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Psychedelic Microdosing: Prevalence and Subjective Effects

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Abstract

Anecdotal reports suggest that the administration of sub-hallucinogenic doses of psychedelic compounds on a chronic, intermittent schedule—a practice known as psychedelic microdosing—is becoming increasingly popular among young adults due to its purported ability to reduce symptoms of depression and anxiety while improving cognitive function and promoting social interaction. Using an anonymous online survey, we collected data from 2347 people to 1) assess the prevalence of psychedelic microdosing and characterize the demographics of microdosers, 2) determine whether microdosers associate the practice with changes in mood, cognitive function, social interaction, or physiology, and 3) investigate frequent motives for discontinuing the practice. Fifty-nine percent of respondents (N_T = 2183) reported familiarity with the concept of psychedelic microdosing, with 17% (383 respondents, N_T=2200) having engaged in this practice. Microdosers attributed psychedelic microdosing with improving their mood, decreasing their anxiety, and enhancing their memory, attention, and sociability. The most frequently cited reasons for quitting microdosing (N_T = 243) were the risks associated with taking an illegal substance (24.28%) and the difficulty of obtaining psychedelic compounds (22.63%). Overall, our findings suggest that psychedelic microdosing is relatively common and is subjectively associated with a broad spectrum of socio-affective, cognitive, and physical outcomes.

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AUTHOR CONTRIBUTIONS

L.P.C. designed the human microdosing survey and contributed to analysis of the data. A.N. completed the statistical analysis of the data. D.E.O. contributed to the analysis. L.P.C., A.N., and D.E.O. wrote the manuscript.

COMPETING INTERESTS

The authors declare no competing interests.

Keywords

psychedelic; microdosing; depression; PTSD; anxiety; LSD

INTRODUCTION

Mood and anxiety disorders are among the leading causes of disability worldwide (Whiteford et al. 2010; Olesen and Leonardi 2003). Despite their tremendous disease burden (Andlin-Sobocki et al. 2011; Insel 2008; Kessler et al. 2008; Gustavsson et al. 2001), medicines for treating these illnesses have improved little over the past 30 years. Furthermore, the number of mechanistically distinct drugs has remained stagnant (Insel and Scolnick 2006) with pharmaceutical companies continuing to reduce their investments in discovery of central nervous system (CNS) drug candidates (Hyman 2007). Diseases such as major depressive disorder (MDD) and post-traumatic stress disorder (PTSD) share common neural circuitry, are highly comorbid, and are treated using similar pharmaceutical and behavioral therapy strategies (Ressler and Mayberg 2007). Current therapeutics for depression are slow-acting, taking several weeks before demonstrating efficacy, and approximately 1/3 of patients will not respond to them (Rush et al. 2006). This dearth of effective treatments has led many individuals to self-medicate and seek alternative forms of treatment.

Psychedelic compounds, such as lysergic acid diethylamide (LSD), psilocybin, and *N,N*-dimethyltryptamine (DMT), have been used for centuries by many cultures for religious and/or medicinal reasons (Ott 1993). More recently, they have shown promise as experimental therapeutics in the clinic for treating depression, anxiety, and substance use disorder (Cameron and Olson 2018b; Nichols, Johnson, and Nichols 2017; Carhart-Harris and Goodwin 2017; Kyzar et al. 2017; Mithoefer, Grob, and Brewerton 2016; Dos Santos et al. 2016). Specifically, psilocybin has been shown to ameliorate end of life anxiety in terminal cancer patients (Griffiths et al. 2016), 3,4-methylenedioxymethamphetamine (MDMA) has produced positive effects in patients suffering from PTSD (Dunlap, Andrews, and Olson 2018), and the DMT-containing tisane known as ayahuasca has demonstrated efficacy for relieving symptoms of depression in treatment-resistant populations (Dos Santos et al. 2016).

