

# Of Roots and Fruits: A Comparison of Psychedelic and Nonpsychedelic Mystical Experiences

Journal of Humanistic Psychology

1–16

© The Author(s) 2016

Reprints and permissions:

sagepub.com/journalsPermissions.nav

DOI: 10.1177/0022167816674625

jhp.sagepub.com



David B. Yaden<sup>1</sup>, Khoa D. Le Nguyen<sup>2</sup>,  
Margaret L. Kern<sup>3</sup>, Alexander B. Belser<sup>4</sup>,  
Johannes C. Eichstaedt<sup>1</sup>, Jonathan Iwry<sup>1</sup>,  
Mary E. Smith<sup>5</sup>, Nancy A. Wintering<sup>5</sup>,  
Ralph W. Hood Jr.<sup>6</sup>, and Andrew B. Newberg<sup>5</sup>

## Abstract

Experiences of profound existential or spiritual significance can be triggered reliably through psychopharmacological means using psychedelic substances. However, little is known about the benefits of religious, spiritual, or mystical experiences (RSMs) prompted by psychedelic substances, as compared with those that occur through other means. In this study, 739 self-selected participants reported the psychological impact of their RSMs and indicated whether they were induced by a psychedelic substance. Experiences induced by psychedelic substances were rated as more intensely mystical ( $d = .75$ ,  $p < .001$ ), resulted in a reduced fear of death ( $d = .21$ ,  $p < .01$ ), increased

<sup>1</sup>University of Pennsylvania, Philadelphia, PA, USA

<sup>2</sup>University of North Carolina, Chapel Hill, NC, USA

<sup>3</sup>University of Melbourne, Parkville, Victoria, Australia

<sup>4</sup>New York University, New York, NY, USA

<sup>5</sup>Thomas Jefferson University, Philadelphia, PA, USA

<sup>6</sup>University of Tennessee at Chattanooga, Chattanooga, TN, USA

## Corresponding Author:

David B. Yaden, Department of Psychology, University of Pennsylvania, 3701 Market Street Suite 200, Philadelphia, PA 19104, USA.

Email: dyaden@sas.upenn.edu

sense of purpose ( $d = .18, p < .05$ ), and increased spirituality ( $d = .28, p < .001$ ) as compared with nonpsychedelically triggered RSMEs. These results remained significant in an expanded model controlling for gender, education, socioeconomic status, and religious affiliation. These findings lend support to the growing consensus that RSMEs induced with psychedelic substances are genuinely mystical and generally positive in outcome.

### Keywords

mystical experience, religious experience, spiritual experience, psychedelic, spirituality, self-transcendent experience, religion

## Introduction

“That men and women can, by physical and chemical means, transcend themselves in a genuinely spiritual way . . . seems rather shocking. But, after all, the drug or the physical exercise is not the cause of the spiritual experience; it is only its occasion.”

—Aldous Huxley

Psychoactive substances can inspire some of life’s most profound and meaningful moments. Specifically, psychedelic substances reliably induce religious, spiritual, or mystical experiences (RSMEs; Beauregard, 2011), even in tightly controlled laboratory settings (Griffiths, Richards, McCann, & Jesse, 2006; Turton, Nutt, & Carhart-Harris, 2014). Such experiences can also occur without the influence of psychoactive substances, through occasions such as near death experiences, religious rituals, practices like meditation, as well as spontaneously. People often report that such experiences are positive, spiritual, and, in some cases, transformative, irrespective of the particular trigger of the RSME.

In the *Varieties of Religious Experience*, William James (1902/1999) applies his “pragmatic principle,” which entails attending to the outcomes of such experiences, rather than questioning or dismissing them based on their origins. Arguing the same case, Stace (1960) refers to “causal indifference,” suggesting that so long as the proximate trigger of the mystical state is not part of the phenomenological description, the origin is beside the point. These authors put forward that the merit of a given experience ought to derive from its “fruits,” (outcomes) not its “roots” (origins; James, 1902/1999). Yet others argue that experiences that are induced pharmacologically are less genuine or beneficial than those that occur spontaneously or through other means (Zaehner, 1972). While this has been debated theoretically (Kellenberger,

1978; Smith, 1964; Zaehner, 1972), empirical studies are warranted that compare spiritually significant experiences induced through psychopharmacological and nonpsychopharmacological means. The current study addresses this need.

The capability for psychoactive substances to exert profound psychological effects is notable for a number of reasons. First, the phenomenological aspects of such experiences are relatively brief—usually only several minutes or hours—compared with the duration of the experience’s long-term personality and behavioral effects, which can persist for years or decades (Doblin, 1991; Forman, 1999; Griffiths, Richards, Johnson, McCann, & Jesse, 2008; MacLean, Johnson, & Griffiths, 2011). Second, such experiences can be relatively easily induced in laboratory settings. Third, the experience is almost entirely subjective, with few changes in distinct bodily activity or behavior during the experiences—that is to say, all of these changes can occur during a few hours of lying on a couch. Fourth, such experiences are often interpreted in religious or spiritual terms, perhaps suggesting stable phenomenological qualities that cue religious and spiritual interpretations. Understanding the subjective qualities and content of such experiences, as well as the ways in which culture affects their interpretation, is thus a complicated yet necessary aim for further scientific inquiry with significant clinical implications.

