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Beyond prohibition: A public health analysis of naturalistic psychedelic use

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ABSTRACT

Psychedelic drug use is experiencing a global resurgence, both in clinical research and community settings. This paper presents a comprehensive public health analysis of the naturalistic use of psychedelics—defined as use outside clinical or research environments. Drawing on a review of 104 peer-reviewed articles, this analysis evaluates the mental, physical, and social outcomes associated with substances such as psilocybin, LSD, MDMA, mescaline, and 5-MeO-DMT. Findings indicate that naturalistic psychedelic use is associated with reductions in depression, anxiety, PTSD, substance use disorders, interpersonal violence, and suicidality, while enhancing emotional well-being, social connectedness, spirituality, nature relatedness, psychological flexibility and physical health. These benefits are observed across diverse populations in many countries, including individuals with trauma, addictions, and chronic pain, as well as in older adults and marginalized groups. Importantly, while adverse effects can occur, they are typically short-lived and often associated with identifiable risk factors such as youth, high doses, psychological vulnerability, and poor set and setting. Drawing on harm reduction principles and Indigenous cultural models, the paper outlines how public education and safe use guidelines—emphasizing mindset, environment, and dosage—can mitigate risks. The data suggest that current prohibitionist drug policies are both outdated and harmful and that a shift toward legalization, regulated access, and evidence-informed education is not only justified but urgently needed. A public health approach to psychedelics, one grounded in safety, inclusion, and scientific evidence, offers the most rational path forward.

KEYWORDS

psychedelics, naturalistic use, public health, drug policy, harm reduction, policing

INTRODUCTION

Interest in psychedelic drug use is increasing as observed in both public use rates and clinical research settings. In 2010, it was estimated that over 30 million people in the United States (US) had at least one psychedelic experience in their lifetime (Krebs & Johansen, 2013). Numerous clinical trials are currently underway exploring psychedelics as medicine for various mental health conditions, including depression, anxiety, post-traumatic stress disorder (PTSD) and other diagnoses. The website clinicaltrials.gov lists research on classical psychedelics (e.g., 220 studies for psilocybin, 129 for LSD), empathogens (e.g., 155 studies for MDMA), and novel psychedelic molecules (e.g., 16 for 5-MeO-DMT). This increasing interest is also reflected in changing public opinion, shifting in favour of wider legal access to these substances (Goldberg, Dec 12, 2024; Louis Plourde et al., Jan 22, 2024; Sandbrink et al., 2024; UC Berkeley Research, July 12, 2023). Psychedelics are gradually being decriminalized in certain jurisdictions - such as California's Senate Bill 519 (Senators Wiener & Assembly

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Members Lee, Feb 17 2021) and de facto decriminalization is being adopted by cities like Vancouver (Chan, Aug 29, 2024) and Toronto (Callan, May 24, 2024) with entrepreneurs establishing mushroom and psychedelic dispensaries. Advocacy groups, including the Psychedelic Association of Canada and Decriminalize Nature, are actively promoting improved access to psychedelics. Despite this, psychedelics remain strictly controlled substances subject to criminal penalties. As lawmakers and municipal authorities consider the potential harms and benefits of psychedelics with the goal of developing appropriate regulatory frameworks and policing practices, a public health analysis can assist the movement toward evidence-based laws, police procedures and policies.

As most psychedelic use occurs outside research settings, the public health perspective on the impact of "recreational" or "community-based" use is crucial for creating laws and policies which maximize the benefits and minimize the harms of psychedelics. While the lack of public health involvement in the field of psychedelics has been noted by some authors (Kuiper et al., 2024) there has been some engagement and discussion on how a public health analysis can be helpful (Canadian Public Health Association, 2023; Oct 22, 1024). This paper is intended to continue with this analysis as the public health perspective is important in the creation of policies and laws based on evidence. Like the never-ending Phase IV of a clinical trial where real-world effectiveness is assessed in an observational, non-interventional manner, there is much to be gleaned from the vast naturalistic use (i.e. use outside of clinical or research settings) of psychedelics that policy makers would be remiss to excuse. This is where the true safety profile of a drug is characterised and prevalent practice patterns can lead to further scientific inquiries and alterations to policy (Suvarna, 2010). This paper provides a public health analysis of the health and social harms and benefits of naturalistic psychedelic use.

Our literature review involved searching for the terms "psychedelic" and "naturalistic" in the University of British Columbia (UBC) library which yielded 57 results and in PubMed which produced 21 results. We also examined the reference sections of journal articles and consulted private academic collections to identify additional relevant materials which produced 79 papers of interest. All identified articles were then screened for legitimacy (peer-reviewed status), relevancy (including naturalistic use, health and wellness, adverse events, context, and history), and duplication. A total of 104 articles were included in the final analysis.

