C. Bouso. 2021. The shipibo ceremonial use of Ayahuasca to promote well-being: An observational study. *Frontiers in Pharmacology* 12:623923. doi:10.3389/fphar.2021.623923.
- González, D., J. Cantillo, I. Pérez, M. Farré, A. Feilding, J. E. Obiols, and J. C. Bouso. 2020. Therapeutic potential of Ayahuasca in grief: A prospective, observational study. *Psychopharmacology* 237 (4):1171–82. doi:10.1007/s00213-019-05446-2.
- Haijen, E. C. H. M., M. Kaelen, L. Roseman, C. Timmermann, H. Kettner, S. Russ, D. Nutt, R. E. Daws, A. D. G. Hampshire, R. Lorenz, et al. 2018. Predicting responses to psychedelics: A prospective study. *Frontiers in Pharmacology* 9. doi: 10.3389/fphar.2018.00897.
- Haikazian, S., D. C. J. Chen-Li, D. E. Johnson, F. Fancy, A. Levinta, M. I. Husain, R. B. Mansur, R. S. McIntyre, and J. D. Rosenblat. 2023. Psilocybin-assisted therapy for depression: A systematic review and meta-analysis. *Psychiatry Research* 329:115531. doi: 10.1016/J.PSYCHRES.2023.115531.
- Halpern, J. H., A. R. Sherwood, T. Passie, K. C. Blackwell, and A. James Rutenber. 2008. Evidence of health and safety in American members of a religion Who Use a hallucinogenic sacrament. *Medical Science Monitor: International Medical Journal of Experimental and Clinical Research* 14 (8):SR15–22.
- Han, B., C. Blanco, E. B. Einstein, and W. M. Compton. 2022. Mental health conditions and receipt of mental health care by illicit Lysergic Acid Diethylamide (LSD) use status among young adults in the United States. *Addiction* 117 (6):1794–800. doi:10.1111/add.15789.
- Harris, R., and L. Gurel. 2012. A study of ayahuasca use in North America. *Journal of Psychoactive Drugs* 44 (3):209–15. doi:10.1080/02791072.2012.703100.
- Hartogsohn, I. 2017. Constructing drug effects: A history of set and setting. *Drug Science, Policy and Law* 3:205032451668332. doi:10.1177/2050324516683325.
- Hughes, M. E., and A. Garcia-Romeu. 2024. Ethnoracial inclusion in clinical trials of psychedelics: A systematic review. *EClinicalMedicine* 74:102711. doi: 10.1016/j.eclinm.2024.102711.
- Jiménez-Garrido, D. F., M. Gómez-Sousa, G. Ona, R. G. Dos Santos, J. E. C. Hallak, M. Á. Alcázar-Córcoles, and J. C. Bouso. 2020. Effects of ayahuasca on mental health and quality of life in Naïve users: A longitudinal and cross-sectional study combination. *Scientific Reports* 10 (1):4075. doi: 10.1038/s41598-020-61169-x.
- Johnson, M. W., A. Garcia-Romeu, P. S. Johnson, and R. R. Griffiths. 2017a. Long-term follow-up of psilocybin-facilitated smoking cessation. *The American Journal of Drug and Alcohol Abuse* 43 (1):55–60. doi: 10.3109/00952990.2016.1170135.
- Johnson, M. W., A. Garcia-Romeu, P. S. Johnson, and R. R. Griffiths. 2017b. An online survey of tobacco smoking cessation associated with naturalistic psychedelic use. *Journal of Psychopharmacology* 31 (7):841–50. doi:10.1177/0269881116684335.
- Jones, G., M. Al-Suwaidi, F. Castro-Ramirez, T. C. McGuire, P. Mair, and M. K. Nock. 2023. Race and ethnicity moderate the associations between lifetime psilocybin use and crime arrests. *Frontiers in Psychiatry* 14:1169692. doi:10.3389/fpsy.2023.1169692.
