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TOWARDS THERAPEUTIC PATHS WITH MINDFULNESS MEDITATION–BASED AND PSYCHEDELICS ASSISTED PSYCHOTHERAPIES IN PTSD: RANDOMIZED CONTROLLED TRIALS SYSTEMATIC REVIEW AND META-ANALYSIS

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Abstract

The purpose of this study was to compare mindfulness meditation-based interventions (MMBIs) and psychedelic-assisted psychotherapies (PAP) in PTSD and examine altered-state mediators as a shared mechanism. Following PRISMA 2020 guidelines, PubMed, Web of Science, and EBSCOhost were systematically searched for randomized controlled trials (RCTs) published through January 2024. Trials reporting post-treatment changes in validated PTSD symptom measures were included, focusing on two intervention categories: MMBIs (n = 13 RCTs) and PAP (n = 9 RCTs). Standardized mean differences (SMD) were calculated under a random-effects model, with 95% confidence intervals (CIs). MMBIs produced a significant, moderate effect on PTSD symptoms (SMD=0.45, 95% CI [0.27, 0.63]; $p < 0.001$). PAP also demonstrated a moderate effect size (SMD=0.54, 95% CI [0.32, 0.76]; $p < 0.001$), with MDMA displaying slightly stronger outcomes than ketamine. PAP studies generally showed tighter confidence intervals and lower risk of bias compared to MMBI trials. Heterogeneity varied, but subgroup analyses indicated consistent effects across intervention types. Both MMBIs and PAP are efficacious in reducing PTSD symptoms among adults. While PAP appears to yield a marginally larger effect size, MMBIs offer practical advantages due to ease of dissemination. Future research should address long-term efficacy, adverse events, and culturally

diverse populations. The role of altered states of consciousness in both interventions also warrant closer investigation, potentially illuminating mechanisms underlying therapeutic gains.

Keywords: Post-Traumatic Stress Disorder (PTSD), Psychedelic-Assisted Psychotherapy (PAP), Mindfulness Meditation–Based Intervention (MMBI), Meta-analysis, Systematic Review, Therapeutic Efficacy

Introduction

Evidence-Based Practice in Psychology (EBPP) underscores the integration of the best available research with clinical expertise, while accounting for individual patient characteristics, culture, and preferences (American Psychiatric Association, 2022; American Psychological, 2002). This framework is critical in addressing post-traumatic stress disorder (PTSD), a psychiatric condition triggered by direct or indirect exposure to traumatic events such as serious injury, sexual violence, or the threat of death (American Psychiatric Association, 2022). Given that 60–75% of the global population is likely to experience at least one traumatic event (Benjet, 2016; Bisson, 2015; Koenen et al., 2017), there is a pressing need to refine and expand evidence-based interventions.

PTSD not only carries a significant psychological burden but also imposes substantial societal costs. In the United States alone, the annual economic burden of PTSD was estimated at $232.3 billion in 2018 (Davis et al., 2022). Although trauma exposure is common**,** only a subset develops PTSD, with lifetime prevalence estimates ranging between 0.38% and 6.67% in certain populations, and as high as 25% in others (Benjet, 2016; Burri, 2014; Schincariol et al., 2024). Even mild or “everyday” traumas can precipitate PTSD in those who are vulnerable, complicating both diagnosis and treatment decisions (Kilpatrick, 2013). However, prevalence rates can vary widely across countries, influenced by war, disasters, and cultural differences (Burri, 2014; Schincariol et al., 2024).

Etiological frameworks highlight a biopsychosocial interplay in PTSD’s development. Neurobiologically, dysregulation of the hypothalamic-pituitary-adrenal (HPA) axis, overactivity in the amygdala, and reduced hippocampal volume are implicated (Pitman, 2012; Sherin, 2011). Peri-traumatic dissociation, high perceived threat, and lack of social support are known predictors (Ozer, 2008). Factors such as low socioeconomic status, prior childhood abuse, and cumulative trauma also increase vulnerability (Koenen et al., 2017; Leiva-Bianchi, 2023). Individuals with PTSD often report elevated comorbidities, up to 78.5%, including depression, anxiety disorders, substance use, and chronic pain (Afari et al., 2014; Qassem, 2021).

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In clinical practice, accurate diagnosis often requires structured instruments such as the Clinician-Administered PTSD Scale (CAPS-5) or the PTSD Checklist (PCL-5) (Blevins, 2015; Weathers, 2018). Despite advancements, current first-line treatments, primarily trauma-focused therapies and pharmacological interventions, frequently leave patients with residual symptoms or lead to high dropout rates (Kilpatrick, 2013; Martin, 2021). This underscores the importance of investigating complementary and novel interventions to improve outcomes for those living with PTSD (Schnurr, 2024). Cognitive Processing Therapy (CPT) and Prolonged Exposure (PE) therapy often yield substantial symptom relief, with evidence for long-term effectiveness in reducing PTSD severity (Belsher, 2019; Mitchell, 2021; Steenkamp, 2015). Eye Movement Desensitization and Reprocessing (EMDR) has also been endorsed (Cusack, 2016; Karatzias, 2019). However, high dropout rates, particularly among individuals with complex PTSD, limit the overall success of exposure-based modalities (Hoppen, 2023). Medications, especially selective serotonin reuptake inhibitors (SSRIs) like paroxetine, sertraline, and fluoxetine, aim to reduce PTSD-related symptoms (Gu, 2016). However, no drug was developed specifically for PTSD, and residual symptoms often persist (Zaretsky, 2024). Other pharmacotherapies, including risperidone and venlafaxine, may help in certain cases (de Moraes Costa, 2020), but comprehensive symptom remission remains elusive. Moreover, medications can carry side-effect burdens, affecting adherence and quality of life. Mindfulness meditation–based interventions (MMBIs) and psychedelic-assisted psychotherapies (PAP) have emerged as promising alternatives (Holas & Kaminska, 2023; Mitchell, 2023; Zaretsky, 2024), though their comparative efficacy is not well understood. In sum, despite advancements and given these limitations, partial symptom relief, side effects, and frequent dropout, interest has turned to alternative interventions that may circumvent barriers posed by direct trauma processing and medication tolerability (Imel, 2013; Kilpatrick, 2013). Two promising avenues involve Mindfulness Meditation-Based Interventions (MMBIs) and Psychedelic-Assisted Psychotherapies (PAP), both of which have generated encouraging data in recent years (Henner, 2022; Zaretsky, 2024).

Mindfulness, often traced to Buddhist traditions, involves cultivating nonjudgmental awareness of the present moment (Kabat-Zinn, 2003). In a clinical context, MMBIs encompass practices such as breathwork, yoga, body scans, mantra repetition, and cognitive-behavioral techniques. They aim to enhance emotion regulation, reduce maladaptive stress responses, and foster a compassionate stance toward internal experiences (Schuman-Olivier, 2020; Wielgosz, 2019). Growing literature supports the efficacy of MMBIs in PTSD populations. Meta-analyses and systematic reviews show statistically significant reductions in avoidance, hyperarousal, and intrusive symptoms (Banks et al., 2015; Goldberg, 2020; Kaplan, 2023). Established protocols like Mindfulness-Based Stress Reduction (MBSR) and Mindfulness-Based Cognitive Therapy (MBCT) have shown promise in

civilian, veteran, and incarcerated populations with high trauma burdens (Boyd, 2018; Nidich, 2018, 2016, 2017; Niles, 2018). Mechanistically, mindfulness is hypothesized to modulate default mode network (DMN) activity and autonomic arousal, thus improving emotional self-regulation (Kang, 2022). Other mindfulness-driven approaches, such as Acceptance and Commitment Therapy (ACT), Mindful Awareness in Body-Oriented Therapy (MABT), and Mantram Repetition Programs (MRP), also show utility in reducing PTSD severity (Boals, 2016; Bormann, 2005, 2020, 2014, 2018, 2013, 2008; Price, 2018). Yoga-based interventions have demonstrated modest to moderate benefit, though methodological variability in yoga protocols complicates the interpretation of outcomes (Cramer, 2018; van der Kolk, 2014). Collectively, these interventions provide a lower-threat pathway to address trauma-related distress and avoidance behaviors. Psychedelics, classically defined as serotonin 2A receptor agonists, have long been used in ceremonial contexts for healing and spiritual exploration (Nichols, 2016). In the 1950s and 1960s, substances like LSD and psilocybin were studied as potential adjuncts to psychotherapy, but restrictive drug policies stalled research (Doblin, 2019). Recent years have seen a resurgence of interest, often dubbed the “psychedelic renaissance,” with expanded clinical trials evaluating MDMA, psilocybin, LSD, ketamine, and other agents (Almeida, 2024; Carhart-Harris, 2017; Nutt, 2019). Psychedelic-Assisted Psychotherapy (PAP) typically involves a structured process: (1) preparatory sessions focusing on psychoeducation and establishing therapeutic rapport, (2) dosing sessions in a controlled and supportive environment, and (3) integration sessions to help individuals process insights from their altered states of consciousness (Mitchell, 2023). Neurobiological mechanisms include enhanced neuroplasticity, altered functional connectivity (especially in the DMN), and partial dampening of fear-related circuitry (Carhart-Harris, 2019; Maia, 2024). The subjective experience can involve states of ego dissolution, heightened emotional awareness, and “mystical” insights, all of which may facilitate the reprocessing of traumatic memories (Nour, 2016).

The key agents currently under investigation are:

- **MDMA**: Labeled an empathogen (Shulgin, 1986) MDMA increases serotonin, dopamine, oxytocin, and norepinephrine, while reducing hyperactivation in the amygdala. Numerous trials underscore significant and durable symptom reductions in PTSD, leading the FDA to grant it “Breakthrough Therapy” status (Mitchell, 2021; Mithoefer, 2019)
- **Ketamine**: While not a classic psychedelic, ketamine is often included in PAP due to its dissociative, NMDA-receptor–antagonist properties. It has demonstrated rapid antidepressant effects and promising though mixed results for PTSD (Feder, 2021; Sicignano, 2024). Ketamine-Assisted Psychotherapy (KAP) protocols combine

subanesthetic doses with psychosocial support sessions, potentially extending therapeutic gains (Dore, 2019).

- **Classic Psychedelics (Psilocybin, LSD, Ayahuasca)**: Psilocybin and LSD are shown to facilitate deep introspection and emotional processing (Carhart-Harris, 2018; Gasser, 2014). Early evidence suggests utility for addictions, depression, and anxiety, but focused PTSD trials remain limited (Bogenschutz, 2015; Oehen, 2022). Ayahuasca, is studied for depression and substance use disorders, with preliminary indications for PTSD relief, albeit mostly in ceremonial contexts (dos Santos, 2016; Inserra, 2018).

Despite differing methods of induction, meditative practice versus pharmacologically altered states, both MMBIs and PAP can yield non-ordinary states of consciousness (NOSCs) that help individuals confront and reframe traumatic content (Franco Corso, 2023; Timmermann, 2023). Both interventions typically emphasize a supportive therapeutic context ("set and setting") that encourages emotional openness and introspection (Alpert, 2024). Self-regulation, resilience, and heightened awareness of bodily and emotional states emerge as common targets, potentially explaining parallel improvements in PTSD symptoms (Zhang, 2023).

At the same time, each modality presents unique considerations. On the one hand, MMBIs generally pose fewer medical risks, require minimal resources, and can be taught in various healthcare or community settings (Banks et al., 2015; Bormann, 2018). On the other hand, PAP, though promising, entails stringent protocols, licensed clinicians, and regulatory approvals. There are concerns regarding adverse events (e.g., transient anxiety, elevated blood pressure, occasional "challenging experiences") but those events are generally moderate under controlled conditions (Breeksema, 2022; Mithoefer, 2011). Nevertheless, neither approach is currently recommended as a first-line therapy for PTSD, highlighting the need for systematic research on efficacy, safety, and optimal implementation (Alpert, 2024; Colcott, 2024).

To the best of our knowledge, it appears no prior review has directly compared mindfulness meditation–based interventions and psychedelic-assisted psychotherapies in PTSD within the same meta-analytic of randomized controlled trials framework, nor examined altered-state mediators as a shared mechanism. There are currently two published works that combine both psychedelic-assisted psychotherapy (PAP) and mindfulness-based interventions (MBIs). The first, is a perspective article outlining theoretical synergies between MBIs and PAP across various mental-health domains (Payne et al., 2021). The second, is a narrative review describing overlapping mechanisms and proposing combined applications (Holas & Kaminska, 2023). Thus, neither study offers a systematic review or meta-analysis comparing PAP and MBIs in PTSD populations.

Hence, this paper aims to synthesize the evidence on MMBIs and PAP in treating PTSD. By conducting two meta-analyses, one focusing on MMBIs, the other on PAP, this study will compare post-treatment outcomes relative to control conditions and explore proposed mechanisms underlying symptom alleviation. It is hypothesized that: (1) MMBIs will yield a statistically significant reduction in PTSD symptoms compared to control conditions; (2) PAP will also demonstrate significant post-treatment improvements in PTSD symptomatology compared to controls. Findings may inform future guidelines by clarifying whether MMBIs and PAP should be considered more prominently in clinical practice, and whether they align with EBPP principles for patient-centered, personalized PTSD care.

Method

Procedure

Literature search and selection. This meta-analysis was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines (Page, 2021). Separate systematic procedures were used for the two interventions of interest, Mindfulness Meditation-Based Interventions (MMBIs) and Psychedelic-Assisted Psychotherapies (PAP), though both followed the same overarching approach. A PICO (Participants, Interventions, Comparisons, Outcomes) framework and rigorous two-phase screening process were employed to ensure clarity and reproducibility.

A PICO-based framework guided the development of inclusion and exclusion criteria:

Participants

- Adults (≥ 18 years).
- Studies with at least 50% of participants meeting PTSD criteria (clinical diagnosis or validated self-report scale).
- The decision to focus solely on adults reflects the typical age range for PAP administration and ensures comparability between PAP and MMBI trials.

