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Shame, guilt and psychedelic experience: Results from a prospective, longitudinal survey of real-world psilocybin use

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Abstract

Introduction: The classic psychedelic psilocybin has attracted special interest across clinical and non-clinical settings as a potential tool for mental health. However, despite increasing attention to challenging psychedelic experiences, few studies have explored the relevance of emotionally painful, shame-related processes with psychedelic use.

Methods: This prospective, longitudinal study involved sequential, automated, web-based surveys that collected data from 679 adults planning to use psilocybin in naturalistic settings at timepoints before and after psilocybin use. State and trait shame and feelings of guilt were collected using validated measures and assessed alongside other measurements of psychological health.

Results: Participants were primarily college-educated, White individuals residing in the United States with a prior history of psilocybin use; mean age = 38.9-41 years. Most users (89.7%) described their experience of psilocybin as positive, though acute feelings of shame or guilt were commonly reported (i.e., 68.2% of users) and difficult to predict. Ratings of participant ability to constructively work through these feelings predicted wellbeing 2-4 weeks after psilocybin use. Psilocybin on average produced a small but significant decrease in trait shame that was maintained 2-3 months after use (Cohen's $d_z = 0.37$; adjusted $p < 0.001$). Trait shame increased in a notable minority (29.8%) of participants.

Discussion: The experience of self-conscious emotions with psychedelics has been explored minimally, but further study in this area may have far-reaching implications for psychological health. The activation of shame-related experiences with psychedelics may pose a unique and context-dependent learning condition for both therapeutic and detrimental forms of shame-related memory reconsolidation.

Introduction

"The Tibetans call our scary visions 'the wrathful deities.' The wrathful deities are the other side of the gods." – Nina Graboi (1, p. 226n12*)*

Classic psychedelics (e.g., psilocybin, lysergic acid diethylamide [LSD]) induce profound changes in affect, perception, cognition, and other subjective processes that individuals frequently interpret as meaningful experiences. It has been observed since the early era of psychedelic research in the 1950-1960s, and well before then in the ritualized contexts of indigenous cultures (2–4), that the subjective quality of these drug journeys can range from extremely positive (e.g., "peak") to psychologically challenging experiences marked by various forms of emotional distress (5–7). The trajectory of a single psychedelic experience may also be quite intricate, during which periods of ease and struggle can both occur (8).

A historical review of challenging psychedelic experiences, sometimes referred to colloquially as "bad trips," suggests that "good" and "bad" drug reactions became increasingly dichotomized in the mid-1960s, shaped by the American War on Drugs, its depiction of psychedelics as inherently destructive, and the regulatory agenda of prohibition (9). Contributing to this divide, certain advocates for psychedelic use proposed that negative drug experiences might be best understood as a failure of "set and setting" – the largely modifiable context within which drug use occurred – rather than something inherent to the drug itself (10). Others focused on characterological vulnerability, some even implying a hierarchy of those who could or could not handle the psychedelic experience, as posed by Ken Kesey's famous question, "Can you pass the acid test? (11)" Lost in these views were more nuanced possibilities: for example, that the course of a drug experience may be unpredictable, that difficult affective states might be typical features of psychedelic use, and that even hellish journeys could be seen as constructive by users (6,11–13).

One common experience with psychedelics involves challenging forms of self-realization and the occurrence of painful emotions that accompany this awareness (2). Feelings like fear, grief, and isolation have been well characterized in these and other psychedelic narratives (2,14), but limited research has examined shame associated with psychedelic use. Shame is conceptualized as a self-focused emotion, and has been described as one of the most agonizing, universal, and simultaneously ignored human emotions (15). Furthermore, while the experience of shame can promote healthy individual and social development, as in the formation of one's moral identity (16), it has also been linked to numerous psychological problems including depression, anxiety, posttraumatic stress disorder, personality disorders, hazardous substance use, disordered eating and self-injurious behavior, especially when shame is chronic and internalized (16–18).

Though the terms are often used interchangeably, guilt is sometimes distinguished from shame as a unique self-conscious emotion based upon different psychological appraisals that can lead to different behaviors (19–21). For example, shame is defined by the aversive experience of oneself as being intrinsically defective or socially undesirable, and a desire to isolate, escape, or hide these aspects of self from others. Guilt, on the other hand, is defined by the appraisal of having thought or done something that violates a moral standard and is often accompanied by a motivation to undo or mitigate this wrongdoing.