- Jones, G. M. 2023. Race and ethnicity moderate the associations between lifetime psychedelic use (Mdma/ecstasy and psilocybin) and Major Depressive Episodes. *Journal of Psychopharmacology* 37 (1):61–69. doi:10.1177/02698811221127304.
- Jones, G. M., and M. K. Nock. 2022a. Lifetime use of MDMA/ Ecstasy and psilocybin is associated with reduced odds of Major Depressive Episodes. *Journal of Psychopharmacology* 36 (1):57–65. doi:10.1177/02698811211066714.
- Jones, G. M., and M. K. Nock. 2022b. Race and ethnicity moderate the associations between lifetime psychedelic

- use (MDMA and Psilocybin) and psychological distress and suicidality. *Scientific Reports* 12 (1):16976. doi:10.1038/s41598-022-18645-3.
- Kaasik, H., and K. Kreegipuu. 2020. Ayahuasca users in Estonia: Ceremonial practices, subjective long-term effects, mental health, and quality of life. *Journal of Psychoactive Drugs* 52 (3):255–63. doi:10.1080/02791072.2020.1748773.
- Kaelen, M., B. Giribaldi, J. Raine, L. Evans, C. Timmerman, N. Rodriguez, L. Roseman, A. Feilding, D. Nutt, and R. Carhart-Harris. 2018. The hidden Therapist: Evidence for a central role of music in psychedelic therapy. *Psychopharmacology* 235 (2):505. doi:10.1007/S00213-017-4820-5.
- Kavenská, V., and H. Simonová. 2015. Ayahuasca tourism: Participants in shamanic rituals and their personality styles, motivation, benefits and risks. *Journal of Psychoactive Drugs* 47 (5):351–59. doi:10.1080/02791072.2015.1094590.
- Kervadec, E., B. Fauvel, L. Strika-Bruneau, A. Amirouche, V. Verroust, P. Piolino, B. Romeo, and A. Benyamina. 2024. Reduction of alcohol use and increase in psychological flexibility after a naturalistic psychedelic experience: A retrospective survey. *Alcohol and Alcoholism (Oxford, Oxfordshire)* 59 (2):agad078. doi:10.1093/alcac/agad078.
- Kettner, H., F. E. Rosas, C. Timmermann, L. Kärtner, R. L. Carhart-Harris, and L. Roseman. 2021. Psychedelic communitas: Intersubjective experience during psychedelic group sessions predicts enduring changes in psychological wellbeing and social connectedness. *Frontiers in Pharmacology* 12:623985. doi:10.3389/fphar.2021.623985.
- Kiraga, M. K., K. P. C. Kuypers, M. V. Uthaug, J. G. Ramaekers, and N. L. Mason. 2022. Decreases in state and trait anxiety post-psilocybin: A naturalistic, observational study among retreat attendees. *Frontiers in Psychiatry* 13:883869. doi: 10.3389/fpsyt.2022.883869.
- Kiraga, M. K., N. L. Mason, M. V. Uthaug, K. I. M. van Oorsouw, S. W. Toennes, J. G. Ramaekers, and K. P. C. Kuypers. 2021. Persisting effects of Ayahuasca on empathy, creative thinking, decentering, personality, and well-being. *Frontiers in Pharmacology* 12:721537. doi: 10.3389/fphar.2021.721537.
- Kjellgren, A., and T. Norlander. 2000. Psychedelic drugs: A study of drug-induced experiences obtained by illegal drug users in relation to Stanislav Grof's Model of altered states of consciousness. *Imagination, Cognition and Personality* 20 (1):41–57. doi:10.2190/A2RX-XV10-NHUE-3612.
- Kohek, M., G. Ona, M. van Elk, R. G. Dos Santos, J. E. C. Hallak, M. Á. Alcázar-Córcoles, and J. C. Bouso. 2022. Ayahuasca and public health II: Health status in a large sample of Ayahuasca-ceremony participants in the Netherlands. *Journal of Psychoactive Drugs* 55 (3):1–12. doi: 10.1080/02791072.2022.2077155.
