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Faculty of Environmental and Life Sciences

School of Psychology

The Impact of Mindfulness on Paranoia and Psychotic-like Experiences in Non-clinical Populations

by

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Thesis for the degree of Doctorate in Clinical Psychology

May 2025

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Abstract

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The aim of this thesis was to explore the role of mindfulness on psychotic-like experiences (PLEs), and specifically paranoia, within non-clinical populations. A systematic review and empirical research project are reported.

Chapter 1 is a bridging chapter that introduces the thesis rationale and aims, and briefly outlines a two-part research project: a systematic review (Chapter 2) and an empirical research study (Chapter 3). It presents the critical realist ontology and post-positivist epistemology that underpin the research, alongside a reflection on the author's values and learning. Additionally, a dissemination plan is detailed.

Chapter 2 reports a systematic review synthesising existing research exploring mindfulness and psychotic-like experiences (PLEs) in non-clinical populations. It addressed three research questions examining the relationship between mindfulness and PLEs as well as the effect of MBIs on both PLEs and mindfulness skills. Searching five databases (PsycINFO, CINAHL, MEDLINE, Web of Science Core Collection and ProQuest) identified 17 eligible papers, and a narrative synthesis and meta-analyses were performed. Eleven studies explored the relationship between mindfulness and PLEs, and a meta-analysis found a small, significant, negative association ($n = 8$; pooled correlation = -0.25 ; 95% Confidence Intervals [CI]: -0.37 to -0.13 , $p < .001$). Five studies showed significant reductions in favour of the MBI, but the summary effect was not significant in the meta-analysis ($n = 5$; mean effect size = 0.09 ; 95% CI: -0.61 to 0.79 ; $p = 0.80$). MBIs increased mindfulness skills with a moderate effect size ($n = 3$; mean effect size = 0.58 ; 95% CI: -1.09 to -0.07 , $p = .03$). These findings suggest high levels of mindfulness were related to reduced PLEs. And although MBIs were found to consistently improve mindfulness skills, there was inconclusive evidence for the effectiveness of MBIs in reducing PLEs. Future research could examine if specific mindfulness facets have a stronger association with PLEs, assess whether explicitly referencing PLEs within MBIs enhances their effectiveness, and investigate a range of clinical outcomes.

Chapter 3 reports a secondary data analysis of a randomised controlled trial (RCT) evaluating the effect of an online MBI on paranoia in a UK and Hong Kong non-clinical sample ($n = 447$). It also investigated whether reductions in paranoia were explained by increases in mindfulness. Participants completed an MBI (2-weeks of listening to daily 10-minute mindfulness meditation) or active control (2-weeks of daily listening to 10-minutes of classical music). Paranoia and mindfulness were measured at baseline, post-intervention and 4-weeks follow-up. Intention to Treat (ITT) analyses found a significant time and group interaction on paranoia with a small effect size ($p = .02$; $\eta_p^2 = .009$). Per protocol (PP) analyses and the mediation analysis found non-significant results. The study provides partial support for the use of online MBIs to reduce paranoia in a non-clinical population, especially for individuals experiencing higher levels of paranoia. Future research could explore underlying mechanisms of MBIs, optimise MBI content, and target more diverse populations.

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Research Thesis: Declaration of Authorship

Print name: Katrina Mysko

Title of thesis: The Impact of Mindfulness on Paranoia and Psychotic-like Experiences in Non-clinical Populations

I declare that this thesis and the work presented in it are my own and has been generated by me as the result of my own original research.

I confirm that:

1. This work was done wholly or mainly while in candidature for a research degree at this University;
2. Where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated;
3. Where I have consulted the published work of others, this is always clearly attributed;
4. Where I have quoted from the work of others, the source is always given. With the exception of such quotations, this thesis is entirely my own work;
5. I have acknowledged all main sources of help;
6. Where the thesis is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself;
7. None of this work has been published before submission

Signature: Date: 16/05/2025

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Definitions and Abbreviations

AANEX	Appraisals of Anomalous Experiences Interview
AC	Active control
ANCOVA	Analysis of covariance
CI	Confidence intervals for 95% confidence intervals
CONSORT	Consolidated Standards of Reporting Trials
FFMQ	Five Facets of Mindfulness Questionnaire
HK	Hong Kong
ITT	Intention to treat
KIMS	Kentucky Inventory of Mindfulness Skills
LMS	Langer Mindfulness Scale
LSHS-R	Launay Slade Hallucination Scale-Revised
MAAS	Mindful Attention Awareness Scale
MBI	Mindfulness-based intervention
Mindfulness	Mindfulness is a skill where a person has intentional, non-judgemental awareness of the present moment.
Non-clinical	People without an active mental health diagnosis and not receiving current support for their mental health
NZ	New Zealand
Paranoia	Paranoia is an exaggerated fear that others intend to cause harm. It exists on a continuum, with equivalent processes underlying clinical and non-clinical experiences.
PDI	Peters Delusions Inventory
PDS	Paranoia and Depression Scale
PLEs	Psychotic-like experiences, variably defined set of subclinical or sub-threshold phenomena that resemble experiences commonly associated with psychosis, such as hallucinations, delusions, and paranoid thoughts. They exist on a continuum across clinical and non-clinical populations. There is currently no universally agreed-upon definition, so for the purposes of this thesis it will reference ‘general PLEs’ when the focus is on a collective group of symptoms, such as persecutory thoughts, bizarre beliefs, and perceptual abnormalities and ‘individual PLEs’ when only one symptom is focused on, such as hallucinations, and use ‘PLEs’ which may refer to either general or individual PLEs or a combination of both.
PP	Per protocol

Definitions and Abbreviations

PRISMA	Preferred Reporting Items for Systematic reviews and Meta-Analyses
RCT	Randomised controlled trials
R-GPTS	Revised Green et al., Paranoid Thoughts Scale
RHS	Revised Hallucination Scale
SAPS	Scale for the Assessment of Positive Symptoms
SCL-90 R	Symptom Checklist 90 Revised
SDA	Secondary data analysis
SMD	Standard mean difference
SMQ	Southampton Mindfulness Questionnaire
sO-LIFE	Short version of the Oxford-Liverpool Inventory of Feelings and Experiences
UK	United Kingdom
USA	United States of America
VRI	Voluntary research intern
WEIRD	Western, Educated, Industrialised, Rich, and Democratic populations

Chapter 1 Introduction

1.1 Rationale and aims of the thesis

Psychotic-like experiences (PLEs) are subclinical phenomena that resemble symptoms of psychosis, such as hallucinations, delusions, and paranoia, but typically occur with low severity and without significant impairment to daily functioning (Bourgin et al., 2020; Logoń et al., 2025). PLEs are understood to lie on a continuum across clinical and non-clinical populations, with a range of severity, frequency, and distress (Linscott & van Os, 2013; Yung et al., 2009). Approximately 26.7% to 30.3% of the general population report experiencing at least one PLE (Bourgin et al., 2020; Rep et al., 2023). Although not a diagnosis in themselves, persistent or recurring PLEs, particularly when accompanied by anxiety (Isaksson et al., 2022) or substance use (Mackie et al., 2011), are associated with increased risk of developing psychotic disorders (Dominguez et al., 2009). PLEs have also been linked to distress, depression, self-injury, and suicidality (Logoń et al., 2025).

Of the various PLEs, this thesis focuses on non-clinical experiences of paranoia, defined as an exaggerated belief that others intend to cause harm (Freeman & Garety, 2000). Paranoid beliefs are not limited to clinical disorders such as schizophrenia or depression but also exist on a continuum (Elahi et al., 2017; Strauss, 1969). Milder forms of paranoia are reported by 20–30% of the general population (Bebbington et al., 2013; Freeman et al., 2005), with 27% of the non-clinical population meeting thresholds for elevated paranoid thinking in daily life (Freeman et al., 2021). Research suggests that non-clinical paranoia can be distressing, persistent, and impactful on well-being (Chan et al., 2021; Ellett et al., 2003; Freeman et al., 2011). For the purposes of this thesis, ‘general PLEs’ refers to clusters of symptoms (such as persecutory thoughts, bizarre beliefs, and perceptual abnormalities), while ‘individual PLEs’ refers to single symptoms (such as hallucinations or paranoia), with ‘PLEs’ used broadly to refer to either or a combination of both.

Given the prevalence and impact of PLEs and paranoia in non-clinical populations, there is growing interest in psychological approaches that may reduce their frequency and associated distress. One such approach is mindfulness, defined as the intentional, non-judgemental awareness of the present moment (Kabat-Zinn, 2000), which has been found to be inversely correlated with paranoia (Pagnini et al., 2018), hallucinations (Moran et al., 2021), delusions (Oliver et al., 2012), and general PLEs (Torok & Keri, 2022). Mindfulness-based interventions (MBIs) incorporate practices such as meditation, breathing exercises, and mindful awareness of thoughts, emotions, and bodily sensations (Kabat-Zinn & Hanh, 2013), and have been shown to

reduce PLEs and paranoia in non-clinical populations (Langer et al., 2010; Shore et al., 2018). Delivery formats of MBIs range from intensive face-to-face groups (Segal et al., 2002) to brief online sessions (Shore et al., 2018). MBIs may be particularly well suited to addressing paranoia, as they do not directly challenge paranoid beliefs in the way that cognitive reappraisal approaches do (Chadwick, 2006). Emerging evidence suggests MBIs show promise in reducing paranoia (Shore et al., 2018) and delusions (Burke et al., 2020) in non-clinical groups.

The aim of my thesis was to explore the role of mindfulness on PLEs, including paranoia specifically, within non-clinical populations, by systematically reviewing the relationship between mindfulness and PLEs, assessing the effectiveness of MBIs on these experiences, and conducting an empirical research project to evaluate the impact of a brief online MBI on experiences of paranoia in a non-clinical population.