PUBLIC HEALTH CHALLENGES ADDRESSED BY NATURALISTIC USE OF PSYCHEDELICS

Depression (WHO: World Health Organization, 2021), anxiety (Dattani, Rodés-Guirao, Ritchie, & Roser, 2023), PTSD (WHO -World Health Organization, May 27, 2024), and substance use disorders (WHO - World Health Organization, 2018; June 28, 2024) are common mental disorders around the globe. All these significant mental disorders are difficult to treat and often the prognosis is poor (Blackburn, 2019; Brorson, Ajo Arnevik, Rand-Hendriksen, & Duckert, 2013; de Vries, Roest, Burgerhof, & de Jonge, 2018; Fournier et al., 2010; Schottenbauer, Glass, Arnkoff, Tendick, & Gray, 2008) while the cost of treating these conditions is significant (de Oliveira, Cheng, Rehm, & Kurdyak, 2018; de Oliveira, Cheng, Vigod, Rehm, & Kurdyak, 2016; J. Rehm et al., 2006; Trautmann, Rehm, & Wittchen, 2016). This paper suggests that the naturalistic use of psychedelics could significantly improve many mental health and addictions challenges without the cost of expensive treatment.

MENTAL HEALTH AND MOOD IMPROVEMENTS WITH NATURALISTIC PSYCHEDELIC USE

Analysing the naturalistic use of psychedelics involves exploring different types of research ranging from querying databases to the examination of survey data tracking the use of psychedelics alongside other health, social, or criminal behaviours. The number of these analyses has grown rapidly in recent years. One of the significant drivers to this topic of research interest is a paper by Hendricks (2014) who analysed a large criminal correctional database (n = 25,622) to understand the protective factors against recidivism. Generally, it is believed that the three primary protective factors preventing people who have been incarcerated from returning to jail are stable family, housing, and employment. Hendricks confirmed these three protective factors but observed that psychedelic use was an even greater protective factor, associated with a 40% reduced likelihood of recidivism. Not surprisingly, cocaine, amphetamine, and opiate use disorders were associated with an increased chance of recidivism.

As a result of this surprising and encouraging outcome, Hendricks (2015) queried the National Survey on Drug Use and Health (NSDUH; n = 190,000) and found that lifetime use of psychedelics was associated with a significant reduction of psychological distress and suicidality compared to those who do not use psychedelics. These observations led to a wide variety of researchers querying different databases for correlates of psychedelic use. For example, Johansen and Krebs (2015) pooled data from the NSDUH (n = 135,095) and examined the association between 11 mental health concerns and psychedelic use, concluding that "*We failed to find any associations between lifetime use of psychedelics and past year serious psychological distress, receiving or needing mental health treatment, depression, anxiety, or suicidal thoughts or behaviour in the past year. Rather, lifetime use of psychedelics was associated with decreased inpatient psychiatric treatment.*" A Norwegian study found use of psychedelics led to improvements in self-perceived symptoms of mental disorders and substance use disorders (Kvam et al., 2023). Another survey reported that participants with

ADHD who took a regular microdose (of mostly psilocybin or LSD) for 4 weeks had the trait of mindfulness enhanced. Specifically, ability to observe and not judge one's inner experience was increased, neuroticism was decreased (Haijen, Hurks, & Kuypers, 2023), emotional regulation and empathy increased (Haijen, Hurks, & Kuypers, 2024), and symptoms of ADHD decreased while well-being increased (Haijen, Hurks, & Kuypers, 2022). In a retrospective online survey (n = 174) of English and French psychedelic drug users with Obsessive Compulsive Disorder (OCD), classic psychedelics (i.e. LSD or psilocybin) were reported as the only psychoactive substances effective in reducing OCD symptoms with this effect reported to last over 3 months by over 30% of respondents (Buot et al., 2023). In a survey of experienced drug users (n = 93), psychedelics were ranked as beneficial, largely because these substances were understood to have significant potential therapeutic application (Carhart-Harris & Nutt, 2013). A survey (n = 1,249) of individuals with adverse childhood experiences demonstrated that the effect of potentially traumatising childhood experiences on psychological distress was lower among those who had used psilocybin compared to those who had not (Card et al., 2023).

As the use of psychedelics has been consistently shown to be associated with positive mental health attributes, it is interesting to observe how this population managed during the COVID-19 pandemic. Analysis of two large surveys (n = 5,618) showed that naturalistic use of psychedelics was linked to improved mental health indicators, while use of other, non-psychedelic drugs was associated with the opposite effect (Cavanna et al., 2021). A group of researchers observed in a large international (i.e., English, Spanish, and Portuguese) survey (n = 2,971 at baseline) that psychedelic use was protective on most mental health measures during the COVID-19 pandemic and documented the association between regular use of hallucinogens and lower psychopathology scores. These authors state "*Users of hallucinogenic drugs scored better on various dimensions that were clearly affected by the recent COVID-19 pandemic, like psychopathology, wellbeing, and post-traumatic growth. This was even clearer in the case of regular users of these drugs. From these results, we can suggest that either these drugs exert certain effects on individuals that protect them against some of the distress of life-changing events, or people who use these drugs do so because they have traits that are related to the better management of stressful events. Overall, these findings have public policy implications that should be addressed*" (Bouso et al., 2023).

