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# Linkages between Psychedelics and Meditation in a Population-Based Sample in the United States

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**ABSTRACT**

There are neurophysiological and phenomenological overlaps between psychedelic and meditative states, but there is little evidence on how exposure to psychedelics might be associated with meditation-related variables. We assessed lifetime classic psychedelic use, ego dissolution during one's most intense experience using a classic psychedelic, and exposure to meditation in a representative sample (n = 953) of American adults. Those who reported experience with meditation were invited to complete a follow-up survey (n = 536, 92.1% response rate) measuring meditation-related variables. Models controlled for a range of potential confounds. Exposure to meditation was associated with lifetime classic psychedelic use and ego dissolution in covariate-adjusted models. In addition, among meditators, greater ego dissolution was associated with more frequent meditation practice. Both lifetime classic psychedelic use and ego dissolution were associated with enlightenment as motivation to practice meditation as well as lower likelihood of overall perceived barriers to meditation practice. Ego dissolution was positively associated with finding meditation more effective. Neither lifetime classic psychedelic use nor ego dissolution was associated with greater likelihood of meditation-related adverse effects. Taken together, results support potential synergy between psychedelics and meditation, but randomized controlled trials are necessary to establish safety and evaluate potential causal relationships.

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Psychedelics; Psilocybin; LSD; ego dissolution; meditation; mindfulness

## Introduction

There has been a dramatic reemergence of research into the therapeutic effects of psychedelics over the past decades. Although experimental studies remain few in number and limited in sample size, the available evidence suggests psychedelics may hold therapeutic potential, particularly in the context of psychiatric disorders (Goldberg et al. 2020; Romeo et al. 2020; Sessa 2018). This research has mainly focused on classic psychedelics, which commonly refers to psychoactive substances known to act as agonists principally at serotonin 2A receptors (Nutt and Carhart-Harris 2021). Most notably, classic psychedelics include N,N-dimethyltryptamine (DMT), the DMT-containing brew ayahuasca, psilocybin, lysergic acid diethylamide (LSD), mescaline, and the mescaline-containing cactus peyote (Sexton, Nichols, and Hendricks 2019). The evidence to date suggests that classic psychedelics have a good safety and tolerability profile and can be effective in the treatment of internalizing disorders (Davis et al. 2021; Luoma et al. 2020; Nutt, King, and Phillips 2010).

One aspect of the psychedelic experience that appears to be particularly important for producing therapeutic effects is a phenomenon known as ego dissolution (Kettner et al. 2019; Lebedev et al. 2016; Nour, Evans, and Carhart-Harris 2017; Uthaug et al. 2018), which broadly refers to a loss of subjective self-identity (Nour et al. 2016). There are intriguing overlaps in phenomenology and neurophysiology between psychedelic-induced ego dissolution and experiences that have been reported in the context of meditation practice (Millière et al. 2018). And as with classic psychedelics, alterations in one's experience of the self has been proposed as a causal mechanism underlying potential benefits of meditation practice (Dahl, Lutz, and Davidson 2015). Despite this overlap, limited research has examined potential associations between use of classic psychedelics and meditation practice.

The available research suggests there may be potential linkages and perhaps synergy between classic psychedelics and meditation practice. In two randomized controlled trials, the use of classic psychedelics was shown to

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increase both frequency and depth of meditation practice (Griffiths et al. 2018; Smigielski et al. 2019). Associations from cross-sectional surveys also suggest a relationship between psychedelic use and subsequent interest in Buddhism (Osto 2016). Taken together, the limited available evidence suggests that classic psychedelics may augment interest in and depth of meditation practice. However, important questions remain at the intersection of the contemplative and psychedelic sciences. Based on the possibility that classic psychedelics may impact one's engagement with meditation, it would be valuable to know whether individuals with lifetime exposure to classic psychedelics are more likely to have lifetime exposure to meditation and whether meditators with and without lifetime classic psychedelic use show different patterns of engagement with meditation (e.g., reasons for practice, amount of practice, type of practice, barriers to practice). It would also be worth examining whether meditators with and without psychedelic experience differ in their report of meditation-related benefits (e.g., overall effectiveness of meditation, levels of cognitive capacities linked to meditation) and harms (i.e., adverse effects).