In my systematic review (Chapter 2) I addressed the following pre-registered research questions: (1) what is the relationship between mindfulness and PLEs in non-clinical populations? (2) what is the effect of MBIs on PLEs in non-clinical populations? and one post hoc research question: (3) do MBIs increase mindfulness skills within the context of PLEs in non-clinical populations. I conducted the systematic review using guidance from the book *Doing a Systematic Review: A student's guide* (Boland et al., 2017) and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA; Page et al., 2021).

In my empirical research project (Chapter 3) I completed a secondary data analysis (SDA) for a previously unpublished study that employed a randomised controlled trial study design (RCT) with an active control (AC) to assess the impact of a brief online MBI on paranoia at post-intervention and 4-week follow-up in a non-clinical population recruited from the United Kingdom (UK) and Hong Kong (HK). The study tested two hypotheses: (H1) engagement in an online MBI will lead to a greater reduction of paranoia at post-intervention and follow-up compared to an active control, whilst controlling for differences between recruitment sites; (H2) mindfulness score at post-intervention will mediate the effect of condition on paranoia at follow-up whilst controlling for baseline paranoia and mindfulness. I generated hypotheses and undertook data preparation and Per Protocol (PP) and Intention To Treat (ITT) analyses in order to test the hypotheses.

1.2 Ontology and epistemology

In both the systematic review and empirical research project, I held a critical realist ontological stance. Critical realism considers reality and truths to exist independently from human perceptions, although our ability, as humans, to understand reality is influenced and

biased by factors such as language, culture, contexts, and pre-existing ideas (Brunson et al., 2025). It accepts that our knowledge of reality is fallible and always partial, requiring continuous refinement when more empirical evidence comes to light. From this perspective, I viewed the psychological constructs of mindfulness, paranoia, and PLEs to be real phenomena, although not directly observable or objectively measurable. I believed these to be abstract constructs that have causal effects that can be inferred through their influence on human emotion, experience and behaviour, and therefore can be measured empirically. I also drew on the critical realist concept of laminated reality (Bhaskar & Danermark, 2006). This suggests that reality is layered with biological, psychological, and social levels that interact and influence one another. Whilst my primary focus of the studies was on psychological constructs I recognised that they might be influenced by biological processes (such as in individual neurodevelopmental differences between participants) and social factors (such as cultural norms and environmental contexts). Acknowledging this layered view helped me to recognise the complexity of the constructs I was studying and the limitations I faced with my interpretation of my findings. To give one small example of this, I focussed on ‘adult’ populations in my thesis, operationally defined as individuals aged 18 years and above, which is standard in many other psychological studies and wider social contexts. However, I acknowledge this categorisation was socially and culturally constructed rather than an objective or biologically fixed marker of development. Therefore, my choice to include ‘adult’ participants and exclude ‘non-adult’ participants would have influenced my findings and their interpretation.

Alongside my ontological stance, I held a post-positivist epistemological position. This enabled me to carry out hypothesis-driven, quantitative research, whilst recognising that all knowledge is inherently provisional and shaped by how it is generated (Panhwar et al., 2017). In both my own empirical research project and within the studies I included in my systematic review, there was the use of standardised, validated self-report measures and statistical analyses to promote rigour and facilitate generalisability, which reflected my desire for objectivity and rigor. While these methods allowed me to generate structured and replicable findings, I did not assume that the results revealed absolute truths. Rather, I understood them as probabilistic insights, subject to reinterpretation, critique, and revision through further empirical research. As an important part of both my systematic review and empirical research project I have made recommendations for future research as a contribution to shaping the future direction of the field. This reflected my epistemological stance as it highlighted the open-ended, ever-evolving nature of scientific understanding.

1.3 Reflexivity and axiology

As my systematic review and empirical research project focused on quantitative study designs, the structure and dissemination conventions left little space for personal reflection on my experience of the research process. However, it was important to me to take the time to reflect on my work and to consider how I was able to remain aligned with my values of integrity, transparency and academic rigor during the process.

This was the first time I had completed a systematic review and meta-analyses, and I was not looking forward to the process. My perception was that it would be laborious and onerous. I am not a particularly fast reader, and I anticipated becoming frustrated by the volume of reading and the time it would demand. However, the process turned out to be more manageable than I had expected. Once I understood the key steps, I felt contained and supported by the structure, and I was able to formulate a clear plan for myself based on the Roadmap for Doing a Systematic Review: A student's guide by Boland et al. (2017). This Roadmap provided me with a systematic process that aligned closely with my value of academic rigour. Following a best-practice structured methodology supported me to feel confident in the robustness of my approach. I also tried to remain aligned with my values of transparency and integrity, particularly when reporting my systematic review. Writing for a peer-reviewed journal helped me to stay focused on making my process replicable and ethically sound. I aimed to be as clear as possible about how I drew my conclusions and the sources I used, in order to ensure that my handling of other people's data was accurate and accountable. Additionally, I found the process of completing the meta-analysis better than expected. I think following a logical statistical process suited my learning style. Furthermore, during the systematic review process, I worked with a Voluntary Research Intern (VRI) who acted as my independent reviewer. My VRI was a first-year undergraduate in Psychology with limited research experience, and I found it rewarding to train and support them through the process. It was encouraging to witness their confidence grow as they became more familiar with navigating research tasks and critically engaging with academic texts. This collaboration also showed me the importance of being mindful of the responsibilities involved when supporting others through academic processes, particularly when they are new to research.

Coming from a background in biomedical sciences before converting to Psychology and eventually starting Clinical Psychology training, I had already undertaken several empirical quantitative research projects as part of my academic training. As such, quantitative research felt familiar and comfortable to me, and I was excited about the opportunity to conduct a meaningful project within the Psychological field. Completing a quantitative research project provided me with a structured framework to approach my research questions, which aligned

closely with my academic value of rigour, and supported my critical thinking and methodological discipline throughout the project. Initially, I was involved in a primary research project investigating the relationship between minority group status and paranoia in adolescents, whilst exploring bullying victimisation, everyday discrimination, and loneliness as potential mediators. I was involved with writing the research proposal, obtaining ethical approval, and incorporating public and patient involvement. However, due to changes in my personal circumstances and broader contextual factors, the project became no longer viable for me. Whilst I was disappointed by this outcome, I remained determined to make the best of the situation and turned my attention to the secondary data analysis (SDA) that ultimately formed my empirical research project.

This was the first time I had undertaken a SDA, and I found certain aspects more frustrating than anticipated. For instance, I had no control over which measures participants had completed, and I discovered a discrepancy between the versions of the Five Facet Mindfulness Questionnaire (FFMQ) used in the UK and HK participants. I was able to problem solve this by employing statistical techniques to standardise the measures, enabling me to combine the data into a single group for analysis. Completing the SDA also presented ethical and methodological responsibilities. I was aware that I was using data collected by others, and I tried to remain transparent and uphold integrity throughout the research process and in my reporting. I ensured that the analysis was accurate, and I strived to clearly explain my decisions so that others could understand and potentially replicate the work. I found that the SDA gave me the opportunity to push myself further with statistical analysis than I had done in previous projects. I conducted a power calculation for the study and performed both Per Protocol (PP) and Intention-To-Treat (ITT) analyses. While I was already familiar with PP analysis, I initially struggled to grasp the logic and implementation of ITT. However, this challenge turned into a valuable learning experience, as ITT analysis helped me develop a deeper understanding of how to handle missing data and carry out multiple imputation procedures. As I explored the literature, I noticed that the studies most similar to my own project, such as those by Shore et al. (2018) and Kingston et al. (2019), only reported PP analyses and had not clearly named this in their reporting. This is likely due to the ubiquity of PP analyses in the field. However, with advances in statistical modelling and growing emphasis on methodological rigour, there is increasing support for including ITT analyses as part of best practice (Ahn & Kang, 2023). I understand now why ITT is generally considered to be less biased, better reflective of real-world implementation challenges, and more conservative in estimating effects. By including both ITT and PP analyses, I think I was able to provide a more comprehensive picture of the intervention's outcomes and produce my work in line with best practice methodology for RCTs.

1.4 Dissemination plan

The two research papers in this thesis have been written with the intention of being disseminated via publication in peer-reviewed journals. For both papers I have targeted the journal *Mindfulness*, which is an international, multi-disciplinary, peer-reviewed journal that publishes research on the conceptual foundations, mechanisms, and application of mindfulness. The scope of the journal includes best practice of mindfulness across a range of contexts including psychology, psychiatry, medicine, neurobiology, philosophy and spirituality (Medvedev & Krägeloh, 2024). I believe *Mindfulness* is a good fit for both my systematic review and empirical research project for several reasons. Firstly, the journal takes a broad view of mindfulness research across diverse populations and contexts, making it more suitable for my research in non-clinical populations, especially compared to journals with a stricter clinical focus. Secondly, as my research is based in non-clinical populations, it may appeal to the multi-disciplinary audience of the journal. Finally, given the international scope of *Mindfulness*, and the fact that both of my chapters include participants or studies from multiple countries, the journal offers an appropriate platform for reaching a wide audience. In line with this, I have prepared my studies according to the journal's submission guidelines, although I have kept the formatting in line with the thesis template for consistency (see Appendix A).

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Chapter 2 Mindfulness and psychotic-like experiences in non-clinical populations: A systematic review and three meta-analyses

2.1 Abstract

Objectives: This systematic review and meta-analyses synthesised literature on mindfulness and psychotic-like experiences (PLEs) in non-clinical populations. It addressed two pre-registered questions: (1) what is the relationship between mindfulness and PLEs in non-clinical populations? (2) what is the effect of MBIs on PLEs in non-clinical populations? and one post-hoc question: (3) do MBIs increase mindfulness skills within the context of PLEs in non-clinical populations?

Methods: Five databases were searched and papers were screened against criteria. Effect sizes were extracted for each study. Narrative syntheses and meta-analyses were performed for each research question.