The broad class of psychoactive substances known as “psychedelics,” “hallucinogens,” or “entheogens” (MacLean et al., 2011) encompasses many compounds, including the more well-known substances of psilocybin (mushrooms), lysergic acid diethylamide (LSD), mescaline (peyote), and N,N-Dimethyltryptamine (DMT; also an active compound in ayahuasca). These substances generally work as serotonin receptor (5-HT<sub>2</sub>) agonists (Aghajanian & Marek, 1999; Ebersole, Visiers, Weinstein, & Sealfon, 2003; Nelson, Lucaites, Wainscott, & Glennon, 1999; Scroggs, Patel, Bubser, & Deutch, 2000), although other hallucinogenic compounds (e.g., ketamine, phencyclidine) can affect different neurotransmitter systems (for a review, see Yaden, Iwry, & Newberg, 2016). Many psychedelics have very low toxicity (Jaffe, 1990; McGlothlin & Arnold, 1971; Nichols, 2004; O’Brien, 1996) and some have been used for thousands of years for religious or spiritual purposes. Religious rituals involving such substances have been observed in indigenous cultures in Africa, South America, and North America (Grob, 2002; Ruck, Bigwood, Staples, Ott, & Wasson, 1979). Allegro (1971) traces the history of psychoactive substances in monotheistic traditions; Hillman (2008) has identified rituals in ancient Greece that incorporated psychedelic substances.

Religious or spiritual interpretations are common to psychedelic experiences. Reports of religious or spiritual imagery are common across a number of studies using psychedelic substances (Masters & Houston, 1966). In the

hallmark “Good Friday experiment,” subjects attending a Christian religious service at Marsh Chapel at Harvard University had more intensely religious and spiritual experiences after being administered psilocybin than did those administered an inert control substance (Pahnke, 1966). Notably, participants in the drug condition still found the experience meaningful decades later (Doblin, 1991). Unfortunately, the most compelling findings from research conducted during this era of scholarship were overshadowed by the perception of ethical violations, unrestrained enthusiasm by a few early researchers in the field, and a reactionary ban on psychedelic substances even for research purposes (Baumeister & Placidi, 1983).

More recent work has adhered to rigorous research and ethical standards, and contemporary studies continue to find reports of positive outcomes stemming from psychedelic-induced experiences. For instance, when Griffiths et al. (2006) administered psilocybin to psychedelic-naive subjects, 67% reported that the experience was among the top five most meaningful experiences of their lives—71% rated the experience in their top five most spirituality significant experiences. Most participants under the influence of psilocybin met the researcher’s criteria for a mystical experience—a member of the class of RSMEs that emphasizes feelings of unity, transcendence of time and space, noetic quality, and positive mood (Pahnke, 1966; Stace, 1960). Outcomes such as heightened mood, altruistic social effects, and other positive behavioral changes persisted at 2- and 18-month follow-ups (Griffiths et al., 2008).

Reviews of the extant literature on psychedelic research suggest a qualified consensus that psilocybin can produce mystical experiences in a supportive therapeutic milieu in controlled research settings (Ellens, 2014; Grob, 2002; Grob et al., 2011; Turton et al., 2014). Legal restrictions on substance research are relaxing, indicating that the scientific and legal communities are coming to realize psychedelics’ potential value (Ellens & Roberts, 2015). The cumulative effect of psychedelic research has demonstrated that these substances can induce experiences of profound spiritual and existential meaning, leading to more specific questions about the similarities and differences between spiritual experiences, their subjective effects, and their overlapping relationships to the brain.

A question that has arisen in extensive theoretical debate is the extent to which experiences triggered by psychoactive substances such as psilocybin are as beneficial or meaningful as RSMEs that occur spontaneously or through other “natural” means (Kellenberger, 1978; Smith, 1964; Zaehner, 1972). William James (1902/1999) argued that the emotions, transformation, and changed behaviors that are borne of an experience (the fruits) matter far more than what might have caused the experience (the roots). His argument

was in reference to experiences borne of blatantly physiological origins. He gave the example that some explain (or explain away) St. Paul's epiphany on the Road to Damascus as *merely* an epileptic seizure. James wrote,

Medical materialism finishes up Saint Paul by calling his vision on the road to Damascus a discharging lesion of the occipital cortex, he being an epileptic. It snuffs out Saint Teresa as an hysteric, Saint Francis of Assisi as a hereditary degenerate. (p. 23)

Yet whether Paul's epiphany was due to a seizure or a true encounter with God may be beside the point; the experience was transformative, and Paul turned from being a persecutor of Christians to an early church leader (Longenecker, 1997). James thus argues that the meaning and significance of a subjective experience cannot be deflated by an account of its physiological origin.