Using data from a nationally representative online sample of 953 adults in the United States (US), we sought to investigate the associations between lifetime classic psychedelic use and ego dissolution during one's most intense experience using a classic psychedelic with various meditation-related variables including (1) lifetime exposure to meditation; (2) current amount of meditation practice; (3) current type of meditation practice; (4) current motivation for meditation practice; (5) perceived barriers to meditation practice; (6) feeling glad to have practiced meditation; (7) perceived efficacy of meditation practice; (8) decentering skills; and (9) meditation-related adverse effects.

## Methods

### Participants and procedure

The data for the present study were collected as part of a large-scale online survey (see https://osf.io/pzkmn/). US residents over 18 years of age were recruited on Prolific Academic (https://app.prolific.co), with the sample ($n$ = 953) stratified across three demographics (age, sex and ethnicity) to reflect the demographic distribution of the US adult population. In the first part of the study, the participants were asked about demographic characteristics, lifetime substance use, meditation experience, and attitudes. Participants who failed the attention check item ("I have been randomly selecting responses on this survey") were screened out ($n$ = 33). The participants who reported experience with meditation ($n$ = 582) were invited to complete the second part of the study (see Supplemental Material for the study description used during recruitment process), which contained a large battery of questions about meditation and health. Of those invited, 92.1% ($n$ = 536; 227 males) completed the second part of the study. As shown in Supplemental Table A1, the subsample used in this study had a mean age of 44 and 55.8% had a bachelor's degree or higher. Study procedures were approved by the Institutional Review Board at the University of Wisconsin – Madison.

### Measures

#### Psychedelic-related variables

We assessed two psychedelic-related variables: lifetime classic psychedelic use and ego dissolution during one's most intense experience using a classic psychedelic.

*Lifetime classic psychedelic use.* A single item, adapted from the Alcohol, Smoking, and Substance Involvement Screening Test (ASSIST; The WHO ASSIST Working Group 2002), assessed lifetime classic psychedelic use:

> There is a group of hallucinogens called classic psychedelics, which include ayahuasca, DMT, LSD, mescaline, peyote, and psilocybin ("magic mushrooms"). In your life, which of the following classic psychedelics have you EVER used? (select all that apply).

Response options included: ayahuasca; DMT; LSD, also called "acid"; mescaline; peyote; psilocybin, also called "magic mushrooms"; other (please specify); never used a classic psychedelic.[1] All participants selecting other (please specify) also reported use of the options listed above or wrote the name of one when specifying other. Responses were coded as 1 when participants indicated they had used a classic psychedelic (ayahuasca; DMT; LSD, also called "acid"; mescaline; peyote; psilocybin, also called "magic mushrooms") and all other responses were coded as 0.

*Ego dissolution.* For participants endorsing lifetime use of classic psychedelics, we assessed ego dissolution during one's most intense experience using a classic psychedelic using the highest loading item from the Ego Dissolution Inventory (Nour et al. 2016): During your most intense experience using a classic psychedelic, how much would you agree with the following statement: "I experienced a disintegration of my 'self' or ego." Participants responded on a slider scale from 0 to 100 (0 = No, not more than usually, 100 = Yes, entirely or completely).

### Meditation-related variables

We assessed several aspects of meditation practice, including lifetime exposure to meditation; current amount of meditation practice; current type of meditation practice; current motivation for meditation practice; perceived barriers to meditation practice; feeling glad to have practiced meditation; perceived efficacy of meditation practice; decentering skills; and meditation-related adverse effects.