Results: Seventeen papers were eligible. Eleven studies explored the relationship between mindfulness and PLEs. The meta-analysis found a small negative association between PLEs and mindfulness ($n = 8$; pooled correlation = -0.25 ; $p < .001$). Eight studies investigated the impact of MBIs on PLEs, with five showing reductions in favour of MBIs. However, the summary effect was not significant in the meta-analysis ($n = 5$; pooled standard mean difference [SMD] = $.09$; $p = 0.80$). Three studies examined the impact of MBIs on mindfulness and the meta-analysis found that MBIs increased mindfulness with a moderate effect size ($n = 3$; pooled SMD = 0.58 ; $p = .03$).

Conclusions: Findings suggest that higher levels of mindfulness are associated with reduced PLEs. There was mixed evidence for the effectiveness of MBIs in reducing PLEs, though MBIs were found to improve mindfulness. Future research could examine if specific mindfulness facets have stronger associations with PLEs.

Preregistration: This review was pre-registered on PROSPERO (ID: CRD420250649252).

Keywords: Systematic review; meta-analyses; mindfulness; psychotic-like experiences; non-clinical populations

2.2 Introduction

Psychotic-like experiences (PLEs) can refer to a broad and variably defined set of subclinical or sub-threshold phenomena that resemble experiences commonly associated with psychosis, such as hallucinations, delusions, and paranoid thoughts (Bourgin et al., 2020). PLEs are observed in both clinical and non-clinical populations and are understood to exist on a continuum, with varying degrees of frequency, intensity, and associated distress (Linscott & van Os, 2013; Yung et al., 2009). There is currently no single agreed-upon definition, probably because they are not defined according to a diagnostic criteria due to their lower severity and duration and lack of detriment to everyday functioning (Logoń et al., 2025). For the purposes of this study it will reference ‘general PLEs’ when the focus is on a collective group of symptoms, such as persecutory thoughts, bizarre beliefs, and perceptual abnormalities and ‘individual PLEs’ when only one symptom is focused on, such as paranoia or hallucinations, such that the term ‘PLEs’ will be used throughout to refer to either general or individual PLEs or a combination of both.

PLEs are often assessed through self-report measures, which may focus on individual PLEs, such as the *Peters et al. Delusion Inventory* (Peters et al., 2004), or general PLEs, such as the Community Assessment of Psychic Experiences (CAPE; Konings et al., 2006; Villacura-Herrera et al., 2024). Research indicates that around 26.7% to 30.3% of the general population report experiencing at least one PLE (Bourgin et al., 2020; Rep et al., 2023). The presence of PLEs have been associated with an increased risk of developing psychotic disorders, particularly when the PLEs are persistence and reoccurring (Dominguez et al., 2009), occurring alongside anxiety (Isaksson et al., 2022), or accompanied by substance use (Mackie et al., 2011). Furthermore, PLEs have been associated with distress, depression, self-injurious behaviours, suicide attempts and suicide deaths (Logoń et al., 2025). Consequently, understanding PLEs in non-clinical populations and identifying strategies to minimise their risks is crucial.

Cognitive behavioural therapy (CBT) is widely recognised as the leading psychological intervention for individuals experiencing psychosis. Numerous meta-analyses have demonstrated its effectiveness, for example Wykes et al., (2008) and Zimmerman et al., (2005), influencing national clinical guidelines in the UK to recommend offering 16 sessions of manualised CBT to all individuals diagnosed with a psychotic disorder (National Institute for Health and Care Excellence [NICE], 2014). CBT for psychosis typically involves challenging cognitive biases and unusual experiences, which some individuals may find too confronting (Chadwick, 2006). Moreover, the recommended CBT intervention is resource-demanding, requiring several months of sessions with highly skilled therapists.

By contrast, mindfulness-based interventions (MBIs) have been less widely researched in individuals with psychosis but they have been used to reduce PLEs in non-clinical populations. Mindfulness, defined as the intentional, non-judgemental awareness of the present moment (Kabat-Zinn, 2000), has been found to be inversely correlated with non-clinical experiences of paranoia (Pagnini et al., 2018), hallucinations (Moran et al., 2021), delusions (Oliver et al., 2012), and overall experiences of PLEs (Torok & Keri, 2022). The Five Facet Mindfulness model (Baer et al., 2006) conceptualises mindfulness as comprising five interrelated skills: observing (noticing internal and external experiences), describing (labelling those experiences in words), acting with awareness (engaging in activities with full attention), non-judging of inner experience (maintaining a non-evaluative stance toward thoughts and feelings), and non-reactivity to inner experience (allowing thoughts and emotions to arise and pass). Together, these facets reflect an intentional and non-judgemental awareness to experiences. MBIs is an umbrella term for a heterogeneous group of therapeutic approaches that all incorporate mindfulness practices, such as meditation, breathing exercises, and mindful awareness of thoughts, emotions, and physical sensations, to promote mental health and well-being (Kabat-Zinn & Hanh, 2013). The delivery of MBIs can be highly variable, ranging from face-to-face groups with 2-hour weekly sessions over eight weeks (Segal et al., 2002) to online formats with daily 10-minute audio sessions for two weeks (Shore et al., 2018). Mindfulness has been incorporated into other forms of psychological support, such as Resilience Training (Burke et al., 2020), and Nature Connectedness (Muneghina et al., 2021). MBIs have been used in non-clinical populations with the aim of reducing paranoid experiences (Shore et al., 2018) and delusions (Burke et al., 2020), as well as clinical populations with participants with a diagnosis of schizophrenia spectrum disorder (Ellett et al., 2020) and schizophrenia or schizo-affective disorder (Chadwick et al., 2016). It is theorised that MBIs may reduce the frequency, distress, or persistence of psychotic-like experiences by promoting a non-judgemental, accepting, and non-reactive awareness to unusual internal experiences such as hallucinations, delusions and paranoia. This could help individuals at the lower end of the psychosis continuum to manage PLEs more adaptively, potentially reducing the risk of transition to clinical disorder. However, whilst it is possible that MBIs may pose a risk that heightened self-focus and awareness of internal stimuli could exacerbate PLEs in individuals vulnerable to psychosis, a recent systematic review and meta-analysis of safety indices concluded MBIs for psychosis appear to be safe and may reduce the risk of hospitalisation and use of crisis services (O'Brien-Venus et al., 2024).

Whilst individual studies have examined the effects of mindfulness on individual PLEs (Shore et al., 2018), or general PLEs (Peters et al., 2016), there is currently no comprehensive synthesis of the impact of MBIs on PLEs. The objective of this systematic review was to assess and synthesise the existing literature examining mindfulness and PLEs in non-clinical

populations. This is particularly important, as online MBIs could offer an early intervention that has the potential to be low-cost and accessible for individuals experiencing PLEs and may reduce their transition to psychosis. The review will address the following pre-registered research questions:

1. What is the relationship between mindfulness and psychotic-like experiences in non-clinical populations?
2. What is the effect of mindfulness-based interventions on psychotic-like experiences in non-clinical populations?

2.3 Methods

This systematic review was performed in compliance with the Page et al. (2021) Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA; see Appendix B for PRISMA checklist) and was pre-registered on PROSPERO on 7th February 2025 (available from <https://www.crd.york.ac.uk/PROSPERO/view/CRD420250649252>). The initial search took place in February 2025 and the searches were re-run in April 2025, with no new papers identified. Rayyan (Ouzzani et al., 2016) software was used to facilitate efficient organisation and categorisation of papers as well as enabling a 'blind mode' for the independent review process.

2.3.1 Inclusion and exclusion criteria

To be included in the systematic review papers had to meet the following inclusion criteria: (1) use of cross-sectional, longitudinal, quasi-experimental or experimental designs, including studies without a control group, waitlist control group, passive control or active control groups; (2) adults aged 18 years or older in a non-clinical population, which was defined as participants without an active mental health diagnosis and not receiving current support for their mental health; (3) collected data of individual PLEs or general PLEs using a self-report measure and/or a mindfulness measure; (4) studies that examined the relationship between mindfulness and PLEs or studies that included either an MBI or where the intervention included a primary focus on mindfulness, defined as mindfulness present in more than 50% of the intervention sessions; (5) published in a peer reviewed journal; (6) published in the English language.

The exclusion criteria were: (1) case studies, case series, systematic reviews; (2) studies that included participants less than 18 years of age, or mixed adult and child samples, or a targeted population based on existing or previous mental health conditions; (3) unpublished

dissertations and conference abstracts; (4) a primary focus on personality disorders, including schizotypal and paranoid personality disorder as the focus was on non-clinical samples.

2.3.2 Database and search strategies

Five electronic databases were searched to find eligible papers: PsycINFO, CINAHL, and MEDLINE, all accessed via EBSCOhost, as well as Web of Science Core Collection and ProQuest. The following search terms were used: ("mindfulness-based interventions" OR "mindfulness based interventions" OR mindfulness OR "mindfulness meditation" OR mediatat*) AND ("non-clinical population" OR "general population" OR "sub-clinical" OR student) AND ("psychotic-like experiences" OR PLEs OR "non-clinical psychosis" OR "psychosis-like experiences" OR hallucination* OR delusion* OR schizotyp* OR psychotic OR "psychosis proneness" OR paranoi* OR persecutory* OR grandiose* OR "unusual experiences" OR "voice hearing" OR "non-clinical paranoia"). No publication date limits were set but a filter of English language was used.

2.3.3 Screening process

Papers were initially screened using their title, abstract, key words and methods. Papers included at the initial screening stage progressed to full text screening. An independent second reviewer assessed 100% of papers identified by the searches, with discrepancies between reviewers resolved by discussion. A PRISMA flowchart of paper identification and screening processes is displayed in Figure 1.