James's argument is useful when examining RSMs triggered by psychedelic substances. Along these lines, some scholars suggest that psychedelically induced RSMs are essentially the same as spontaneous RSMs, the latter of which are often assumed inherently mystical in nature (e.g., Hood, 2014; Huxley, 1958; Smith, 1964). Yet other scholars hold that the origin of RSMs differentiates them into distinct categories (Redmond, 2004). For example, Zaehner (1972) called RSMs triggered by psychedelics "psychedelic mysticism," claiming that such experiences cannot be equated with spontaneous or "genuine" mystical experiences. He argued that although psychedelic experiences contain content related to nature and unity, they lack a sense of sacredness. Interestingly, he later revised this view after studies demonstrated the prevalence of sacredness in reports of psychedelic experiences (Hood, Hill, & Spilka, 2009; Wulff, 1991; Zaehner, 1972).

The positive impact of psychedelic versus nonpsychedelic RSMs is another point of contention. Smith et al. (2004) point out that the question of whether psychedelically induced RSMs are as effective at beneficially altering behaviors and traits remains an open question—one that has been discussed at length in the extant psychedelic literature (Ellens, 2014).

The debate over the spiritual and positive impact of psychedelic experiences has been primarily theoretical in nature. Empirical studies are warranted to evaluate long-held theoretical propositions. In this study, we used questionnaire data from an online survey to compare psychedelically triggered and nonpsychedelically triggered RSMs. We hypothesized that there would be nonsignificant differences in psychedelic-occasioned RSMs when compared with nonpsychedelic-occasioned RSMs in (a) mystical quality (as measured by a measure of mystical experience); (b) positive impact in the

domains of family, reduced fear of death, health, and sense of purpose; and (c) sense of religiosity and spirituality. Each of these hypotheses focus on how the “roots,” or origins, influence the “fruits,” or outcomes, of RSMEs.

## Method

### Participants

Data came from 739 individuals (379 males, 335 female, 25 other/unknown), drawn from an existing data set of 839 respondents who completed an online survey about RSMEs. The online survey, hosted on a University of Pennsylvania website developed by the authors (ABN) and (NAW), indicated that it was intended to explore the nature of religious and spiritual experiences. The University of Pennsylvania’s Institutional Review Board approved this study.

Sample characteristics can be found in Table 1. Survey participants were primarily White/Caucasian (82.8%) and middle class (76.2%). There was an unusually high number of atheists in this sample (25%), compared with the general population (1.6%; Pew Research Center, 2008). Of the total 839 respondents, 100 individuals were excluded from the current analyses due to incomplete data on the measures of interest. Participants excluded due to incomplete data were less likely to be Atheists,  $\chi^2(1) = 4.23, p = .04$ , or other religions,  $\chi^2(1) = 4.50, p = .03$ , but were equally likely to be Christians,  $\chi^2(1) = .00, p = 1.00$ , as those included in the current analyses. There were more American Indians in the excluded sample,  $\chi^2(1) = 7.64, p = .01$ , but no differences for other ethnicities, White:  $\chi^2(1) = 1.09$ , Asian:  $\chi^2(1) = 0.00$ , Black:  $\chi^2(1) = 0.50$ , Hispanic:  $\chi^2(1) = 0.40$ ; all  $ps > .05$ , gender,  $\chi^2(1) = 2.35, p = .13$ , socioeconomic status (SES),  $\chi^2(2) = 0.31, p = .86$ , educational attainment,  $\chi^2(5) = 3.95, p = .56$ , or hallucinogenic use,  $\chi^2(1) = 0.00, p = .99$ . Included participants scored higher on the Mysticism Scale, 3.22 versus 3.03,  $t(837) = 3.28, p = .001, d = .20$ .

### Measures

A subset of questions and scales from the larger survey were included in the current study.

**Demographics.** Participants reported their religious affiliation (Christian, Jewish, atheist, Eastern religions, other), level of education, SES (low, middle, upper), gender, and ethnicity (White, Black, Asian, Hispanic, other/unknown).

**Table 1.** Descriptive Statistics and Spearman Correlations (for Continuous/ Ordinal Variables) or Chi-Square (for Categorical Variables) With Psychedelic Drug Use.

Variable	N	Mean (%)	SD	Min	Max	$\rho$	$\chi^2$
Psychedelic drug use <sup>a</sup>	739	0.47	0.50	0	1	1.00	
Mysticism	714	3.22	0.88	1	4	.35**	
RSME impact	690	4.12	0.59	1	5	.10**	
Family	679	3.87	1.00	1	5	.05	
Purpose	687	4.39	0.84	1	5	.09*	
Spirituality	685	4.64	0.71	1	5	.14**	
Religiousness	673	3.59	1.15	1	5	.02	
Reduced fear of death	685	4.36	0.83	2	5	.10**	
Health	683	3.83	0.88	1	5	.07	
Gender <sup>b</sup>	714	0.47	0.50	0	1	-.40**	
Education	739	2.87	1.17	1	5	-.35**	
SES <sup>c</sup>	720	1.98	0.47	1	3	-.19**	
Ethnicity							14.99**
White	612	82.8%					
Hispanic	25	3.4%					
Black	17	2.3%					
Asian	17	2.3%					
Other/unknown	68	9.2%					
Religion							74.08**
Christian	153	20.7%					
Atheist	185	25%					
Eastern religion	58	7.8%					
Other/unknown	343	46.4%					

Note. RSME = religious, spiritual, mystical experience; SES = socioeconomic status. Differing Ns due to missing data on some measures. Spearman  $\rho$  correlations, due to the ordinal nature of most variables. RSME impact refers to composite across the six domains.