***Lifetime exposure to meditation.*** All participants were assessed on lifetime exposure to meditation using a single item: "Have you ever tried any of the following types of meditation, even just once? (select all that apply)" Response options included mantra meditation, mindfulness meditation, spiritual meditation, Tibetan meditation, yogic meditation, meditation as a part of a movement practice (e.g., yoga), and other meditation practices (see Supplemental Material for details on response options).

***Current amount of meditation practice.*** For participants who reported experience with meditation, a single item assessed current amount of meditation practice: "How often do you currently practice meditation?" (1 = Never, 2 = Several times per year, 3 = Monthly, 4 = Weekly, 5 = Daily).

***Current type of meditation practice.*** For participants who reported experience with meditation, a single item assessed current type of meditation practice: "Which of the following is your current primary meditation practice? (select one)" The participants were presented with a list of response options (e.g., body scan, pranayama, centering prayer). The responses were coded as "Buddhist meditation," "Hindu meditation," "Spiritual meditation," "Meditation as part of yoga, tai-chi, or qi gong," and "Other type of meditation" (see Supplemental Material for details on response options and how the responses were coded).

***Current motivation for meditation practice.*** For participants who reported experience with meditation, a single item assessed current motivation for meditation practice: "Why do you currently practice meditation? (select all that apply)" The responses were coded as "Physical health," "Mental health," "Part of social, cultural, or religious identity," "General spiritual," "Enlightenment," and "Other reason."

***Perceived barriers to meditation practice.*** All participants were asked to complete the 12-item Determinants of Meditation Practice Inventory-Revised (DMPI-R; Hunt et al. 2020). The measure has previously shown a four-factor structure and convergent validity with relevant constructs (e.g., experiential avoidance, curiosity; Hunt et al. 2020). However, in the current sample, internal consistency was unacceptably low for the cultural barriers subscale (alpha = .40). The three remaining subscales assessed perceived benefit (e.g., "I don't believe meditation can help me"), knowledge (e.g., "I don't know much about meditation"), and pragmatic barriers (e.g., "I don't have time"). We also calculated a total score across all items. Higher subscale and total score values indicate greater barriers to meditation practice. Internal consistency was adequate for all three subscales and total score (alphas = .72 to .78).

***Feeling glad to have practiced meditation.*** For participants who reported experience with meditation, a single item assessed whether they feel glad to have practiced meditation:

> Consider the various experiences you have had through meditation, including any challenging, difficult, or distressing experiences. How much do you agree with the following statement: "I am glad I have practiced meditation."

The responses were rated on a 1- (Strongly disagree) to 6-point (Strongly agree) Likert scale.

***Perceived efficacy of meditation practice.*** For participants who reported experience with meditation, a single item assessed efficacy of meditation practice: "In general, how effective have you found meditation practice?" The responses were rated on a 1- (Not at all effective) to 6-point (Very effective) Likert scale.

***Decentering skills.*** For participants who reported experience with meditation, we assessed decentering skills using the 11-item Experiences Questionnaire – Decentering subscale (EQ – Decentering), which included items such as "I can separate myself from my thoughts and feelings" and "I can treat myself kindly." The responses were rated on a 1- (Never) to 5-point (All the time) Likert scale. EQ – Decentering has shown good reliability and validity in previous research (Fresco et al. 2007; Gecht et al. 2014; Naragon-Gainey et al. 2020; Soler et al. 2014). A subscale score was calculated by summing across all items, with higher scores indicating greater decentering skills. Internal consistency was adequate (alpha = .91).

***Meditation-related adverse effects.*** For participants who reported experience with meditation, we assessed meditation-related adverse effects using the 11-item

Meditation-Related Adverse Effects Scale – Mindfulness-Based Program (MRAES-MBP; Britton, Lindahl, and Cooper 2018). This measure is designed to assess meditation-related adverse effects and asks participants "Have you ever had any of the following occur as a result of meditation?" It includes items that have previously been reported in qualitative interviews with meditation practitioners (Lindahl et al. 2017) such as "I felt anxious" and "Feeling disconnected from everything around me." Responses indicate frequency (1 = Never, 2 = For a few days to 1 week, 3 = 1 week to 1 month, 4, 1 month to 1 year, 5 = 1 year or longer). Given low rates of most response options (< 5%), items were dichotomized and a total score computed across the 10 specific adverse effects items. Internal consistency was adequate (Kuder-Richardson = .89).