2.3.4 Quality assessment

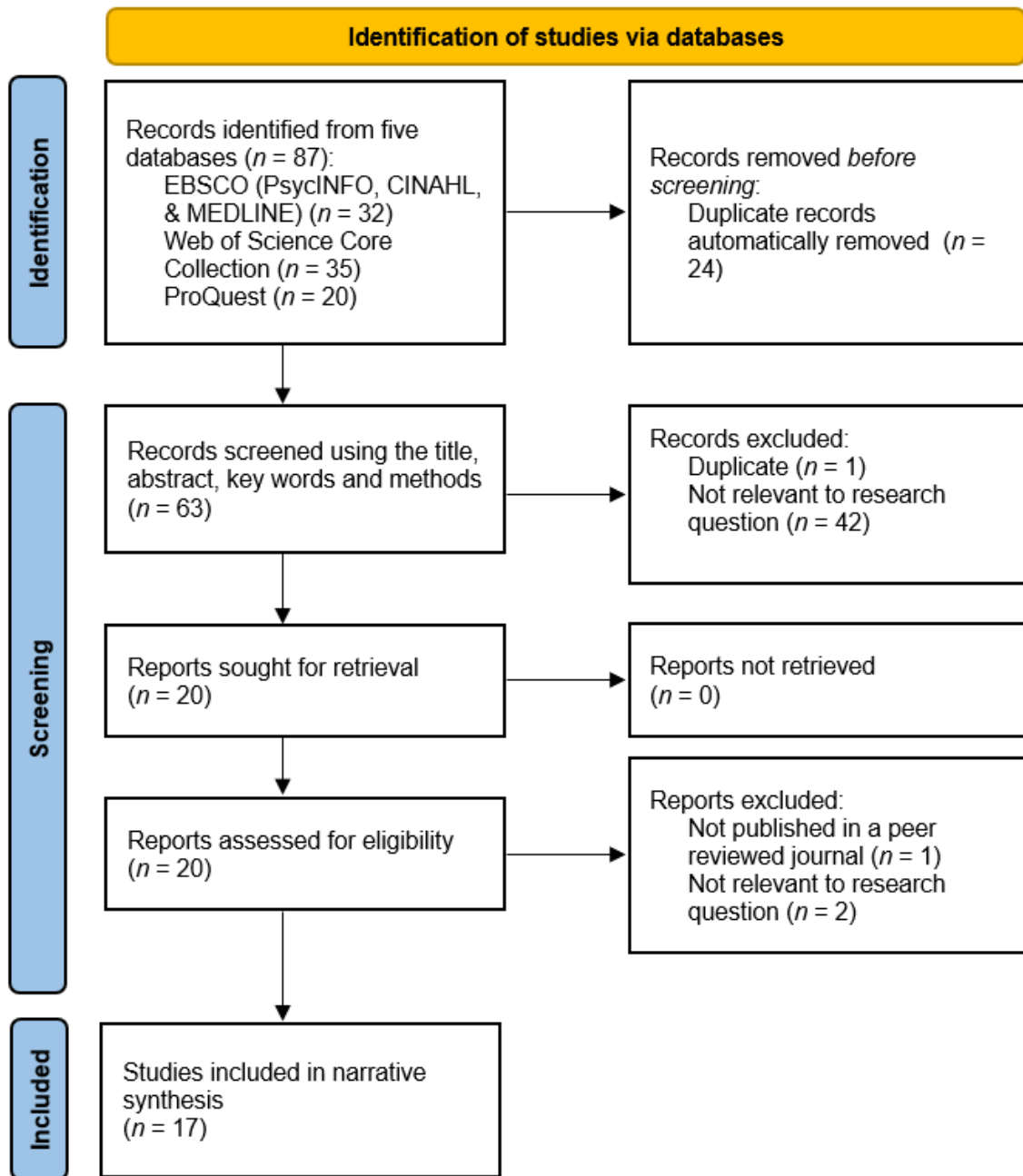
Each paper was assessed for methodological quality using the Standard Quality Assessment Criteria for Evaluating Primary Research Papers from a Variety of Fields (Kmet et al., 2004). The tool consisted of 14 questions with each item scored on a 3-point Likert scale (no = 0, partial = 1, yes = 2), although four items were not used for cross-sectional and quasi-experimental studies (questions 5, 6, 7, and 12) and one item was not used for RCTs (question 7). The tool included guidelines for responses to each item and an equation to calculate the summary score. The following cut-offs were used for the summary score: Strong > 0.80; Good = 0.70–0.80%; Adequate = 0.50–0.69; Limited < 50% (Lee et al., 2008). An independent second reviewer quality assessed 4 papers (22.22%), with discrepancies between reviewers resolved by discussion.

2.3.5 Data extraction, synthesis and meta-analysis

The key characteristics of each study and its population, as well as data related to the research questions including effect sizes (either Pearson's r or Cohen's d), were extracted manually by the first author. Authors were contacted to request any missing data. For the purposes of this review, only baseline and immediate post-intervention data were considered, regardless of any follow-up outcomes reported. To provide a comprehensive understanding of the findings, meta-analyses were planned if there were two or more appropriate papers addressing each research question, supplemented by use of narrative synthesis. Meta-analyses were carried out using Comprehensive Meta Analysis Version 4 (Borenstein et al., 2022).

A random-effects model was used for all meta-analyses to allow for substantial heterogeneity across studies as a range of different measures were used to capture PLEs and mindfulness. Additionally, this approach was appropriate as it was assumed there was a variation in effect sizes across the studies rather than an assumption of a single true effect size (Riley et al., 2011). For studies exploring the relationship between mindfulness and PLEs in non-clinical populations, a meta-analysis was conducted using Pearson's correlation coefficient (r) of total mindfulness score and PLEs and the sample size. For studies exploring the effect of mindfulness-based interventions on psychotic-like experiences in non-clinical populations, a meta-analysis was conducted using the sample size and means and standard deviation for the PLE measure for both the control group and experimental group at post-intervention. In addition to the planned analyses, a post-hoc analysis was conducted to explore the effect of MBIs on mindfulness in non-clinical populations. For this, another meta-analysis was conducted using the sample size, and means and standard deviation for the mindfulness measure for both the control group and experimental group at post-intervention. Statistical heterogeneity was assessed by the Q test and I^2 statistic. High heterogeneity was considered present if the Q test result was significant ($p < 0.05$) or if the I^2 value exceeded 50% (Deeks et al., 2024). To evaluate publication bias, funnel plots were visually inspected and Egger's test was performed. A significant result from Egger's test ($p < 0.05$) or data points falling outside the funnel plot indicated the presence of publication bias (Page et al., 2024). Effect sizes of Cohen's d were interpreted as small (0.2), medium (0.5), and large (0.8), and effect sizes of Pearson's r were interpreted as small (0.1), medium (0.3), and large (0.5), in line with conventional categorisation (Cohen, 1992).

Figure 1. PRISMA Flowchart



2.4 Results

A total of 87 papers were identified and screened, 20 papers were extracted and assessed for eligibility, 17 papers were eligible for inclusion and were included in the final review. One paper contained 3 studies, 2 of which were relevant to this systematic review and were treated as two separate studies. See Table 1 for a summary of study characteristics for the papers included in the review.

2.4.1 Characteristics of studies included

The total number of participants included across all studies was 3,641. The studies were conducted in 11 different countries, with some papers having multiple recruitment sites or online recruitment: United Kingdom ($k = 7$), Spain ($k = 3$), United States of America ($k = 3$), and one study each from China, Hungary, Iran, Ireland, Italy, and New Zealand. The systematic review included studies with cross-sectional ($k = 10$), randomised controlled trial (RCT; $k = 6$), and quasi-experimental ($k = 2$) designs, with one paper contributing a cross-sectional study and an RCT.

2.4.2 Characteristics of participants

Only one study reported no demographic information about the participants (Hosseini et al., 2021). Of the remaining studies, 14 reported more female participants (ranging from 53.2% to 89.2% female) and two reported more male participants (43.1% and 49.3% female). Additionally, of the 16 studies that reported participant characteristics, there was an age range of 18-80 years old, with a pooled mean age of 24.18 years and a pooled standard deviation of 9.03. All 17 studies reported some information on their sample composition: University students ($k = 6$), general population ($k = 3$), combined university students and general population ($k = 3$), university students who were reporting at least one risk factor, such as reporting some current level of PLE or mild depression ($k = 4$), and combined university students and general population who were reporting at least one risk factor, such as high schizotypy ($k = 1$).

2.4.3 PLE measures

All studies had at least one measure of PLEs; 15 studies collected data for individual PLEs, when only one symptom is focused on, one study focused on general PLEs when the focus is on a collective group of symptoms, and two studies used multiple measures to assess PLEs. Paranoia was explored in seven of the studies, four of which used Fenigstein and Venable

(1992) Paranoia Scale, two used the Paranoia Ideation subscale of the Symptom Checklist 90-Revised (SCL-90 R; Derogatis & Unger, 2010), and one used the Paranoia Scale of the Paranoia and Depression Scale (PDS; Bodner & Mikulincer, 1998). Hallucinations were investigated in six of the studies, four of which used the Launay Slade Hallucination Scale-Revised (LSHS-R; Bentall & Slade, 1985), and two used the Revised Hallucination Scale (RHS; Morrison et al., 2002). Four papers explored delusions and all used the Peters Delusions Inventory (PDI; Peters et al., 2004). One study investigated unusual experiences using the Unusual Experiences subscale of the short version of the Oxford-Liverpool Inventory of Feelings and Experiences (sO-LIFE; Mason et al. 2005). One study explored positive symptoms generally, using the Scale for the Assessment of Positive Symptoms (SAPS; Andreasen, 1984). Finally, one study investigated anomalous experiences using the Appraisals of Anomalous Experiences Interview (AANEX; Brett et al., 2007). Whilst some studies used validated translated versions of these measures, others used translations that were created specifically for their study without prior validation, see summary Table 1.

2.4.4 Mindfulness measures

Three papers collected no data on mindfulness, but the remaining 14 papers used a mindfulness measure: six studies used the Five Facets of Mindfulness Questionnaire (FFMQ; Baer et al., 2006), four studies used the Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2003), two studies used the Southampton Mindfulness Questionnaire (SMQ; Chadwick et al., 2008), one study used the Kentucky Inventory of Mindfulness Skills (KIMS; Baer et al., 2004), and one study used the Langer Mindfulness Scale (LMS; Pirson et al., 2012). Some studies used translated versions of the measures, see summary Table 1.