Interventions

- MMBIs: Required to include mindfulness or meditation techniques as the central therapeutic component (e.g., breathwork, mantra repetition). Interventions primarily based on physical postures or movement (e.g., yoga, Tai Chi, Qigong) were excluded to maintain focus on meditation-oriented protocols.

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- PAP: Required the use of a psychedelic substance as part of a structured psychotherapeutic process.

***Comparisons*:** A valid control arm (active control, passive placebo, waitlist, or treatment-as-usual) was mandatory in each study.

***Outcomes*:** Any valid measure of PTSD symptoms, both pre- and post-treatment, was acceptable (e.g., Clinician-Administered PTSD Scale, PTSD Checklist).

Study Design

- Randomized controlled trials (RCTs) published in English or French, from 2000 onward.
- Systematic reviews, meta-analyses, protocols, theses, and non-randomized studies were excluded.
- Publications representing a condensed version of multiple studies were excluded to avoid duplication of data.

The year 2000 was chosen as a cutoff to capture the resurgence of PAP research under modern methodological standards and to maintain consistency across both intervention groups. A systematic literature search was conducted in three electronic databases, PubMed, Web of Science (WOS), and EBSCOhost (encompassing Eric, PsycINFO, and Medline), up to January 15, 2024. Search terms were developed based on established literature, database thesauri, and expert consultation. A detailed list of keywords and Boolean operators is provided in Table 1. Reference lists of retrieved articles were also screened for potentially relevant studies. No additional language or population filters were applied beyond those stipulated in the eligibility criteria

Coding of studies

The initial selection (Phase 1) involved screening titles and abstracts against the PICO framework and the following core criteria:

1. Written in English or French.
2. Randomized controlled trial design.
3. Published since 2000.
4. Not a review, meta-analysis, protocol, thesis, or student essay.

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Table 1

Searched terms: list of keywords and Boolean operators based on established literature, database thesauri and expert consultation

CATEGORIES	KEYWORDS
Post traumatic stress disorder	« posttraumatic stress disorder post-traumatic stress disorder OR ptsd OR posttraumatic stress disorder OR post traumatic stress disorder »
Design of the study	« randomized controlled trial OR randomised controlled trial OR rct »
MMBIs	« meditation OR mindfulness-based OR mindfulness meditation OR mindfulness-based stress reduction OR mindfulness-based cognitive therapy OR mindfulness-based pain management OR mindfulness-based trauma recovery OR vipassana meditation OR zen buddhist meditation OR mantra meditation OR transcendental meditation OR relaxation response technique OR Clinically Standardized Meditation OR acem meditation OR loving kindness meditation OR body scan OR Acceptance and Commitment Therapy OR non-ordinary states of consciousness OR altered states of consciousness OR Observing-thoughts Meditation OR compassion based therapy OR compassion focused therapy OR mantram repetition program OR mindful breathing OR breathing meditation »
PAP (* Ketamine was entered alone because it was forgotten in the first search and the selection were already finished)	« hallucinogen OR psilocybin OR psilocin OR DMT OR N-dimethyltryptamine OR 5-MeO-DMT OR mescaline OR peyote OR LSD OR lysergic acid diethylamide OR MDMA OR 3,4-methylenedioxymethamphetamine OR cannabinoid OR psychedelic OR substance-assisted therapy OR cannabis OR THC OR ayahuasca » « ketamine »*

Studies that appeared to meet these criteria underwent full-text review (Phase 2). During this second phase, the same eligibility criteria were re-applied in more detail, including the requirement for ≥50% of participants with PTSD, a valid control group, and no duplication of data from other studies. Articles not available through the primary databases were sought via the University of Fribourg's Discovery service or ResearchGate. The entire selection process was documented in Excel (version 16.85), where duplicates were automatically removed and then manually verified. Reasons for exclusion were recorded, noting only the most significant criterion when multiple applied (Figure 1) and (Figure 2). Two independent reviewers (the first author and AG) screened and assessed articles at both phases. Any disagreements were resolved through discussion until consensus was reached. Cohen's Kappa coefficient was calculated to quantify inter-rater reliability and ensure consistency in study selection.

Figure 1

PRISMA Flow Diagram for MMBIs

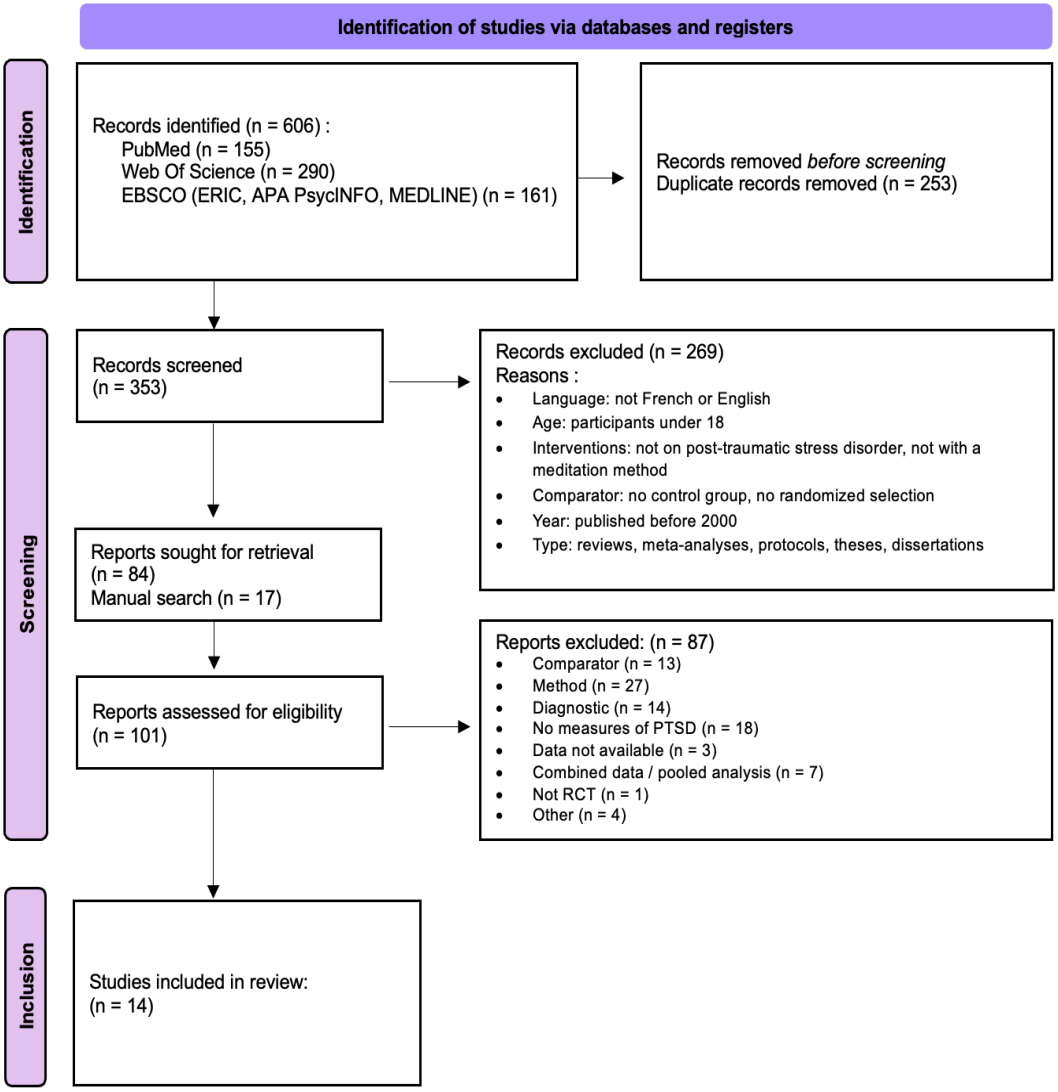
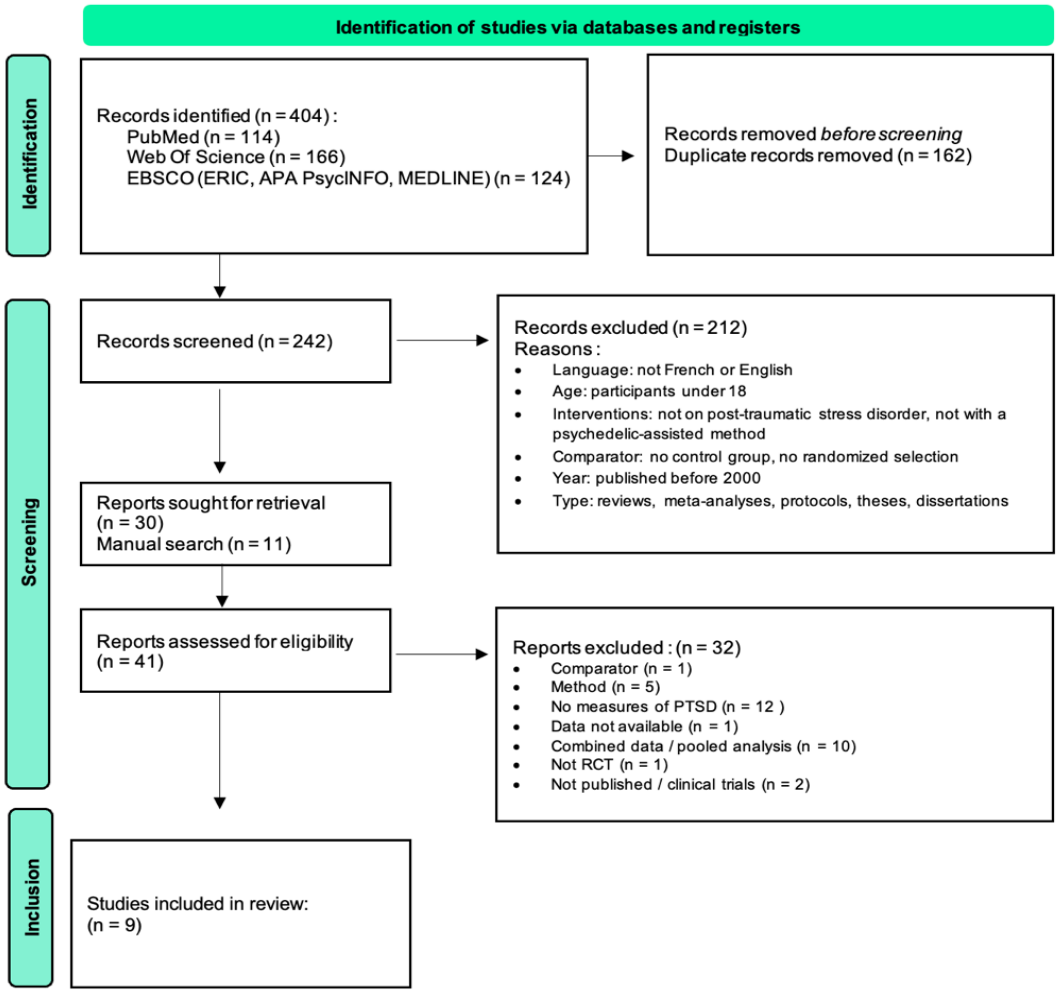


Figure 2

PRISMA Flow Diagram for PAP



Data analysis

Data extraction was performed using a pre-designed spreadsheet in Microsoft Excel. For each study included, the following information was recorded:

- Study characteristics (authorship, publication year).
- Participant demographics (sample size, age, clinical status).
- Intervention details (type of MMBI or psychedelic substance, session format, duration).
- Control type (active, placebo, waitlist, treatment-as-usual).
- PTSD outcome measures and time points (means and standard deviations [SDs]).

- Other relevant variables (e.g., adverse events, dropout rates) when reported.

Missing or incomplete data were requested directly from corresponding authors. If data remained unavailable, the study's ability to contribute to the meta-analysis was re-evaluated based on the specific outcomes or effect sizes in question.

All quantitative analyses were conducted in R (version 2024.04.1+748) with RStudio (version 2023.12.1), primarily using the "metafor" package (version 4.4-0). Effect sizes were computed as standardized mean differences (SMD, Cohen's d), comparing post-treatment PTSD scores (or change scores) between intervention and control groups. Where studies reported standard errors (SEs) instead of SDs, SDs were derived according to Cochrane Handbook guidelines (Higgins, 2019).

Risk of bias assessment

Risk of bias was assessed using the Cochrane revised risk of bias tool (RoB2), as recommended by the Cochrane Handbook for Systematic Reviews of Interventions (Higgins, 2019). All included RCTs were evaluated independently by two reviewers. Discrepancies were resolved through consensus. Results were visualized using the robvis online tool (McGuinness, 2020), displaying each study's risk-of-bias judgments across domains (randomization process, deviations from intended interventions, missing outcome data, measurement of outcome, and selection of reported result).

Heterogeneity and influence analysis

A random-effects model was used to account for expected heterogeneity across diverse populations and interventions. Heterogeneity was quantified using the I^2 statistic, Tau^2, and prediction intervals. Influence analyses identified outlier studies with disproportionate impacts on overall results; these studies were either explored separately or subjected to sensitivity analyses.

Publication bias

Funnel plots and Egger's test were used to evaluate potential publication bias (i.e., whether smaller or null-result studies were systematically underrepresented). Asymmetry in funnel plots or significant Egger's tests prompted further examination of the data

Supplementary data and preprint

The preprint of this study is available at https://doi.org/10.31219/osf.io/mg93w_v2, and supplementary materials can be accessed via the Open Science Framework (OSF) at https://osf.io/3rvq4/files

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Results

Study selection

Mindfulness Meditation–Based Interventions (MMBIs). The systematic search for MMBI studies yielded 606 records (PubMed: n = 155; Web of Science: n = 290; EBSCO: n = 161). After removing 253 duplicates, 353 titles and abstracts were screened, resulting in 269 exclusions for failing to meet basic eligibility criteria. Consequently, 84 records underwent full-text review, augmented by 17 articles identified through manual searches, yielding 101 for detailed assessment. Of these, 87 were excluded during second-phase screening. Where data were missing, four corresponding authors were contacted, with one providing additional information (Bellehsen, 2022). Ultimately, 14 studies met final inclusion criteria. Inter-rater reliability was substantial (Cohen's $\kappa = 0.60$).