Participants were also asked three additional single items on meditation-related adverse effects: "I personally have had challenging, difficult, or distressing experiences as a result of my meditation practice" (1 = Never, 2 = Rarely, 3 = Occasionally, 4 = Regularly, 5 = Frequently; recoded as 1 = Yes, 0 = Never); "My meditation-related challenging, difficult, or distressing experiences impaired my ability to function" (1 = Not at all, 2 = Somewhat, 3 = Moderately, 4 = Severely; recoded as 1 = Yes, 0 = Not at all); and "How long did your impairment last?" (1 = 1 day or less, 2 = For a few days to 1 week, 3 = 1 week to 1 month, 4 = 1 month to 1 year, 5 = 1 year or longer; recoded as 1 = 1+ day, 0 = 1 day or less).

### Covariates

We controlled for a number of demographic and other covariates that may confound potential associations between lifetime classic psychedelic use and meditation-related variables. Given the cross-sectional nature of our design and the possibility of spurious associations between classic psychedelics and meditation (e.g., both being driven by third variables), covariates were included in all analyses. The covariates broadly mirrored the covariates of a recent cross-sectional study to the extent the same or similar variables were included in this survey (Nour, Evans, and Carhart-Harris 2017). However, given the relatively modest sample size, many covariates were dichotomized by collapsing less common responses into one value.

Demographic covariates included age in years (continuous), sex (male, other), and educational attainment (Bachelor's degree or higher, other). We also controlled for lifetime use of cocaine (yes, no) and alcohol (yes, no) with an item adapted from ASSIST (The WHO ASSIST Working Group 2002).

### Statistical analyses

We used linear and logistic regression models to evaluate associations between meditation-related variables with lifetime classic psychedelic use and ego dissolution during one's most intense experience using a classic psychedelic. In these models, lifetime classic psychedelic use or ego dissolution (z-scored) were entered as the independent variables along with the covariates described above while meditation-related variables were entered as the dependent variables. Bivariate associations between study variables were also examined using the Pearson correlation coefficient, the point biserial correlation coefficient, and the Phi coefficient.

## Results

Table 1 presents the associations between psychedelic-related and meditation-related variables when a range of covariates are controlled for. Sample descriptive statistics for all independent and dependent variables are reported in Supplemental Table A1. Zero-order associations between study variables are reported Supplemental Table A2.

Across the full sample, lifetime classic psychedelic use was associated with lifetime exposure to meditation (aOR = 2.04, p = .002), with 28% of those exposed to meditation reporting lifetime classic psychedelic use compared to 17% of those not exposed to meditation. Ego dissolution was also associated with lifetime exposure to meditation (aOR = 1.39, p = .047).

Among meditators, ego dissolution but not lifetime classic psychedelic use was associated with greater amount of current meditation practice (β = .19 and .03; p = .032 and .554, respectively) as well as current use of Buddhist meditation practice (aOR = 1.58 and 0.97; p = .019 and .890, respectively). However, neither lifetime classic psychedelic use nor ego dissolution were associated with current use of Hindu meditation practice, spiritual meditation practice, meditation as part of movement practice, or other type of meditation practice.

For current motivation for meditation practice, both lifetime classic psychedelic use and ego dissolution were associated with enlightenment as motivation (aOR = 2.38 and 1.64; p = .009 and .043, respectively). Ego dissolution but not lifetime classic psychedelic use was associated with mental health as motivation (aOR = 1.69 and 0.97; p = .008 and .905, respectively). However, neither lifetime classic psychedelic use nor ego dissolution were associated with other motivations for practice (physical health; part of social, cultural, or religious identity; general spiritual; or other reason).