2.4.5 Mindfulness based interventions

Eight of the studies included an MBI, four used a face-to-face group format and four studies used online audio tracks of guided meditation practice. The amount of mindfulness practice undertaken ranged from 50 minutes (10 minutes daily for 5 consecutive days) to 20 hours (weekly 2.5 hour sessions for 8 weeks). Five interventions encouraged home practice whereas two did not. Two of these studies were quasi-experimental and therefore had no control group, reporting within-subjects results only. For the other six studies, three had waitlist control groups and three had active control (reflective journaling $k = 1$; audio track of guided visual imagery $k = 1$; watching videos on sociopolitical topics and engaging in a group discussion $k = 1$) (see Table 1).

2.4.6 Main Findings

2.4.6.1 Relationship between PLEs and mindfulness

Ten cross-sectional studies examined the relationship between PLEs and mindfulness and one quasi-experimental study that reported the baseline association between the two measures. Of these eleven studies, five studies focused on hallucinations, four on delusions, two on paranoia, one on unusual experiences, one on positive symptoms, and one on current and lifetime anomalous experiences. Two studies reported on more than one PLE.

Ten studies reported at least one Pearson's correlation coefficient for total PLEs scores and either the total mindfulness scores or subscale scores. Eight studies found significant negative correlations (range $r = -.38$ to $-.57$), indicating that greater mindfulness skills were associated with lower scores on the PLE measures, with small-medium effect sizes. One study found a positive correlation between the Observing facet of the FFMQ and hallucination proneness ($r = .22$), suggesting higher levels of observation were associated with increased proneness to hallucination (Hosseini et al., 2021), and two further studies reported non-significant correlations between PLEs and mindfulness (Pagnini et al., 2018; Peters et al., 2016). Finally, one cross-sectional study by Perona-Garcelán et al. (2014) found that participants categorised as 'high hallucination proneness' scored significantly lower on the mindfulness scale compared to participants categorised as 'low hallucination proneness' (Cohen's $d = 1.12$).

Studies were included in the meta-analysis if a correlation coefficient between overall PLE score and overall mindfulness score was reported. Of the eleven studies identified above, eight were included in the meta-analysis, see Table 2. Additionally, one study contributed two correlations (Palacios-García et al., 2018) and another study contributed three correlations (Peters et al., 2016), resulting in a total of 12 correlations included in the meta-analysis.

The meta-analysis found a pooled correlation of -0.25 (95% Confidence Intervals [CI]: -0.37 to -0.13 , $p < .001$), indicating a small negative association between PLEs and mindfulness. This suggests that higher levels of mindfulness are associated with lower levels of PLEs. The $Q(11) = 165.86$ ($p < .001$) and the I^2 statistic was 93%, suggesting 93% of the variability in effects sizes reflected true heterogeneity rather than sampling error. Given the significant Q -value and I^2 value exceeded 50%, substantial heterogeneity was deemed to be present. Additionally, visual inspection of the Funnel Plot revealed that eight out of twelve studies fell outside of the funnel and Egger's regression intercept (B_0) was 4.26 (95% CI: -1.93 to 10.44 ; $t(10) = 1.53$; 1-tailed p -value = $.078$). The Funnel Plot and Egger's test may indicate the presence of publication bias. Taken together, these findings indicate a small negative association between mindfulness

and PLEs. However, due to the high levels of heterogeneity and potential publication bias, the results of this meta-analysis should be interpreted with caution.

2.4.6.2 Impact of MBIs on PLEs

Two quasi-experimental studies and six RCTs investigated the impact of MBIs on PLEs. Of these, five studies focused on paranoia, two on delusions and one on hallucinations. Five studies (two quasi-experimental and three RCTs) found the MBIs significantly reduced PLEs with medium effect sizes (range $d = .58, .78$). One study found that participation in both the MBI and the guided visual imagery active control reduced PLEs but the MBI was not superior to the active control ($d = -.18$, 95% CI: $-.65$ to $.30$). Additionally, two studies found no reduction of PLEs following MBI completion and no differences between the MBI group compared to the active control groups of reflective journaling or watching videos on sociopolitical topics and engaging in a group discussion.

Quasi-experimental studies were not included in the meta-analysis. Of the six RCTs identified above, five were included in the meta-analysis, see Table 3. The meta-analysis found a pooled standard mean difference (SMD) of 0.09 (95% CI: -0.61 to 0.79 , $p = 0.80$), indicating a non-significant impact of MBI on PLEs. The $Q(4) = 35.98$ ($p < 0.001$) and the I^2 statistic was 89%, suggesting 89% of the variability in effects sizes reflected true heterogeneity rather than sampling error. Given the significant Q -value and I^2 value exceeded 50%, substantial heterogeneity was deemed present in the meta-analysis. Additionally, visual inspection of the Funnel Plot revealed that two out of the five studies fell outside of the funnel and Egger's regression intercept (B_0) was -8.30 (95% CI: -19.86 to 3.26 ; $t(3) = 2.28$; 1-tailed p -value = 0.05). The Funnel Plot and Egger's test may indicate the presence of publication bias, although the Egger's test had low power as there are fewer than 10 studies (Page et al., 2024). Taken together, these results suggest that MBI participation does not reduce experiences of PLEs. However, due to high levels of heterogeneity and potential publication bias, the results of this meta-analysis should be interpreted with caution.

2.4.6.3 Impact of MBIs on mindfulness

As the above meta-analysis found that MBIs did not reduce experiences of PLEs, a post-hoc narrative synthesis and meta-analysis were conducted to investigate whether MBIs increased mindfulness skills. Three RCT studies, all using waitlist control groups, explored the impact of MBIs on mindfulness. Of these, two studies measured mindfulness using the FFMQ and one used the MAAS. Two studies found that participation in the MBI significantly increased mindfulness skills compared to the waitlist control ($p = .01$ and $.001$, $d = -.80$ and $-.89$), and one

study found no significant difference in mindfulness scores between intervention and waitlist control groups ($p = .97$; $d = -.06$, CI: $-.52$ to $.40$).

All three studies were included in the meta-analysis, which found a pooled SMD of 0.58 (95% CI: -1.09 to -0.07 , $p = .03$), indicating a significant impact of MBI on mindfulness with a moderate effect size, see Table 4. The $Q(2) = 7.40$ ($p = .03$) and the I^2 statistic was 73%, suggesting 73% of the variability in effects sizes reflected true heterogeneity rather than sampling error. Given the significant Q-value and I^2 value exceeded 50%, substantial heterogeneity was deemed present in this meta-analysis. Additionally, visual inspection of the Funnel Plot revealed that one out of the three studies fell outside of the funnel and Egger's regression intercept (B_0) was 1.02 (95% CI: -163.26 to 165.29 ; $t(1) = 0.08$; 1-tailed p -value = $.48$). The Funnel Plot and Egger's test may indicate the presence of publication bias, although the Egger's test had low power as it contained fewer than 10 studies (Page et al., 2024). Taken together, these results suggest that MBI participation increases mindfulness skills. However, due to high levels of heterogeneity and potential publication bias, the results of this meta-analysis should be interpreted with caution.

2.4.7 Quality analysis results

Quality analysis found that 14 studies were 'strong', three were 'good' and one was 'adequate', see summary Table 1.

Table 1. Summary table of the papers included in the systematic review and their quality assessment score

Author (Year)	Country	Study design	Total sample <i>n</i> (MBI <i>n</i>)	Sample composition	Outcome measure(s) of interest	MBI and control group	Main findings relating to PLE and/or mindfulness	Quality assessment score
Burke et al. (2020)	USA	Quasi- experimental	60	University students with at least one risk factor (mild to moderate depression and/or PLEs)	PDI (Peters et al., 2004) FFMQ (Baer et al., 2006)	Resilience training intervention 4 weeks of 1.5 hour sessions Group format Encouragement of home practice No control group	1. PLEs were significantly negatively correlated with mindfulness ($p < .05$). 2. Significantly lower levels of PLEs, following the intervention compared to baseline ($p < .001$). 3. No significant increase in mindfulness skill observed from baseline to post-intervention ($p = .18$).	0.95 (strong)
DeTore et al. (2023)	USA	RCT	107 (54)	University students with at least one risk factor (mild to moderate depression and/or PLEs.	PDI (Peters et al., 2004) FFMQ (Baer et al., 2006)	Based on resilience training intervention (Burke et al., 2020) 4 weeks of 1.5 hour sessions Group format Encouragement of home practice Waitlist control group	1. Significant time x group interaction for the PLEs ($F(1,86) = 7.66, p = 0.007, \eta_p^2 = 0.08$). 2. MBI group showed a greater decrease in PLEs ($t(86) = -2.77, p = 0.007, d = -0.58$) at post- intervention compared to waitlist group. 3. Significant time x group interaction for mindfulness ($F(1,46) = 8.32, p = 0.006, \eta_p^2 = 0.15$).	0.85 (strong)

							4. The MBI group showed a greater increase in mindfulness ($t(46) = 2.89$, $p = 0.006$, $d = 0.79$) at post-intervention compared to the waitlist group.	
Hosseini et al. (2021)	Iran	Cross-sectional	168	University students	RHS Persian version (Goodarzi, 2009) FFMQ Persian version (Ahmadvand et al., 2013)	N/A	Significant relationship between hallucination proneness and each of the 5 facets of the FFMQ. Positive correlation between observing score and hallucination (Observing $r = .22$) but negative correlation for all of the other facets (Describing $r = -.24$; Acting $r = -.31$; Not judging $r = -.20$; Not reacting $r = -.17$)	0.70 (good)
Kingston et al. (2019) Study 1	UK and online	Cross-sectional	410	University students and general population	Paranoia Scale (Fenigstein & Vanable, 1992) FFMQ (Baer et al., 2006)	N/A	^a Mindfulness negatively correlated with PLEs ($r = -.57$, $p < .001$).	0.95 (strong)