Psychedelic-Assisted Psychotherapies (PAP). A separate search for PAP retrieved 404 records (PubMed: n = 114; Web of Science: n = 166; EBSCO: n = 124). After 162 duplicates were removed, 242 abstracts were screened, leading to 212 exclusions. This left 30 articles; 11 additional articles were identified manually, totaling 41 for full-text review. Of these, 32 failed second-phase criteria. One author was contacted for missing data but did not respond. Ultimately, 9 studies met the inclusion criteria. Inter-rater reliability was high (Cohen's $\kappa = 0.73$).

Characteristics of included studies

Mindfulness Meditation–Based Interventions (MMBIs)

Sample Characteristics. Fourteen MMBI studies (Table 2) were conducted in the United States (n = 12), Lithuania (n = 1), and China (n = 1). Sample sizes ranged from 29 to 221 ($M \approx 78$ participants per study). Overall, 58.75% of participants were male; mean participant age was 42.8 years. Most studies enrolled veterans (n = 7), while others focused on survivors of violence or abuse, university students, homeless individuals, or those with substance use disorders (SUD). Six studies explicitly required a confirmed PTSD diagnosis (e.g., CAPS-based); four enrolled participants scoring above the clinical threshold on validated PTSD scales.

Table 2

Characteristics of Included Studies for MMBIs

Authors Years Country	Outcome measure	Time of measures (Follow up = from baseline)	Population	Participants	Intervention	Control comparison	3rd arm comparison	Intent to treat?
Bellehsen et al., 2022 USA	CAPS-5 / PCL-5	Baseline END: 12 weeks	Veterans Established PTSD diagnosis	N = 40 Age = 51.6 %M = 85	n = 20 TM - group 16 sessions (11 sessions of 1h 1x/week + 20 min 2x/day at home)	n = 20 TAU		ITT
Boals & Murrell, 2016 USA	PCL-S	Baseline END: 4 weeks *Follow up: 10 weeks*[a]	Proximity center for people who have suffered violence or abuse Threshold indicating a diagnosis of PTSD (PCL-S > 44)	N = 63 Age = 35.7 %M = 3	n = 37 ACT + TAU - group 4 sessions 1h/1x pro week	n = 26 TAU		No ITT
Bormann et al., 2013 USA	CAPS-5	Baseline END: 6 weeks *Follow up: 12 weeks*[a]	Veterans Established PTSD diagnosis	N = 146 Age = 57 %M = 97	n = 71 MRP + TAU - group 6 sessions 1,5h 1x/week	n = 75 TAU		ITT
Dumarkaite et al., 2021 Lithuanie	ITQ	Baseline END: 8 weeks	University students who have experienced traumatic event(s) Criteria of clinical significance PTSD or	N = 70 Age = 23.34 %M = 12.9	n = 31 Mindfulness-based internet intervention - group 8 sessions	n = 39 WL		No ITT

			PTSD-C (ITQ)					
Gallegos et al., 2020 USA	PCL-5	Baseline END: 8 weeks *Follow up :12 weeks* [a]	Survivors of intimate partner violence Threshold indicating probable diagnosis of PTSD (PCL-5 > 31)	N = 29 Age = 42.69 %M = 0	n = 19 MBSR - group 8 sessions 2h 1x/week	n = 10 Active control: Active wellness		m ITT
Garland et al., 2016 USA	PCL-C	Baseline END: 10 weeks	Homeless people PTSD total (25%) or partial (37%) and co-occurring substance use and psychiatric disorders	N= 180 Age = 37.6 (38.1) %M = 100	n = 64 MORE - group 10 sessions 2h 1x/week + 15 min 1x/week at home	n = 52 TAU	N = 64 CBT	ITT
Kearney et al., 2013 USA	PCL-C	Baseline END: 8 weeks *Follow up: 12 weeks* [a]	Veterans Established PTSD diagnosis	N=47 Age = 52 %M = 78.7	n = 25 MBSR + TAU - group 8 sessions 2,5 h; 1x/week + 1 retreat of 7h	n = 22 TAU		ITT
Nidich et al., 2018 USA	CAPS-5	Baseline *4,6,8,10 week* [a] END: 12 weeks	Veterans Established PTSD diagnosis (+ CAPS >45)	N= 202 Age = 47 % = 83	n = 68 TM - group 12 sessions 1,5h 1x/week	n = 66 Active control: Health education (HE)	N = 68 Prolonged Exposure (PE)	ITT
Niles et al., 2012 USA	CAPS-5	Baseline END: 8 weeks *Follow up :14 weeks* [a]	Veterans Established PTSD diagnosis	N = 33 Age = 52.0 %M = 100	n = 17 MBSR - online 8 weeks 2 sessions in person (45min) et 6 phone calls (20min)	n = 16 Active control: Psychoeducation		No ITT

Possemato et al., 2016 USA	CAPS-5 PCL	Baseline END: 4 weeks *Follow up: 8 weeks* [a]	Veterans PTSD below the threshold or at diagnostic level linked to military service (CAPS)	N= 62 Age = 47.6 %M 85.5	n = 36 Primary care brief mindfulness training - group 4 sessions 1,5h 1x/week	n = 26 Active control: Primary care mental health integrated		ITT
Price et al., 2012 USA	MPSS	Baseline END: 12 weeks *Follow up: 6, 9 months* [a]	With substance use disorder 63% above PTSD threshold (PSS-SR)	N = 46 Age = 39 %M = 0	n = 31 MABT - individual 8 sessions 1,5h 1x/week	n = 15 TAU		?
Price et al., 2019 USA	PSS-SR	Baseline END: 12 weeks *Follow up: 6, 12 months* [a]	With substance use disorder 68% above PTSD threshold (PSS-SR)	N = 187 Age = 35 %M = 0	n = 74 MABT + TAU - individual 8 sessions 1,5h 1x/week	n = 67 TAU	N = 46 WHE + TAU	ITT
Wahbeh et al., 2016 USA	PCL-C	Baseline END: 6 weeks	Veterans Established PTSD diagnosis	N = 52 Age = 53.1 %M = 94.3	n = 27 MM - individual 6 sessions + 20 min at home 1x/week	n = 25 Active control: SQ	MM+SB (25) SB (25)	No ITT
Zhao et al., 2023 Chine	PCL-5	Baseline END: 4 weeks	Elevated PTSD symptoms (PCL >31)	N = 221 Age = 25.12 %M = 24.43	n = 76 ACT – online app 4 sessions 30-60 min 1x/week	n = 67 WL	N = 78 Mindfulness	ITT

Note. ACT = Acceptation and Commitment Therapy, Age = Mean age, CAPS-5 = Clinician-Administered PTSD Scale for DSM-5, ITQ = International Trauma Consortium (ICD-11), ITT = Intent To Treat, MABT = Mindful Awareness in Body-oriented Therapy, MBSR = Mindfulness-Based Stress Reduction, MM = Body Scan Mindfulness Meditation, MORE = Mindfulness-Oriented Recovery Enhancement, MPSS = Modified Post-traumatic Stress Disorder Scale (DSM-IV), MRP = Mantram Repetition Program, m ITT = Modified Intent To Treat, N = total number of participants, n = total of participants per group, PCL-5 = PTSD Checklist for DSM-5, PCL-C = PTSD Checklist for Civilian, PCL-S = PTSD Checklist for Specific trauma, PSS-SR = PTSD Symptom Scale-Self Report (DSM-IV-TR), PTSD = Post-Traumatic Stress Disorder, SB = Slow Breathing, SQ = Sitting quietly, TAU = Treatment as Usual, TM = Transcendental Meditation, WHE = Women Health

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Education, WL = Waitlist, %M = Percentage of Men (compared to women) a the results of these different measurement times were not included in the meta-analysis

Interventions. A range of MMBIs was represented. Mantra-based (Mantram Repetition Program, n = 1) and Transcendental Meditation (n = 2) interventions were relatively few. Acceptance and Commitment Therapy (n = 2), Mindfulness-Based Stress Reduction (MBSR, n = 3), Mindfulness-Oriented Recovery Enhancement (n = 1), and Mindful Awareness in Body-Oriented Therapy (n = 2) were also included. Delivery formats varied from in-person groups to individualized or online sessions.

Comparisons. Comparison conditions included treatment-as-usual (TAU, n = 7), waitlist (n = 2), and various active controls (psychoeducation, health education, or sitting quietly, among others). Five studies included a third control arm (e.g., CBT, slow breathing exercises), providing additional comparative perspectives.

Outcome Measures and Analysis. PTSD symptom severity was commonly assessed using CAPS (n = 3) or PCL (n = 6), with other measures (ITQ, MPSS, PSS-SR) used less frequently. Intervention lengths ranged from 4 to 12 weeks, with follow-up from 8 weeks to 12 months. Eight studies employed an intent-to-treat (ITT) analysis, one used a modified ITT, and four had no ITT.

Psychedelic-Assisted Psychotherapies (PAP)

Sample Characteristics. Nine PAP studies (Table 3) were primarily U.S.-based (n = 7), with one in Switzerland and one multicenter trial across the United States and Israel. Sample sizes ranged from 12 to 158 ($M \approx 46$). The mean participant age spanned 36–43 years, and male representation ranged from 15% to 81%. Most trials focused on individuals with established civilian or combat-related PTSD, including veterans, firefighters, and police officers; one study targeted participants with comorbid chronic pain.

Table 3

Characteristics of included studies for PAP

Authors Years Country	Outcome measure	Time of measures (Follow up = from baseline)	Population	Participants	Intervention	Control comparison	3rd arm comparison	Intent to treat?
Abdallah et al., 2022 USA	PCL-5 / CAPS-5	Baseline Day 1 : 24h post 1st IV [a] END : day 25 (24h post last injection) Follow-up : 8 weeks [a]	Veterans and military Established PTSD diagnosis	N = 158 Age = 43 %M = 81.1	n = 51 Ketamine (0,5mg/kg) 2x/week for ~4 weeks = 8 IV	n = 54 Inactive : placebo	Low dose ketamine (0,20 mg/kg) n = 53	ITT
Dadabayev et al., 2020 USA	IES-R	Baseline 24h post 1st IV [a] END : 1 week post-injection	Established PTSD diagnosis + Chronic Pain	N = 19 Age = 42.47 %M = 61.9	n = 10 Ketamine (0,5mg/kg) Single dose IV	n = 9 Active placebo : Ketorolac (15mg)		?
Feder et al., 2014 USA	IES-R (CAPS-5)	Baseline 24h, 48h, 72h post-IV [a] END : 1 week post-IV Cross-over of 1 more week [a]	Established civilian or combat-related PTSD diagnosis + CAPS >50	N = 41 Age = 36.05 %M = 53.7	n = 22 Ketamine (0,5mg/kg) Single dose IV	n = 19 Active placebo : Midazolam (0,045mg/kg)		m ITT
Feder et al., 2021 USA	CAPS-5	Baseline 24h post 1st IV [a] At each visit [a] END: 2 weeks	Established PTSD diagnosis	N = 30 Age = 38.9 %M = 20	n = 15 Ketamine (0,5mg/kg) 3x injections per week for 2 weeks	n = 15 Active placebo : Midazolam (0,045mg/kg)		ITT
Mitchell et al., 2023 Multi-site (Israel, USA)	CAPS-5	Baseline *Post sessions #1 et #2* [a] END: 18 weeks (6-8 post session #3)	Established PTSD diagnosis (moderate to severe)	N = 104 Age = 39.1 %M = 28.8	n = 53 MDMA 120-180mg 3x sessions of 8h 1 month apart 3 integration sessions after each	n = 51 Inactive : placebo		m ITT

					dose (1/week)			
Mithoefer et al., 2011 USA	CAPS-IV	Baseline *3-5 days post sessions #1 et #2* [a] END: 12 weeks (8 weeks post session #2) + open label [a]	Established PTSD diagnosis	N = 20 Age = 40.4 %M = 15	n = 12 MDMA 125mg (+62,5) 2x sessions of 8h 1 month apart With phone contact 3 integration sessions after each dose (1/week) + open label	n = 8 Inactive : placebo		?
Mithoefer et al., 2018 USA	CAPS-IV	Baseline END: 8 weeks (4 weeks post session #2) + open label [a] Follow-up : 12 months (no control condition) [a]	Veterans, firefighters or police officers Established PTSD diagnosis > 6months + CAPS >50	N = 26 Age = 37.2 %M = 73	n = 12 MDMA 125mg (+62,5) 2x sessions of 8h 1 month apart With phone contact 3 integration sessions after each dose (1/week) + open label	n = 7 Active placebo: MDMA 30mg (+15mg)	Active placebo: MDMA 75mg (+37,5) n = 7	ITT
Oehen et al., 2013 CH	CAPS-IV	Baseline *3 weeks post session #2* [a] END: ~12 weeks (3 weeks post session #3 + open label [a] Follow-up : 12 months (no control condition) [a]	Established PTSD diagnosis with treatment-resistant symptoms	N = 12 Age = 41.4 %M = 16	n = 8 MDMA 125mg (+62,5) 3x sessions of 8h 1 month apart With phone contact 3 integration sessions after each dose (1/week) + open label	n = 4 Active placebo: MDMA 25mg (+12,5mg)		?