**Table 1.** Associations between psychedelic-related and meditation-related variables.

| | Lifetime Classic Psychedelic Use | | | Ego Dissolution | | |
|---|---|---|---|---|---|---|
| | β | aOR (CI 95%) | *p* | β | aOR (CI 95%) | *p* |
| **Past and current use of meditation** | | | | | | |
| Lifetime exposure to meditation | | 2.04 (1.31–3.18) | **.002** | | 1.39 (1.01–1.91)[a] | **.047** |
| Current amount of meditation practice | .03 | | .554 | .19 | | **.032** |
| **Current type of meditation practice** | | | | | | |
| Buddhist meditation | | 0.97 (0.59–1.58) | .890 | | 1.58 (1.08–2.32) | **.019** |
| Hindu meditation | | 2.03 (0.48–8.63)[a] | .340 | | 0.71 (0.26–1.91)[a] | .497 |
| Spiritual meditation | | 0.44 (0.15–1.28) | .132 | | 0.38 (0.15–1.02)[a] | .054 |
| Meditation as part of yoga, tai-chi, or qi gong | | 0.92 (0.41–2.05) | .833 | | 0.89 (0.46–1.71) | .727 |
| Other type of meditation | | 4.66 (0.93–23.21)[a] | .061 | | 1.00 (0.34–2.96)[a] | .995 |
| **Current motivation for meditation practice** | | | | | | |
| Physical health | | 0.95 (0.54–1.68) | .859 | | 1.21 (0.80–1.83)[a] | .358 |
| Mental health | | 0.97 (0.57–1.64) | .905 | | 1.69 (1.15–2.48)[a] | **.008** |
| Part of social, cultural, or religious identity | | 0.99 (0.37–2.70) | .991 | | 1.07 (0.49–2.32)[a] | .868 |
| General spiritual | | 1.13 (0.65–1.96) | .659 | | 1.48 (0.99–2.23)[a] | .059 |
| Enlightenment | | 2.38 (1.24–4.57) | **.009** | | 1.64 (1.02–2.64)[a] | **.043** |
| Other reason | | 1.63 (0.36–7.24) | .524 | | 0.94 (0.37–2.37)[a] | .890 |
| **Perceived barriers to meditation practice** | | | | | | |
| Benefit | −.13 | | **.001** | −0.23 | | **.001** |
| Knowledge | −.12 | | **.004** | −.13 | | .062 |
| Pragmatic barriers | −.14 | | **.001** | −.14 | | **.045** |
| Total | −.16 | | **<.001** | −.23 | | **.001** |
| **Perception of meditation practice** | | | | | | |
| Feeling glad to have practiced meditation | .06 | | .250 | .12 | | .160 |
| Perceived efficacy of meditation practice | .06 | | .259 | .20 | | **.025** |
| **Experiences Questionnaire** | | | | | | |
| Decentering Skills | −.05 | | .369 | .11 | | .213 |
| **Adverse Effects** | | | | | | |
| Meditation-Related Adverse Effects | −.01 | | .850 | .05 | | .560 |
| Adverse Effects – Ever | | 1.36 (0.80–2.31) | .256 | | 1.31 (0.88–1.94) | .179 |
| Impaired Function – Any | | 0.94 (0.42–2.08) | .876 | | 1.01 (0.54–1.86)[a] | .987 |
| Impaired Function – 1+ Day | | 1.56 (0.58–4.18) | .380 | | 1.25 (0.57–2.76) | .577 |

β = standardized coefficients; aOR = adjusted Odds Ratios; β and aOR are adjusted for age, sex, educational attainment, lifetime cocaine use, and lifetime alcohol use; results in linear regression models are reported with β and results in logistic regression models are reported with aOR. Note: a = lifetime alcohol use omitted from model due to collinearity reported by Stata. For ease of understanding, Supplemental Table A3 shows full specification of first regression model (lifetime classic psychedelic use and lifetime meditation exposure).