- Korman, B. A. 2023a. The rising use of LSD among business managers. *Substance Use and Misuse* 59 (2):159–66. doi: 10.1080/10826084.2023.2267105.
- Korman, B. A. 2023b. On the mushrooming reports of “quiet quitting”: Employees’ lifetime psilocybin use predicts their overtime hours worked. *Journal of Psychoactive Drugs* 56 (4):475–84. doi: 10.1080/02791072.2023.2242358.
- Kvam, T. M., M. V. Uthaug, K. A. A. Andersen, B. B. Refsum, P. A. Tunstad, L. H. Stewart, H. B. Jacobsen, and C. Grønnerød. 2023. Epidemiology of classic psychedelic substances: Results from a Norwegian Internet Convenience Sample. *Frontiers in Psychiatry* 14:1287196. doi: 10.3389/fpsyt.2023.1287196.
- Lake, S., and P. Lucas. 2024. The global psychedelic survey: Consumer characteristics, patterns of use, and access in primarily anglophone regions around the world. *International Journal of Drug Policy* 130:104507. doi:10.1016/j.drugpo.2024.104507.
- Longo, M. S. C., B. Bienemann, M. Multedo, M. A. Negreiros, E. Schenberg, and D. C. Mograbi. 2023. The association of classic serotonergic psychedelic use and intention of future use with nature relatedness. *Journal of Psychoactive Drugs* 55 (4):402–10. doi: 10.1080/02791072.2022.2112788.
- Lukačovič, M., and R. Masaryk. 2021. Use of hallucinogens in Slovakia: Does it differ from global trends? *International Journal of Drug Policy* 98:103385. doi:10.1016/j.drugpo.2021.103385.
- Mans, K., H. Kettner, D. Erritzoe, E. C. H. M. Haijen, M. Kaelen, and R. L. Carhart-Harris. 2021. Sustained, multifaceted improvements in mental well-being following psychedelic experiences in a prospective opportunity sample. *Frontiers in Psychiatry* 12:647909. doi: 10.3389/fpsyt.2021.647909.
- Mason, N. L., E. Mischler, M. V. Uthaug, and K. P. C. Kuypers. 2019. Sub-acute effects of psilocybin on empathy, creative thinking, and subjective well-being. *Journal of Psychoactive Drugs* 51 (2):123–34. doi: 10.1080/02791072.2019.1580804.
- Matzopoulos, R., R. Morlock, A. Morlock, B. Lerer, and L. Lerer. 2022. Psychedelic mushrooms in the USA: Knowledge, patterns of use, and association with health outcomes. *Frontiers in Psychiatry* 12:780696. doi:10.3389/fpsyt.2021.780696.
- Mian, M. N., B. R. Altman, and M. Earleywine. 2020. Ayahuasca’s antidepressant effects covary with behavioral activation as well as mindfulness. *Journal of Psychoactive Drugs* 52 (2):130–37. doi:10.1080/02791072.2019.1674428.
- Nayak, S. M., H. Jackson, N. D. Sepeda, D. S. Mathai, S. So, A. Yaffe, H. Zaki, T. J. Brasher, M. X. Lowe, R. P. Del Jolly, et al. 2023. Naturalistic psilocybin use is associated with persisting improvements in mental health and wellbeing: Results from a prospective, longitudinal survey. *Frontiers in Psychiatry* 14:1199642. doi:10.3389/fpsyt.2023.1199642.
- Nichols, D. E. 2016. Psychedelics. *Pharmacological Reviews* 68 (2):264–355. doi:10.1124/pr.115.011478.
- Nikolaidis, A., R. Lancelotta, N. Gukasyan, R. Griffiths, F. Barrett, and A. K. Davis. 2022. Subtypes of the psychedelic experience have reproducible and predictable effects on depression and anxiety symptoms. *Journal of Affective Disorders* 324:239–49. doi: 10.1016/j.jad.2022.12.042.