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Kingston et al. (2019) Study 3	UK	RCT	68 (34)	University students	PDS Paranoia Scale (Bodner & Mikulincer, 1998) FFMQ (Baer et al., 2006)	Based on guided mindfulness meditation (Chadwick, 2006) 1 week of 10 minute daily practice Audio track of guided meditation practice No additional home practice Active control - Guided visual imagery	1. Time × condition interaction was not significant for PLEs ($F(1, 66) = 1.19, p = .29$). 2. Main effect of time: PLEs significantly reduced pre-post intervention ($F(1, 66) = 42.00, p < .001$) 3. Main effect of group: No difference between the MBI and control groups ($F(1, 68) = 1.29, p = .26$)	0.88 (strong)
Langer et al. (2010)	Spain	RCT	38 (18)	University students with at least one risk factor (distressing and anxiety-provoking hallucination-like experiences)	RHS Spanish version (Cangas et al., 2011)	Based on MBCT (Segal et al., 2002) 8 weeks of 1 hour sessions Group format Encouragement of home practice Active control - Watching videos on sociopolitical topics and engaging in a group discussion	No significant reduction in PLEs in experimental group compared to active control group ($p = .78, d = .08$).	0.50 (adequate)

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Liu (2019)	China	Quasi-experimental	81	University students	SCL-90 R Paranoid Ideation Chinese version (Jin, 1986)	Based on MBCT (Segal et al., 2002) 8 weeks of 2.5 hour sessions Group format Encouragement of home practice No control group	MBI decreased PLEs ($F = 19.857, p < .01$).	0.85 (strong)
Lynn et al. (2023)	USA	Cross-sectional	527	University students	LSHS-R (Bentall & Slade, 1985) FFMQ (Baer et al., 2006)	N/A	^b A significant, negative correlation was found between total FFMQ and PLEs ($r = -.28, p < .001$).	1.00 (strong)
McDonald et al. (2024)	UK and online	RCT	24 (12)	Combined university students and general population with at least one risk factor (high schizotypy)	Paranoia Scale (Fenigstein & Vanable, 1992)	Use of Headspace app 10 days of 10 minute daily practice Audio track of guided meditation practice No additional home practice Active control – Reflective journaling	No overall group effect was observed from baseline to post-intervention for PLEs.	0.92 (strong)

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Moran et al. (2021)	Ireland	Cross-sectional	77	University students and general population	LSHS-R (Bentall & Slade, 1985) MAAS (Brown & Ryan, 2003)	N/A	^a Mindfulness was negatively correlated with PLEs ($r = -.38, p = .001$).	1.00 (strong)
Muneghina et al. (2021)	UK and online	RCT	72 (37)	General population	Paranoia Scale (Fenigstein & Venable, 1992) MAAS (Brown & Ryan, 2003)	5 days of 10 minute daily practice Audio track of guided meditation practice No additional home practice Waitlist control group	1. Significant condition x time interaction on PLEs ($F(1.60, 111.91) = 12.09, p < 0.001$). 2. Main effect of condition on PLEs: Significant difference in PLEs scores between intervention and control groups ($F(1, 70) = 994.713, p < 0.001$). 3. PLEs were significantly lower in the MBI compared with the control group at post-intervention ($p < 0.001$), but not at baseline ($p = 0.122$). 4. No significant condition x time interaction on mindfulness scores ($F(1.693, 118.496) = 1.537, p = 0.221$). 5. Main effect of condition on mindfulness: No significant difference in scores between intervention and control	0.77 (good)

							groups ($F(1, 70) = 0.002, p = 0.966$).	
Oliver et al. (2012)	UK and NZ	Cross-sectional	700	University students	PDI (Peters et al., 2004) KIMS (Baer et al., 2004)	N/A	^a Significant inverse correlation between mindfulness and PLEs ($r = -.19, p < .001$).	0.90 (strong)
Pagnini et al. (2018)	Italy	Cross-sectional	248	University students	SCL-90 R Paranoid Ideation Italian version (Sarno et al., 2011) LMS (Pirson et al., 2012) Italian translation	N/A	A negative, non-significant, correlation was found between mindfulness and the PLEs ($r = -.086, p = .19$).	0.75 (good)
Palacios-García et al. (2018)	Spain	Cross-sectional	526	University students	PDI Spanish version (López-Ilundain et al., 2006) LSHS-R Spanish version (Fonseca-Pedrero et al., 2010) MAAS Spanish version (Soler et al., 2012)	N/A	Significant inverse correlations were found between mindfulness scores and the overall scores of the PDI-21 ($r = -.470, p < .001$), and the LSHS-R ($r = -.525, p < .001$).	0.95 (strong)

Perona-Garcelán et al. (2014)	Spain	Cross-sectional	83	University students with at least one risk factor (high or low hallucination proneness)	LSHS-R Spanish version (Fonseca-Pedrero et al., 2010) SMQ (Chadwick et al., 2008) Spanish translation	N/A	Subjects with high proneness showed significantly lower levels on the mindfulness scale compared to participants with low proneness ($t(81) = -4.56, p < .001; d = 1.12$).	0.90 (strong)
Peters et al. (2016)	UK	Cross-sectional	92	General population	SAPS (Andreasen, 1984) AANEX (Brett et al., 2007) SMQ (Chadwick et al., 2008)	N/A	^a Total lifetime AANEX not significantly correlated to total mindfulness ($r = .031, p = .78$). Current AANEX not significantly correlated to total mindfulness ($r = .079, p = .47$). Total positive symptoms not significantly correlated to total mindfulness ($r = .092, p = .41$).	0.90 (strong)
Shore et al. (2018)	UK and online	RCT	60 (29)	University students and general population	Paranoia Scale (Fenigstein & Venable, 1992) FFMQ (Baer et al., 2006)	Based on guided mindfulness meditation (Chadwick, 2006) 2 weeks of 10 minute daily practice Audio track of guided meditation practice plus access to	1. Significant group x time interaction on PLEs ($F(1.70, 98.72) = 5.70, p = .01$). 2. Significant difference in PLEs between MBI and waitlist control at post-intervention ($t(69.9) = 2.32, p = .024, d = 0.74$ 95% CI for $d = (0.22, 1.27)$).	0.88 (strong)

						'Learning Meditation Online' website Encouragement of home practice Waitlist control group	3. MBI group showed a significant decrease in PLEs over time pre- to post-intervention ($t(33) = 4.18, p < .001, d = 0.60$, 95% CI for $d = (0.11, 1.08)$). ^a 4. Increase in mindfulness score at post-intervention for MBI compared to control ($p = .001, d = -.89$).
Torok and Keri (2022)	Hungary	Cross- sectional	300	General population	sO-LIFE Unusual Experiences subscale Hungarian version (Kocsis- Bogár et al., 2016) MAAS Hungarian version (Simor et al., 2013)	N/A	Mindfulness significantly predicted PLEs ($R^2 = 0.06, \beta = -0.22, SE = 0.06, p < 0.01$). 0.95 (strong)

Note. USA = United States of America; UK = United Kingdom; NZ = New Zealand; RCT = Randomised controlled trial; PLEs = Psychotic-like experiences; PDI = Peters Delusions Inventory; RHS = Revised Hallucination Scale; PDS = Paranoia and Depression Scale; SCL-90 R = Symptom Checklist 90 Revised; LSHS-R = Launay Slade Hallucination Scale-Revised; SAPS = Scale for the Assessment of Positive Symptoms; AANEX = Appraisals of Anomalous Experiences Interview; sO-LIFE = short version of the Oxford-Liverpool Inventory of Feelings and Experiences; FFMQ = Five Facets of Mindfulness Questionnaire; MAAS = Mindful Attention Awareness Scale; KIMS = Kentucky Inventory of Mindfulness Skills; LMS = Langer Mindfulness Scale; SMQ = Southampton Mindfulness Questionnaire.

^a Results provided by corresponding author.

^b Results from supplementary material.