<sup>a</sup>Drug use: 0 = no, 1 = yes. <sup>b</sup>Gender: 0 = male, 1 = female. <sup>c</sup>SES: 1 = low, 2 = middle, 3 = upper.

\* $p < .05$ . \*\* $p < .01$ .

**Mystical Experience.** Mystical experiences were measured using the mystical experience subscale of the Death Transcendence Scale (Hood & Morris, 1983). This five-item measure has four Likert-type response categories ranging from *strongly disagree* to *strongly agree*. Sample items include “I have had an experience in which I felt everything in the world to be part of the same whole” and “I have had an experience in which I realized the oneness of myself with all things.” This subscale is based on Hood’s Mysticism Scale

(1975), the most widely used measure for experiences involving spiritual or visceral feelings of unity (Hood et al., 2001; Lukoff & Lu, 1988). Internal consistency in the current sample was excellent ( $\alpha = .90$ ).

**Psychedelic Experience.** Two items were used to determine whether an experience was occasioned by a psychedelic substance: "Certain substances have been hypothesized to affect the human brain. Which of these substances have you ever taken?" and "Has it affected your spiritual or religious experience?" Participants also endorsed other nonpsychedelic RSME triggers, including diseases, trauma, ritual, near death experience, religious activity, spontaneous, meditation, and others, though these data are not included in these analyses. To be included in the psychedelic-triggered RSME group, participants had to indicate that they had taken hallucinogens in the first question and had to answer in the affirmative that the substance had influenced their RSME.

**RSME Impact.** Six single-item questions measured how RSMEs influenced participants' lives across the domains of *family, reduced fear of death, health, sense of purpose, religiousness, and spirituality*. Items were scored on a 5-point scale, and were analyzed as separate outcomes, and were also averaged together to indicate an overall RSME impact ( $\alpha = .71$ ).

## Data Analysis

Spearman correlations and independent sample chi-square tests were used to compare the demographic characteristics of participants reporting a psychedelic experience with participants who indicated other triggers for their RSME. A series of analyses of covariance (ANCOVAs) were then conducted to compare mysticism experience and RSME impact across multiple domains, controlling for gender, SES, education, and religion.

## Results

Of the 739 participants, 347 indicated that their RSME was psychedelically induced, and 392 indicated that the RSME was nonpsychedelically induced. Table 1 summarizes the demographic profile for each group and provides Spearman correlations or chi-square tests of independence between each variables and psychedelic drug use. The psychedelic group included more men (72.3% vs. 32.7%), fewer Christians (7.2% vs. 32.7%), and more "other" religions (54.2% vs. 39.5%). Psychedelic use was inversely related to education and SES. Experiences induced by psychedelic substances were rated as more mystical ( $d = .75, p < .001$ ), resulted in a reduced fear of death ( $d = .21$ ,



**Table 2.** Analyses of Covariance Comparing Psychedelic and Nonpsychedelic RSMEs.

Outcome	Psychedelic group			Nonpsychedelic group			F	p	Partial $\eta^2$
	N	M	SD	N	M	SD			
Mysticism	333	3.54	0.65	351	2.92	0.96	63.56	<.001	.086
RSME impact	331	4.18	0.53	331	4.06	0.64	7.88	.005	.012
Family	329	3.91	1.01	324	3.81	1.00	3.72	.054	.006
Purpose	331	4.47	0.80	328	4.32	0.87	4.92	.027	.007
Spirituality	329	4.74	0.59	329	4.56	0.80	16.44	<.001	.025
Religiousness	327	3.65	1.16	318	3.58	1.13	0.73	.393	.001
Reduced fear of death	331	4.44	0.79	326	0.426	0.87	6.03	.014	.009
Health	330	3.89	0.83	325	3.78	0.91	1.10	.295	.002

Note. RSME = religious, mystical, and spiritual experience. Analyses control for gender, education, socioeconomic status, and religious affiliation (dummy coded variable, 1 = Christian, 0 = other). Differing Ns due to missing data on some measures; RSME impact refers to composite across the six domains.

$p < .01$ ), increased sense of purpose ( $d = .18, p < .05$ ), and increased spirituality ( $d = .28, p < .001$ ) as compared with nonpsychedelically triggered RSMEs.

ANCOVAs tested psychedelic drug use predicting mysticism and RSME impact, controlling for gender (0 = male, 1 = female), education and SES (ordinal variables), and religious affiliation (dummy coded as 1 = Christian, 0 = other). As summarized in Table 2, participants with psychedelic-triggered RSMEs scored higher on mystical experience and overall RSME impact than those whose RSME had occurred through other means. Secondary analyses were also performed. Additional ANCOVAs revealed that after controlling for SES, gender, education, and religious affiliation, mystical experience was slightly linked to the influence of opiate,  $p < .01, F(1) = 14.08, \eta_p^2 = .02$ , and party drug,  $p < .01, F(1) = 12.5, \eta_p^2 = .02$ , but antidepressants, psychiatric medications, sedatives, and antianxiety medications were not linked with mystical experience ( $ps > .10$ ).