Psychedelic microdosing, the practice of taking chronic, sub-hallucinogenic doses of psychedelic compounds on an intermittent schedule, has been gaining popularity, and its potential use in medicine is being increasingly discussed in scientific communities and the popular media. Moreover, it is purported to enhance cognitive performance, facilitate creativity, and improve productivity, properties that would be attractive to those looking to gain a competitive edge in school or the workplace (Glatter 2015). In fact, pharmacological cognitive enhancement is becoming more prevalent throughout the world (Maier, Ferris, and Winstock 2018). While stimulants are the most commonly used drugs for cognitive enhancement, psychedelics have long been suggested as potential pharmacological means for promoting creativity (Sessa 2008), and a recent study by Prochazkova and colleagues (2018) demonstrated that a single microdose can enhance cognitive flexibility. Claims that

psychedelic microdosing can enhance cognitive function coupled with the increasing popularity of pharmacological cognitive enhancement, highlight the need to evaluate the potential risks and benefits of this practice through rigorous scientific studies. Additionally, studies examining the prevalence of psychedelic microdosing are imperative.

It has not been established that the hallucinations produced by psychedelic compounds are necessary for their positive effects on mood and anxiety. In fact, several lines of evidence argue against this. First, psychedelics of the entactogen class, such as MDMA, do not reliably produce hallucinations, yet MDMA has demonstrated efficacy for treating PTSD in phase II clinical trials (Dunlap, Andrews, and Olson 2018). This promising therapeutic recently received breakthrough therapy designation by the Food and Drug Administration (FDA), and phase III clinical trials are already recruiting subjects. Additionally, anecdotal reports have suggested that low, sub-hallucinogenic doses of psychedelic compounds might also possess therapeutic value. As psychedelics have been shown to produce profound effects on neural plasticity, even at low doses (Ly et al. 2018) it is possible that these psychoplastogenic compounds (Olson 2018) can promote positive neural adaptations in circuits relevant to the regulation of mood, fear, and reward in the absence of perceptual effects.

Psychedelic microdosing has been covered extensively by the media, described in popular books (Waldman 2017, Fadiman 2011), and more recently, has been the focus of scientific investigation (Anderson et al. 2019a; Anderson et al. 2019b; Fadiman and Korb 2019; Webb, Copes and Hendricks 2019; Yanakieva et al. 2018; Johnstad 2018; Prochazkova et al. 2018; Winstock et al. 2018). Thus far, there has only been one placebo-controlled trial studying the effects of psychedelic microdosing (Yanakieva et al. 2018). This study focused on time-perception, but did not assess the effects of psychedelic microdosing on emotionality. We conducted an anonymous online survey of 2347 people to 1) document the prevalence of psychedelic microdosing, 2) determine the perceived effects of this practice on depression, anxiety, memory, attention, and sociability and 3) establish the common motives for discontinuing the practice.

METHODS

Participants

A total of 2368 individuals responded to the survey. Some responses were excluded because they were under 18 years of age (n = 9), and because they did not provide their consent (n = 12). Thus, 2347 respondents were used in the remaining analyses. A total of 383 respondents reported having practiced microdosing, either previously or currently. Responses for previous and current microdosers were combined, with the exception of the question regarding discontinuing the practice, which is only relevant to past users. Given the sensitive nature of the survey material, participants could decline to answer any question. Thus, we report the proportion of responses for each result below. The total number of potential responses for a given question is denoted as N Question (N_Q); The total number of responses for a given question is denoted as N Total (N_T); the subset of answers for a given question are denoted as ‘n’. Gender representation was relatively equal with 49% of participants being female (N_T = 1707, n = 832). Participants ranged from 18 to 99 years of age (mean =

35) and individuals represented various education and income levels, as well as diverse occupational experiences.