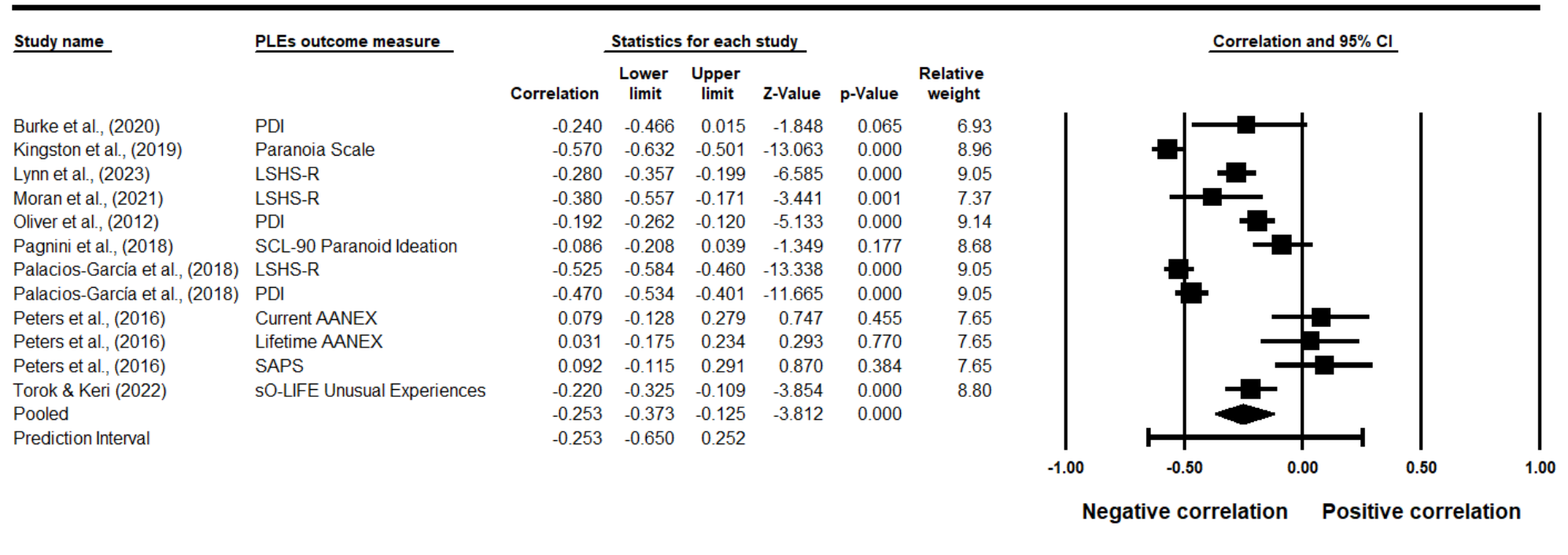
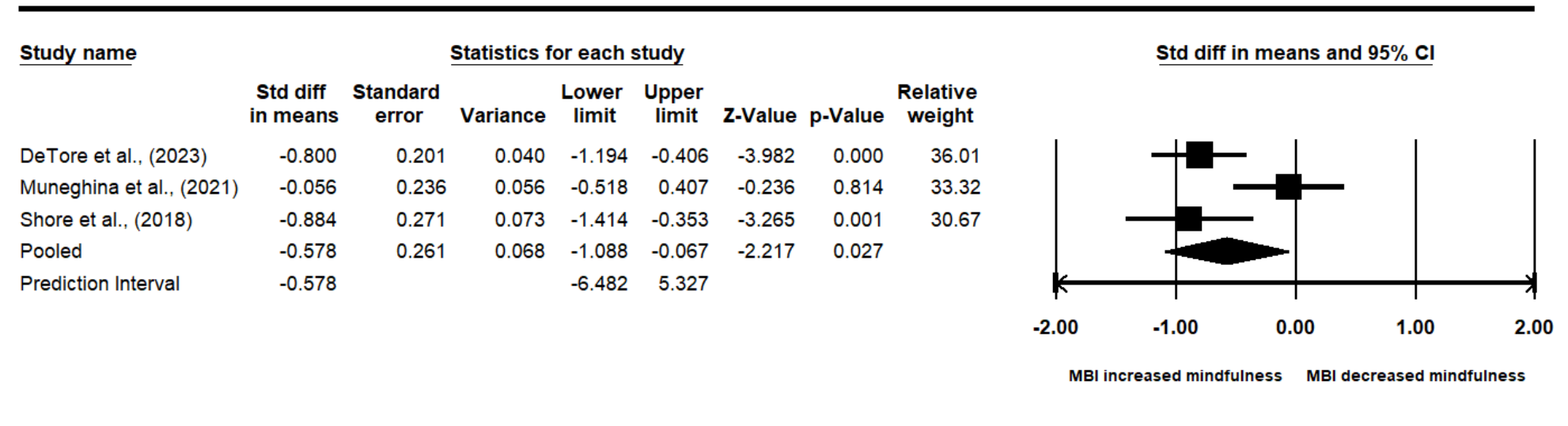
Table 2. Meta-analysis and forest plot of the relationship between mindfulness and PLEs

Table 3. Meta-analysis and forest plot of the effect of MBIs on PLEs

<u>Study name</u>	<u>Statistics for each study</u>								<u>Std diff in means and 95% CI</u>	
	Std diff in means	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value	Relative weight		
DeTore et al., (2023)	0.666	0.199	0.039	0.277	1.055	3.353	0.001	21.70		
Kingston et al., (2019)	-0.175	0.243	0.059	-0.651	0.301	-0.720	0.472	21.00		
McDonald et al., (2024)	-2.123	0.510	0.261	-3.123	-1.122	-4.159	0.000	15.76		
Muneghina et al., (2021)	0.783	0.245	0.060	0.304	1.263	3.202	0.001	20.97		
Shore et al., (2018)	0.752	0.267	0.071	0.228	1.276	2.813	0.005	20.58		
Pooled	0.092	0.357	0.127	-0.608	0.792	0.258	0.796			
Prediction Interval	0.092			-2.524	2.708					

-4.00 -2.00 0.00 2.00 4.00

MBI increased PLEs MBI decreased PLEs

Table 4. Meta-analysis and forest plot of the effect of MBIs on mindfulness

2.5 Discussion

This systematic review and the associated meta-analyses provided the first synthesis of the literature including seventeen studies exploring mindfulness and PLEs. Two pre-registered research questions were addressed by examining the relationship between mindfulness and PLEs ($k = 11$), and to assess the effectiveness of MBIs for individuals experiencing PLEs in non-clinical populations ($k = 8$). It also synthesised findings on the effect of MBIs on mindfulness skills ($k = 3$). Most papers were assessed as having either a strong or good quality rating ($k = 16$), with only one paper in the adequate category, suggesting that the body of literature overall is robust. Overall, three main findings emerged from the systematic review and meta-analyses. Firstly, mindfulness and PLEs were negatively correlated with the meta-analysis finding a small association. This association was consistent across a number of studies, despite the use of different PLEs and mindfulness measures, suggesting that enhanced mindfulness is associated with lower score on PLE measures. Secondly, there was mixed and therefore inconclusive evidence of the effect of MBIs on PLEs with five studies showing significant reductions in favour of the MBI, but the summary effect was not significant in the meta-analysis. Lastly, MBIs were shown to increase mindfulness skills with the meta-analysis showing a moderate effect size. It should be noted that all three meta-analyses undertaken resulted in high levels of heterogeneity and with evidence of some publication bias, therefore all findings need to be interpreted cautiously.

Collectively, these findings suggest that PLEs and mindfulness are negatively correlated and that although MBIs increase mindfulness skills, there was mixed evidence for the effectiveness of MBIs in reducing PLEs in nonclinical populations with five studies in favour of the MBIs but the pooled effect size was not significant. Some MBIs may not be sufficient in duration or intensity to produce measurable change in such experiences in these populations. Additionally, the variability in intervention content and delivery, ranging from brief daily audio sessions to intensive multi-week programmes, may have contributed to inconsistent outcomes. In some cases, active control conditions were also found to reduce PLEs, suggesting that non-specific therapeutic factors, such as structured self-reflection or relaxation, may partially account for improvements. Furthermore, baseline severity of PLEs may impact the effectiveness of MBIs, although this was not controlled for in any of the studies and should therefore be addressed in future research. Many studies recruited from university or general populations with low levels of PLEs, potentially resulting in floor effects that limited observable changes.

The post-hoc analysis found that MBIs significantly increased mindfulness skills with a moderate effect size, indicating that the interventions were effective in increasing mindfulness skills. This finding is consistent with the broader mindfulness literature and supports the assumption that MBIs function as intended in cultivating mindfulness capacities (Cavanagh et al., 2013; Chiesa et al., 2014). The discrepancy between improved mindfulness and unchanged PLE outcomes in the meta-analyses suggests that while MBIs may enhance general mindfulness skills, they may not directly translate into reductions in PLEs, at least within the constraints of the interventions assessed. However, given the relatively few studies conducted to date, and the limitations of the meta-analyses conducted, future studies are needed before any definitive conclusions can be drawn.

This systematic review had several strengths, including adherence to PRISMA guidelines, pre-registration of the protocol, and the use of both narrative synthesis and meta-analyses approaches. A comprehensive and systematic search strategy was applied across multiple databases, with rigorous screening and quality assessment processes. Nevertheless, several limitations should be acknowledged. First, several studies lacked comprehensive demographic reporting, which limited the ability to evaluate the potential influence of factors such as age, gender, and cultural context on the findings. In cases where demographic information or sample characteristics were reported, participants were predominantly drawn from Western, Educated, Industrialised, Rich, and Democratic (WEIRD) populations. This overrepresentation of WEIRD samples highlighted a notable limitation in the generalisability of the results, as such populations represented only a small proportion of global human diversity (Henrich et al., 2010) and are not representative of the global majority. Therefore, future research might usefully examine the effect of MBIs on individuals from low and middle income countries and include samples from a range of ethnic backgrounds. Second, the high heterogeneity observed in all meta-analyses is reflective of the considerable variation in study methodologies, measures, and populations, making it difficult to draw well-substantiated conclusions. Third, all studies included relatively small follow up periods, and therefore it is not possible to determine the durability of any effects found and whether individuals continue to practice and potentially benefit from mindfulness. Fourth, given the presence of PLEs has been associated with an increased risk of developing psychotic disorders, particularly when PLEs are persistent and reoccurring (Dominguez et al., 2009), there is a notable absence of data in the literature about whether MBIs might prevent transition to psychosis or an at risk mental state in non-clinical populations.

It was acknowledged that there is currently no universally accepted definition of PLEs and that the studies included in this review were highly heterogeneous in how they conceptualised and measured them. To improve consistency and comparability across studies,

future research should aim to clearly define and operationalise PLEs. Additionally, it is possible that specific facets of mindfulness, such as non-judgemental awareness or non-reactivity, are more closely associated with PLEs than general mindfulness as measured by trait-level scales, and future research could address this. Furthermore, this systematic review found a wide range of MBIs used across studies, however it was unclear whether any of the interventions specifically addressed PLEs. Specific guidance recommends that MBIs for psychosis should reference and normalise psychotic experience throughout the practice (Ellett, 2024). Therefore, future research could explore incorporating explicit references to PLEs in the content of the MBIs to see if it enhances the effectiveness of MBIs in reducing these experiences in non-clinical populations. Finally, given that PLEs often occur alongside additional presenting problems, including anxiety (Isaksson et al., 2022) and substance use (Mackie et al., 2011), future studies might usefully also measure a broader range of clinically-relevant outcomes.