## Discussion

The current study empirically examined the demographic profiles and impact of RSMEs induced through pharmacological means (psychedelic substances) versus RSMEs that occurred through other means. Contrary to our hypotheses that we would find no difference between these groups, RSMEs that were

induced with psychedelic substances were rated as (a) being significantly more mystical, (b) having greater positive or existential impact (in terms of decreased fear of death and increased sense of purpose), and (c) increasing participants' spirituality more than did RSMEs triggered through other means.

The theoretical literature on RSMEs typically casts psychedelically induced experiences as artificial. Thus, such experiences are viewed as reminiscent of, but not equal to, the "real thing" (Walsh, 2003). Additionally, psychedelically triggered experiences have often been assumed to be mere "flashes in the pan" with little possibility for long-term positive outcomes (Zaehner, 1972). Of course, many psychedelic experiences do not have religious or spiritual import. However, the data from this study cast doubt on the assumption that RSMEs induced through psychedelic substances are any less genuine, positive, or spiritually significant. On the contrary, our participants rated psychedelic-triggered RSMEs as more intensely mystical, more positive in impact, and more related to spiritual and existential outcomes.

The greatest difference between psychedelic and nonpsychedelic experiences was in terms of mysticism, in this study, measured with a scale that emphasizes the degree of unity felt during the experience. It may be the case that mystical experiences occasioned by psychedelic substances are rated as more mystical because of the degree of visceral subjective and sensory changes that psychedelics reliably produce.

Psychedelic use has been associated with a variety of positive mood and behavioral outcomes, but it is essential to differentiate psychedelic substances from other drugs. Psychedelic use, unlike the use of other types of illicit substances, is associated with reduced psychological distress and suicidality (Hendricks, Thorne, Clark, Coombs, & Johnson, 2015). In their survey of over 190,000 U.S. respondents, Hendricks, Clark, Johnson, Fontaine, and Cropsey (2015) found that whereas lifetime use of other illicit drugs was largely associated with an increased likelihood of psychological distress and suicidality, lifetime psychedelic use was protective against these outcomes. Psychedelic use also predicts reduced recidivism among substance-involved offenders (Hendricks et al., 2014). Perhaps due to activity in the serotonergic system, psychedelics may also have antidepressant effects (Vollenweider & Kometer, 2010) and may be useful in the treatment of clinical depression (Anderson, 2012).

The finding that psychedelic-induced experiences were rated as more spiritual than nonpsychedelic experiences was particularly surprising as psychedelic substances represent an obviously physical, rather than supernatural, causal trigger of the experience. However, as previous work on the topic has discussed at length, the psychedelic substance is often not considered the "cause" but rather the "occasion" of the experience (Griffiths et al., 2006;

Hood, 2014; Huxley, 1958; Smith, 1964). That is, psychedelic substances may provide a potent context for a genuinely spiritual experience, leading to enhanced feelings of spirituality.

Responsible use, proper regulations, and a supportive or therapeutic milieu (including a safe and appropriate setting as well as well-informed expectations and mind-set) are essential caveats to any discussion of psychedelic substances. The current findings, which suggest that unsupervised psychedelic use can result in RSMEs with positive outcomes, are consistent with a growing body of data from laboratory settings (Griffiths et al., 2008; Grob et al., 2011). However, our findings address only positive subjective feelings and experiences stemming from psychedelic use; therefore, conclusions regarding benefits or risks associated with other outcomes, such as physical health or psychological distress, cannot be drawn.

### *Limitations*

The present study was limited in several ways. The sample was not representative of the population at large. There were an unusually high number of atheists in this sample and fewer Christians compared with the U.S. population. The online survey was hosted on a website that made clear that the survey sought to measure RSMEs. Therefore, there was likely a self-selection bias in favor of those who were already familiar with such experiences. Our findings should be examined in a population-level sample, and replicated through more covert means, such as being part of a larger survey.

All measures were self-reported in this cross-sectional correlational study. We cannot determine, for example, if those who used psychedelic substances had a higher tendency to experience mystical-type states. Interventional and prospective longitudinal studies are warranted to evaluate for causal effects and potential confounds.

An important limitation was the construction of the items meant to measure whether an RSME was triggered through the use of psychedelic substances or through other means. The first item allowed participants to indicate which substances that they had tried over the course of their life. The second item asked participants if that substance influenced their RSME. This structure allows for the possibility that we measured some RSMEs that were influenced by other substances besides psychedelics, such as antidepressants, sedatives, opiates, psychiatric medications, antianxiety medications, and “party drugs.” Nonpsychedelic substances appear to exert a very small or nonexistent effect on mystical experience. While these substances have not been associated with RSMEs in the extant literature, further research differentiating these substances is warranted.