Despite this conceptual difference, these two emotional states can occur together (e.g., guilt triggering a sense of shame), and as such, many scholars have focused on studying both in

terms of their roles in psychological health and dysfunction. It is also worth noting here that a distinction is made in the psychological research literature between state-shame, which refers to acute, context-specific experiences of shame, and trait-shame, which can be thought of as a more stable construct, related to one's global sense of self and predisposition toward feeling shame. For an in-depth examination of these ideas, including theoretical models and synthesis of the research literature, please see Candea et al. (19).

In a mixed-methods analysis of 608 individuals reporting extended difficulties attributed to psychedelic use, Evans and colleagues (22) found that 58% of participants reported struggling with their perception of themselves as a result of their experiences. In open-ended narratives, feelings of shame and guilt appeared as a recurring and unprompted subtheme in 7% of this sample population. These numbers are possibly conservative estimates, given that shame-related feelings are often underreported (23).

Of interest to the study presented here, is the quantitative examination of state-shame and guilt as challenging features of the psychedelic experience and the sensitivity of trait-shame to psilocybin specifically, given the drug's prevalence among psychedelic users, its substantial development as a potential psychiatric intervention, and limited research in this area to date. The current investigation was part of a larger longitudinal online survey study that was conducted to gather prospective data on naturalistic psilocybin use (24). Our specific aims were to: 1) characterize acute shame and guilt elicited during psilocybin use and explore general predictors of these experiences; 2) assess acute shame and guilt during psilocybin use as potential predictors of long-term wellbeing; and 3) examine whether psilocybin use impacts trait shame over time.

Methods

Participants

This prospective, longitudinal survey study was approved by the Johns Hopkins Medicine Institutional Review Board and enrolled English-speaking adults (≥ 18 years old) who were planning to take psilocybin outside of a clinical research setting. The sample population and retention across survey timepoints has been described in detail elsewhere (24). Briefly, participants were predominantly residing in the United States (72.6-83.1%), White (80.7-86.5%), male (53.5-59.1%), college educated (53.8-65.8%), married or in a committed relationship (55.3-61.8%), and had previous experience using psychedelics (85.4-86.9%). The mean age was 38.9-41 years old. Anxiety and mood disorders were prevalent at rates of 26.2-34.3% and 26.2-29.7%, respectively. Participants typically initiated psilocybin use with dried mushrooms (mean dose = 3.1 grams) and had specific motivations for their planned use of psilocybin, especially involving self-exploration (81.1%) and mental health (71.3%), but reported diverse settings for use (e.g., alone vs with friend/sitter, home vs outdoors, etc.).

Procedures

General procedures have been detailed elsewhere (24). The study was comprised of 6 sequential web-based surveys that were automated through Qualtrics XM secure online platform. Recruitment advertisements were shared online through social media and via word of mouth. Following an initial informed consent and demographics survey, participants completed 5

surveys with timing relative to the reference psilocybin experience: 2 weeks before, 1 day before, 1 to 3 days after, 2-4 weeks after, and 2-3 months after. Responses were collected from July 22, 2020 to July 14, 2022. Items specifically related to shame and guilt were approved and added when data collection was already underway, resulting in a smaller sample size than that reported for the primary analysis.

Measures assessed for this study

Baseline measurements (2 weeks prior to psilocybin use): Participants completed demographic information, the 8-item External and Internal Shame Scale assessing self-reported trait (general) shame (EISS; scored 0–32, with higher scores indicating greater trait shame) (16), the 20-item Short State-Trait Anxiety Inventory assessing state (current) and trait anxiety (STAI-State/STAI-Trait; each subscale scored 10–40, with higher scores indicating greater anxiety) (25,26), a modified version of the 20-item Beck Depression Inventory excluding an item on current suicidality due to lack of ability to respond adequately to imminent risk (BDI-II) (27), the revised 14-item Adverse Childhood Experience scale (ACE) (28), and the 12-item Cognitive Flexibility Scale assessing self-reported ability to think and behave adaptively (CFS) (29).

Measurements 1 day before psilocybin use: Participants were asked whether a sitter/guide would be present during psilocybin use and were also administered the 10-item State of Surrender scale to assess level of psychological surrender or preoccupation before the session (SOS) (30).