Ot'alora et al., 2018USA	CAPS-IV	Baseline END: ~12 weeks (4 weeks post session #2) + open label [a] Follow-up : 12 months (no control condition) [a]	Established PTSD diagnosis	N = 28 Age = 41.4 %M = 16	n = 13 MDMA 125mg (+62,5) 2x sessions of 8h 1 month apart With phone contact 3 integration sessions after each dose (1/week) + open label	n = 6 Active placebo: MDMA 40mg (+20)	Active placebo: MDMA 100mg (+50) n = 9	ITT

Note. Age = Mean age, CAPS-IV = Clinician-Administered PTSD Scale for DSM-IV, CAPS-5 = Clinician-Administered PTSD Scale for DSM-5, ITT = Intent To Treat, IV = Intravenous Infusion, m ITT = Modified Intent To Treat, N = number of participants, PCL-5 = PTSD Checklist for DSM-5, PTSD = Post-Traumatic Stress Disorder, TAU = Treatment as Usual, WL = Waitlist, %M = Percentage of Men (compared to women)

[a] The results of these different measurement times were not included in the meta-analysis

Interventions. Two psychedelics were studied: ketamine (n = 4) and MDMA (n = 5). Ketamine was administered intravenously at 0.5 mg/kg per dose, with dosing schedules varying from single to multiple infusions (2–3 times per week) over different durations. MDMA dosages ranged from 120 to 180 mg in up to three discrete sessions, each followed by integration sessions (1–3 times weekly). All studies were conducted in individualized settings, commonly with a post-session phone check.

Comparisons. Controls included both inactive placebos (n = 3) and active placebos (e.g., midazolam, low-dose MDMA), aiming to preserve blinding. Three studies featured three-arm designs, though the third arm (low-dose psychedelics) was excluded from the quantitative meta-analysis but noted qualitatively.

***Outcome Measures and Analysis*.** CAPS was the primary PTSD measure in most studies, with a few additionally using the PCL-5 or IES-R. Treatment durations varied from a single day to 18 weeks, with follow-up extending to 12 months. Four studies used ITT, two used modified ITT, and three had unclear analysis approaches.

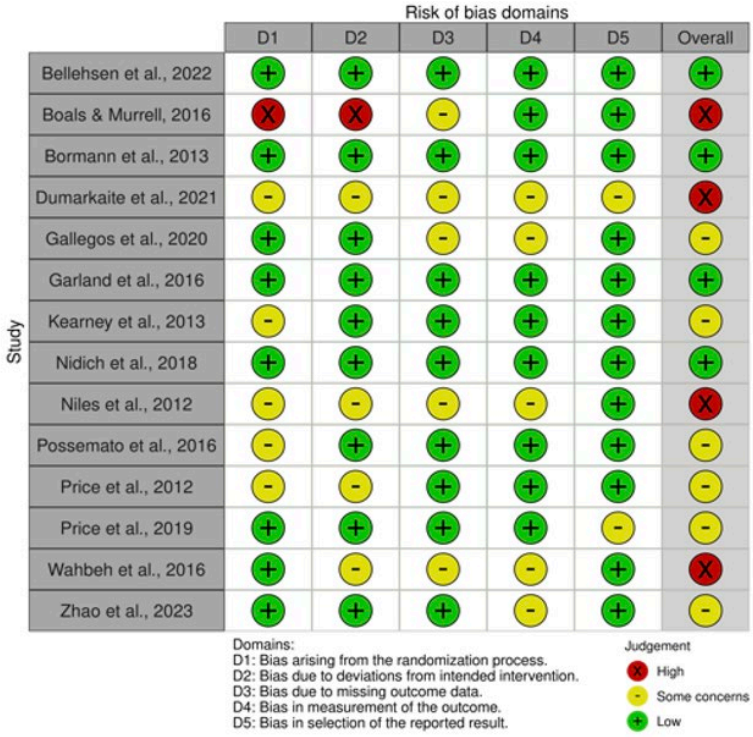
Risk of bias

Mindfulness Meditation–Based Interventions (MMBIs). Overall risk of bias was mixed (Figure 3). Randomization processes were generally adequate in 8 of 14 studies, unclear in 5, and high-risk in 1 (Boals, 2016). Blinding was not routinely assessed due to the practical constraints of

MMBI trials. Missing outcome data posed some concerns in 5 studies, primarily due to lack of ITT. Four studies demonstrated low overall risk of bias (Bellehsen, 2022; Bormann, 2013; Garland, 2016; Nidich, 2018), while 6 had some concerns and 4 were rated high-risk.

Figure 3

Risk of Bias Assessment for MMBIs



Psychedelic-Assisted Psychotherapies (PAP). PAP studies generally exhibited low overall risk of bias (Figure 4). Blinding methods (placebo or low-dose psychedelics) were clearly described in most trials. Two studies lacked clear ITT details (Dadabayev, 2020; Oehen, 2013). Five studies showed low risk of bias (Abdallah, 2022; Feder, 2021; Mitchell, 2023; Mithoefer, 2018; Ot'alora G, 2018), while four had some concerns (Dadabayev, 2020; Feder, 2014; Mithoefer, 2011; Oehen, 2013).

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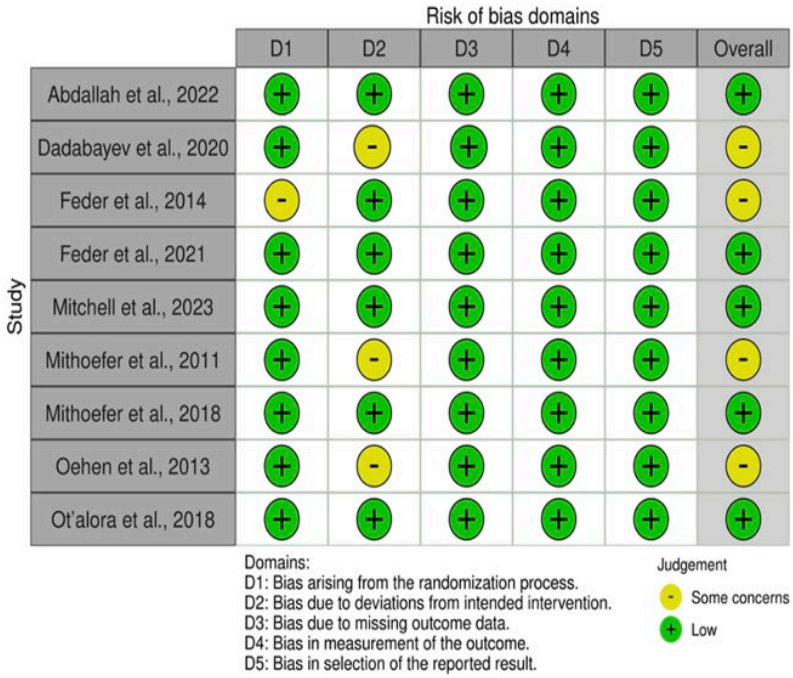
Figure 4

Risk of Bias Assessment for PAP

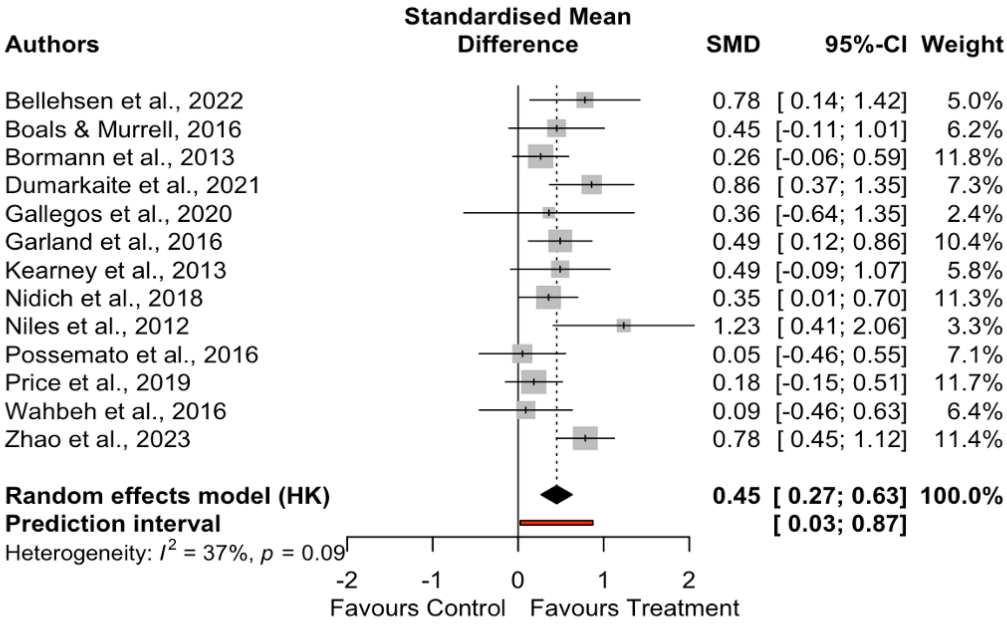


Meta-analytic findings

Mindfulness Meditation–Based Interventions (MMBIs). Figure 5 summarize effect sizes (Standard Mean Difference, SMD) for MMBIs. An initial analysis including all 14 studies yielded a moderate effect (SMD = 0.63; 95% CI [0.22, 1.04], $p = 0.006$) but revealed significant heterogeneity ($I^2 = 76\%$; Q(13)= 54.21, $p < 0.001$). Influence analyses identified one outlier (Price et al., 2012); after removing it, heterogeneity decreased markedly ($I^2 = 37.2\%$; Q(12) = 19.12, $p = 0.09$), and the resulting pooled estimate was small-to-moderate (SMD = 0.45; 95% CI [0.27, 0.63], $p < 0.001$; prediction interval 0.03–0.87). Among the remaining 13 studies, 6 showed significant positive effects (Bellehsen, 2022; Dumarkaite, 2021; Garland, 2016; Nidich, 2018; Niles, 2012; Zhao, 2023); the rest reported positive but non-significant trends. Egger's test did not indicate publication bias ($p = 0.38$).

Figure 5

Forest Plot of PTSD Measure Post-Treatment, Condition Control versus Treatment for MMBIs



Note. SMD = standardized mean differences, 95-%CI = 95% Confidence Interval

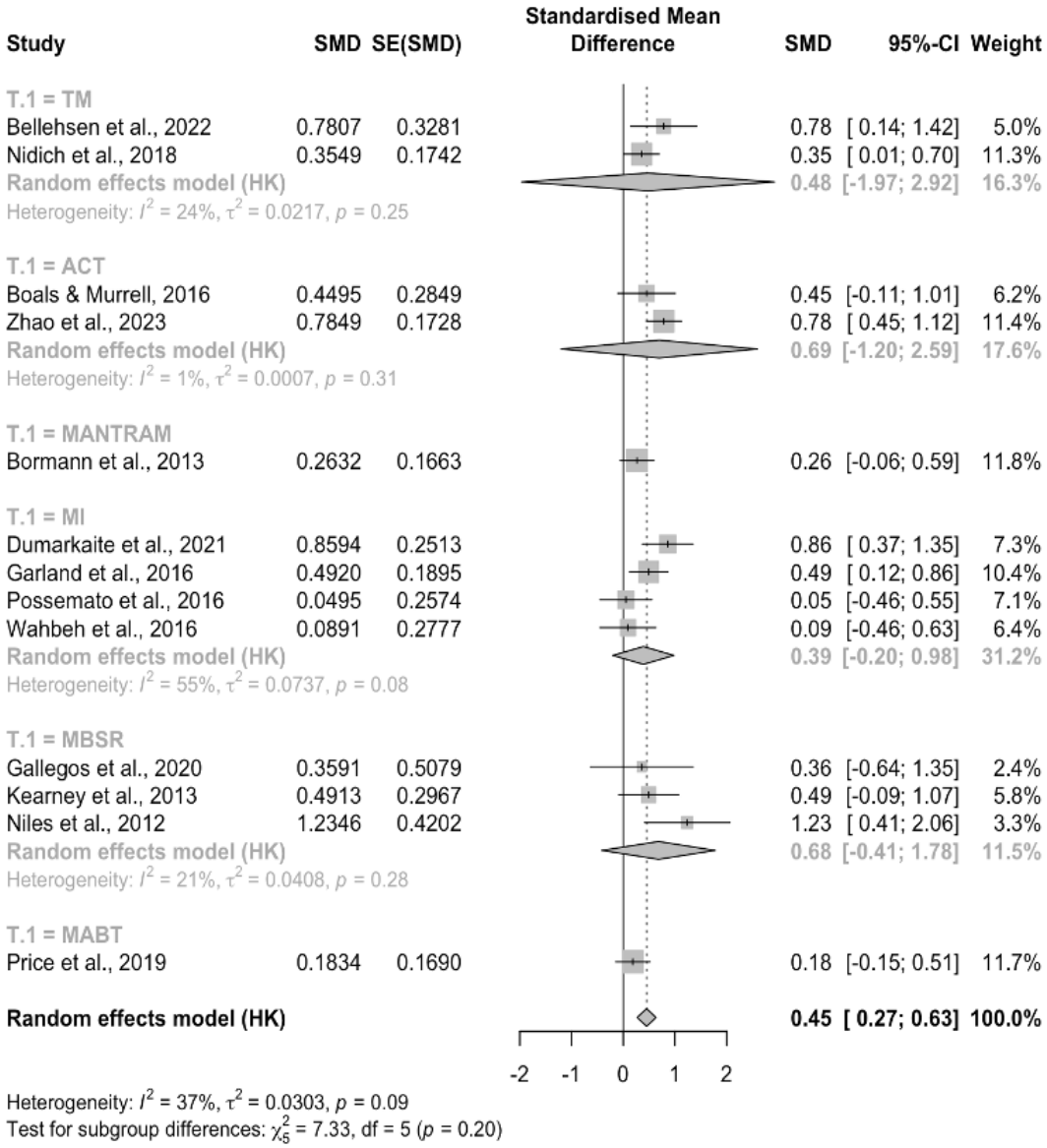
A subgroup analysis (Figure 6) grouped interventions into Transcendental Meditation (TM), Acceptance and Commitment Therapy (ACT), MBSR, and a general "mindfulness interventions" (MI) category:

- **TM (n = 2):** Medium pooled effect, SMD = 0.48 (95% CI [−1.97, 2.92]), I^2 = 24%
- **ACT (n = 2):** Medium-large effect, SMD = 0.69 (95% CI [−1.20, 2.59]), I^2 = 1%
- **MBSR (n = 3):** Medium-large effect, SMD = 0.68 (95% CI [−0.41, 1.78]), I^2 = 21%
- **MI (n = 6):** Small effect, SMD = 0.39 (95% CI [−0.20, 0.98]), I^2 = 55%

Mantram Repetition (n = 1) and MABT (n = 1) each appeared in only one study, so no pooled effects were calculated for these categories.