- Nikolin, S., A. Rodgers, A. Schwaab, A. Bahji, C. Zarate, G. Vazquez, and C. Loo. 2023. Ketamine for the treatment of major depression: A systematic review and meta-analysis. *EClinicalMedicine* 62:102127. doi:10.1016/j.eclinm.2023.102127.
- Nour, M. M., L. Evans, and R. L. Carhart-Harris. 2017. Psychedelics, personality and political perspectives. *Journal of Psychoactive Drugs* 49 (3):182–91. doi:10.1080/02791072.2017.1312643.
- Ona, G., M. Kohek, T. Massaguer, A. Gomariz, D. F. Jiménez, R. G. Dos Santos, J. E. C. Hallak, M. Á. Alcázar-Córcoles, and J. C. Bouso. 2019. Ayahuasca and Public health: Health

- status, psychosocial well-being, lifestyle, and coping strategies in a large sample of ritual ayahuasca users. *Journal of Psychoactive Drugs* 51 (2):135–45. doi: [10.1080/02791072.2019.1567961](https://doi.org/10.1080/02791072.2019.1567961).
- Orłowski, P., J. Hobot, A. Ruban, J. Szczypiński, and M. Bola. 2023. The relation between naturalistic use of psychedelics and perception of emotional stimuli: An event-related potential study comparing non-users and experienced users of classic psychedelics. *Journal of Psychopharmacology* 38 (1):68–79. doi: [10.1177/02698811231216322](https://doi.org/10.1177/02698811231216322).
- Orłowski, P., A. Ruban, J. Szczypiński, J. Hobot, M. Bielecki, and M. Bola. 2022. Naturalistic use of psychedelics is related to emotional reactivity and self-consciousness: The mediating role of ego-dissolution and mystical experiences. *Journal of Psychopharmacology* 36 (8):987–1000. doi: [10.1177/02698811221089034](https://doi.org/10.1177/02698811221089034).
- Ortiz Bernal, A. M., C. L. Raison, R. L. Lancelotta, and A. K. Davis. 2022. Reactivations after 5-Methoxy-N, N-Dimethyltryptamine use in naturalistic settings: An initial exploratory analysis of the Phenomenon’s predictors and its emotional valence. *Frontiers in Psychiatry* 13:1049643. doi: [10.3389/fpsy.2022.1049643](https://doi.org/10.3389/fpsy.2022.1049643).
- Pallavicini, C., F. Cavanna, F. Zamberlan, L. A. de la Fuente, Y. Ilksoy, Y. S. Perl, M. Arias, C. Romero, R. Carhart-Harris, C. Timmermann, et al. 2021. Neural and subjective effects of inhaled N,N-Dimethyltryptamine in natural settings. *Journal of Psychopharmacology* 35 (4):406–20. doi: [10.1177/0269881120981384](https://doi.org/10.1177/0269881120981384).
- Perkins, D., E. S. Opaleye, H. Simonova, J. C. Bouso, L. F. Tófoli, N. L. Galvão-Coelho, V. Schubert, and J. Sarris. 2022. Associations between ayahuasca consumption in naturalistic settings and current alcohol and drug use: Results of a large International Cross-sectional survey. *Drug and Alcohol Review* 41 (1):265–74. doi: [10.1111/dar.13348](https://doi.org/10.1111/dar.13348).
- Perkins, D., B. A. Pagni, J. Sarris, P. C. R. Barbosa, and R. Chenhall. 2022. Changes in mental health, wellbeing and personality following ayahuasca consumption: Results of a naturalistic longitudinal study. *Frontiers in Pharmacology* 13:884703. doi: [10.3389/fphar.2022.884703](https://doi.org/10.3389/fphar.2022.884703).
- Perkins, D., V. Schubert, H. Simonová, L. F. Tófoli, J. C. Bouso, M. Horák, N. L. Galvão-Coelho, and J. Sarris. 2021. Influence of context and setting on the mental health and wellbeing outcomes of ayahuasca drinkers: Results of a large International survey. *Frontiers in Pharmacology* 12:623979. doi: [10.3389/fphar.2021.623979](https://doi.org/10.3389/fphar.2021.623979).