The effects of naturalistic use of psychedelics on mood has also been evaluated. Nygart et al. (2022) conducted a survey (n = 302 at baseline and 109 at survey completion) of those who intended to take a psychedelic (primarily LSD or psilocybin). Data was collected one day before the experience (baseline), 1 day after the experience, then 2 and 4-weeks later. Large changes in the reduction of depressive symptoms were observed in both the 2 and 4-week data collections. Notably, the size of these changes was comparable to the outcomes observed in clinical trials. In a much larger online survey (n = 2,510) of naturalistic use, Raison, Jain, Penn, Cole, and Jain (2022) examined the relationship between the number of lifetime psychedelic experiences with depression and anxiety. Participants were asked to rate their levels of these two conditions before and after their exposure to classic psychedelics (mainly LSD or psilocybin). The survey respondents reported that their use of psychedelics was associated with significant reductions of depressive and anxious symptoms. These improvements increased in magnitude with increasing psychedelic exposure with a ceiling effect. However, improvements were also noted following a single lifetime use. Forstmann, Yudkin, Prosser, Heller, and Crockett (2020) conducted a large survey of psychedelic users (n = 2,100) in two countries (USA and UK), also finding a positive effect on mood which was correlated with feelings of social connectedness and the belief they had undergone a transformative experience.

While most naturalistic research focuses on two classic psychedelics (LSD and psilocybin), other research explores additional psychedelic substances. For example, among the 40% of 362 respondents using 5-MeO-DMT who reported a pre-existing diagnosis of depression or anxiety, the vast majority subsequently reported improvements in their conditions (Davis, So, Lancelotta, Barsuglia, & Griffiths, 2019). The single use of a psychedelic (i.e., 5-MeO-DMT) can be associated with significant improvements in depression, anxiety, and stress. Specifically, in a multi-country survey (n = 42), after one ingestion of 5-MeO-DMT respondents reported increased satisfaction with life and mood improvements which were maintained beyond 4 weeks (Uthaug et al., 2019).

Another way to examine whether psychedelics can be useful for mental health is to explore the question of wellness (not just illness). Specifically, can psychedelics improve well-being? It was observed in an online survey (n = 750) that psychedelic use promoted well-being in both clinical and nonclinical populations (Amada & Shane, 2022). This is consistent with a large survey (n = 2,510) which observed emotional well-being was improved with psychedelic use (Raison et al., 2022). Helping someone know themselves better (self-insight) and helping to fully develop one's unique talents and skills (personal development) are areas of well-being that have been touted as benefitting from psychedelic use (Doblin & Burge, 2014).

These researchers provide good evidence supporting the benefits of naturalistic psychedelic use in both those with mental health and mood challenges as well as in improving well-being in the general, non-clinical population.

SPIRITUALITY, NATURE RELATEDNESS, AND PERSONALITY CHANGE ASSOCIATED WITH NATURALISTIC PSYCHEDELIC USE

Reasons for naturalistic psychedelic use include spirituality (conceptualized as spiritual-seeking and the desire for self-transcendent experiences), psychological well-being, and

psychospiritual development (Arnaud & Sharpe, 2023) and perceived benefits from psychedelics often are correlated with the experience of spirituality. In a survey (n = 452) of mescaline use in naturalistic settings, improvements in depression, anxiety, PTSD were self-reported and many respondents stated that this was the single most spiritually significant experience of their lives (Agin-Liebes et al., 2021). In another survey (n = 985), mystical and insightful effects of a psychedelic experience were significantly associated with decreases in depression/anxiety and increases in psychological flexibility (Davis, Barrett, & Griffiths, 2020). Researchers have observed that the naturalistic use of psychedelics is associated with involvement in meditation practices (Simonsson, Osika, et al., 2023) which can assist with emotional regulation and general mental health (Alvarez-Perez et al., 2022; Totzeck et al., 2020). Anxiety regarding death was observed to be significantly reduced in psychedelic users in a Brazilian survey (n = 517) due to their ability to open up the idea of transcending death (Ana Cláudia Mesquita Garcia et al., Jan 10, 2025). In a large survey (n = 4,285), participants reported mystical/spiritual experiences with naturalistic psychedelic use (Griffiths, Hurwitz, Davis, Johnson, & Jesse, 2019). These effects may relate to physical alterations pursuant to psychedelic use. Specifically, long-term, frequent psychedelic use (i.e., use of ayahuasca at least 50 times in the last 2 years) was associated with differences in brain structures which were associated with religiousness and spirituality (Bouso et al., 2015). The relationship between spirituality and health appears to be connected as spiritual motivations produce health benefits and health motivations are associated with spiritual experiences.