Figure 6

Forest Plot of PTSD Measure Post-treatment Condition Control versus Treatment by Sub-group for MMBIs



Note. SMD = standardized mean differences, 95-%CI = 95% Confidence Interval

Psychedelic-Assisted Psychotherapies (PAP). Nine PAP studies were included in the main analysis (Table 4, Figure 7). A random-effects model demonstrated a significant medium effect size (SMD=0.54; 95% CI [0.32, 0.76], p < 0.001; prediction interval 0.28–0.80). Heterogeneity was negligible (I^2 = 0.0%, Q(8) = 5.80, p = 0.67), and no studies were identified as outliers. Four trials

showed statistically significant intervention effects (Feder, 2021; Mitchell, 2023; Mithoefer, 2018, 2011). Egger's test did not suggest publication bias (p = 0.23), although power was limited (k < 10).

Table 4

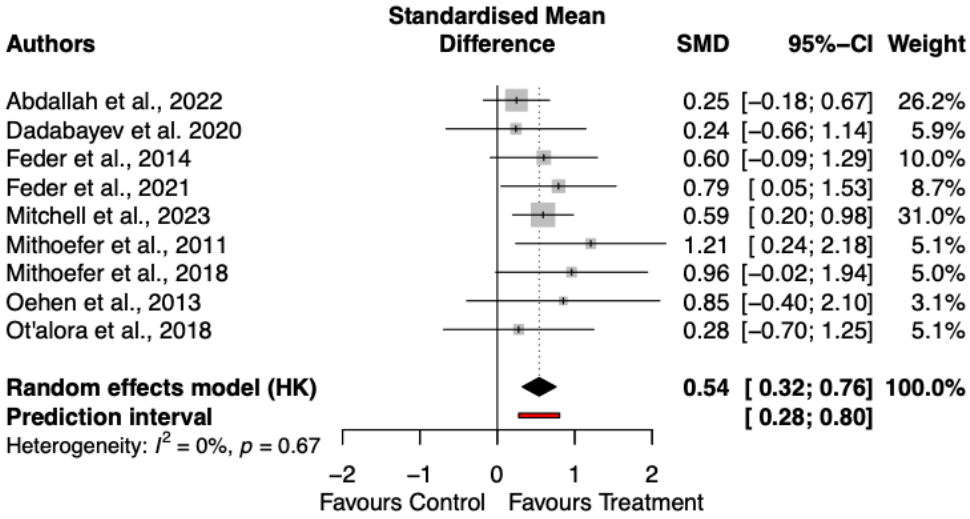
Standardized Mean Differences at Post Treatment for PAP

	Control Group			PAP			SMD	[95% CI]
Study	n	M	SD	n	M	SD		
Abdallah et al., 2022	44	27.34	20.25	41	22.54	17.98	0.25	[-0.18, 0.67]
Dadabayev et al., 2020	9	33.67	20.43	10	28.22	22.6	0.24	[-0.66, 1-14]
Feder et al., 2014	15	36.32	13.73	19	25.76	19.4	0.60	[-0.09, 1.29]
Feder et al., 2021	15	33.2	11.8	15	22.5	14.4	0.79	[0.05, 1.53]
Mitchell et al., 2023	51	23.3	12.79	53	15.8	12.4	0.59	[0.20, 0.98]
Mithoefer et al., 2011	8	59.1	26.59	12	25.5	36.67	1.21	[0.24, 2.18]
Mithoefer et al., 2018	7	76	23.4	12	45.3	33.8	0.96	[-0.02, 1.94]
Oehen et al., 2013	4	66.5	7.6	8	50.8	19.7	0.84	[-0.40, 2.10]
Ot'alora et al., 2018	6	73.3	24.5	13	64.3	33.6	0.28	[-0.70, 1.25]

Note. M = Mean, n = number of participants, SMD = standardized mean differences, 95% CI = 95% Confidence Interval

Figure 7

Forest Plot of PTSD Measure Post-Treatment, Condition Control versus Treatment for PAP



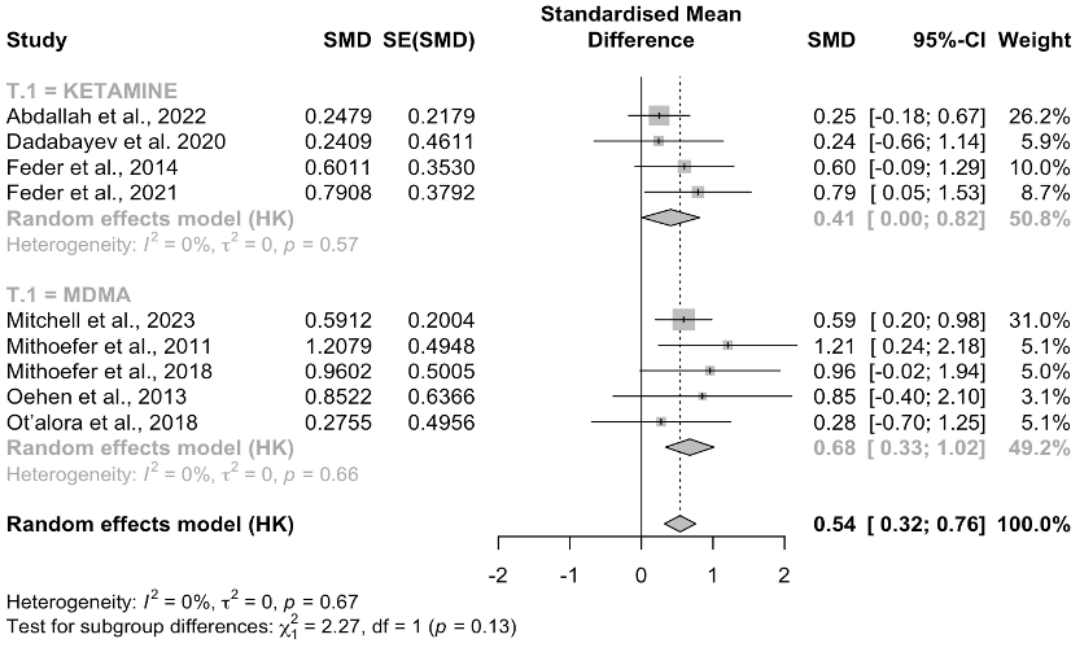
Note. SMD = standardized mean differences, 95-%CI = 95% Confidence Interval

A subgroup analysis (Figure 8) separating PAP by substance (ketamine vs. MDMA) revealed:

- **Ketamine (n = 4):** Small-to-moderate effect, SMD=0.41 (95% CI [0.00, 0.82]), I^2 = 0%
- **MDMA (n = 5):** Moderate effect, SMD=0.68 (95% CI [0.33, 1.02]), I^2 = 0%

Figure 8

Forest Plot of PTSD Measure Post-treatment Condition Control versus Treatment by Sub-groups for PAP



Note. SMD = standardized mean differences, 95-%CI = 95% Confidence Interval

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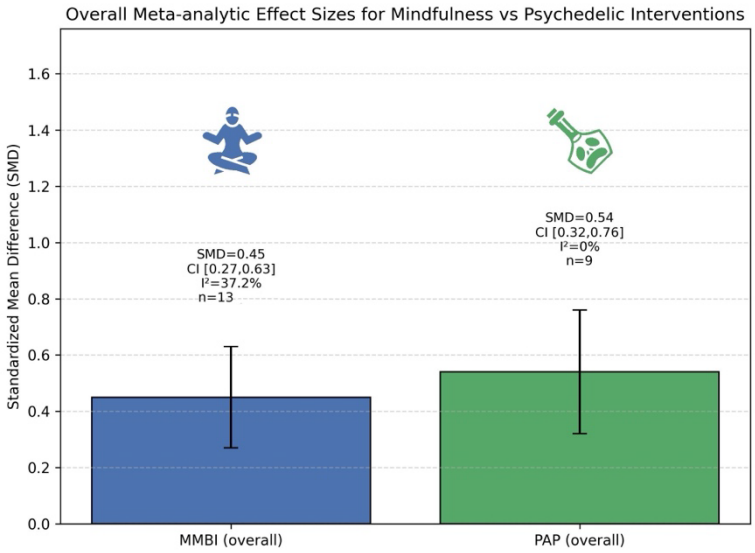
For a summary of the results, please refer to Figure 9

Figure 9

Overall Meta-analytic Effect Sizes for Mindfulness vs Psychedelic Interventions



Note. Bars represent overall standardized mean differences (SMD) for mindfulness meditation-based interventions (MMBIs) and psychedelic-assisted psychotherapy (PAP) on PTSD symptoms. Error bars denote 95 % confidence intervals; I^2 and n denote heterogeneity and number of studies, respectively.

Discussion

This meta-analysis synthesized findings from 22 randomized controlled trials (RCTs), 13 examining Mindfulness-Based Interventions (MBIs) and 9 investigating Psychedelic-Assisted Psychotherapies (PAP), to assess their effects on post-traumatic stress disorder (PTSD) symptoms in adults. Both MBIs and PAP demonstrated moderate effect sizes overall, suggesting clinically meaningful reductions in PTSD symptomatology.

Across the 13 included MBI studies, Mindfulness-Based Stress Reduction (MBSR) and Acceptance and Commitment Therapy (ACT) yielded moderate to large effect sizes, while Transcendental Meditation (TM) and Motivational Interviewing (MI) showed small to moderate effects. These results align with prior meta-analyses that likewise report significant symptom improvements in PTSD populations (Gallegos, 2017; Goldberg, 2020; Hilton, 2017; Hopwood, 2017; Liu, 2022; Sun, 2021; Taylor, 2020).

All nine PAP trials produced moderate effect sizes. MDMA showed moderate to large effects, aligning with other systematic reviews (Yao et al., 2024). Ketamine demonstrated moderate efficacy, consistent with recent analyses (Albuquerque et al., 2022; Almeida, 2024; Sicignano, 2024). Notably,

PAP studies displayed lower heterogeneity, potentially reflecting more standardized protocols (e.g., active/placebo controls, uniform dosing schedules) and tightly defined clinical populations.

MBIs were an important part of the evidence base in this review. Although PAP produced a slightly larger overall effect (SMD ≈ 0.54, with MDMA ≈ 0.68 and ketamine ≈ 0.41), MBIs showed a statistically significant moderate effect size on PTSD symptoms (SMD ≈ 0.45; 95 % CI 0.27–0.63). Six of the thirteen mindfulness trials included in the meta-analysis reported significant reductions in PTSD symptoms, with low publications bias detected. Mindfulness also cultivates skills, such as self-regulation, emotional awareness and resilience, that may promote long-term recovery and complement other treatments. In this review, both interventions were hypothesized to work partly through altered states of consciousness, yet mindfulness achieves these states through meditative practice rather than pharmacology, posing fewer medical risks. Thus, although MDMA-assisted therapy showed the largest individual effect size, the accessibility, safety and holistic benefits of mindfulness-based interventions make them a crucial component of the therapeutic landscape. Mindfulness programs are non-pharmacological, require minimal resources and can be delivered in diverse clinical or community settings.

Although MBI studies exhibited higher overall heterogeneity, this was not statistically significant after removing outliers. By contrast, PAP studies had consistently low heterogeneity. Confidence intervals also revealed critical nuances: several PAP studies had intervals that did not cross zero, reinforcing their robust effects; in contrast, many MBIs had intervals crossing zero, implying cautious interpretation of statistical significance.

Findings for MBIs mirror previous meta-analyses suggesting moderate efficacy (Gallegos, 2017; Goldberg, 2020; Sun, 2021). Specifically, TM and the Mantram Repetition Program (MRP) have shown promise in high-exposure populations, such as veterans. For PAP, this review corroborates moderate to large effects of MDMA on PTSD outcomes, consistent with Yao et al., 2024 (Yao et al., 2024) and moderate effects of ketamine, paralleling prior work (Almeida, 2024; Sicignano, 2024). However, many PAP trials relied on pre–post comparisons, highlighting a need for more extensive research to clarify long-term outcomes.

Several limitations warrant caution. First, restricting participants to adults limits extrapolation to younger populations. Second, including only RCTs, though improving methodological rigor, excludes valuable data from other designs. Third, analyses only considered studies published in English or French, potentially omitting relevant international research. Fourth, interventions focusing on body-centered activities (e.g., yoga, tai chi) were intentionally excluded to isolate meditation-specific MBIs. Fifth, notable ketamine studies integrating mindfulness (Pradhan et al., 2017, 2018) were omitted to

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maintain clear MBI-PAP delineations, leaving open questions about synergy between psychedelics and mindfulness training.

Variability in control groups further complicates comparisons; PAP studies generally had more consistent placebo designs, whereas suitable placebos are challenging to implement for MBIs. Finally, most studies did not distinguish PTSD from Complex PTSD (C-PTSD), and only one study explicitly addressed C-PTSD. Given recognized differences in symptom profiles, such omissions limit the specificity of these findings. During post-hoc verification, we discovered that one of the primary studies incorporated into our pooled dataset, (Mithoefer, 2019) Mithoefer et al. (2019), “MDMA-assisted psychotherapy for PTSD: A pooled analysis of phase 2 trials”, had been formally retracted after we had completed data extraction and the meta-analytic computations. Because the retraction notice was issued only once the analytic pipeline had been finalised, the study’s effect-size estimates remain embedded in the aggregate results presented herein. The continued inclusion of a retracted article constitutes a potential source of bias and may attenuate the evidential strength of our conclusions. This issue is therefore explicitly flagged to preserve methodological transparency and it is recommended that readers interpret findings influenced by this dataset with commensurate caution. Future updates and independent replications should exclude the retracted study outright or, at minimum, subject the pooled estimates to rigorous sensitivity analyses quantifying its impact on overall effect sizes. (see the Retraction Note document for the reasons in (Mithoefer, 2019).