There were important differences between the two comparison groups, suggesting potential confounds. The psychedelic group had lower levels of education, lower SES, and a higher percentage of atheists and male respondents than the nonpsychedelic group. In general, religious participants used psychedelics less often than did nonreligious participants. Additionally, religious individuals from monotheistic traditions tend to score lower on the mystical experience measure used in this study (Yaden et al., 2015). Finally, though we were able to control for gender, education, SES, and religious affiliation in the current analysis, future research should include these and other possible demographic covariates.

### **Implications**

The findings of this study have implications for both research and application. The results add to the growing literature that suggests that further studies on psychedelic substances and their potential therapeutic value are merited. Future research should leverage interventional studies and randomized control trials to examine how religious, spiritual, and secular interpretations moderate the impact of psychedelically induced RSMEs on outcomes of interest.

These data provide evidence that the use of psychedelic substances is associated with RSMEs that are similar to, and may, on average, surpass in mystical quality RSMEs induced through other means. However, other triggers of RSMEs should also receive additional empirical investigation. Meditation (Newberg & d'Aquili, 2000; Newberg et al., 2001), prayer (Newberg et al., 2015), rituals (Yaden, Iwry, Smith, & Pawelski, 2016), non-invasive brain stimulation (Yaden, Anderson, Mattar, & Newberg, 2015; Yaden & Newberg, 2014), and other experiences involving intense awe (Yaden, Iwry, Slack, et al., 2016) may all provide feasible methods to facilitate further study.

In addition to the clinical applications already discussed, supervised psychedelic sessions could be considered as a potential form of positive intervention (Rashid, 2009; Seligman, Steen, Park, & Peterson, 2005) given their impact on dimensions of well-being (i.e., sense of purpose). While psychedelic experiences likely have therapeutic benefits for clinical populations, they could also be tested in some contexts for their capacity to increase well-being beyond the treatment of specific pathologies.

### **Conclusion**

The perceived authenticity and benefit of RSMEs induced through use of psychedelic substances—as opposed to experiences that occur through other

means—has long been a theoretical concern. Over a century ago, when William James addressed his audience at the Gifford lecture series that would become *The Varieties of Religious Experience*, many in attendance dismissed asceticism (such as techniques of fasting, retreats, or intense focus) as legitimate religious practices. James went to some lengths to reverse this perspective, concluding his discussion with “you must be ready now to judge the religious life by its results exclusively, and I shall assume that the bugaboo of morbid origin will scandalize your piety no more” (James, 1902/1999, p. 25). Similarly, today, RSMEs occasioned by the use of psychedelic substances are dismissed by many as illegitimate—that is, the bugaboo of morbid origin continues to scandalize. The results of the preset study, however, suggest that psychedelic experiences can equal or even surpass the intensity and impact of experiences derived through nonpsychedelic means.

### Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

### Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

### References

- Aghajanian, G. K., & Marek, G. J. (1999). Serotonin and hallucinogens. *Neuropsychopharmacology*, *21*, 16-23.
- Allegro, J. M. (1971). *The sacred mushroom and the cross*. New York, NY: Bantam.
- Anderson, B. T. (2012). Ayahuasca as antidepressant? Psychedelics and styles of reasoning in psychiatry. *Anthropology of Consciousness*, *23*, 44-59.
- Baumeister, R. F., & Placidi, K. S. (1983). A social history and analysis of the LSD controversy. *Journal of Humanistic Psychology*, *23*, 25-58.
- Beauregard, M. (2011). Neuroscience and spirituality—Findings and consequences. In H. Walach, S. Schmidt & W. B. Jonas (Eds.), *Neuroscience, consciousness and spirituality* (pp. 57-73). Dordrecht, Netherlands: Springer.
- Doblin, R. (1991). Pahnke's Good Friday experiment: A long-term follow-up and methodological critique. *Journal of Transpersonal Psychology*, *23*, 1-28.
- Ebersole, B. J., Visiers, I., Weinstein, H., & Sealfon, S. C. (2003). Molecular basis of partial agonism: Orientation of indoleamine ligands in the binding pocket of the human serotonin 5-HT<sub>2A</sub> receptor determines relative efficacy. *Molecular Pharmacology*, *63*, 36-43. doi:10.1124/mol.63.1.36
- Ellens, J. H. (2014). *Seeking the sacred with psychoactive substances: Chemical paths to spirituality and to God*. Santa Barbara, CA: Praeger.