Recruitment and Survey Distribution

An anonymous online survey was used to sample 2347 people from April through August of 2018. Participants were recruited via snowball sampling through a number of outlets including social media (e.g., Facebook, Twitter, Instagram), our research group's website (www.olsonlab.org), drug- and nondrug-related online forums (Reddit, Craigslist), and distribution of pamphlets across the UC Davis campus and community events (e.g., local farmers market). To prevent biasing the study towards participants with extensive knowledge and/or experience with psychedelics, the survey was described as an anonymous research study on "Recreational Drug and Alcohol Use." The survey was also designed such that each IP address could only take the survey once to avoid collecting multiple responses from the same participants. Individuals voluntarily participated in the study and did not receive compensation. The survey was approved by the University of California, Davis Institutional Review Board (IRB).

Microdosing Survey Design

After providing informed consent, participants were asked a series of questions related to their familiarity with psychedelic microdosing as well as their personal experience with the practice. Psychedelic microdosing was defined as "using multiple sub-hallucinogenic doses of a psychedelic compound on an intermittent basis for a minimum of at least 2 weeks." Individuals who indicated that they currently microdose or have previously microdosed ($n = 89$ and $n = 294$ respectively, $N_T = 2200$) were asked which drugs they used to microdose and what changes, if any, they perceived related to depression, anxiety, memory, focus/attention, sociability, and physical factors. Changes were reported for each construct using the following response options: improvement (positive effects), no effect, no noticeable effect and worsening of symptoms (negative effects). For clarity, "no effect" and "no noticeable effect" responses were combined. Additionally, individuals who reported previously engaging in microdosing were asked about factors that deterred them from continued engagement in this practice. The survey can be viewed in its entirety at 10.6084/m9.figshare.9757901.

Statistical Analysis

As participants could decline to answer any question, we report the number of responses, as well as the proportion of responses, for each result below. All statistical comparisons were made using completed responses and excluded cases where the question was not answered. Group responses were compared using Pearson's chi-squared test with a significance level of $p < 0.05$. Given the exploratory nature of this work, descriptive statistics were used to characterize overall trends in the prevalence of microdosing and the use of psychedelic substances across various groups in our study. Regression models were used with 95% confidence intervals reported to identify and quantify the strength of associations. Statistical analyses were performed using RStudio (version 1.0.143).

RESULTS

Prevalence of psychedelic microdosing

Fifty-nine percent of responders reported familiarity with the concept of psychedelic microdosing (N_T = 2183, Table 1). Approximately 83% of 2200 survey participants said they did not engage in this practice, 13% said they microdosed at some point in their life, and 4% said they currently microdose with psychedelics (N_T = 2200, Table 1).

Demographics of Current and Former Microdosers

The average age of participants with psychedelic microdosing experience was 33.26 (N_T = 290, Table 2). Among the microdosers who indicated which gender they identify with (N_T = 293), males were most likely to report engaging in this practice (n = 188, 64.16%, Table 2). A chi-squared test indicated a significant difference between the ratio of microdosers to non-microdosers across the four gender categories ($\chi 2$ = 31.81, df = 3, $p < 0.001$).

Anecdotal reports suggest that psychedelic microdosing might be relatively common in the tech industry. Thus, we examined the prevalence of this practice across different occupations (Table 2). Occupation was not associated with microdosing history.

In the sample of veterans surveyed (N_T = 77), 73% said they have never microdosed (n = 56), and 27% said they currently microdose or previously experimented with microdosing (n = 21, Table 2). A chi-squared test indicated that a greater proportion of veterans microdose as compared to the general population ($\chi 2$=5.16, df=1, p=0.02).

Education was significantly associated with microdosing history (N_T = 1705, Table 2). Individuals that reported microdosing tended to have less education ($\chi 2$ = 26.49, df = 1, $p < 0.01$). Participants' annual income was used to partition them into lower-income (<$50,000), middle-income ($50,000-$99,999), and upper-income ($100,000+) households according to the definition of each group provided by the Pew Research Center (2016). Participants from the low SES group were more likely to report engaging in psychedelic microdosing (N_T = 1699, Table 2), and this association was significant ($\chi 2$ = 11.43, df = 2, $p<0.01$).