Risks of bias varied notably between MBI and PAP studies. MBIs generally lacked double blinding, increasing susceptibility to biases in outcome assessment. PAP trials were frequently double-blinded and employed rigorous controls, reflecting heightened regulatory scrutiny around psychedelics. Future investigations should endeavor to:

1. Incorporate more diverse populations, including adolescents and non-Western cohorts.
2. Extend follow-up intervals (≥ 3–6 months) to evaluate lasting effects.
3. Distinguish PTSD from C-PTSD using ICD-11 criteria.
4. Explore the therapeutic impact of group-based formats and environmental influences.
5. Examine biological and sociocultural moderators, such as sex/gender and cultural context.

Despite methodological constraints, findings offer encouraging news for practitioners and policymakers. Both MBIs and PAP appear to reduce PTSD symptom severity, though PAP, particularly MDMA, showed slightly higher effect sizes and generally lower risk of bias. However, PAP remains limited by regulatory status, requiring trained clinicians and controlled settings. MBIs are comparatively accessible and cost-effective, potentially bridging mental healthcare gaps in

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underserved areas. An optimal care model may combine the accessibility of MBIs with the potent, rapid symptom relief of PAP, tailored to patient preference and clinical need.

In conclusion, this meta-analysis highlights moderate effectiveness for both Mindfulness-Based Interventions (MBIs) and Psychedelic-Assisted Psychotherapies (PAP) in mitigating PTSD symptoms among adults, with PAP (especially MDMA) exhibiting slightly stronger effects. Nonetheless, MBIs remain advantageous due to broader accessibility, non-pharmacological nature, and cost-effectiveness. The review notes that MBIs are “comparatively accessible and cost-effective,” allowing them to bridge mental-healthcare gaps in underserved areas. Unlike psychedelic therapies, which must be administered by trained clinicians in controlled environments due to regulatory and safety considerations, mindfulness practices can be taught in group formats or even remotely, making them scalable and widely disseminable.

Future research should extend the follow-up window, explore potential adverse events, and incorporate sociocultural and biological moderators. Efforts to differentiate PTSD and C-PTSD, investigate altered states of consciousness, and integrate advanced training in psychedelic psychotherapy may further refine clinical approaches. Overall, these findings underscore a promising therapeutic landscape, advocating for continued trials on MDMA, ketamine, and other emerging agents, as well as for the widespread dissemination of MBIs to enhance patient access and expand evidence-based options for PTSD care.

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Authors' contributions: All authors contributed to the present manuscript. Each author has made substantial contributions to the conception OR design of the work; OR the acquisition, analysis, OR interpretation of data; OR have drafted the work or substantively revised it AND has approved the submitted version (and any substantially modified version that involves the author's contribution to the study); AND has agreed both to be personally accountable for the author's own contributions and ensures that questions related to the accuracy or integrity of any part of the work, even ones in which the author was not personally involved, are appropriately investigated, resolved, and the resolution documented in the literature.

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Références

1. Abdallah, C. G., Roache, J. D., Gueorguieva, R., Averill, L. A., Young-McCaughan, S., Shiroma, P. R., Purohit, P., Brundige, A., Murff, W., Ahn, K.-H., Sherif, M. A., Baltutis, E. J., Ranganathan, M., D'Souza, D., Martini, B., Southwick, S. M., Petrakis, I. L., Burson, R. R., Guthmiller, K. B., … Krystal, J. H. . (2022). Dose-related effects of ketamine for antidepressant-resistant symptoms of posttraumatic stress disorder in veterans and active duty military : A double-blind, randomized, placebo-controlled multi-center clinical trial. *Neuropsychopharmacology: Official Publication of the American College of Neuropsychopharmacology*, *47*(8), 1574-1581. https://doi.org/https://doi.org/10.1038/s41386-022-01266-9
2. Afari, N., Ahumada, S. M., Wright, L. J., Mostoufi, S., Golnari, G., Reis, V., & Cuneo, J. G. (2014). Psychological trauma and functional somatic syndromes: a systematic review and meta-analysis. *Psychosom Med*, *76*(1), 2–11. https://doi.org/10.1097/PSY.0000000000000010
3. Albuquerque, T. R., Macedo, L. F. R., Delmondes, G. A., Rolim Neto, M. L., Almeida, T. M., Uchida, R. R., Cordeiro, Q., Lisboa, K., & Menezes, I. R. A. (2022). Evidence for the beneficial effect of ketamine in the treatment of patients with post-traumatic stress disorder: A systematic review and meta-analysis. *J Cereb Blood Flow Metab*, *42*(12), 2175–2187. https://doi.org/10.1177/0271678X221116477
4. Almeida, T. M., Lacerda da Silva, U. R., Pires, J. P., Borges, I. N., Martins, C. R. M., Cordeiro, Q., & Uchida, R. R. (2024). Effectiveness of ketamine for the treatment of post-traumatic stress disorder: A systematic review and meta-analysis. *Clinical Neuropsychiatry*, *21*(1), 22-31. https://doi.org/https://doi.org/10.36131/cnfioritieditore20240102
5. Alpert, M. D., O'Donnell, K. C., Paleos, C. A., Sola, E., Stauffer, C. S., Wagner, A. C., Nicholas, C. R., & Mithoefer, M. C. (2024). Psychotherapy in psychedelic treatment: safe, evidence-based, and necessary. *The American journal of psychiatry*, *181*(1), 76–77. https://doi.org/https://doi.org/10.1176/appi.ajp.20230665
6. American Psychiatric Association. (2022). *Diagnostic and statistical manual of mental disorders: DSM-5-TR™* (5th ed., text rev ed.). https://doi.org/https://doi.org/10.1176/appi.books.9780890425787
7. American Psychological, A. (2002). Criteria for evaluating treatment guidelines. *American Psychologist*, *57*(12), 1052–1059. https://doi.org/10.1037/0003-066X.57.12.1052
8. Banks, K., Newman, E., & Saleem, J. (2015). An overview of the research on mindfulness-based interventions for treating symptoms of posttraumatic stress disorder: a systematic

review: mindfulness and ptsd. *Journal of Clinical Psychology*, *71*(10), 935–963. https://doi.org/10.1002/jclp.22200

9. Bellehsen, M., Stoycheva, V., Cohen, B. H., & Nidich, S. . (2022). A pilot randomized controlled trial of Transcendental Meditation as treatment for posttraumatic stress disorder in veterans. *Journal of Traumatic Stress*, *35*(1), 22-31. https://doi.org/https://doi.org/10.1002/jts.22665
10. Belsher, B. E., Beech, E., Evatt, D., Smolenski, D. J., Shea, M. T., Otto, J. L., Rosen, C. S., & Schnurr, P. P. (2019). Present-centered therapy (PCT) for post-traumatic stress disorder (PTSD) in adults. *The Cochrane Database of Systematic Reviews*, *2019*(11), CD012898. https://doi.org/https://doi.org/10.1002/14651858.CD012898.pub2
11. Benjet, C., Bromet, E., Karam, E. G., Kessler, R. C., McLaughlin, K. A., Ruscio, A. M., Shahly, V., Stein, D. J., Petukhova, M., Hill, E., Alonso, J., Atwoli, L., Bunting, B., Bruffaerts, R., Caldas-de-Almeida, J. M., de Girolamo, G., Florescu, S., Gureje, O., Huang, Y., … Koenen, K. C. (2016). The epidemiology of traumatic event exposure worldwide : Results from the World Mental Health Survey Consortium. *Psychological Medicine*, *46*(2), 327-343. https://doi.org/https://doi.org/10.1017/S0033291715001981
12. Bisson, J. I., Cosgrove, S., Lewis, C., & Robert, N. P. (2015). Post-traumatic stress disorder. *BMJ (Clinical research ed.)*, *351*, h6161. https://doi.org/https://doi.org/10.1136/bmj.h6161
13. Blevins, C. A., Weathers, F. W., Davis, M. T., Witte, T. K., & Domino, J. L. (2015). The posttraumatic stress disorder checklist for DSM-5 (PCL-5) : Development and initial psychometric evaluation. *Journal of Traumatic Stress*, *28*(6), 489-498. https://doi.org/https://doi.org/10.1002/jts.22059
14. Boals, A., & Murrell, A. R. (2016). I am > trauma : Experimentally reducing event centrality and PTSD symptoms in a clinical trial. *Journal of Loss and Trauma*, *21*(6), 471-483. https://doi.org/https://doi.org/10.1080/15325024.2015.1117930
15. Bogenschutz, M. P., Forcehimes, A. A., Pommy, J. A., Wilcox, C. E., Barbosa, P. C. R., & Strassman, R. J. . (2015). Psilocybin-assisted treatment for alcohol dependence : A proof-of-concept study. *Journal of Psychopharmacology (Oxford, England)*, *29*(3), 289-299. https://doi.org/https://doi.org/10.1177/0269881114565144
16. Bormann, J. E. (2005). Frequent, silent mantram repetition. *Topics in Emergency Medicine*, *27*(2), 163–166. https://doi.org/https://www.acperesearch.net/Bormann.pdf
17. Bormann, J. E., Kane, J. J., & Oman, D. (2020). Mantram repetition : A portable practice for being mindful. *Mindfulness*, *11*(8), 2031-2033. https://doi.org/https://doi.org/10.1007/s12671-020-01440-4

18. Bormann, J. E., Oman, D., Walter, K. H., & Johnson, B. D. . (2014). Mindful attention increases and mediates psychological outcomes following mantram repetition practice in veterans with posttraumatic stress disorder. *Medical Care*, *52*(12), S13–18. https://doi.org/https://doi.org/10.1097/MLR.0000000000000200
19. Bormann, J. E., Thorp, S. R., Smith, E., Glickman, M., Beck, D., Plumb, D., Zhao, S., Ackland, P. E., Rodgers, C. S., Heppner, P., Herz, L. R., & Elwy, A. R. (2018). Individual treatment of posttraumatic stress disorder using mantram repetition : A randomized clinical trial. *The American Journal of Psychiatry*, *175*(10), 979-988. https://doi.org/https://doi.org/10.1176/appi.ajp.2018.17060611
20. Bormann, J. E., Thorp, S. R., Wetherell, J. L., Golshan, S., & Lang, A. J. (2013). Meditation-based mantram intervention for veterans with posttraumatic stress disorder : A randomized trial. *Trauma-Theory Research Practice and Policy*, *5*(3), 259-267. https://doi.org/https://doi.org/10.1037/a0027522
21. Bormann, J. E., Thorp, S., Wetherell, J. L., & Golshan, S. (2008). A spiritually based group intervention for combat veterans with posttraumatic stress disorder : Feasibility study. *Journal of Holistic Nursing: Official Journal of the American Holistic Nurses' Association*, *26*(2), 109-116. https://doi.org/https://doi.org/10.1177/0898010107311276
22. Boyd, J. E., Lanius, R. A., & McKinnon, M. C. (2018). Mindfulness-based treatments for posttraumatic stress disorder : A review of the treatment literature and neurobiological evidence. *Journal of Psychiatry & Neuroscience : JPN*, *43*(1), 7-25. https://doi.org/https://doi.org/10.1503/jpn.170021
23. Breeksema, J. J., Kuin, B. W., Kamphuis, J., van den Brink, W., Vermetten, E., & Schoevers, R. A. . (2022). Adverse events in clinical treatments with serotonergic psychedelics and MDMA : A mixed-methods systematic review. *Journal of Psychopharmacology*, *36*(10), 1100-1117. https://doi.org/https://doi.org/10.1177/02698811221116926
24. Burri, A., & Maercker, A. (2014). Differences in prevalence rates of PTSD in various European countries explained by war exposure, other trauma and cultural value orientation. *BMC Research Notes*, *7*, 407. https://doi.org/https://doi.org/10.1186/1756-0500-7-407
25. Carhart-Harris, R. L., & Friston, K. J. . (2019). REBUS and the anarchic brain : Toward a unified model of the brain action of psychedelics. *Pharmacological Reviews*, *71*(3), 316-344. https://doi.org/https://doi.org/10.1124/pr.118.017160
26. Carhart-Harris, R. L., & Goodwin, G. M. (2017). The therapeutic potential of psychedelic drugs : Past, present, and future. *Neuropsychopharmacology: Official Publication of the*

American College of Neuropsychopharmacology, *42*(11), 2105-2113. https://doi.org/https://doi.org/10.1038/npp.2017.84

27. Carhart-Harris, R. L., Erritzoe, D., Haijen, E., Kaelen, M., & Watts, R. (2018). Psychedelics and connectedness. *Psychopharmacology*, *235*(2), 547-550. https://doi.org/https://doi.org/10.1007/s00213-017-4701-y
28. Colcott, J., Guerin, A. A., Carter, O., Meikle, S., & Bedi, G. (2024). Side-effects of mdma-assisted psychotherapy : A systematic review and meta-analysis. *Neuropsychopharmacology: Official Publication of the American College of Neuropsychopharmacology*, *49*(8), 1208-1226. https://doi.org/https://doi.org/10.1038/s41386-024-01865-8
29. Cramer, H., Anheyer, D., Saha, F. J., & Dobos, G. (2018). Yoga for posttraumatic stress disorder: A systematic review and meta-analysis. *BMC Psychiatry*, *18*(1), 72. https://doi.org/https://doi.org/10.1186/s12888-018-1650-x
30. Cusack, K., Jonas, D. E., Forneris, C. A., Wines, C., Sonis, J., Middleton, J. C., Feltner, C., Brownley, K. A., Olmsted, K. R., Greenblatt, A., Weil, A., & Gaynes, B. N. (2016). Psychological treatments for adults with posttraumatic stress disorder : A systematic review and meta-analysis. *Clinical Psychology Review*, *43*, 128-141. https://doi.org/https://doi.org/10.1016/j.cpr.2015.10.003
31. Dadabayev, A. R., Joshi, S. A., Reda, M. H., Lake, T., Hausman, M. S., Domino, E., & Liberzon, I. . (2020). Low dose ketamine infusion for comorbid posttraumatic stress disorder and chronic pain : A randomized double-blind clinical trial. *Chronic Stress (Thousand Oaks, Calif.)*, *4*, 2470547020981670. https://doi.org/https://doi.org/10.1177/2470547020981670
32. Davis, L., Chik, W., Thomas, S., Kumar, S., & Sivagangabalan, G. (2022). EHRA expert consensus statement and practical guide on optimal implantation technique for conventional pacemakers and implantable cardioverter-defibrillators: endorsed by the Heart Rhythm Society (HRS), the Asia Pacific Heart Rhythm Society (APHRS), and the Latin-American Heart Rhythm Society (LAHRS)-a role for post-operative ultrasound? *Europace*, *24*(3), 523. https://doi.org/10.1093/europace/euab263
33. de Moraes Costa, G., Zanatta, F. B., Ziegelmann, P. K., Soares Barros, A. J., & Mello, C. F. (2020). Pharmacological treatments for adults with post-traumatic stress disorder : A network meta-analysis of comparative efficacy and acceptability. *Journal of Psychiatric Research*, *130*, 412-420. https://doi.org/https://doi.org/10.1016/j.jpsychires.2020.07.046