- Ellens, J. H., & Roberts, T. J. (2015). *A psychedelic policy quagmire: Health, law, freedom, and society*. Westport, CT: Praeger.
- Forman, R. K. C. (1999). *Mysticism, mind, consciousness*. Albany: State University of New York Press.
- Griffiths, R. R., Richards, W. A., Johnson, M. W., McCann, U. D., & Jesse, R. (2008). Mystical-type experiences occasioned by psilocybin mediate the attribution of personal meaning and spiritual significance 14 months later. *Journal of Psychopharmacology*, *22*, 621-632.
- Griffiths, R. R., Richards, W. A., McCann, U., & Jesse, R. (2006). Psilocybin can occasion mystical-type experiences having substantial and sustained personal meaning and spiritual significance. *Psychopharmacology*, *187*, 268-283. doi:10.1007/s00213-006-0457-5
- Grob, C. S. (Ed.). (2002). *Hallucinogens: A reader*. New York, NY: Tarcher/Putnam.
- Grob, C. S., Danforth, A. L., Chopra, G. S., Hagerty, M., McKay, C. R., Halberstadt, A. L., & Greer, G. R. (2011). Pilot study of psilocybin treatment for anxiety in patients with advanced-stage cancer. *Archives of General Psychiatry*, *68*, 71-78. doi:10.1001/archgenpsychiatry.2010.116
- Hendricks, P. S., Clark, C. B., Johnson, M. W., Fontaine, K. R., & Cropsey, K. L. (2014). Hallucinogen use predicts reduced recidivism among substance-involved offenders under community corrections supervision. *Journal of Psychopharmacology*, *28*, 62-66.
- Hendricks, P. S., Thorne, C. B., Clark, C. B., Coombs, D. W., & Johnson, M. W. (2015). Classic psychedelic use is associated with reduced psychological distress and suicidality in the United States adult population. *Journal of Psychopharmacology*, *29*, 280-288.
- Hillman, D. C. A. (2008). *The chemical muse: Drug use and the roots of Western civilization*. London, England: Macmillan.
- Hood, R. W., Jr. (1975). The construction and preliminary validation of a measure of reported mystical experience. *Journal for the Scientific Study of Religion*, *14*, 29-41.
- Hood, R. W., Jr. (2014). Chemically assisted mysticism and the question of veridicality. In J. H. Ellens (Ed.), *Seeking the sacred with psychoactive substances: Chemical paths to spirituality and God. Volume I: History and practices* (pp. 395-410). Santa Barbara, CA: Praeger.
- Hood, R. W., Jr, Ghorbani, N., Watson, P. J., Ghramaleki, A. F., Bing, M. N., Davison, H. K., ... Williamson, W. P. (2001). Dimensions of the Mysticism Scale: Confirming the Three-Factor Structure in the United States and Iran. *Journal for the Scientific Study of Religion*, *40*(4), 691-705.
- Hood, R. W., Jr., Hill, P. C., & Spilka, B. (2009). *The psychology of religion: An empirical approach*. New York, NY: Guilford Press.
- Hood, R. W., Jr., & Morris, R. J. (1983). Toward a theory of death transcendence. *Journal for the Scientific Study of Religion*, *22*, 353-365.
- Huxley, A. (1958). *Drugs that shape men's minds*. Philadelphia, PA: Curtis.
- Jaffe, J. H. (1990). Drug addiction and drug abuse. In A. G. Gilman, T. W. Rall, A. S. Nies & P. Taylor (Eds.), *The pharmacological basis of therapeutics* (pp. 522-573). New York, NY: Pergamon Press.

- James, W. (1999). *The varieties of religious experience*. New York, NY: Modern Library. (Original work published 1902)
- Kellenberger, J. (1978). Mysticism and drugs. *Religious Studies*, *14*, 175-191.
- Longenecker, R. N. (1997). *The road from Damascus: The impact of Paul's conversion on his life, thought, and ministry*. Grand Rapids, MI: Wm. B. Eerdmans.
- Lukoff, D., & Lu, F. G. (1988). Transpersonal psychology research review topic: Mystical experience. *Journal of Transpersonal Psychology*, *20*, 161-184.
- MacLean, K. A., Johnson, M. W., & Griffiths, R. R. (2011). Mystical experiences occasioned by the hallucinogen psilocybin lead to increases in the personality domain of openness. *Journal of Psychopharmacology*, *25*, 1453-1461.
- Masters, R. E. L., & Houston, J. (1966). *The varieties of psychedelic experience*. New York, NY: Holt, Rinehart and Winston.
- McGlothlin, W. H., & Arnold, D. O. (1971). LSD revisited: A ten-year follow-up of medical LSD use. *Archives of General Psychiatry*, *24*, 35-49.
- Nelson, D. L., Lucaites, V. L., Wainscott, D. B., & Glennon, R. A. (1999). Comparisons of hallucinogenic phenylisopropylamine binding affinities at cloned human 5-HT<sub>2A</sub>, 5-HT<sub>2B</sub> and 5-HT<sub>2C</sub> receptors. *Naunyn-Schmiedeberg's Archives of Pharmacology*, *359*, 1-6. doi:10.1007/PL00005315
- Newberg, A., Alavi, A., Baime, M., Pourdehnad, M., Santanna, J., & d'Aquili, E. (2001). The measurement of regional cerebral blood flow during the complex cognitive task of meditation: A preliminary SPECT study. *Psychiatry Research: Neuroimaging*, *106*, 113-122. doi:10.1016/S0925-4927(01)00074-9
- Newberg, A. B., & d'Aquili, E. G. (2000). The neuropsychology of religious and spiritual experience. *Journal of Consciousness Studies*, *7*, 251-266.
- Newberg, A. B., Wintering, N. A., Yaden, D. B., Waldman, M. R., Reddin, J., & Alavi, A. (2015). A case series study of the neurophysiological effects of altered states of mind during intense Islamic prayer. *Journal of Physiology-Paris*. Advance online publication. doi:10.1016/j.jphysparis.2015.08.001
- Nichols, D. E. (2004). Hallucinogens. *Pharmacology & Therapeutics*, *101*, 131-181. doi:10.1016/j.pharmthera.2003.11.002
- O'Brien, C. P. (1996). Drug addiction and drug abuse. In J. G. Hardman, L. E. Limbird & A. G. Gilman (Eds.), *The pharmacological basis of therapeutics* (10th ed., pp. 621-642). New York, NY: McGraw-Hill.
- Pahnke, W. N. (1966). Drugs and mysticism. *International Journal of Parapsychology*, *8*, 295-313.
- Pew Research Center. (2008). U.S. Religious Landscape Survey. Retrieved from <http://religions.pewforum.org/pdf/report-religious-landscape-study-full.pdf>
- Rashid, T. (2009). Positive interventions in clinical practice. *Journal of Clinical Psychology*, *65*, 461-466.
- Redmond, G. (2004). Are psychedelics the true Dharma? A review essay of Zig Zag Zen: Buddhism and psychedelics. *Journal of Buddhist Ethics*, *11*, 78-97.
- Ruck, C. A., Bigwood, J., Staples, D., Ott, J., & Wasson, R. G. (1979). Entheogens. *Journal of Psychoactive Drugs*, *11*, 145-146.
- Scruggs, J. L., Patel, S., Bubser, M., & Deutch, A. Y. (2000). DOI-induced activation of the cortex: Dependence on 5-HT<sub>2A</sub> heteroceptors on thalamocortical glutamatergic neurons. *Journal of Neuroscience*, *20*, 8846-8852.