Common Drugs Used for Microdosing

Of the various psychedelic compounds used for microdosing, LSD and psilocybin were the most common (48.58% and 26.18% respectively, N_T = 317, Table 3). Individuals who selected "Other" (11.67%, n = 37, N_T = 317) reported using marijuana, cocaine, or a combination of psychedelic compounds (i.e., LSD and psilocybin or LSD and ayahuasca). We did not collect information regarding dosing regimen because previous work has demonstrated that users largely estimate the dosage reported (Hutten et al. 2019; Winstock et al. 2018). Additionally, dosage can vary according to factors that cannot be controlled in survey studies, such as the compound used, the purity of the substance used, and the weight or body composition of the individual.

Subjective effects associated with mood, anxiety, cognition, and sociability

Reports of changes in depression were found to differ significantly among microdosers (Table 4, $\chi 2 = 227.32$, df = 2, $p<0.001$). Microdosers who responded to the survey item related to changes in depression ($N_T = 316$) were most likely to report an improvement in depressive symptoms (Improvement: 71.84%, Worsening: 4.77%, No Effect: 23.42%). We also examined reported changes in depression for males versus females ($N_T = 286$). Although both males and females indicated an overall improvement of depression, a chi-squared test indicated a significant difference in the ratio of changes reported by these groups ($\chi 2 = 13.57$, df = 2, $p < 0.001$). This difference may have been driven by a greater proportion of improvement in males, and a greater percentage of females reporting worsening of symptoms (11.00% of responses, compared to 1.61% in males).

Changes in anxiety reported by microdosers were also found to be significant (Table 4, $\chi 2 = 89.89$, df = 2, $p < 0.001$). Microdosers who responded to this survey item ($N_T = 313$) were more likely to report a subjective improvement in anxiety (Improvement: 56.55%, Worsening: 13.10%, No Effect: 30.35%). Although this outcome appeared more pronounced for males compared to females ($N_T = 283$, Female: 53.00%, Male: 61.20%), there was not a significant difference in the ratio of reported changes in anxiety between these groups.

Participants associated microdosing with a significant change in memory (Table 4, $\chi 2 = 52.07$, df = 2, $p < 0.001$). Individuals who responded to this survey item ($N_T = 314$) were most likely to report an improvement in memory (38.85%) or no effect (46.50%, Table 4). We observed a significant difference in the ratio of change to memory in male and female microdosers ($\chi 2 = 19.00$, df = 2, $p < 0.001$). This change was likely driven by a greater proportion of improvement in males (43.48% of responses, compared to 30% of females), and a greater percentage of females reporting worsening of symptoms (27% of responses, compared to 8.15% in males).

Changes in attention were also found to be significant (Table 4, $\chi 2 = 98.53$, df = 2, $p < 0.001$). Individuals who responded to this survey item ($N_T = 312$) were most likely to report an improvement in attentional focus (n = 184, 58.97%). Furthermore, the data indicated a significant difference in the ratio of changes to attention in male and female microdosers ($N_T=283$, $\chi 2=13.93$, df=2, $p<0.001$). This change was likely driven by a greater proportion of attentional improvement in males (66.30% of responses, compared to 44.44% of females) as well as a greater percentage of females reporting no effect (32.32% of responses, compared to 22.83% of males) and worsening of symptoms (23.23% of responses, compared to 10.87% in males).

Finally, microdosers reported significant changes in sociability (Table 4, $\chi 2 = 161.85$, df = 2, $p < 0.001$). Microdosers who responded to this survey item ($N_T = 314$) were most likely to report an improvement in sociability (66.56%). Gender differences in reported sociability were also examined ($N_T = 284$). Males reported a significantly greater proportion of improvement in sociability (70.11% of responses, compared to 60.00% of females) and females were more likely to report a worsening of sociability (19.00% of responses, compared to 8.15% in males) ($\chi 2 = 7.38$, df = 2, $p = 0.025$).