Another variable that psychedelic researchers have queried is "nature-relatedness" or identification with nature which is important in relation to pro-environmental behaviours and potentially to overall mental well-being. In a large-scale online study (n = 1,487), Forstmann (2017) identified a novel predictor of nature-relatedness and pro-environmental behaviour. They observed that experience with classic psychedelic substances has lasting effects on the way people perceive nature and how strongly they engage in ecological behaviour. Specifically, results show that lifetime experience with psychedelic substances (as opposed to other recreationally consumed substance classes) uniquely predicts self-reported nature-relatedness. This finding was replicated by Kettner, Gandy, Haijen, and Carhart-Harris (2019) who surveyed a large group (n = 654) finding that naturalistic psychedelic use was associated with high levels of nature-relatedness and this effect was durable over time (2 years+). The observation of increased nature-relatedness after psychedelic use was also observed in a clinical study population (Lyons & Carhart-Harris, 2018).

While most psychiatrists and psychologists believe that personality is a fixed variable over one's lifetime, it appears that psychedelic use may have the ability to shift personality, or certain personalities are more open to psychedelic use, or both. Specifically, psychedelic users have been found to be more open, extraverted, less neurotic, and have greater emotional stability than non-users (Weiss, Sleep, Beller, Erritzoe, & Campbell, 2023). Another study using an online survey (n = 160) found that psychological flexibility was increased in respondents who used psychedelics (Kervadec et al., 2023). Psychological flexibility was also a predictor of reductions in psychological distress in a group of self-selected autistic adults (n = 233) who attributed reductions in psychological distress (82%) and social anxiety (78%) and increases in social engagement (70%) to their most "impactful" psychedelic experience (Stroud et al., 2025). Recreational psychedelic users (n = 45, 24 users and 21 matched non-users) were observed to have increased openness on measures of personality (Erritzoe et al., 2019).

The above research explores how naturalistic psychedelic use has been shown repeatedly to benefit how users perceive their world, be it through spirituality, connection to nature, their inner experience or their interpersonal relatedness.

VIOLENCE, SOCIAL CONNECTEDNESS, AND ADDICTION TREATMENT AS AFFECTED BY NATURALISTIC PSYCHEDELIC USE

Researchers have documented the potential benefits of naturalistic psychedelic use to assist with a wide variety of violence and addiction-related concerns. Thiessen, Walsh, Bird, and Lafrance (2018) surveyed 1,266 community members about psychedelic use, emotional regulation, and intimate partner violence. Males who used psilocybin-containing mushrooms or LSD had lower odds of perpetrating physical violence against their current partner and reported better emotional regulation compared to males with no history of psychedelic use. This group of researchers also surveyed a database of 302 inmates and found that psychedelic use predicted reduced arrests for interpersonal violence (Walsh et al., 2016).

Perhaps a factor in this reduction in violence is the improved social connectedness and functioning associated with naturalistic use. Specifically, in a series of field studies involving 1,200 participants, Forstmann et al. (2020) gathered evidence that psychedelic use in the community was significantly and positively associated with social connectedness. Weiss et al. corroborated this finding in a survey of 148 psychedelic users. A number of pro-social changes were observed. Specifically, social connectedness and empathy improved, while critical and quarrelsome behaviour, and anxiety and mood fluctuations decreased (Weiss, Nygart, Pommerencke, Carhart-Harris, & Erritzoe, 2021). These authors state: *"The most substantive changes were reductions in the personality domains of Neuroticism and increases in Agreeableness and Social connectedness. Notably, reductions in Neuroticism and increases in Agreeableness covaried over time, which may be suggestive of common processes involving emotion regulation"* (Weiss et al., 2021).

Several research groups have shown that naturalistic psychedelic use benefits those with addictive concerns. In a survey where 72% of 343 respondents met the criteria for