Both lifetime classic psychedelic use and ego dissolution were associated with lower likelihood of overall perceived barriers to meditation practice (i.e., total score; β = −.16 and −.23; p = < .001 and .001, respectively) as well as with lower likelihood of perceived barriers related to benefit (β = −.13 and −.23; p = .001 and .001, respectively) and pragmatism (β = −.14 and −.14; p = .001 and .045, respectively). Lifetime classic psychedelic use but not ego dissolution was associated with lower likelihood of perceived barriers related to knowledge (β = −.12 and −.13; p = .004 and .062, respectively).

Ego dissolution but not lifetime classic psychedelic use was associated with perceived efficacy of meditation practice (β = .20 and .06; p = .025 and .259, respectively). Neither lifetime classic psychedelic use nor ego dissolution were associated with likelihood of feeling glad to have practiced meditation (β = .06 and .12; p = .250 and .160, respectively) or decentering skills (β = −.05 and .11; p = .369 and .213, respectively).

Contrary to the possibility that classic psychedelic use is associated with higher likelihood of meditation-related adverse effects, neither lifetime classic psychedelic use nor ego dissolution were associated with total score of meditation-related adverse effects (β = −.01 and .05; p = .850 and .560, respectively), lifetime occurrence of adverse effects (aOR = 1.36 and 1.31, p = .256 and .179, respectively), functional impairment (aOR = 0.94 and 1.01, p = .876 and .987, respectively), or impaired function lasting longer than a day (aOR = 1.56 and 1.25, p = .380 and .577, respectively).

## Discussion

Against a backdrop of clinical, phenomenological, and neurophysiological overlap, the current study sought to examine associations between classic psychedelic use and meditation practice in a population-based sample. Several associations were noted between lifetime classic psychedelic use and a key element of the acute psychedelic experience (i.e., ego dissolution) with variables related to meditation practice. Lifetime exposure to meditation was associated with lifetime classic psychedelic use and ego dissolution during one's most intense experience using a classic psychedelic. Although causality cannot be inferred in the current design, this finding suggests that merely being exposed to classic

psychedelics as well as greater ego dissolution during one's most intense psychedelic experience increases the likelihood that one later practices meditation (or vice versa, that exposure to meditation increases the likelihood that one later uses classic psychedelics or experiences greater ego dissolution). In addition, greater ego dissolution but not lifetime classic psychedelic use was associated with greater current meditation practice as well as current use of Buddhist meditation specifically.

A similar divergence emerged in associations between lifetime classic psychedelic use and ego dissolution for motivations for practice, with ego dissolution but not lifetime classic psychedelic use showing an association with mental health motivation. However, both lifetime classic psychedelic use and ego dissolution were associated with enlightenment motivation (aOR = 2.38 and 1.64, respectively).

One of the most robust findings was a consistent linkage between both of the psychedelic-related variables and perceived barriers to meditation practice. Specifically, meditators with lifetime classic psychedelic use or greater ego dissolution tended to report lower barriers to meditation (e.g., related to perceived benefit, pragmatic barriers). This association could certainly be caused by an unmeasured third variable (e.g., openness to experience, openness to spiritual experiences specifically, psychological mindedness), but it is also possible that resemblance between the acute psychedelic experience and meditative states decreases confusion about how to practice meditation and reduces barriers that inhibit engagement with meditation (Payne, Chambers, and Liknaitzky 2021).

While neither lifetime classic psychedelic use nor ego dissolution was associated with feeling glad to have practiced meditation, ego dissolution showed associations that were not observed for lifetime classic psychedelic use. Specifically, meditators reporting greater ego dissolution during their most intense experience using a classic psychedelic were also more likely to report finding meditation more effective. It is possible that the acute psychedelic experience could give people without meditation experience a reference point with which they can orient their practice, thereby leading to greater efficacy. Likewise, meditation practice may develop the psychological capacity to support the experience of ego dissolution (Payne, Chambers, and Liknaitzky 2021). However, contrary to the possibility that psychedelics increase efficacy, we did not observe linkages between either of the psychedelic-related variables with a mindfulness-related cognitive skill (i.e., decentering).