Physical changes associated with microdosing

Individuals could elaborate on any physical changes they perceived with a text response. These text responses were subsequently coded for thematic content. Two-thirds (65.63%) of these free-form responses were related to positive physical or emotional outcomes (e.g., “working out so body composition is improving”, “slight euphoria w/ on-set that lasts throughout initial peak 2–3 hrs”, “better workouts?”), 31.25% cited negative outcomes (e.g., “occasional ‘swimmy’ vision”, “Memory is pretty bad”, “sweats”), and 49.21% were not related to change in weight.

Deterrents to Microdosing

Former microdosers selected one of several possible reasons for no longer continuing this practice (N_T = 243, Table 5). The most frequently cited reasons were related to the risks associated with taking illegal substances (24.28% of former microdosers) and the difficulty of obtaining the microdosing drug (22.63% of former microdosers). Thirty-six percent of former microdosers selected the “Other” option. Text responses contained the following themes: a desire to microdose infrequently (e.g., “It isn’t something I want to do everyday,” “It’s not something I felt like doing all the time”), fear of dependency (e.g., “Did not want to become addicted,” “The physical euphoria brought on a sense of dependency that isn’t present on a normal dose”), aging (“Getting older,” “Gotten older, health issues”), and unstandardized dosage (“Psilocybin is too easy to overdose without a standardized preparation. DMT has proved easier to administer in a threshold dose,” “LSD I got wasn’t properly perforated making the proper dosing hard to do”).

DISCUSSION

The present study provides a quantitative analysis of demographics and prevalence data for psychedelic microdosing using a large sample (N_T=2347). We found that approximately 13% of the sample had practiced microdosing previously, and 4% of the sample were *currently* microdosing. These data are consistent with prior reports (Winstock et al. 2018). Males were almost twice as likely to report having engaged in psychedelic microdosing compared to females.

We observed that significantly more people report experiencing a decrease in depressive symptoms following psychedelic microdosing, mirroring other work demonstrating that microdosing decreases negative emotionality and improves mood (Anderson et al. 2019a; Anderson et al. 2019b; Fadiman and Korb 2019; Johnstad 2018; Polito and Stevenson 2018). Furthermore, we found that individuals were likely to associate psychedelic microdosing with enhanced memory, improved attention, and increased sociability. Interestingly, a placebo-controlled trial looking at the effects of LSD microdosing on time perception, an aspect of cognitive function, found that microdosing was not associated with any robust changes in perception, mentation, or concentration (Yanakieva et al. 2018). Additional placebo-controlled studies will prove useful in determining the exact effects of psychedelic microdosing on mood, anxiety, memory, attention, and sociability. Future work should also strive to gauge exactly how long participants need to microdose to achieve effects, and how long these effects last following the cessation of microdosing.

We report the first data suggesting that male and female microdosers note different effects related to depression, memory, attention, and sociability. While both sexes report that microdosing produces beneficial subjective effects in these areas, males more frequently report improvements. Additionally, males were nearly twice as likely to report practicing microdosing than were females. Interestingly, both sexes report a change in weight associated with microdosing. A recent study in rodents demonstrated that DMT microdosing caused male, but not female, rats to gain a significant amount of weight. This change in weight was not attributed to an increase in fat or muscle mass, but rather an overall increase in body mass (Cameron et al. 2019). The data collected in this survey suggests that humans describe opposite effects, indicating that microdosing may promote weight loss as well as improve body composition and physical fitness. This is congruent with a recent study (278 participants) that also suggests that psychedelic microdosers report improvements in their exercise routines (Anderson et al., 2019a). Since exercise is associated with antidepressant effects through the release of neurotrophic factors (Phillips 2017), the improvements in mental health documented in this survey may derive from increased physical activity. Follow-up surveys and experiments could examine the physical outcomes associated with microdosing in a more nuanced fashion in order to identify potential factors beyond gender that may influence the physical effects of microdosing.