severe alcohol use disorder (AUD), most reported that taking a moderate or high dose of LSD (38%) or psilocybin (36%) was followed by a significant reduction in alcohol consumption. After the psychedelic experience 83% no longer met AUD criteria (Garcia-Romeu et al., 2019). It was noted that insight, mystical experiences, and personal meaning were associated with controlling one's alcohol use. Reduction of alcohol use has also been observed after naturalistic psychedelic use in a retrospective online survey (n = 160) (Kervadec et al., 2023). In another research study, Garcia-Romeu et al. (2020) conducted a survey of 444 respondents who had a problematic relationship with either cannabis, opioids, or stimulants. Prior to the psychedelic experience, 96% met substance use disorder (SUD) criteria, whereas only 27% met SUD criteria after their use of LSD (43%) or psilocybin-containing mushrooms (29%). Larger psychedelic doses, insight, mystical-type effects, and personal meaning of experiences were associated with greater reduction in problematic drug consumption. Lower rates of Opiate Use Disorder were found to be associated with psilocybin use (Jones, Ricard, Lipson, & Nock, 2022) and peyote was found to be associated with lower odds of Cocaine Use Disorder in a nationally representative sample from the US (n = 214,505) (Jones & Nock, 2022). Naturalistic psychedelic use was the primary factor in long-term quitting of cigarettes by a group of 358 smokers. It was noted that quitting was mediated by spiritual experiences, changed priorities/values, and improved emotional regulation achieved by use of primarily LSD (41%) and psilocybin (46%) (Johnson, Garcia-Romeu, Johnson, & Griffiths, 2017). Smoking cessation was also observed in a survey (n = 173) and this was associated with increased psychological flexibility (Romeo et al., 2023). In the Canadian Psychedelic Survey (n = 2,045) 18% of the responders reported substitution effects, defined as using psychedelics to reduce or stop the use of prescription or non-prescription drugs (Lake & Lucas, 2023). In another large survey (n = 56,276) naturalistic use of mescaline was associated with decreased prevalence of substance use disorders (Rabinowitz, Lev-Ran, & Gross, 2022). In a survey (n = 452) of mescaline use in naturalistic settings, improvements in AUD and SUD were self-reported (Agin-Liebes et al., 2021).

The emerging evidence suggests that in contrast to other substances that often induce societal harm, naturalistic psychedelic use is associated with reductions in interpersonal violence, improvements in emotional regulation and social connectedness, and substantial decreases in various substance use disorders, highlighting its potential as a promising avenue for addressing complex psychological and behavioral challenges.

PHYSICAL HEALTH, SICK LEAVE, AND SUICIDAL IDEATION IN VULNERABLE POPULATIONS AS AFFECTED BY NATURALISTIC PSYCHEDELIC USE

A number of researchers have explored the relationship between physical health and naturalistic psychedelic use by querying the American National Health Survey database and asking if users of psychedelics differ from the general population on a number of variables. Psychedelic use was observed to be associated with lower rates of hypertension (Simonsson, Hendricks, Carhart-Harris, Kettner, & Osika, 2021), heart disease, and diabetes (Simonsson, Osika, Carhart-Harris, & Hendricks, 2021), significantly higher odds of greater self-reported overall health, and significantly lower odds of being overweight or obese (Simonsson, Sexton, & Hendricks, 2021). The Canadian Psychedelic Survey reported that the treatment of headaches and migraines was one of the motivations for use (Lake & Lucas, 2023). As there is an association between naturalistic psychedelic use and improved mental and physical health, it is not surprising that individuals who reported using psychedelics in the US National Survey on Drug Use and Health (n = 407,717) used less sick leave than the abstaining population (Mellner, Dahlen, & Simonsson, 2022). This is consistent with underground therapists who report guided naturalistic use of psychedelics being successfully used to treat a wide range of mental health conditions (Glynos et al., 2024) and chronic pain (Glynos et al., 2025). As most research does not focus on older adults it is notable the positive effects were observed in mental health conditions and well-being in adults over the age of 60 (n = 62) (Kettner, Roseman, Gazzaley, Carhart-Harris, & Pasquini, 2024).

Naturalistic psychedelic use was evaluated in a group of marginalized women (i.e. homeless, sex workers, opiate and stimulant users) and researchers found significant reductions of suicide ideation or attempts, possibly due to psychedelic-associated reduction in the negative effects of using prescription opioids and cocaine (Argento, Braschel, Walsh, Socias, & Shannon, 2018). Naturalistic use of psychedelics was found to be beneficial for Indigenous individuals who were dealing with trauma issues (Salle, Gran-Ruaz, Davis, Davis, & Williams, 2022) and was also observed to be helpful for those suffering from eating disorders (Lafrance et al., 2017, 2024; Loh & Luke, 2025).

This evidence points to a wide range of populations that have experienced physical and mental health benefits from naturalistic psychedelic use.

REASONS FOR AND PATTERNS OF NATURALISTIC PSYCHEDELIC USE INCLUDING MICRODOSING AND LIFETIME USE

In the Canadian Psychedelic Survey the top motivations for psychedelic drug use were, in order of priority: fun, self-exploration, well-being, personal growth, trauma treatment, and medical (Lake & Lucas, 2023). In another survey, a large proportion of respondents reported using psilocybin to address mental health and emotional challenges (Card et al., 2023).