34. Doblin, R. E., Christiansen, M., Jerome, L., & Burge, B. . (2019). The past and future of psychedelic science : An introduction to this issue. *Journal of Psychoactive Drugs*, *51*(2), 93-97. https://doi.org/https://doi.org/10.1080/02791072.2019.1606472
35. Dore, J., Turnipseed, B., Dwyer, S., Turnipseed, A., Andries, J., Ascani, G., Monnette, C., Huidekoper, A., Strauss, N., & Wolfson, P. (2019). Ketamine Assisted Psychotherapy (KAP) : Patient demographics, clinical data and outcomes in three large practices administering ketamine with psychotherapy. *Journal of Psychoactive Drugs*, *51*(2), 189-198. https://doi.org/https://doi.org/10.1080/02791072.2019.1587556
36. dos Santos, R. G., Balthazar, F. M., Bouso, J. C., & Hallak, J. E. (2016). The current state of research on ayahuasca : A systematic review of human studies assessing psychiatric symptoms, neuropsychological functioning, and neuroimaging. *Journal of Psychopharmacology*, *30*(12), 1230-1247. https://doi.org/https://doi.org/10.1177/0269881116652578
37. Dumarkaite, A., Truskauskaite-Kuneviciene, I., Andersson, G., Mingaudaite, J., & Kazlauskas, E. (2021). Effects of mindfulness-based internet intervention on ICD-11 posttraumatic stress disorder and complex posttraumatic stress disorder symptoms: A pilot randomized controlled trial. *Mindfulness*, *12*(11), 2754-2766. https://doi.org/https://doi.org/10.1007/s12671-021-01739-w
38. Feder, A., Costi, S., Rutter, S. B., Collins, A. B., Govindarajulu, U., Jha, M. K., Horn, S. R., Kautz, M., Corniquel, M., Collins, K. A., Bevilacqua, L., Glasgow, A. M., Brallier, J., Pietrzak, R. H., Murrough, J. W., & Charney, D. S. . (2021). A randomized controlled trial of repeated ketamine administration for chronic posttraumatic stress disorder. *The American Journal of Psychiatry*, *178*(2), 193-202. https://doi.org/https://doi.org/10.1176/appi.ajp.2020.20050596
39. Feder, A., Parides, M. K., Murrough, J. W., Perez, A. M., Morgan, J. E., Saxena, S., Kirkwood, K., Aan Het Rot, M., Lapidus, K. A. B., Wan, L.-B., Iosifescu, D., & Charney, D. S. (2014). Efficacy of intravenous ketamine for treatment of chronic posttraumatic stress disorder : A randomized clinical trial. *JAMA Psychiatry*, *71*(6), 681-688. https://doi.org/https://doi.org/10.1001/jamapsychiatry.2014.62
40. Franco Corso, S. J., O'Malley, K. Y., Subaiya, S., Mayall, D., & Dakwar, E. (2023). The role of non-ordinary states of consciousness occasioned by mind-body practices in mental health illness. *Journal of Affective Disorders*, *335*, 166-176. https://doi.org/https://doi.org/10.1016/j.jad.2023.04.116
41. Gallegos, A. M., Crean, H. F., Pigeon, W. R., & Heffner, K. L. (2017). Meditation and yoga for posttraumatic stress disorder : A meta-analytic review of randomized controlled trials.

Clinical Psychology Review, *58*, 115-124. https://doi.org/https://doi.org/10.1016/j.cpr.2017.10.004

42. Garland, E. L., Roberts-Lewis, A., Tronnier, C. D., Graves, R., & Kelley, K. . (2016). Mindfulness-oriented recovery enhancement versus CBT for cooccurring substance dependence, traumatic stress, and psychiatric disorders: Proximal outcomes from a pragmatic randomized trial. *Behaviour Research and Therapy*, *77*, 7-16. https://doi.org/https://doi.org/10.1016/j.brat.2015.11.012
43. Gasser, P., Holstein, D., Michel, Y., Doblin, R., Yazar-Klosinski, B., Passie, T., & Brenneisen, R. (2014). Safety and efficacy of lysergic acid diethylamide-assisted psychotherapy for anxiety associated with life-threatening diseases. *Journal of Nervous & Mental Disease*, *202*(7), 513-520. https://doi.org/https://doi.org/10.1097/NMD.0000000000000113
44. Goldberg, S. B., Riordan, K. M., Sun, S., Kearney, D. J., & Simpson, T. L. . (2020). Efficacy and acceptability of mindfulness-based interventions for military veterans : A systematic review and meta-analysis. . *Journal of Psychosomatic Research*, *138*, 110232. https://doi.org/https://doi.org/10.1016/j.jpsychores.2020.110232
45. Gu, W., Wang, C., Li, Z., Wang, Z., & Zhang, X. (2016). Pharmacotherapies for posttraumatic stress disorder : A meta-analysis. *The Journal of Nervous and Mental Disease*, *204*(5), 331. https://doi.org/https://doi.org/10.1097/NMD.0000000000000478
46. Henner, R. L., Keshavan, M. S., & Hill, K. P. (2022). Review of potential psychedelic treatments for PTSD. *Journal of the Neurological Sciences*, *439*, 120302. https://doi.org/https://doi.org/10.1016/j.jns.2022.120302
47. Higgins, J. P., Li, T., & Deeks, J. J. . (2019). Choosing effect measures and computing estimates of effect. In *Cochrane Handbook for Systematic Reviews of Interventions* (pp. 143-176). John Wiley & Sons, Ltd. https://doi.org/https://doi.org/10.1002/9781119536604.ch6
48. Hilton, L., Maher, A. R., Colaiaco, B., Apaydin, E., Sorbero, M. E., Booth, M., Shanman, R. M., & Hempel, S. . (2017). Meditation for posttraumatic stress : Systematic review and meta-analysis. *Psychological Trauma: Theory, Research, Practice and Policy*, *9*(4), 453-460. https://doi.org/https://doi.org/10.1037/tra0000180
49. Holas, P., & Kaminska, J. (2023). Mindfulness meditation and psychedelics: potential synergies and commonalities. *Pharmacol Rep*, *75*(6), 1398–1409. https://doi.org/10.1007/s43440-023-00551-8
50. Hoppen, T. H., Kip, A., & Morina, N. . (2023). Are psychological interventions for adult PTSD more efficacious and acceptable when treatment is delivered in higher frequency? A meta-

analysis of randomized controlled trials. *Journal of Anxiety Disorders*, *95*, 102684. https://doi.org/https://doi.org/10.1016/j.janxdis.2023.102684

51. Hopwood, T. L., & Schutte, N. S. (2017). A meta-analytic investigation of the impact of mindfulness-based interventions on post traumatic stress. *Clinical Psychology Review*, *57*, 12-20. https://doi.org/https://doi.org/10.1016/j.cpr.2017.08.002
52. Imel, Z. E., Laska, K., Jakupcak, M., & Simpson, T. L. . (2013). Meta-analysis of dropout in treatments for posttraumatic stress disorder. *Journal of Consulting and Clinical Psychology*, *81*(3), 394-404. https://doi.org/https://doi.org/10.1037/a0031474
53. Inserra, A. (2018). Hypothesis: The psychedelic ayahuasca heals traumatic memories via a sigma 1 receptor-mediated epigenetic-mnemonic process. *Frontiers in Pharmacology*, *9*, 330. https://doi.org/https://doi.org/10.3389/fphar.2018.00330
54. Kabat-Zinn, J. (2003). Mindfulness-based interventions in context : Past, present, and future. *Clinical Psychology: Science and Practice*, *10*(2), 144-156. https://doi.org/https://doi.org/10.1093/clipsy.bpg016
55. Kang, S. S., Sponheim, S. R., & Lim, K. O. . (2022). Interoception underlies therapeutic effects of mindfulness meditation for posttraumatic stress disorder : A randomized clinical trial. *Biological Psychiatry: Cognitive Neuroscience and Neuroimaging*, *7*(8), 793-804. https://doi.org/https://doi.org/10.1016/j.bpsc.2021.10.005
56. Kaplan, J., Somohano, V. C., Zaccari, B., & O'Neil, M. E. (2023). Randomized controlled trials of mind-body interventions for posttraumatic stress disorder : A systematic review. *Frontiers in Psychology*, *14*, 1219296. https://doi.org/https://doi.org/10.3389/fpsyg.2023.1219296
57. Karatzias, T., Murphy, P., Cloitre, M., Bisson, J., Roberts, N., Shevlin, M., Hyland, P., Maercker, A., Ben-Ezra, M., Coventry, P., Mason-Roberts, S., Bradley, A., & Hutton, P. (2019). Psychological interventions for ICD-11 complex PTSD symptoms : Systematic review and meta-analysis. *Psychological Medicine*, *49*(11), 1761-1775. https://doi.org/https://doi.org/10.1017/S0033291719000436
58. Kilpatrick, D. G., Resnick, H. S., Milanak, M. E., Miller, M. W., Keyes, K. M., & Friedman, M. J. . (2013). National estimates of exposure to traumatic events and PTSD prevalence using DSM-IV and DSM-5 criteria. *Journal of Traumatic Stress*, *26*(5), 537-547. https://doi.org/https://doi.org/10.1002/jts.21848
59. Koenen, K. C., Ratanatharathorn, A., Ng, L., McLaughlin, K. A., Bromet, E. J., Stein, D. J., Karam, E. G., Meron Ruscio, A., Benjet, C., Scott, K., Atwoli, L., Petukhova, M., Lim, C. C. W., Aguilar-Gaxiola, S., Al-Hamzawi, A., Alonso, J., Bunting, B., Ciutan, M., De Girolamo,

G.,…Kessler, R. C. (2017). Posttraumatic stress disorder in the world mental health surveys. *Psychological Medicine*, *47*(13), 2260–2274. https://doi.org/10.1017/S0033291717000708

60. Leiva-Bianchi, M., Nvo-Fernandez, M., Villacura-Herrera, C., Miño-Reyes, V., & Parra Varela, N. (2023). What are the predictive variables that increase the risk of developing a complex trauma? A meta-analysis. *Journal of Affective Disorders*, *343*, 153-165. https://doi.org/https://doi.org/10.1016/j.jad.2023.10.002
61. Liu, Q., Zhu, J., & Zhang, W. . (2022). The efficacy of mindfulness-based stress reduction intervention 3 for post-traumatic stress disorder (PTSD) symptoms in patients with PTSD : A meta-analysis of four randomized controlled trials. *Stress and Health*, *38*(4), 626-636. https://doi.org/https://doi.org/10.1002/smi.3138
62. Maia, J. M., de Oliveira, B. S. A., Branco, L. G. S., & Soriano, R. N. (2024). Therapeutic potential of psychedelics : History, advancements, and unexplored frontiers. *Progress in Neuro-Psychopharmacology & Biological Psychiatry*, *131*, 110951. https://doi.org/https://doi.org/10.1016/j.pnpbp.2024.110951
63. Martin, A., Naunton, M., Kosari, S., Peterson, G., Thomas, J., & Christenson, J. K. . (2021). Treatment guidelines for PTSD: A systematic review. *Journal of Clinical Medicine*, *10*(18), 4175. https://doi.org/https://doi.org/10.3390/jcm10184175
64. McGuinness, L. A., & Higgins, J. P. T. (2020). Risk-of-bias VISualization (robvis) : An R package and Shiny web app for visualizing risk-of-bias assessments. *Research Synthesis Methods*, *12*(1), 55–61. https://doi.org/ https://doi.org/10.1002/jrsm.1411
65. Mitchell, J. M., Bogenschutz, M., Lilienstein, A., Harrison, C., Kleiman, S., Parker-Guilbert, K., Ot'alora G, M., Garas, W., Paleos, C., Gorman, I., Nicholas, C., Mithoefer, M., Carlin, S., Poulter, B., Mithoefer, A., Quevedo, S., Wells, G., Klaire, S. S., van der Kolk, B., … Doblin, R. (2021). MDMA-assisted therapy for severe PTSD : A randomized, double-blind, placebo-controlled phase 3 study. *Nature Medicine*, *27*(6), 1025-1033. https://doi.org/https://doi.org/10.1038/s41591-021-01336-3
66. Mitchell, J. M., Ot'alora G, M., van der Kolk, B., Shannon, S., Bogenschutz, M., Gelfand, Y., Paleos, C., Nicholas, C. R., Quevedo, S., Balliett, B., Hamilton, S., Mithoefer, M., Kleiman, S., Parker-Guilbert, K., Tzarfaty, K., Harrison, C., de Boer, A., Doblin, R., Yazar-Klosinski, B., & MAPP2 Study Collaborator Group. (2023). MDMA-assisted therapy for moderate to severe PTSD : A randomized, placebo-controlled phase 3 trial. *Nature Medicine*, *29*(10), 2473-2480. https://doi.org/https://doi.org/10.1038/s41591-023-02565-4
67. Mithoefer, M. C., Feduccia, A. A., Jerome, L., Mithoefer, A., Wagner, M., Walsh, Z., Hamilton, S., Yazar-Klosinski, B., Emerson, A., & Doblin, R. . (2019). MDMA-assisted psychotherapy

for treatment of PTSD : Study design and rationale for phase 3 trials based on pooled analysis of six phase 2 randomized controlled trials. *Psychopharmacology*, *236*(9), 2735-2745. https://doi.org/https://doi.org/10.1007/s00213-019-05249-5