Additionally, we investigated the reasons why people may have discontinued microdosing. The most frequent deterrents to psychedelic microdosing cited by former microdosers were the risks associated with taking an illegal substance and the difficulty of obtaining psychedelic drugs. Few microdosers (9%, $N_T = 243$) ceased the practice due to a negative effects or lack of efficacy, which is in agreement with previous studies (Anderson et al., 2019a). Interestingly, other groups found most people stopped microdosing due to a perceived lack of efficacy (Hutten et al. 2019), though this could be due to a difference in the surveyed population. Aging emerged as a deterrent to microdosing; responses implied that older individuals associate microdosing with their youth and deem it to be appropriate only during that phase of their life. Older individuals also reported not currently microdosing because they fear adverse reactions to their current medication regimen. It is also worth considering that the illegal status of psychedelics in many countries makes it increasingly difficult for individuals to acquire these substances. Future work should examine these themes related to microdosing within the aging community.

Although large-scale surveys of this nature are generally limited by challenges such as self-selection bias, we made an effort to control for this by utilizing a survey title that encouraged responses from a wide-range of individuals with varying experiences using alcohol and other mind-altering substances. Surveys examining the topic of alcohol and drug use are generally subject to other limitations including biased or inaccurate subjective estimates of dosage and providing responses while concurrently self-medicating (i.e., while microdosing). Furthermore, we combined the groups of current and former microdosers in our analysis, though it is possible that these populations recall their experiences differently due to the length of time between reporting and the last microdose administration. Other factors that cannot be controlled for or measured precisely through surveys, such as non-standardized dosing regimens, pre-existing mental illness, and poly-drug use, provide compelling reasons for 1) collecting data from the partners, friends, and family of people who started a

microdosing regimen, and/or 2) studying the effects of psychedelic microdosing in controlled clinical trials. Due to the cross-sectional survey design, it is impossible to infer causation about microdosing efficacy. Double-blind placebo-controlled clinical trials are better suited for controlling for the placebo effect as well as standardizing the purity of the drug, dosage, and frequency of administration

Psychedelics have been shown to produce long-lasting changes in mood and behavior in humans (Carhart-Harris et al. 2017; Griffiths et al. 2011; Griffiths et al. 2006) and have profound effects on neural plasticity even at low doses (Ly et al. 2018). An acute hallucinogenic dose of DMT is known to impact brain structure and function in rats long after the drug has been cleared from the body (Cameron et al. 2018a; Ly et al. 2018). Such changes in brain structure/function are believed to underlie the therapeutic effects of these compounds. However, whether or not the perceptual effects of psychedelic drugs are necessary for their positive effects on mood and anxiety has remained an open question. If the effects reported by participants in this study are true—something that can only be tested by placebo-controlled trials—perhaps the hallucinogenic effects of psychedelics can be decoupled from their therapeutic properties. Further studies may wish to directly address the difference between microdosing and fully hallucinogenic doses on mood, anxiety, and other cognitive functions, preferably using a rigorous testing method as part of placebo-controlled trials.

Bridging Human and Rodent Microdosing Literature

In the absence of human clinical trials for psychedelic microdosing, rodent behavioral studies corroborate the findings above on mood and anxiety and circumnavigate the issue of self-reporting. Recent data suggests that chronic, intermittent low doses of DMT can enhance fear extinction learning and produce antidepressant-like effects in the forced swim test (Cameron et al. 2019). Furthermore, similar effects have been observed when treating rodents with high acute doses of psychedelics (Cameron et al. 2018a; Young et al. 2015; Catlow et al. 2013), results that are consistent with the retrospective self-reports of psychedelic microdosing presented here. Fear conditioning/extinction in rodents is often used to model PTSD, and considering the fact that psychedelic microdosing facilitates extinction learning (Cameron et al. 2019), it is intriguing that veterans experiment with this practice. The psychedelic MDMA is currently in phase III clinical trials for the treatment of PTSD.