Measurements 1 to 3 days after psilocybin use: Participants completed the following Likert item about the experience: 1) Do you believe the experience was ultimately negative or positive? (scored as 1-7 Likert scale with 1 = Extremely positive, 4 = Neither positive nor negative, and 7 = Extremely negative). Participants also completed the 30-item Mystical Experience Questionnaire (MEQ; total scores scaled 0–5, with higher scores indicating greater degree of mystical-type experience) (5), the 26-item Challenging Experience Questionnaire (CEQ; total scores scaled 0–1, with higher scores indicating greater degree of mystical-type experience) (14), and a version of the 10-item State Shame and Guilt Scale measuring state shame and guilt adapted for acute psilocybin administration (SSGS-Shame/SSGS-Guilt; each subscale scored 5–25, with higher scores indicating greater psilocybin-related experiences of shame and guilt, respectively) (31,32). Individuals who reported any experiences of shame or guilt during psilocybin use (i.e., SSGS-Shame or SSGS-Guilt > 5) were prompted to respond to three additional items: 1) Approximately how long did these feelings of shame or guilt last? (categorical choices), 2) How personally difficult or challenging were these feelings? (scored as 1-5 Likert scale), and 3) Did you find that you were able to work through these feelings during the session in a constructive way? (scored as 1-5 Likert scale). To facilitate the present analysis, the final two item variables were classified as “shame/guilt difficulty” and “shame/guilt processing.”

Measurements 2 to 4 weeks after psilocybin use (primary endpoint): Participants completed the EISS, and the following Likert item assessing long-term changes to well-being: 1) Do you believe that psilocybin experience and your contemplation of that experience has led to long-term and persisting changes in your current sense of personal well-being or life satisfaction?

(scored as 1-7 Likert scale). To facilitate analysis, this Likert variable was classified as "wellbeing."

Measurements 2 to 3 months after psilocybin use: Participants completed the EISS again.

Analytic Plan

For Aim 1, characterizing acute shame and guilt elicited by psilocybin use (Aim 1a) and general predictors of these experiences (Aim 1b), descriptive statistics were used along with two applied multivariable regression models for all individuals with SSGS data (n = 679). Purposeful assessment of bivariate relationships with SSGS-Shame or SSGS-Guilt score, respectively, was conducted using least-squares regression and the following predictors: age, gender, race (White or non-White), education, marital status, religious belief system (non-believer, agnostic, or believer), baseline trait shame (global EISS), STAI-State, STAI-Trait, BDI-II, ACE, CFS, SOS before, and the presence of a sitter during psilocybin use. These demographic variables were selected to assess for potential confounders, along with measurements of psychological vulnerability and support during dosing that were hypothesized to overlap with trait shame and be relevant to state shame or guilt with psilocybin. P-values for categorical demographic variables (gender, race, education, marital status, religious belief system) were calculated using Graphpad Prism reference values based on the most frequent levels for each variable. Per Hosmer et al. (33), the final regression models for SSGS-Shame and SSGS-Guilt included covariates with p-value < 0.2, using a variance inflation factor (VIF) of 4 and tolerance of 0.25 to screen for multicollinearity. Model results for individual regression parameters were reported as beta regression coefficients (β) and p-values. Pearson's correlation coefficients were conducted post-hoc to illustrate the relationships between trait shame and other psychometric covariates (i.e., STAI-State, STAI-Trait, BDI-II, ACE, and CFS), using the Šidák correction for five comparisons.

For Aim 2, assessing acute shame and guilt during psilocybin use as potential predictors of long-term wellbeing, multiple linear regression was used to measure the relationship between wellbeing 2 to 4 weeks after psilocybin use and the following covariates among individuals with SSGS data (n = 679): age, baseline STAI-Trait, acute shame during psilocybin (SSGS-Shame), acute guilt during psilocybin (SSGS-Guilt), shame/guilt difficulty, shame/guilt processing, CEQ, and MEQ. The baseline variables of age and baseline STAI-Trait were informed by Aim 1 findings and selected to account for confounding, along with measurements of the acute psilocybin experience that were hypothesized to be relevant to long-term wellbeing. To isolate the effects of processing shame or guilt, follow-up regressions were conducted in a subsample of individuals who reported only experiences of shame (n = 112) or guilt (n = 85), using the same covariates but only the relevant SSGS measure. Model results for individual regression parameters were reported as beta regression coefficients (β) and p-values.

For Aim 3, examining whether psilocybin use impacts trait shame over time, a repeated-measures one-way ANOVA as implemented in GraphPad Prism was used for individuals with global EISS scores at baseline (T0), 2 to 4 weeks after psilocybin use (T1), and 2 to 3 months after psilocybin use (T2) (n = 215 for this complete sample). Geisser-Greenhouse corrections were used as sphericity was not assumed, and the Tukey method was used for post-hoc testing of significant comparisons.