- Pontual, A. A. D. D., L. F. Tófoli, C. M. Corradi-Webster, K. van Oorsouw, A. R. O. Delgado, and J. G. Ramaekers. 2022. The influence of ceremonial settings on mystical and challenging experiences occasioned by Ayahuasca: A survey among ritualistic and religious Ayahuasca users. *Frontiers in Psychology* 13:857372. doi: [10.3389/fpsyg.2022.857372](https://doi.org/10.3389/fpsyg.2022.857372).
- Qiu, T. T., and J. P. Minda. 2023. Psychedelic experiences and mindfulness are associated with improved wellbeing. *Journal of Psychoactive Drugs* 55 (2):123–33. doi: [10.1080/02791072.2022.2060773](https://doi.org/10.1080/02791072.2022.2060773).
- Roberts, C. A., I. Osborne-Miller, J. Cole, S. H. Gage, and P. Christiansen. 2020. Perceived harm, motivations for use and subjective experiences of recreational psychedelic “magic” mushroom use. *Journal of Psychopharmacology* 34 (9):999–1007. doi: [10.1177/0269881120936508](https://doi.org/10.1177/0269881120936508).
- Ruffell, S. G. D., N. Netzband, W. F. Tsang, M. Davies, A. Inserra, M. Butler, J. J. H. Rucker, L. F. Tófoli, E. L. Dempster, A. H. Young, et al. 2021. Ceremonial Ayahuasca in Amazonian retreats—mental health and epigenetic outcomes from a six-month naturalistic study. *Frontiers in Psychiatry* 12:687615. doi: [10.3389/fpsy.2021.687615](https://doi.org/10.3389/fpsy.2021.687615).
- Samorini, G. 2019. The oldest archeological data evidencing the relationship of Homo Sapiens with psychoactive plants: A worldwide overview. *Journal of Psychedelic Studies* 3 (2):63–80. doi: [10.1556/2054.2019.008](https://doi.org/10.1556/2054.2019.008).
- Savoldi, R., A. Roazzi, and R. C. de Oliveira Sales. 2023. Mystical and ego-dissolution experiences in ayahuasca and Jurema holistic rituals: An exploratory study. *The International Journal for the Psychology of Religion* 33 (4):332–60. doi: [10.1080/10508619.2023.2185369](https://doi.org/10.1080/10508619.2023.2185369).
- Sepeda, N. D., J. M. Clifton, L. Y. Doyle, R. Lancelotta, R. R. Griffiths, and A. K. Davis. 2020. Inhaled 5-methoxy-N,N-dimethyltryptamine: Supportive context associated with positive acute and enduring effects. *Journal of Psychedelic Studies* 4 (2):114–22. doi: [10.1556/2054.2019.033](https://doi.org/10.1556/2054.2019.033).
- Sicignano, D., A. V. Hernandez, B. Schiff, N. Elmahy, and C. M. White. 2024. The impact of psychedelics on patients with alcohol use disorder: A systematic review with meta-analysis. *Current Medical Research and Opinion* 40 (2):293–302. doi: [10.1080/03007995.2023.2296968](https://doi.org/10.1080/03007995.2023.2296968).
- Simonsson, C., R. Chambers, P. S. Hendricks, S. B. Goldberg, W. Osika, M. Schlosser, A. Ryde, E. Christersson, and O. Simonsson. 2023. Classic psychedelic use and current meditation practice. *Mindfulness* 14 (4):763–68. doi: [10.1007/s12671-023-02103-w](https://doi.org/10.1007/s12671-023-02103-w).
- Simonsson, O., S. B. Goldberg, R. Chambers, W. Osika, C. Simonsson, and P. S. Hendricks. 2023. Psychedelic use and psychiatric risks. *Psychopharmacology*. doi: [10.1007/s00213-023-06478-5](https://doi.org/10.1007/s00213-023-06478-5).