While psychedelic microdosing produces antidepressant effects in the forced swim test and facilitates fear extinction learning, it does not seem to impact general anxiety levels in rodents (Cameron et al. 2019; Horsley et al. 2018). Moreover, rodent studies do not support the human survey data suggesting that psychedelic microdosing increases cognitive function and sociability. Rats treated with chronic, intermittent low doses of DMT were indistinguishable from vehicle-treated controls in a variety of behaviors related to cognition and social interaction including spontaneous alternation behavior, novel object recognition, and 3-chambered social approach (Cameron et al. 2019). However, it is possible that these rodent behavioral tests do not adequately model the human condition, or that the enhanced cognition and sociability reported by humans are an indirect consequence of improved mood

and/or reduced anxiety. This study utilized DMT, as DMT constitutes the core structure of all indole-containing psychedelic compounds, including LSD and psilocybin. However, most humans do not microdose DMT, and future work should strive to elucidate the differences in the effects of microdosing various compounds.

The antidepressant and anxiolytic clinical effects of psychedelics have been hypothesized to result from the psychoplastogenic effects of these drugs (Olson 2018). Psychedelics promote the growth of dendritic branches, spines, and synapses in the prefrontal cortex (PFC). The PFC is a critical brain region responsible for modulation of circuits implicated in mood and anxiety. Given that psychedelics cause behavioral changes in rodents that persist long after the drugs have been cleared from the body (Sitaram et al. 1987), and a single acute dose can cause structural changes in the brain (Ly et al. 2018), it is possible that psychedelic microdosing produces long-lasting functional changes in these key circuits. With regard to rodent models of PTSD, using psychedelics in combination with or fear extinction training could possibly strengthen these specific circuits to mitigate fear responses.

In general, more work needs to be done to identify potential risks associated with the increasingly popular practice of psychedelic microdosing. Several studies in humans suggest that long-term intermittent use of ayahausca—which contains a high dose of DMT—is not correlated with increased mental illness (Bouso et al. 2001). However, we know relatively little about the impact of psychedelics on neurodevelopment or the aging brain. Psychedelics activate the mammalian target of rapamycin (mTOR) (Ly et al. 2018), and overactivation of mTOR has been linked to autism spectrum disorder (ASD) (Winden et al. 2018) and Alzheimer’s disease (AD) (Cai et al. 2015). Therefore, it will be critical to assess the safety of psychedelic microdosing across the lifespan.

Conclusion

Given the lack of information on psychedelic microdosing in humans, studies examining the prevalence of this practice and its associated outcomes are imperative. This study is one of the first to demonstrate that this practice is relatively common. We also report several factors that cause people to stop microdosing. In conjunction with several other recent publications regarding the effects of psychedelic microdosing (Anderson et al. 2019a; Anderson et al. 2019b; Fadiman and Korb 2019), our work finds that many people feel that microdosing has alleviated their symptoms of depression and/or anxiety. Given the prevalence of this practice, a thorough assessment of potential risks should be conducted. To establish efficacy, placebo-controlled clinical trials will be essential.

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Table 1.

Microdosing Prevalence (N_Q = 2437)

	% (n)
Familiarity with the Concept of microdosing	
Yes	59.09 (1290)
No	40.91 (893)
No Response	n = 254
Do you microdose?	
Yes	4.05 (89)
No, but I have in the past	13.36 (294)
No	82.59 (1817)
No Response	n = 237

Table 2.

Demographic Characteristics of Respondents (N_Q = 2437).