Results

Characterizing experiences of shame/guilt with psilocybin (*Aim 1a*)

Out of 679 participants with SSGS data, 463 individuals (68.2%) reported either shame or guilt during psilocybin use (i.e., SSGS-Shame or SSGS-Guilt > 5), including 378 individuals reporting experiences of shame (55.7%) and 352 individuals reporting experiences of guilt (51.8%). For 80 participants (11.8%), a feeling related to shame or guilt was rated at its maximal value. The mean duration of these experiences fell between 10–60 minutes categorically (range: "<10 minutes" to "entire session"). See Table 1 for SSGS individual item data. For context, participant experiences with psilocybin were largely rated as positive (89.7%), with a smaller proportion of individuals rating the experience as neither positive nor negative (6.5%), or negative (3.8%).

SHAME			**GUILT**		
SSGS-S Item	N endorsing (% of total)	Mean score if endorsed	SSGS-G Item	N endorsing (% of total)	Mean score if endorsed
I felt small	300 (44.2%)	2.87	I felt tension about something I have done	255 (37.6%)	2.98
I felt like I was a bad person	154 (22.7%)	2.72	I felt remorse, regret	215 (31.7%)	3.01
I felt worthless, powerless	116 (17.1%)	2.78	I felt like apologizing, confessing	201 (29.6%)	3.14
I wanted to sink into the floor and disappear	104 (15.3%)	2.89	I felt bad about something I have done	198 (29.2%)	2.8
I felt humiliated, disgraced	78 (11.5%)	2.8	I could not stop thinking about something bad I have done	116 (17.1%)	2.75

TABLE 1 | State shame and guilt scale (SSGS) individual item data regarding psilocybin experience. *Individual item scale:* 1 = Did not feel this way at all; 5 = Felt this way very strongly. *For individuals with shame or guilt during psilocybin:* SSGS-Shame subscale range = 6–25, mean = 8.6, SD = 3.1; SSGS-Guilt subscale range = 6–25, mean = 10.5, SD = 4.8.

Predicting experiences of shame/guilt with psilocybin (*Aim 1b*)

As a way of illustrating the relationships between trait shame and baseline psychometric covariates, Pearson's correlations indicated that trait shame was significantly correlated with STAI-State ($r = 0.56$, adjusted $p < 0.001$), STAI-Trait ($r = 0.77$, adjusted $p < 0.001$), BDI-II ($r = 0.70$, adjusted $p < 0.001$), ACE ($r = 0.31$, adjusted $p < 0.001$), and CFS ($r = -0.55$, adjusted $p < 0.001$). However, as a predictor of experiences with psilocybin, baseline trait shame did not relate to acute shame ($\beta = 0.005$, $p = 0.90$) or guilt ($\beta = -0.004$, $p = 0.94$) in the model-building stage.

The final regression model for SSGS-Shame included the following covariates with p-value < 0.2: age, race, baseline STAI-Trait, and baseline CFS. In this model, only age ($\beta = -0.04$, $p < 0.001$) and baseline STAI-Trait ($\beta = 0.08$, $p < 0.001$) significantly predicted acute shame experiences with psilocybin, wherein younger age and higher trait anxiety predicted higher shame scores. The final regression model for SSGS-Guilt included the following covariates with p-value < 0.2: age, SOS before dosing, and presence of a sitter. In this model, only age ($\beta = -0.05$, $p < 0.001$) significantly predicted acute guilt experiences with psilocybin, wherein younger age predicted higher guilt scores.

Relationship between experiences of shame/guilt during psilocybin and wellbeing after 2 to 4 weeks (*Aim 2*)

Higher MEQ (β = 0.39, p < 0.001) and shame/guilt processing (β = 0.16, p = 0.01) during psilocybin significantly predicted wellbeing 2-4 weeks later. However, acute shame (β = 0.02, p = 0.57), acute guilt (β = -0.02, p = 0.32), shame/guilt difficulty (β = 0.04, p = 0.55), and CEQ (β = 0.03, p = 0.96) did not. Mean scores for these and other psychometric data organized by experience of shame/guilt during psilocybin use (+/-) and level of processing (1-5) are indicated in Table 2. MEQ and wellbeing scores were highest numerically for individuals who were able to work through experiences of shame or guilt very constructively (Level 5), even when compared to respondents without experiences of shame or guilt during psilocybin use (see Figure 1).