- Simonsson, O., P. S. Hendricks, C. U. D. Stenfors, S. B. Goldberg, L. Honk, and W. Osika. 2023. Longitudinal associations between psychedelic use and unusual visual experiences in the United States and the United Kingdom. *Journal of Psychopharmacology* 38 (1):110–15. doi: [10.1177/02698811231218931](https://doi.org/10.1177/02698811231218931).
- Simonsson, O., W. Osika, R. Carhart-Harris, and P. S. Hendricks. 2021. Associations between lifetime classic psychedelic use and cardiometabolic diseases. *Scientific Reports* 11 (1):14427. doi: [10.1038/s41598-021-93787-4](https://doi.org/10.1038/s41598-021-93787-4).
- Simonsson, O., W. Osika, C. U. D. Stenfors, S. B. Goldberg, L. Honk, and P. S. Hendricks. 2023. Longitudinal associations between psychedelic use and meditation practices in the United States and the United Kingdom. *Psychological Medicine* 54 (6):1228–34. doi: [10.1017/S0033291723003082](https://doi.org/10.1017/S0033291723003082).
- Simonsson, O., J. D. Sexton, and P. S. Hendricks. 2021. Associations between lifetime classic psychedelic use and markers of physical health. *Journal of Psychopharmacology* 35 (4):447–52. doi: [10.1177/0269881121996863](https://doi.org/10.1177/0269881121996863).
- Soler, J., M. Elices, A. Franquesa, S. Barker, P. Friedlander, A. Feilding, J. C. Pascual, and J. Riba. 2016. Exploring the therapeutic potential of ayahuasca: Acute intake increases mindfulness-related capacities. *Psychopharmacology* 233 (5):823–29. doi: [10.1007/s00213-015-4162-0](https://doi.org/10.1007/s00213-015-4162-0).
- Studerus, E., A. Gamma, M. Kometer, F. X. Vollenweider, and M. Mazza. 2012. Prediction of psilocybin response in

- healthy volunteers. *PLoS One* 7 (2):e30800. doi:10.1371/journal.pone.0030800.
- Sweat, N. W., L. W. Bates, and P. S. Hendricks. 2016. The associations of naturalistic classic psychedelic use, mystical experience, and creative problem solving. *Journal of Psychoactive Drugs* 48 (5):344–50. doi:10.1080/02791072.2016.1234090.
- Tricco, A. C., E. Lillie, W. Zarin, K. K. O'Brien, H. Colquhoun, D. Levac, D. Moher, M. D. J. Peters, T. Horsley, L. Weeks, et al. 2018. PRISMA extension for scoping reviews (PRISMA-ScR): Checklist and explanation. *Annals of Internal Medicine* 169 (7):467–73. doi: 10.7326/M18-0850.
- Trichter, S., J. Klimo, and S. Krippner. 2009. Changes in spirituality among ayahuasca ceremony novice participants. *Journal of Psychoactive Drugs* 41 (2):121–34. doi:10.1080/02791072.2009.10399905.
- United Nations Office on Drugs and Crime. 2023. Recent developments involving psychedelics. *World Drug report 2023*.
- Uthaug, M. V., R. Lancelotta, A. M. Ortiz Bernal, A. K. Davis, and J. G. Ramaekers. 2020. A comparison of reactivation experiences following vaporization and intramuscular injection (IM) of synthetic 5-methoxy-N, N-Dimethyltryptamine (5-MeO-DMT) in a naturalistic setting. *Journal of Psychedelic Studies* 4 (2):104–13. doi:10.1556/2054.2020.00123.
- Uthaug, M. V., R. Lancelotta, A. Szabo, A. K. Davis, J. Riba, and J. G. Ramaekers. 2020. Prospective examination of synthetic 5-methoxy-N,N-Dimethyltryptamine inhalation: Effects on salivary IL-6, cortisol levels, affect, and non-judgment. *Psychopharmacology* 237 (3):773–85. doi:10.1007/s00213-019-05414-w.