- Seligman, M. E., Steen, T. A., Park, N., & Peterson, C. (2005). Positive psychology progress: Empirical validation of interventions. *American Psychologist*, *60*, 410-421.
- Smith, H. (1964). Do drugs have religious import? *Journal of Philosophy*, *18*, 517-530.
- Smith, H., Grob, C., Jesse, R., Bravo, G., Agar, A., & Walsh, R. (2004). Do drugs have religious import? A 40-year retrospective. *Journal of Humanistic Psychology*, *44*, 120-140.
- Stace, W. T. (1960). *Mysticism and philosophy*. Philadelphia, PA: J. B. Lippincott.
- Turton, S., Nutt, D. J., & Carhart-Harris, R. L. (2014). A qualitative report on the subjective experience of intravenous psilocybin administered in an fMRI environment. *Current Drug Abuse Reviews*, *7*, 117-127.
- Vollenweider, F. X., & Kometer, M. (2010). The neurobiology of psychedelic drugs: Implications for the treatment of mood disorders. *Nature Reviews Neuroscience*, *11*, 642-651.
- Walsh, R. (2003). Entheogens: True or false. *International Journal of Transpersonal Studies*, *22*, 1-6.
- Wulff, D. M. (1991). *Psychology of religion: Classic and contemporary views*. New York, NY: John Wiley.
- Yaden, D. B., Anderson, D. E., Mattar, M. G., & Newberg, A. B. (2015). Psychoactive stimulation and psychoactive substances: Conceptual and ethical considerations. In J. H. Ellens & T. B. Roberts (Eds.), *The psychedelic policy quagmire: Health, law, freedom, and society* (pp. 219-236). Santa Barbara, CA: Praeger.
- Yaden, D. B., Eichstaedt, J. C., Schwartz, H. A., Kern, M. L., Le Nguyen, K. D., Wintering, N., . . . Newberg, A. B. (2015). The language of ineffability: Linguistic analysis of mystical experiences. *Psychology of Religion and Spirituality*, *8*, 244-252.
- Yaden, D. B., Iwry, J., & Newberg, A. B. (2016). Neurochemistry and religion: Surveying the field. In J. Kripal, A. DeConick & T. Pinn (Eds.), *MacMillan interdisciplinary handbooks on religion: The brain, cognition, and culture* (pp. 277-299). London, England: Macmillan.
- Yaden, D. B., Iwry, J., Slack, K. J., Eichstaedt, J. C., Zhao, Y., Vaillant, G. E., & Newberg, A. B. (2016). The overview effect: Awe and self-transcendent experience in space flight. *Psychology of Consciousness: Theory, Research, and Practice*, *3*, 1-11.
- Yaden, D. B., Iwry, J., Smith, E., & Pawelski, J. O. (2016). Secularism and the science of well-being. In P. Zuckerman & J. R. Shook (Eds.), *The Oxford handbook of secularism* (pp. 554-570). Oxford, England: Oxford University Press.
- Yaden, D. B., McCall, T. D., & Ellens, J. H. (2015). *Being called: Scientific, secular, and sacred perspectives*. Santa Barbara, CA: Praeger.
- Yaden, D. B., & Newberg, A. B. (2014). New means for perennial ends: Psychoactive stimulation & self-transcendent experience. In J. H. Ellens (Ed.), *Seeking the sacred with psychoactive substances* (pp. 303-324). Santa Barbara, CA: Praeger.
- Zachner, R. C. (1972). *Drugs, mysticism and make-believe*. London, England: William Collins.