		Timepoint of measurement relative to psilocybin use												
		≥ 2 weeks prior						1-3 days prior	1-3 days after					2-4 weeks after
	Level (%)*	**Age**	**EISS**	**STAI-T**	**BDI**	**ACE**	**CFS**	**SOS**	**MEQ**	**CEQ**	**S-S**	**S-G**	**S/G-Difficulty**	**Wellbeing****
+shame/guilt	1 (2.8%)	44.1	18.8	26.5	22.8	5.58	53.2	25.7	1.68	0.28	9.26	10.1	2.79	4.62
	2 (3.1%)	38.8	17.0	26.7	21.5	5.89	52.6	27.4	1.61	0.18	8.62	10.0	2.05	5.00
	3 (9.7%)	41.7	15.2	24.3	17.6	5.03	54.4	28.2	2.09	0.22	8.48	9.29	2.11	5.48
	4 (13.1%)	39.3	15.3	23.9	18.9	4.58	54.1	27.8	2.47	0.20	8.28	10.2	2.37	5.53
	5 (33.9%)	41.0	13.4	21.3	14.9	4.95	58.6	29.2	3.09	0.17	7.66	8.56	1.87	6.01
–shame/guilt	N/A (31.8%)	45.8	12.5	21.1	14.5	4.78	58.3	28.9	1.99	0.05	5.00	5.00	N/A	5.51

TABLE 2 | Mean scores for shame/guilt sample organized by experience of shame or guilt during psilocybin use (+/-) and level of processing (1-5). **Level scale:* 1 = Not able to work through constructively; 5 = Very able to work through constructively (note level data was missing for 38 individuals with + shame/guilt, or 5.6% of total sample); N/A = no processing as no shame or guilt experiences with psilocybin were reported. ***Wellbeing scale:* 4 = No change; 5 = Slight positive that I consider desirable; 6 = Moderate positive change that I consider desirable; 7 = Strong positive change that I consider desirable.

Abbreviations: SSGS = State Shame and Guilt Scale; EISS = External and Internal Shame Scale; STAI-T = Short State-Trait Anxiety Inventory (trait); BDI = Beck Depression Inventory-II; ACE = Adverse Childhood Experience scale (expanded); CFS = Cognitive Flexibility Scale; SOS = State of Surrender; MEQ = Mystical Experience Questionnaire; CEQ = Challenging Experience Questionnaire; S-S = State Shame and Guilt Scale (shame subscale); S-G = State Shame and Guilt Scale (guilt subscale); S/G-Difficulty = shame or guilt difficulty.

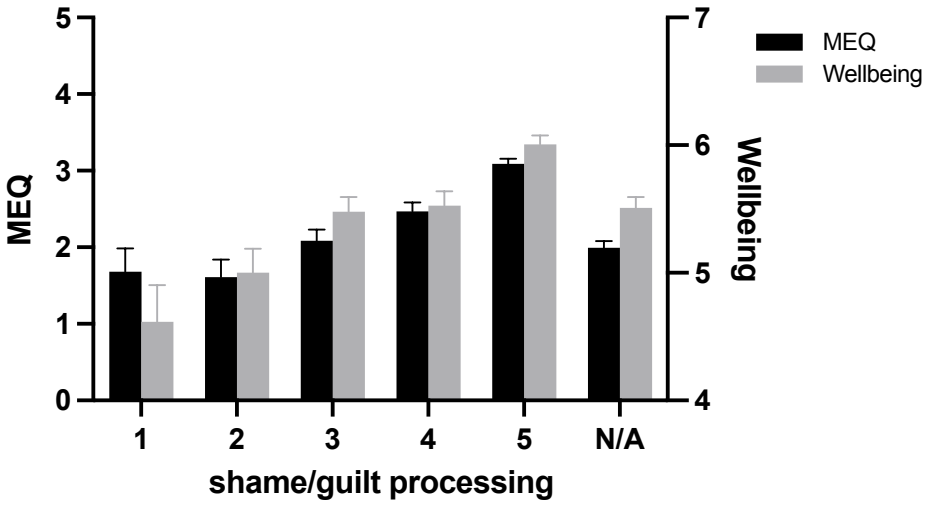

FIGURE 1 | Mean mystical experience questionnaire (MEQ) and wellbeing scores by level of shame/guilt processing during psilocybin use. Error bars represent standard error of the mean (SEM). *Shame/guilt processing scale:* 1 = Not able to work through constructively; 5 = Very able to work through constructively; N/A = No processing as no shame or guilt experiences with psilocybin were reported. *MEQ scale:* Total scores scaled 0–5, with higher scores indicating greater degree of mystical-type experience. *Wellbeing scale:* 4 = No change; 5 = Slight positive that I consider desirable; 6 = Moderate positive change that I consider desirable; 7 = Strong positive change that I consider desirable. *Pearson's correlation coefficients for:* MEQ and wellbeing ($r = 0.53$, $p < 0.001$); shame/guilt processing and MEQ ($r = 0.41$, $p < 0.001$); shame/guilt processing and wellbeing ($r = 0.33$, $p < 0.001$).