- Uthaug, M. V., R. Lancelotta, K. van Oorsouw, K. P. C. Kuypers, N. Mason, J. Rak, A. Šuláková, R. Jurok, M. Maryška, M. Kuchař, et al. 2019. A single inhalation of vapor from dried toad secretion containing 5-methoxy-N, N-Dimethyltryptamine (5-MeO-DMT) in a naturalistic setting is related to sustained enhancement of satisfaction with life, mindfulness-related capacities, and a decrement of psychopathological symptoms. *Psychopharmacology* 236 (9):2653–66. doi: 10.1007/s00213-019-05236-w.
- Uthaug, M. V., N. L. Mason, S. W. Toennes, J. T. Reckweg, E. B. de Sousa Fernandes Perna, K. P. C. Kuypers, K. van Oorsouw, J. Riba, and J. G. Ramaekers. 2021. A placebo-controlled study of the effects of Ayahuasca, set and setting on mental health of participants in Ayahuasca group retreats. *Psychopharmacology* 238 (7):1899–910. doi:10.1007/S00213-021-05817-8.
- Uthaug, M. V., K. van Oorsouw, K. P. C. Kuypers, M. van Boxtel, N. J. Broers, N. L. Mason, S. W. Toennes, J. Riba, and J. G. Ramaekers. 2018. Sub-acute and long-term effects of Ayahuasca on affect and cognitive thinking style and their association with ego dissolution. *Psychopharmacology* 235 (10):2979–89. doi: 10.1007/s00213-018-4988-3.
- van Elk, M., and E. I. Fried. 2023. History repeating: Guidelines to address common problems in psychedelic science. *Therapeutic Advances in Psychopharmacology* 13:20451253231198466. doi:10.1177/20451253231198466.
- Van Oorsouw, K. I., M. V. Uthaug, N. L. Mason, N. J. Broers, and J. G. Ramaekers. 2021. Sub-acute and long-term effects of ayahuasca on mental health and well-being in healthy ceremony attendants: A replication study. *Journal of Psychedelic Studies* 5 (2):103–13. doi:10.1556/2054.2021.00174.
- Van Oorsouw, K., S. W. Toennes, and J. G. Ramaekers. 2022. Therapeutic effect of an ayahuasca analogue in clinically depressed patients: A longitudinal observational study. *Psychopharmacology* 239 (6):1839–52. doi:10.1007/s00213-021-06046-9.
- Weiss, B., C. Sleep, J. D. Miller, and W. K. Campbell. 2023. Examining the therapeutic effect of ceremonial ayahuasca on narcissistic personality and antagonistic externalizing in adults. *Journal of Personality Disorders* 37 (2):131–55. doi:10.1521/pedi.2023.37.2.131.
- Weiss, B., A. Wingert, D. Erritzoe, and W. K. Campbell. 2023. Prevalence and therapeutic impact of adverse life event reexperiencing under ceremonial ayahuasca. *Scientific Reports* 13 (1):9438. doi:10.1038/s41598-023-36184-3.
- Williams, M. T., A. K. Davis, Y. Xin, N. D. Sepeda, P. C. Grigas, S. Sinnott, and A. M. Haeny. 2021. People of color in North America report improvements in racial trauma and mental health symptoms following psychedelic experiences. *Drugs: Education, Prevention & Policy* 28 (3):215–26. doi:10.1080/09687637.2020.1854688.
- Winstock, A. R., L. J. Maier, C. Villa-Llera, A. Zhuparris, E. Davies, R. Sutherland, K. Kuypers, C. Timmermann, J. A. Ferris, and M. J. Barrat. 2021. Global Drug survey (GDS) 2020: Key findings report. Global Drug Survey, London, United Kingdom.
- Yockey, A., and K. King. 2021. Use of psilocybin (“mushrooms”) among US adults: 2015–2018. *Journal of Psychedelic Studies* 5 (1):17–21. doi:10.1556/2054.2020.00159.
- Yockey, R. A., R. A. Vidourek, and K. A. King. 2020. Trends in LSD use among US adults: 2015–2018. *Drug and Alcohol Dependence* 212:108071. doi:10.1016/j.drugalcdep.2020.108071.