Assessment of the patterns of naturalistic use of psychedelics versus other drugs suggests that psychedelics are not likely candidates for abuse or dependency. Use patterns

can be broken into lifetime use events (quantity) and frequency (spacing between use events) to evaluate addictive use patterns. In regard to overall lifetime quantity of use events, in a large survey (n = 2,510) participants aged 18 to 86 reported an average of 38.55 uses over their lifetime (Raison et al., 2022). Another online survey of psychedelic and alcohol users (n = 160) reported approximately a third of participants having used psychedelic drugs between 1 and 10 times and 13.1% of respondents having used psychedelic substances more than 100 times (Kervadec et al., 2023). In another large anonymous online survey (n = 770), participants reported on their usage amounts with the following results: just once - 51 (6.6%), 1–10 times - 376 (46.3%), 10–50 times - 268 (34.8%), and 50+ times - 95 (12.3%) (Kvam et al., 2023). In an online survey (n = 748) of psychedelic users from 46 different countries, it was observed that the range of lifetime use was 1–6 times with the average number being 3.34 (Amada & Shane, 2022).

In regard to frequency or spacing between use events, an online survey of those who use psychedelics for entheogenic purposes (n = 684) observed that participants used on average 10–19 times in total and 3–4 times per year (Arnaud & Sharpe, 2023). An English and French online survey (n = 174) of psychedelic drug users with OCD observed among those with more than one experience, 47% (n = 42) reported an intake frequency of at most 3 times a year, 14% (n = 13) reported once a month, and 16% (n = 14) at least once a week (Buot et al., 2023). The above wide variety of different surveys supports the consistent observation in the literature (Nichols, 2004) that psychedelics, even in naturalistic, recreational, non-clinical settings, do not produce dependence or addiction and are generally used very infrequently.

Another popular form of naturalistic use is to "microdose" meaning to take a mini-dose, popularly defined as approximately 1/10 of a "normal" dose, on a regular basis (e.g., every three days). While there are discussions about microdosing various psychedelic substances, LSD and psilocybin-containing mushrooms are most common. Researchers have published data observing positive effects of microdosing on reported mental health status (Anderson et al., 2019; Cameron, Nazarian, & Olson, 2020; Johnstad, 2018; Rootman et al., 2021; Rosenbaum et al., 2020), pain tolerance (Ramaekers et al., 2021), and creativity (Prochazkova et al., 2018; Sweat, Bates, & Hendricks, 2016).

WHY ARE BENEFITS SEEN SO WIDELY?

The benefits of psychedelic use can be seen on a population level and encompass a wide range of mental and physical health issues. Therefore, it is interesting to ask the question: why are psychedelics able to promote such a wide range of positive and durable benefits? One plausible explanation is that psychedelics induce neuroplasticity, the brain's ability to reorganize its structure and function and adapt to changes (Nardou et al., 2023; Sandbrink et al., 2024; Vargas et al., 2023). Neuroplasticity is essential for learning, memory, recovery from trauma, healing psychological and addiction issues as well as adapting to life experiences. The theory that psychedelics open a window of neuroplasticity would explain how long-term effects outlast the drug's presence in the body. Other explanations include psychedelics' ability to promote insight, connections to others and a broad sense of spirituality all of which can promote long-term health and well-being.

CHALLENGING EXPERIENCES ASSOCIATED WITH PSYCHEDELIC USE

Not all naturalistic psychedelic use results in positive outcomes and therefore many researchers have observed both short-term and long-term negative mental health outcomes. In an anonymous online Norwegian survey of psychedelic experiences (n = 841) most respondents reported positive outcomes (76.9%) or short-acting adverse reactions (10.6%) but some respondents reported longer durations of negative reactions of a few weeks (4.5%) or months (3.8%) or more than a year (4.2%) (Kvam et al., 2023). In a John Hopkins survey study including users of psychedelics (n = 218), a number of participants reported adverse consequences of a psychedelic experience (n = 28, 14%) which included an extended period of anxiety, stress, introversion, and caution/aversion of psychedelic drugs (Weiss et al., 2023). In a large survey (n = 2,510) while most respondents reported benefits, 13% reported at least one negative experience. The top two negative experiences were the desire to use cigarettes and misuse of cannabis (Raison et al., 2022). In a large survey (n = 7,667 at T2) of both psychedelic users and non-users, it was noted that psychedelic users reported visual changes at a greater frequency than non-users (e.g., 6% of users reported halos around things where only 2.4% of non-users made this observation) (Simonsson et al., 2024). In an analysis of a large Global Drug Survey (n = 3,364), 22.5% of the respondents reported at least one negative consequence of naturalistic psychedelic use. The duration of the negative experience was mostly 7 days or less (54.6 %) but for some, it lasted a month or more (27%). The most common negative experience was "*Mental confusion, memory problems, or racing thoughts.*" In the Canadian Psychedelic Survey (n = 2,045), 52% reported challenging experiences. However, 55% of these agreed there was a positive aspect to the challenging experience (Lake & Lucas, 2023).