68. Mithoefer, M. C., Mithoefer, A. T., Feduccia, A. A., Jerome, L., Wagner, M., Wymer, J., Holland, J., Hamilton, S., Yazar-Klosinski, B., Emerson, A., & Doblin, R. (2018). 3,4-methylenedioxymethamphetamine (MDMA)-assisted psychotherapy for post-traumatic stress disorder in military veterans, firefighters, and police officers : A randomised, double-blind, dose-response, phase 2 clinical trial. *The Lancet. Psychiatry*, *5*(6), 486-497. https://doi.org/https://doi.org/10.1016/S2215-0366(18)30135-4
69. Mithoefer, M. C., Wagner, M. T., Mithoefer, A. T., Jerome, L., & Doblin, R. . (2011). The safety and efficacy of {+/-}3,4-methylenedioxymethamphetamine-assisted psychotherapy in subjects with chronic, treatment-resistant posttraumatic stress disorder : The first randomized controlled pilot study. *Journal of Psychopharmacology (Oxford, England)*, *25*(4), 439-452. https://doi.org/https://doi.org/10.1177/0269881110378371
70. Nichols, D. E. (2016). Psychedelics. *Pharmacological Reviews*, *68*(2), 264-355. https://doi.org/https://doi.org/10.1124/pr.115.011478
71. Nidich, S., Mills, P. J., Rainforth, M., Heppner, P., Schneider, R. H., Rosenthal, N. E., Salerno, J., Gaylord-King, C., & Rutledge, T. . (2018). Non-trauma-focused meditation versus exposure therapy in veterans with post-traumatic stress disorder : A randomised controlled trial. *The Lancet. Psychiatry*, *5*(12), 975-986. https://doi.org/https://doi.org/10.1016/S2215-0366(18)30384-5
72. Nidich, S., O'Connor, T., Rutledge, T., Duncan, J., Compton, B., Seng, A., & Nidich, R. . (2016). Reduced trauma symptoms and perceived stress in male prison inmates through the transcendental meditation program : A randomized controlled trial. *The Permanente Journal*, *20*(4), 16-17. https://doi.org/https://doi.org/10.7812/TPP/16-007
73. Nidich, S., Seng, A., Compton, B., O'connor, T., Salerno, J. W., & Nidich, R. . (2017). Transcendental meditation and reduced trauma symptoms in female inmates : A randomized controlled study. *The Permanente Journal*, *21*, 16-18. https://doi.org/https://doi.org/10.7812/TPP/16-008
74. Niles, B. L., Klunk-Gillis, J., Ryngala, D. J., Silberbogen, A. K., Paysnick, A., & Wolf, E. J. (2012). Comparing mindfulness and psychoeducation treatments for combat-related PTSD using a telehealth approach. *Psychological Trauma: Theory, Research, Practice, and Policy*, *4*(5), 538-547. https://doi.org/https://doi.org/10.1037/a0026161

75. Niles, B. L., Mori, D. L., Polizzi, C., Pless Kaiser, A., Weinstein, E. S., Gershkovich, M., & Wang, C. (2018). A systematic review of randomized trials of mind-body interventions for PTSD. *Journal of Clinical Psychology*, *74*(9), 1485-1508. https://doi.org/https://doi.org/10.1002/jclp.22634
76. Nour, M. M., Evans, L., Nutt, D., & Carhart-Harris, R. L. . (2016). Ego-dissolution and psychedelics : Validation of the Ego-Dissolution inventory (EDI). *Frontiers in Human Neuroscience*, *10*, 269. https://doi.org/https://doi.org/10.3389/fnhum.2016.00269
77. Nutt, D. (2019). Psychedelic drugs-a new era in
78. psychiatry? *Dialogues in Clinical Neuroscience*, *21*(2), 139-147. https://doi.org/https://doi.org/10.31887/DCNS.2019.21.2/dnutt
79. Oehen, P., & Gasser, P. (2022). Using a MDMA- and LSD-Group therapy model in clinical practice in Switzerland and highlighting the treatment of trauma-related disorders. . *Frontiers in Psychiatry*, *13*, 863552. https://doi.org/https://doi.org/10.3389/fpsyt.2022.863552
80. Oehen, P., Traber, R., Widmer, V., & Schnyder, U. (2013). A randomized, controlled pilot study of MDMA (± 3,4-Methylenedioxymethamphetamine)-assisted psychotherapy for treatment of resistant, chronic post-traumatic stress disorder (PTSD). *Journal of Psychopharmacology (Oxford, England)*, *27*(1), 40-52. https://doi.org/https://doi.org/10.1177/0269881112464827
81. Ot'alora G, M., Grigsby, J., Poulter, B., Van Derveer, J. W., Giron, S. G., Jerome, L., Feduccia, A. A., Hamilton, S., Yazar-Klosinski, B., Emerson, A., Mithoefer, M. C., & Doblin, R. (2018). 3,4-Methylenedioxymethamphetamine-assisted psychotherapy for treatment of chronic posttraumatic stress disorder : A randomized phase 2 controlled trial. *Journal of Psychopharmacology (Oxford, England)*, *32*(12), 1295-1307. https://doi.org/https://doi.org/10.1177/0269881118806297
82. Ozer, E. J., Best, S. R., Lipsey, T. L., & Weiss, D. S. (2008). Predictors of posttraumatic stress disorder and symptoms in adults : A meta-analysis. *Psychological Trauma: Theory, Research, Practice, and Policy*, *S*(1), 3-36. https://doi.org/https://doi.org/10.1037/1942-9681.S.1.3
83. Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., … Moher, D. (2021). The PRISMA 2020 statement : An updated guideline for reporting systematic reviews. *BMJ (Clinical Research Ed.)*, *372*, n71. https://doi.org/https://doi.org/10.1136/bmj.n71

84. Payne, J. E., Chambers, R., & Liknaitzky, P. (2021). Combining Psychedelic and Mindfulness Interventions: Synergies to Inform Clinical Practice. *ACS Pharmacol Transl Sci*, *4*(2), 416–423. https://doi.org/10.1021/acsptsci.1c00034
85. Pitman, R. K., Rasmusson, A. M., Koenen, K. C., Shin, L. M., Orr, S. P., Gilbertson, M. W., Milad, M. R., & Liberzon, I. (2012). Biological studies of post-traumatic stress disorder. *Nature Reviews Neuroscience*, *13*(11), 769-787. https://doi.org/https://doi.org/10.1038/nrn3339
86. Price, C. J., & Hooven, C. (2018). Interoceptive awareness skills for emotion regulation : Theory and approach of mindful awareness in body-oriented therapy (MABT). *Frontiers in Psychology*, *9*, 798. https://doi.org/https://doi.org/10.3389/fpsyg.2018.00798
87. Qassem, T., Aly-ElGabry, D., Alzarouni, A., Abdel-Aziz, K., & Arnone, D. (2021). Psychiatric co-morbidities in post-traumatic stress disorder : Detailed findings from the adult psychiatric morbidity survey in the English population. *Psychiatric Quarterly*, *92*(1), 321-330. https://doi.org/https://doi.org/10.1007/s11126-020-09797-4
88. Schincariol, A., Orru, G., Otgaar, H., Sartori, G., & Scarpazza, C. (2024). Posttraumatic stress disorder (PTSD) prevalence: an umbrella review. *Psychol Med*, *54*(15), 1–14. https://doi.org/10.1017/S0033291724002319
89. Schnurr, P. P., Hamblen, J. L., Wolf, J., Coller, R., Collie, C., Fuller, M. A., Holtzheimer, P. E., Kelly, U., Lang, A. J., McGraw, K., Morganstein, J. C., Norman, S. B., Papke, K., Petrakis, I., Riggs, D., Sall, J. A., Shiner, B., Wiechers, I., & Kelber, M. S. (2024). The management of posttraumatic stress disorder and acute stress disorder: Synopsis of the 2023 U.S. department of veterans affairs and U.S. department of defense clinical practice guideline. *Annals of Internal Medicine*, *177*(3), 363–374. https://doi.org/https://doi.org/10.7326/M23-2757
90. Schuman-Olivier, Z., Trombka, M., Lovas, D. A., Brewer, J. A., Vago, D. R., Gawande, R., Dunne, J. P., Lazar, S. W., Loucks, E. B., & Fulwiler, C. (2020). Mindfulness and behavior change. *Harvard Review of Psychiatry*, *28*(6), 371-394. https://doi.org/https://doi.org/10.1097/HRP.0000000000000277
91. Sherin, J. E., & Nemeroff, C. B. (2011). Post-traumatic stress disorder : The neurobiological impact of psychological trauma. *Dialogues in Clinical Neuroscience*, *13*(3), 263-278. https://doi.org/https://doi.org/10.31887/DCNS.2011.13.2/jsherin
92. Shulgin, A. T. (1986). The background and chemistry of MDMA. *J Psychoactive Drugs*, *18*(4), 291–304. https://doi.org/10.1080/02791072.1986.10472361
93. Sicignano, D. J., Kurschner, R., Weisman, N., Sedensky, A., Hernandez, A. V., & White, C. M. . (2024). The impact of ketamine for treatment of post-traumatic stress disorder : A

systematic review with meta-analyses. *Annals of Pharmacotherapy*, *58*(7), 669-677. https://doi.org/https://doi.org/10.1177/10600280231199666

94. Steenkamp, M. M., Litz, B. T., Hoge, C. W., & Marmar, C. R. . (2015). Psychotherapy for military-related PTSD : A review of randomized clinical trials. *JAMA*, *314*(5), 489-500. https://doi.org/https://doi.org/10.1001/jama.2015.8370
95. Sun, Z., Yu, C., Zhou, Y., & Liu, Z. (2021). Psychological interventions for healthcare providers with PTSD in life-threatening pandemic : Systematic review and meta-analysis. *Frontiers in Psychiatry*, *12*, 697783. https://doi.org/https://doi.org/10.3389/fpsyt.2021.697783
96. Taylor, J., McLean, L., Korner, A., Stratton, E., & Glozier, N. (2020). Mindfulness and yoga for psychological trauma : Systematic review and meta-analysis. *Journal of Trauma & Dissociation*, *21*(5), 536-573. https://doi.org/https://doi.org/10.1080/15299732.2020.1760167
97. Timmermann, C., Bauer, P. R., Gosseries, O., Vanhaudenhuyse, A., Vollenweider, F., Laureys, S., Singer, T., Mind and Life Europe (MLE) ENCECON Research Group, Antonova, E., & Lutz, A. (2023). A neurophenomenological approach to non-ordinary states of consciousness : Hypnosis, meditation, and psychedelics. *Trends in Cognitive Sciences*, *27*(2), 139-159. https://doi.org/https://doi.org/10.1016/j.tics.2022.11.006
98. van der Kolk, B. A., Stone, L., West, J., Rhodes, A., Emerson, D., Suvak, M., & Spinazzola, J. (2014). Yoga as an adjunctive treatment for posttraumatic stress disorder : A randomized controlled trial. *Journal of Clinical Psychiatry*, *75*(6), E559-E565. https://doi.org/https://doi.org/10.4088/JCP.13m08561
99. Weathers, F. W., Bovin, M. J., Lee, D. J., Sloan, D. M., Schnurr, P. P., Kaloupek, D. G., Keane, T. M., & Marx, B. P. (2018). The Clinician-Administered PTSD Scale for DSM-5 (CAPS-5) : Development and initial psychometric evaluation in military veterans. *Psychological Assessment*, *30*(3), 383-395. https://doi.org/https://doi.org/10.1037/pas0000486
100. Wielgosz, J., Goldberg, S. B., Kral, T. R. A., Dunne, J. D., & Davidson, R. J. (2019). Mindfulness meditation and psychopathology. *Annual Review of Clinical Psychology*, *15*, 285-316. https://doi.org/https://doi.org/10.1146/annurev-clinpsy-021815-093423
101. Yao, Y., Guo, D., Lu, T. S., Liu, F. L., Huang, S. H., Diao, M. Q., Li, S. X., Zhang, X. J., Kosten, T. R., Shi, J., Bao, Y. P., Lu, L., & Han, Y. (2024). Efficacy and safety of psychedelics for the treatment of mental disorders: A systematic review and meta-analysis. *Psychiatry Res*, *335*, 115886. https://doi.org/10.1016/j.psychres.2024.115886

102. Zaretsky, T. G., Jagodnik, K. M., Barsic, R., Antonio, J. H., Bonanno, P. A., MacLeod, C., Pierce, C., Carney, H., Morrison, M. T., Saylor, C., Danias, G., Lepow, L., & Yehuda, R. (2024). The psychedelic future of post-traumatic stress disorder treatment. *Current Neuropharmacology*, *22*(4), 636-735. https://doi.org/https://doi.org/10.2174/1570159X22666231027111147

103. Zhang, J., Mao, Y., Wang, Y., & Zhang, Y. (2023). The relationship between trait mindfulness and resilience : A meta-analysis. *Personality and Mental Health*, *17*(4), 313-327. https://doi.org/https://doi.org/10.1002/pmh.1581

104. Zhao, C., Zhao, Z., Levin, M. E., Lai, L., Shi, C., Hu, J., Chen, W., & Ren, Z. (2023). Efficacy and acceptability of mobile application-delivered acceptance and commitment therapy for posttraumatic stress disorder in China : A randomized controlled trial. *Behaviour Research and Therapy*, *171*, 104440. https://doi.org/https://doi.org/10.1016/j.brat.2023.104440