To isolate the effect of processing either shame or guilt, follow-up analyses were conducted in 112 individuals who reported experiences of shame without guilt (16.5%; SSGS-Shame range = 6–11, mean = 7.0, SD = 1.2) and 85 individuals who reported experiences of guilt without shame (12.5%; SSGS-Guilt range = 6–20, mean = 8.1, SD = 2.6). For individuals with experiences of shame only, higher MEQ ($\beta = 0.33$, $p = 0.004$) and shame processing ($\beta = 0.26$, $p = 0.04$) predicted long-term wellbeing, as before. For individuals with experiences of guilt only, long-term wellbeing was likewise predicted by higher MEQ ($\beta = 0.44$, $p < 0.001$) and guilt processing ($\beta = 0.29$, $p = 0.01$).

Effect of psilocybin use on trait shame over time (*Aim 3*)

For 215 participants with complete EISS data, the repeated measures one-way ANOVA demonstrated a significant effect of psilocybin on trait shame [$F(1.96, 418.4) = 18.18$, $p < 0.001$]. Post-hoc testing revealed a significant decrease in EISS score after 2 to 4 weeks (Cohen's $d_z = 0.31$; adjusted $p < 0.001$) and 2 to 3 months (Cohen's $d_z = 0.37$; adjusted $p < 0.001$) compared with baseline. There was not a significant difference in EISS score between the two post-psilocybin follow-up points (adjusted $p = 0.36$). These data are presented in Figure 2. On a participant-level, most individuals (56.7%) demonstrated improvements in EISS score at 2 to 4 weeks after psilocybin use; however, trait shame remained the same in 29 participants (13.5%) and increased in 64 participants (29.8%).

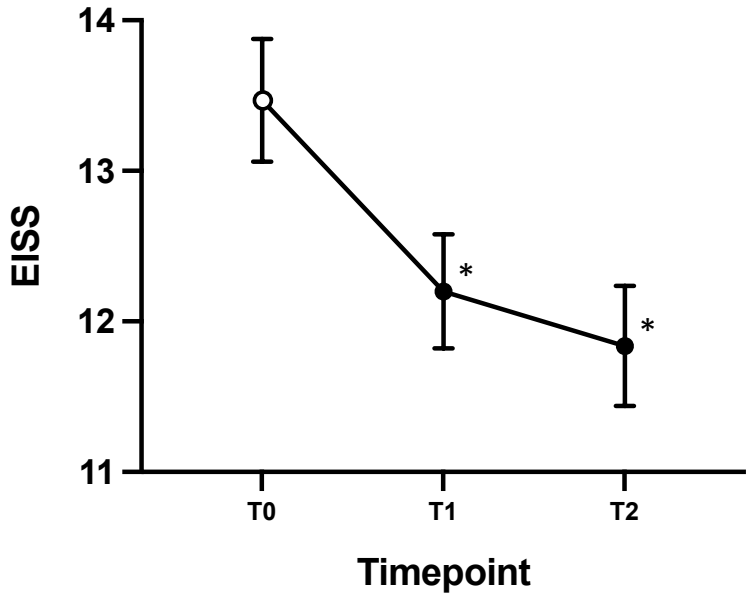

FIGURE 2 | Mean global external and internal shame scale (EISS/trait shame) scores with psilocybin over time. Error bars represent standard error of the mean (SEM). T0 = baseline before psilocybin use (open circle); T1 = 2 to 4 weeks after psilocybin; T2 = 2 to 3 months after psilocybin (closed circles). *Indicates significant difference from baseline per ANOVA; T1 and T2 were not significantly different; Cohen's d_z effect sizes for T0-T1 = 0.31; for T0-T2 = 0.37.

Discussion

With swiftly growing, and often polarized, interest in outcomes related to psychedelic use, there is an urgent need for integrated perspectives that account for both the psychological risk and reward unique to drugs like psilocybin. Recent work has explored the spectrum of challenging psychedelic experiences with care (2,6,8,12,14,22,34–46); however, the study of shame and guilt with psychedelics has progressed minimally, despite their far-reaching implications for psychological health.