In an analysis of another large survey (n = 10,836) on ayahuasca, 12% of participants sought professional support for adverse psychological effects (Bouso et al., 2022). In a survey (n = 1,993) of challenging psychedelic experiences, 7.6% of participants sought psychological treatment for enduring symptoms. It is notable that in this challenging experience survey, 84% of participants reported benefiting from the challenging experience with 76% reporting increased well-being or life satisfaction (Carbonaro et al., 2016).

A survey which was representative of the US adult population (n = 613), showed that naturalistic use of

psychedelics was associated with more psychotic symptoms in the past 2 weeks for individuals with family history of psychotic or bipolar disorders but interestingly the reverse for those without such family history. Specifically, individuals who used psychedelics with no family history of psychosis or bipolar disorders reported the lowest rates of psychosis (Simonsson, Goldberg, et al., 2023).

In a study of adverse events specifically (n = 608), the most common concerns observed were anxiety and fear, existential struggle, social disconnection, depersonalization and derealization, and for a third of the participants, this persisted over a year. Childhood trauma was believed by 40% of the participants to be the root of the challenge. Despite significant challenges, these researchers observed that 90% of those impacted by a negative experience still maintained a positive view of the psychedelic experience (Evans et al., 2023) and this observation was similar to Carbonaro (2016) who noted 84% of those who had challenging experiences still perceived that psychedelics offered a beneficial experience. In a survey specifically on challenging experiences (n = 159), it was observed that social disconnection (72%), anxiety and panic attacks (68%), and existential struggle (65%) were the most prevalent difficulties. Anxiety and panic attacks were rated as the most severe (Robinson, Evans, Mcalpine, Argyri, & Luke, 2024).

An exploration of the causal factors of challenging experiences is warranted. In a small survey and interview study (n = 32) on negative outcomes specifically, the following potential causal factors were identified: unsafe or complex environments during or surrounding the experience, unpleasant acute experiences (classic psychedelics), prior psychological vulnerabilities, high or unknown drug quantities, and young age (Bremler, Katati, Shergill, Erritzoe, & Carhart-Harris, 2023). In an analysis of the Global Drug Survey (n = 3,364), a lack of experience with psychedelics, younger age, and intensity of experience were all associated with increased negative experiences (Kopra et al., 2023). This is consistent with the observation that older adults were reported to have fewer challenging experiences than younger adults (Kettner et al., 2024). In a meta-analysis of naturalistic observational studies, the presence of a personality disorder was observed to increase the risk of a negative experience four-fold, and it was also observed that prolonged negative responses were rare (Marrocu et al., 2023). This is consistent with a survey of underground guides in naturalistic settings where personality and bipolar disorders were observed to be associated with negative outcomes (Glynos et al., 2024).

From the above research it can be observed that a small percentage of individuals who use psychedelics experience adverse experiences, therefore it is interesting to put this in context and reflect on the research examining drug harms generally. A large survey (n = 5,791) of individuals from over 40 countries ranked many drugs including alcohol, tobacco, cannabis, opiates, stimulants and psychedelics. Hallucinogens (and Viagra and cannabis) were ranked as the least harmful of all drugs (Morgan, Noronha, Muetzelfeldt, Feilding, & Curran, 2013). This is consistent with other research analyses of the relative lack of harm of psychedelics and should be taken into account when designing policies around the use of these substances (Carhart-Harris & Nutt, 2013; Nutt, King, Phillips, & Independent Scientific Committee on, 2010; Schlag, Aday, Salam, Neill, & Nutt, 2022; van Amsterdam, Nutt, Phillips, & van den Brink, 2015).

Naturalistic psychedelic use is not without risk of challenging experiences both during and after the experience, however there is much that can be done to lessen these risks and these lessons are worth taking into account when forming public health guidelines.

PUBLIC HEALTH PROTECTION AND HARM REDUCTION AS MODELED BY INDIGENOUS CULTURES

While the naturalistic use of psychedelics is generally associated with benefits, it can also give rise to challenging experiences. From a public health perspective, it is therefore reasonable to aim for a reduction of potential harms while maximizing the already significant benefits these substances can offer. Adopting a broader, global perspective on psychedelic use helps inform this approach.

Many cultures around the globe have incorporated psychedelic use into the healing and spiritual practices of their communities. The Shipibo of Peru, Santo Daime of Brazil, Huichol of Mexico, and the Bwiti of Gabon are examples of long-standing Indigenous cultures where psychedelic use is interwoven into the fabric of communities demonstrating positive mental and physical health impacts and beneficial social outcomes, including for adolescents (Barnard, 2022; Davis, 2016; Grob et al., 1996; Labate & Cavnar, 2016; Schultes & Hoffman, 1779; Stewart, 1987; Wasson, 1968). These cultures all feature a ritualistic use structure providing a "container of safety" for the psychedelic experience (Coomber & South, 2004).