A final intriguing finding was the lack of association between either lifetime classic psychedelic use and ego dissolution with meditation-related adverse effects. This finding contrasts the view that psychedelics may confer risk for meditators. An important caveat for interpreting this finding, however, was the modest amount of meditation experience within the sample. For example, 65% of the meditators reported between 0 and 100 hours of cumulative meditation experience and only 6% reported having ever attended a meditation retreat. Given evidence that more intensive meditation practice is linked with adverse effects (Lindahl et al. 2017), it would be valuable to replicate these analyses in a sample with greater lifetime exposure to retreat. Moreover, it would be important to carefully assess the time course of both meditation practice and classic psychedelic use. As both meditation and classic psychedelics become more popular, it will be crucial to carefully determine whether, for whom, and under what circumstances (e.g., practice intensity) combining meditation and classic psychedelics confers increased risk for adverse effects.

The present findings are novel, but there are several limitations. First, the sample was stratified across age, sex and ethnicity to reflect the demographic distribution of the US population, but previous research has found Democrats to be overrepresented on online platforms (Arechar and Rand 2021; Paolacci and Chandler 2014). The survey did not ask respondents to report political identity, which meant the sample's political representativeness could not be determined. The percentage of participants who reported lifetime classic psychedelic use in the present study's full sample (23%) was higher than prevalence in the US (14%) found in recent investigations using the National Survey on Drug Use and Health (NSDUH; Simonsson, Sexton, and Hendricks 2021). The NSDUH does not ask specific questions about ayahuasca or DMT use alone, but prior investigations have instead derived ayahuasca and DMT use from a write-in section, which may underestimate the percentage of ayahuasca and DMT users in the population. Nonetheless, the higher prevalence of lifetime classic psychedelic exposure in the current sample raises some questions regarding representativeness. Second, as noted, the meditators in the sample had limited experience with meditation practice. It is therefore possible that the associations would be different for experienced meditators or meditators with experience primarily in intensive settings. Third, the survey did not ask respondents to describe the set and setting of their use of classic psychedelics. The set and setting-specific associations (e.g., context, frequency, dose, intentions, and psychological support) between past use of classic psychedelics and meditation-related variables could therefore not be evaluated. Fourth, the question about perceived efficacy of meditation practice may have

been interpreted differently across respondents (e.g., efficacy in improving mental health, physical health), which makes it difficult to understand in what way meditation practice might have been effective for the respondents. Fifth, the relatively modest sample size meant that a few variables had to be dichotomized while lifetime alcohol use had to be dropped due to collinearity in some of the regression models. Sixth, causality could not be inferred due to the cross-sectional design. It is, for example, possible that the emphasis on non-self in Buddhism may have increased the likelihood of respondents who had a Buddhist meditation practice to experience high degrees of ego dissolution during the acute psychedelic experience. The issue of causality is further muddied by not assessing the time course of classic psychedelic use or meditation practice.

Notwithstanding these limitations, the current study highlights several potentially intriguing linkages between psychedelic-related and meditation-related variables. Future research should use larger samples and would ideally use randomized controlled trials to help clarify the potential synergy between classic psychedelics and meditation practice.

## Note

1. Note: PCP was included as a response option but not counted as a classic psychedelic in analyses. All participants who reported lifetime PCP use also reported lifetime classic psychedelic use.

## Data availability statement

Data are available by request.

## Disclosure statement

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

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## Ethical approval

All procedures performed involving human participants were in accordance with the ethical standards of the 1964 Helsinki declaration and its later amendments or comparable ethical standards. The study was approved by the Internal Review Board (IRB) at UW-Madison.

## Author contributions

SG conceptualized and designed the study, with input from OS. OS analyzed the data with assistance from SG. OS wrote the manuscript, with comments from SG. SG supervised the study.

## Informed consent

Informed consent was obtained from all individual participants included in the studies.

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