In this prospective, longitudinal survey study of psilocybin use in naturalistic settings, we discovered that acute experiences of shame or guilt occur commonly with psilocybin, are generally mild in nature but also range to more severe, and are predicted by younger age (for both shame and guilt) and higher trait anxiety (for shame only). In this sample, approximately two-thirds reported some degree of guilt or shame during psilocybin use. These findings contrast with theories that psychedelics reduce self-focused attention acutely, and that this is a mechanism by which psychedelics exert their lasting effects (47,48).

For reference, state-shame/guilt scores during psilocybin use in this sample were higher than baseline means for healthy volunteers (49) and consistent with means observed in shame-activating experimental paradigms (50), supporting the claim that state-shame/guilt can be uniquely activated with psilocybin. While the frequency and intensity of challenging experiences are expected to be higher in naturalistic than clinical research settings (6), it is worth considering

that for many people feelings of shame and guilt may be inevitable with psilocybin, given the kinds of personal expectation and self-evaluation that routinely accompany psychedelic use (11,51,52).

The inverse relationship between age and experience difficulty in psychedelic users has been documented across various studies (34,53), and data suggest that shame and guilt also tend to be experienced less in older adults, perhaps due to age-related decreases in arousal to aversive stimuli (53), or other maturational changes in perspective or relationship with the self. Surprisingly, besides age and trait anxiety, no covariates predicted state- shame or -guilt, including: adverse childhood experiences, other measures of psychological vulnerability, religious belief system, the presence of a sitter, one's state of surrender before the drug session, or even trait shame.

The trait shame measure used here is an intentionally brief instrument, and though it demonstrated correlations with measures of anxiety, depression, adverse childhood experiences and (inversely) cognitive flexibility that are expected to overlap with shame as a stable trait, it may be more limited as an indicator of shame-proneness (17). It may be that unmeasured constructs also contribute to drug-induced state experiences of shame and guilt, such as recent life events, or past experiences of humiliation, moral conflict, or early family dynamics. Alternatively, it is possible that experiences of shame and guilt with psilocybin are uniquely difficult to predict and do not "discriminate" between users. Unfortunately, we were unable to account for variables such as dose, previous psychedelic use, physical environment, or the professional qualifications of the sitter without compromising the predictive ability of our model, although these factors seem relevant to outcomes and deserve attention moving forward.

Importantly, the extent to which participants were able to constructively work through experiences of shame or guilt, rather than the magnitude of these experiences, predicted wellbeing 2 to 4 weeks after psilocybin use. Furthermore, those who were most able to work through these emotions had even higher ratings of mystical experience during and wellbeing following the psilocybin experience than participants whose journeys were shame-free.

These findings add to the growing literature on "emotional breakthrough" and "spiritual emergency" with psychedelics, whereby a sense of release and therapeutic growth are derived from the process of moving through difficult internal events (38,40,42,54,55). As has been described elsewhere, a certain degree of contact with psychologically challenging material may be prerequisite for experiences of healing with effective psychedelic therapy, and with effective psychotherapy at large (46,56). From this perspective, the activation of shame-related experiences with psychedelics may pose unique learning conditions for self-acceptance and growth, or alternatively, ongoing avoidance or reinforcement of negative patterns of self-judgment that promotes or maintains psychopathology (57–60). Therefore, it seems special attention should be paid to helping individuals work through these experiences of shame/guilt should they arise during psychedelic-assisted therapies, as a means of optimizing positive wellbeing outcomes.

While current findings emphasize the potential value of facing difficult emotions that can accompany psychedelic use, they also show that for a minority these experiences provoke more distress without resolution. Clinically, this evidence raises questions about optimal preparation, methods of support during psychedelic use, and methods of post-dosing integration or psychotherapy. It may be that, for those who leave psychedelic journeys feeling unresolved, a therapeutic framework in which they can process their experiences and cultivate self-compassion or acceptance is necessary to minimize harm. This framework of understanding psychedelic

mechanisms of action is not compatible with viewing the user as a passive recipient of a pharmacological cure.

Furthermore, it is conceivable in any given instance that a psychedelic user may not be able to work through a challenging experience, with or without professional guidance (58). The reasons for "stuckness" in therapy are manifold, including treatment-, therapist- and patient-related factors (61), and this exploration is sometimes understood as a necessary endeavor for the therapeutic process (62). For informed consent in research trials involving psychedelics, it is recommended that clinicians disclose to participants the possible emotional demands of drug-assisted therapy and be trained in navigating complex emotions like shame and guilt.