	Total (n = 2437) % (n)	**Non-Microdosers (n = 2054) % (n)**	**Microdosers (n = 383) % (n)**
Age (mean, SD)		35.62, 14.12	33.26, 14.15
No Response	n = 750	n = 657	n = 93
Gender			
Male	50.09 (855)	47.17 (667)	64.16 (188)
Female	48.74 (832)	51.76 (732)	34.13 (100)
Other	0.47 (8)	0.53 (5)	1.02 (3)
Prefer not to say	0.70 (12)	0.71 (10)	0.68 (2)
No Response	n = 730	n = 640	n = 90
Employment			
Non-Tech Industry	40.99 (698)	84.53 (590)	15.47 (108)
Tech Industry	9.04 (154)	79.87 (123)	20.13 (31)
Student	30.48 (519)	80.27 (427)	17.72 (92)
Retired	6.93 (118)	79.66 (94)	20.34 (24)
Unemployed	12.57 (214)	82.24 (176)	17.76 (38)
No Response	n = 734	n = 644	n = 90
Veteran Status			
Non-veteran	95.48 (1625)	96.03 (1355)	92.78 (270)
Veteran	4.52 (77)	3.97 (56)	7.22 (21)
No Response	n = 735	n = 643	n = 92
Education Level			
No High School Diploma	2.17 (37)	1.91 (27)	3.44 (10)
High School or equivalent	31.73 (541)	29.28 (414)	43.64 (127)
Associate or Bachelor degree	42.99 (733)	43.64 (617)	39.86 (116)
Master degree or higher	23.11 (394)	25.18 (356)	13.05 (38)
No Response	n = 732	n = 640	n = 92
Income level			
< $49,999	66.89 (1133)	64.96 (914)	75.00 (219)
$50,000 - $99,999	21.01 (357)	21.89 (308)	16.78 (49)
> $100,000	12.30 (209)	13.15 (185)	8.22 (24)
No Response	n = 738	n = 647	n = 91

Table 3.

Psychedelics Used in Microdosing (N_Q = 383)

	% (n)
LSD	48.58 (154)
DMT	1.58 (5)
Psilocybin	26.18 (83)
MDMA	11.99 (38)
Poly-Drug Use	7.89 (25)
Other	3.78 (12)
No Response	n = 66

Table 4.

Effects of Psychedelic Microdosing by Gender (N_Q = 383).

	Total sample (n = 383) % (n)	Male (n = 188) % (n)	Female (n = 100) % (n)	Gender not specified (n = 95) % (n)
Depression				
Improvement	71.84 (227)	77.96 (145)	65.00 (65)	56.67 (17)
No Effect	23.42 (74)	20.43 (38)	24.00 (24)	40.00 (12)
Worsening	4.75 (15)	1.61 (3)	11.00 (11)	3.33 (1)
No Response	n = 67	n = 2	n = 0	n = 65
Anxiety				
Improvement	56.55 (177)	61.20 (112)	53.00 (53)	40.00 (12)
No Effect	30.35 (95)	28.42 (52)	29.00 (29)	46.67 (14)
Worsening	13.10 (41)	10.38 (19)	18.00 (18)	13.33 (4)
No Response	n = 70	n = 5	n = 0	n = 65
Memory				
Improvement	38.85 (122)	43.48 (80)	30.00 (30)	40.00 (12)
No Effect	46.50 (146)	48.37 (89)	43.00 (43)	46.67 (14)
Worsening	14.65 (46)	8.15 (15)	27.00 (27)	13.33 (4)
No Response	n = 69	n = 4	n = 0	n = 65
Focus/Attention				
Improvement	58.97 (184)	66.30 (122)	44.44 (44)	62.07 (18)
No Effect	26.28 (82)	22.83 (42)	32.32 (32)	27.59 (8)
Worsening	14.74 (46)	10.87 (20)	23.23 (23)	10.34 (3)
No Response	n = 71	n = 4	n = 1	n = 66
Sociability				
Improvement	66.56 (209)	70.11 (129)	60.00 (60)	66.67 (20)
No Effect	22.29 (70)	21.74 (40)	21.00 (21)	30.00 (9)
Worsening	11.15 (35)	8.15 (15)	19.00 (19)	3.33 (1)
No Response	n = 69	n = 4	n = 0	n = 65

Table 5.

Deterrents from Microdosing (N_Q = 383)

	Total Responses % (n)
Too expensive	8.23 (20)
Too difficult to obtain materials	22.63 (55)
Too risky due to legal concerns	24.28 (59)
Wasn't getting the effects I was hoping for	4.94 (12)
Side effects	4.12 (10)
Other	35.80 (87)
No Response	n = 140