In contrast, Western societies, where psychedelics have been subject to criminal prohibition, have not adopted analogous, elder-led ceremonial structures. As a result, it is reasonable to assume that current approaches to managing difficult psychedelic experiences could be significantly improved.

A public health framework should involve examining both Indigenous practices and contemporary Western protocols. Through both lenses, three core variables emerge as essential to ensuring a safe and constructive psychedelic experience: **set**, **setting**, and **dosage**.

Set refers to the individual's internal state—their mindset, intentions, emotional well-being, past experiences, and expectations. Psychedelics tend to amplify what is already present in the psyche, so going into the experience with a clear intention and emotional readiness can greatly influence whether the experience is healing or destabilizing.

Setting involves the external environment, including both the physical space and the social context. A calm, safe, and supportive environment can help the individual feel safe and secure, especially if difficult emotions arise. Elements

such as lighting, music, nature, and symbolic objects also affect the tone and direction of the journey.

Dosage is the third pillar and it determines the intensity and nature of the psychedelic effects. A low or moderate dose may allow for gentle introspection and emotional release, while a higher dose can induce profound insight or powerful visions—but also carries a greater risk of disorientation or distress if not properly supported. The right dose must be carefully calibrated to the individual's psychological state, level of experience, and the context of the session (therapeutic, ceremonial, or exploratory).

As the goal of a public approach to psychedelics is to maximize the benefits and reduce the harms of these substances, it can be observed that the harms which occur can be greatly reduced. A public health approach would promote public education efforts that can emphasize the importance of set, setting, and dosage which are critical in creating a safe and supportive environment to minimize risks (Zinberg, 1986). As younger age is more commonly associated with challenging experiences, youth should be specifically engaged in educational programs. Ideally, these programs would also provide opportunities to participate in elder-led, ritualistic psychedelic experiences to model best practices and offer culturally grounded frameworks for safe and meaningful use.

CONCLUSION

This paper has explored the substantial evidence demonstrating that significant and durable benefits are associated with the naturalistic use of psychedelic substances. While naturalistic studies do not follow the rigorous protocols of double-blind, placebo-controlled clinical trials, they offer consistent observations across a variety of real-world settings. In this way, they are akin to population-based Phase 4 studies, reflecting how these substances function outside controlled clinical environments.

In a broader context, the widespread benefits observed in naturalistic psychedelic use align with findings from meta-analyses of the academic literature, which consistently report optimism about the health, social, and spiritual potential of psychedelics (Amoroso & Workman, 2016; Dos Santos, Balthazar, Bouso, & Hallak, 2016; Dos Santos, Bouso, Alcázar-Córcoles, & Hallak, 2018; Dos Santos, Osorio, Crippa, & Hallak, 2016; Fuentes, Fonseca, Elices, Farre, & Torrens, 2020; Krebs & Johansen, 2012; Nunes et al., 2016; Passie, Halpern, Stichtenoth, Emrich, & Hintzen, 2008; Reiff et al., 2020).

A detailed evaluation of the body of evidence exploring naturalistic use leads to the conclusion that the continued prohibition of psychedelics is not justified. The data overwhelmingly indicates that the benefits of psychedelic use far outweigh the harms. A public health approach—rather than a prohibitionist one—is therefore the most appropriate. This approach should not only aim to reduce the potential for harm but should also promote practices that maximize benefits.

Encouragingly, the development of appropriate regulatory models for psychedelics has started (Canadian Public Health Association, 2023; Oct 22, 1024; Haden, 2020; Haden, Emerson, & Tupper, 2016; Transform Drug Policy Foundation, Nov 2023). At a minimum, a harm reduction framework is indicated. If the motivation for use is to improve mental or physical health, incorporating psychotherapy as well as preparation and integration practices is vital (Gorman, Nielson, Molinar, Cassidy, & Sabbagh, 2021). Honest, factual drug education is also imperative (Duncan, Nicholson, Clifford, Hawkins, & Petosa, 1994). Robust systems of education and harm reduction are needed as psychedelic drug users must have access to factual information about these drugs and their effects, along with contraindications, where to find support, how to prepare, set intentions and integrate their experiences. In order to maximize the benefits (not just minimize harms) psychedelics should also be recognized as valuable tools for self-reflection and connection (Tupper, 2003).

From a public health standpoint, criminal justice sanctions themselves emerge as the most harmful consequence associated with psychedelics—both in terms of human suffering and public expenditure. For lawmakers, municipal politicians and policymakers, significant reconsideration of criminal (federal) and policing (municipal) approaches to psychedelic drugs is warranted.

After an examination of the significant body of evidence documenting naturalistic use of psychedelics, the legalization, regulation of access, and decriminalization approaches are all justified. Following the research will result in ending the prohibitionist approach rooted in judgement and punishment and instead implementing an approach to psychedelics guided by evidence, wisdom, compassion, and inclusion through the establishment of a regulated system of access.

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