Finally, we found that psilocybin on average produces small but enduring decreases in trait shame within the context of largely purposeful and intentional use. This finding is consistent with retrospective data in adults with histories of childhood maltreatment showing associations between a history of psychedelic drug use with therapeutic intent and lower levels of complex trauma symptoms and internalized shame (63), and also with findings that psychedelic use is associated with changes in other presumptively stable, characterological domains such as personality (34,64). Other investigations have not looked at shame explicitly but have documented improvements in self-acceptance and self-regard attributed to psychedelic use, which are thought to be related psychological constructs (65–68). Few studies have examined therapeutic interventions aimed at one's relationship with shame, though shame appears to be a transdiagnostic feature of numerous psychological disorders (69).

Shame that is chronic and internalized may be especially representative of the entrenched "canalizations" of thought and behavior that can occur in response to adversity, distress, or dysphoria (70). Such phenotypes are often resistant to revision, even in the face of new evidence, but may be sensitive to the plasticity-related and belief-updating effects of psychedelic interventions (57,71–75). Critically, these processes are expected to be highly context-dependent, which may explain our mixed findings involving trait shame on a participant-level.

It is possible that a state of heightened plasticity marked by emotional challenge without resolution could strengthen or induce beliefs that aspects of one's self are beyond healing (46). When memories of prior trauma are activated in this process, without the development of new associations or effective reconsolidation, some users may even endure a form of "retraumatization" (52,76). Attention to appropriate therapeutic setting, support and integration may be pivotal in this regard, but some challenging trips may be just "bad" and have in some cases predicted negative long-term outcomes (22,35,38,77,78). We should work toward minimizing such drug reactions, but we should also work to destigmatize and reduce further shaming of individuals who have these challenging journeys.

This study has several important limitations that are outlined in detail elsewhere (24). Briefly, there was minimal standardization with regard to psilocybin use and the use of concurrent substances: a typical drawback for naturalistic research but perhaps more reflective of real-world psychedelic use and outcomes (79). Furthermore, while shame is often conceptualized as a universal and cross-cultural construct (80), participant self-selection and limited representation of non-White and minoritized populations in this sample may hinder the ability to generalize these findings to the larger population. Indeed, the difficulties of measuring shame are considerable (17), and made more difficult by the high rates of variability and dropout seen with this longitudinal survey.

Our assessment of successful emotional processing raises clinically relevant questions for further research, but a more robust measure is needed to unpack the black box of what it means

to constructively "work through" shame or guilt. Another future direction of research would be to replicate these analyses in the controlled research settings that portend medical uses of psychedelics and assess the relevance of these constructs across different clinical populations. The use of qualitative or mixed-methods analyses could allow for improved specification of shame-related experiences, changes and mechanisms of successful resolution seen with psilocybin that were not captured by the data here.

Ultimately, this study adds to an imperative but insufficient literature on psychedelics, psychedelic challenges, and healing by centering self-conscious emotions. These findings may be instructive for those who have struggled with shame-related experiences during psychedelic use and imagined themselves to be alone. As the psychotherapist Joseph Burgo writes, "The road to authentic self-esteem inevitably passes through the land of shame and never entirely leaves it (81, p. xiv)." Psychedelic use, also, is aptly conveyed as a winding journey, and drugs like psilocybin may help transform encounters with challenging feelings and self-representations into opportunities for growth and self-fulfillment. As journeys go, there may be a real sense of uncertainty and risk no matter the circumstances; there may be an equal need for sustained contact with supporting characters who can be experienced as skilled and trustworthy. These passages may offer the chance to return anew but are not to be taken lightly.

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Authorship statement

David S. Mathai: conceptualization, formal analysis, methodology, software, writing – original draft; *Daniel E. Roberts:* conceptualization, writing – original draft, review and editing; *Sandeep M. Nayak:* methodology, resources, writing – review and editing; *Nathan D. Sepeda:* data curation, resources, software, writing – review and editing; *Amy Lehrner:* conceptualization, writing – review and editing; *Matthew W. Johnson:* conceptualization, funding acquisition, methodology, writing - review and editing; *Matthew X. Lowe*: resources, supervision, writing – review and editing; *Heather Jackson:* conceptualization, resources, supervision, writing – review and editing; *Albert Garcia-Romeu:* conceptualization, funding acquisition, methodology, project administration, supervision, writing – review and editing.

Conflicts of interest

Daniel E. Roberts has received compensation for his role as training faculty from Fluence. Matthew W. Johnson serves as consultant to AJNA Labs, AWAKN Life Sciences, Beckley Psychedelic Ltd., Clarion Clinics, Mind Medicine, Negev Capital, Otsuka Pharmaceutical Development & Commercialization, and Reunion Neurosciences. Albert Garcia-Romeu serves as a paid scientific advisor to Innerwell. The remaining authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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