In conclusion, this systematic review and the associated meta-analyses provides evidence that higher levels of mindfulness may be associated with fewer PLEs. However, evidence for the effectiveness of MBIs in reducing PLEs is mixed and therefore remains inconclusive, with outcomes likely influenced by variability in intervention design, participant characteristics, and baseline symptom severity. Notably, MBIs were consistently effective in enhancing mindfulness skills in the small number of studies included in this review. Future studies could explore the development of a definition for PLEs, examine which specific facets of mindfulness are most strongly associated with PLEs, assess whether explicitly referencing PLEs within MBIs enhances their effectiveness, and include a broader range of clinically relevant outcomes such as anxiety and substance use.

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Chapter 3 A randomised controlled trial of an online mindfulness-based intervention for non-clinical paranoia: A cross cultural study

3.1 Abstract

Objectives: Paranoia exists on a continuum across clinical and non-clinical populations, with similar experiences across cultures. Online mindfulness-based interventions (MBIs) have shown potential in reducing paranoia. This study undertook secondary data analysis of a randomised controlled trial (RCT) to investigate the effects of an online MBI on paranoia in a non-clinical sample recruited from the United Kingdom and Hong Kong. It also investigated whether reductions in paranoia were explained by increases in mindfulness.

Methods: 447 participants were randomly assigned to an MBI (2 weeks of daily 10-minute mindfulness meditation) or active control (2 weeks of daily 10-minutes of classical music). Paranoia and mindfulness were measured at baseline, post-intervention and 4-weeks follow-up.

Results: Intention to Treat (ITT) analyses found a significant interaction of time and condition on paranoia with a small effect size ($p = .02$; $\eta_p^2 = .009$). Per protocol (PP) analyses indicated a non-significant interaction. The mediation analysis found a non-significant indirect effect, suggesting that mindfulness did not mediate the effect of condition on state paranoia. Additionally, this study found that participants with higher baseline paranoia were more likely to complete the intervention than those with lower levels ($t(445) = 3.12$, $p = .002$).

Conclusions: This study partially supports using online MBIs to reduce paranoia in a non-clinical population. As participants with higher baseline paranoia were more likely to complete the intervention, MBIs may be particularly helpful for individuals experiencing higher levels of paranoia. Future research could target diverse populations and explore underlying mechanisms of MBIs and Acs.

Keywords: RCT; Paranoia; Mindfulness; Online; Non-clinical; ITT

3.2 Introduction

Paranoia is an exaggerated fear that others intend to cause harm (Freeman & Garety, 2000). While experiences of paranoia are typically associated with clinical diagnoses such as schizophrenia (Sheffield et al., 2022), depression (Fowler et al., 2011), and social anxiety (Michail & Birchwood, 2009), evidence suggests that paranoia exists on a continuum, with equivalent processes underlying clinical and non-clinical experiences (Elahi et al., 2017). Indeed, milder forms of paranoia are commonly experienced by 20-30% of the general population (Bebbington et al., 2013; Freeman et al., 2005), with 27% meeting the threshold for elevated levels of paranoid thinking in daily life (Freeman et al., 2021). Additionally, research has shown that paranoid experiences in the general population can be distressing, preoccupying, have a significant impact on well-being (Ellett et al., 2003; Freeman et al., 2011) and persistent (Allen-Crooks & Ellett, 2014; Chan et al., 2021). Together, these studies emphasise the widespread prevalence of paranoia and its impact.

Importantly, the continuum of paranoia is not confined to any one culture or country, and has been reported globally, including places such as Belgium (Kramer et al., 2013), Germany (Nittel et al., 2019), Spain (Cristóbal-Narváez et al., 2016) and Hong Kong (So et al., 2020). However, there is currently limited research on how paranoia manifests across cultures along the continuum of experience. Schlier et al. (2024) demonstrated that the two-factor model of paranoia – comprising Ideas of Reference and Persecutory Thoughts as measured by the revised Green et al., Paranoid Thoughts Scale (R-GPTS) – is relevant across cultures, specifically within UK, USA, Germany and Hong Kong populations. In addition, Kingston et al. (2023) observed a similar profile of paranoid experiences in majority and minority groups across different countries. These studies indicate that paranoia is a common and distressing experience across cultures, making it crucial to identify effective interventions that are accessible, brief, and culturally relevant.

Cognitive behavioural therapy (CBT) is currently the most established psychological intervention for individuals experiencing psychosis. Multiple meta-analyses have demonstrated its benefits, for example Wykes et al., (2008) and Zimmerman et al., (2005). This had led to national clinical guidelines in the UK to recommend that 16 sessions of manualised CBT be offered to all individuals diagnosed with a psychotic disorder (National Institute for Health and Care Excellence [NICE], 2014). CBT for psychosis usually incorporates challenging cognitive biases and paranoid beliefs, which some participants may find too confronting (Chadwick, 2006). Additionally, the recommended CBT intervention is resource-intensive, requiring input from highly trained therapists over several months.

In contrast, mindfulness-based interventions (MBIs) are less extensively researched in psychosis populations but they have shown promise in reducing paranoia across the continuum of experience (Ellett, 2013; Ellett et al., 2020; Shore et al., 2018). Mindfulness has been defined as the intentional, non-judgemental awareness of the present moment (Kabat-Zinn, 2000). It has been postulated that the skill of mindfulness has five inter-related facets (Baer et al., 2006). These are the ability to describe and observe inner experiences, to act with awareness, and to respond non-judgmentally and non-reactivity to inner experiences. MBIs is a broad term encompassing a heterogeneous group of therapeutic interventions that utilise mindfulness practices with the aim of increasing skills related to having an intentional and non-judgmental awareness of experiences. It is hypothesised that MBIs may help reduce the frequency, intensity, or duration of paranoia by fostering a non-judgmental, accepting, and non-reactive response to the paranoid experiences. Although there is a possible potential risk that increasing self-focus and awareness of internal stimuli may exacerbate paranoid experiences for people at risk of psychosis, a recent systematic review and meta-analysis of safety indicators found that MBIs for psychosis appear to be safe and may decrease the use of crisis services and risk of hospitalisation (O'Brien-Venus et al., 2024).

To date, several studies have explored the effects of MBIs on non-clinical paranoia. For example, an RCT by Shore et al. (2018) demonstrated that a brief online MBI led to a reduction in paranoia, with a medium effect size. Specifically, they identified that the reduction in paranoia was mediated by improvements in mindfulness skills, particularly in the areas of observing, describing, and non-reactivity domains. However, a key limitation of this study was the use of a waitlist control instead of an active control (AC). The use of an AC is important because it controls for nonspecific factors such as restful alertness, physical inactivity and expectancy effects (Goldberg et al., 2022; Kingston et al., 2019). In another experimental study, Kingston et al. (2019) found that a one-week self-administered mindfulness or guided visual imagery training intervention significantly reduced paranoia in a non-clinical sample. Although, they did not conduct a mediation analysis to explore how mindfulness skills might contribute to the reduction in paranoia. These studies collectively suggest that brief MBIs hold promise for alleviating paranoia in the general population. However, further research is needed to clarify the relationship between mindfulness and paranoia, as well as the mechanisms underlying any effect, particularly in cross-cultural contexts.

This research aims to enhance our understanding of mindfulness as an intervention for non-clinical paranoia across culturally diverse populations. The current study involved secondary analysis and reporting of data from a previous unpublished study. The original study employed a RCT with an AC design to assess the impact of a brief online MBI on paranoia at post-intervention and 4-week follow-up in a non-clinical population from the United Kingdom

(UK) and Hong Kong (HK). The present study tested two hypotheses: (H1) engagement in an online MBI will lead to a greater reduction of state paranoia at post-intervention and follow-up compared to an active control, whilst controlling for differences between recruitment sites, and (H2) mindfulness score at post-intervention will mediate the effect of condition on state paranoia at follow-up whilst controlling for baseline state paranoia and mindfulness. Given that paranoia is theorised to be broadly comparable across populations (Kingston et al., 2023; Schlier et al., 2024), the subjective experience of paranoia was not expected to meaningfully differ by recruitment site. Rather than treating recruitment site as a primary factor in the analysis, it was considered more theoretically appropriate to analyse the combined experiences across site to better capture the general features of paranoid experience across participants. Accordingly, recruitment site was treated as a covariate in subsequent analyses, allowing for the statistical control of potential site-related variance without positioning it as a key variable of interest.

3.3 Methods

3.3.1 Design

The study used a pooled dataset with an RCT design to investigate the effects of a brief online MBI on paranoia at post-intervention and 4-weeks follow-up compared to an AC in a non-clinical population recruited from two sites. Self-report measures assessing paranoia and mindfulness were collected.

The HK dataset was collected and written up for two unpublished Masters dissertations (Ku & So, 2024; Yi & So, 2024). Both Masters projects had a primary research aim of investigating if participation in an MBI reduces paranoia at post-intervention and follow-up compared to an AC. Ku and So (2024) also explored if mindfulness would mediate the relationship condition and paranoia post-intervention, whereas Yi and So (2024) investigated anxiety using the GAD-7 as a mediator. The UK dataset was not collected by the author and has not previously been analysed or written up prior to this project. Therefore, there is no original study to cite for the UK papers. This project pooled the HK master's students' dataset and UK dataset. This is the first time the complete dataset has been analysed and written up.

3.3.2 Participants

The study had one recruitment site in the UK and one in HK. The inclusion criteria were that participants had to have capacity to consent to the study, be aged 18 years or older, and able to understand English or Chinese for the UK or HK site respectively. There were no

exclusion criteria. A power calculation was conducted to estimate the minimum sample size required. Using G*Power (Faul, 2014) with 80% power and alpha set at 0.05 and assuming a medium effect size based on previous research by Shore et al. (2018), it was found that 155 participants would be needed in total.

3.3.3 Ethical approval

The original study gained ethical approval by the Survey and Behavioural Research Ethics Committee of The Chinese University of Hong Kong and the College Research Ethics Committee of Royal Holloway, University of London for data collection and reporting. Additionally, approval by the University Ethics Committee of The University of Southampton (ID: 99706) was granted for secondary data analysis and reporting, see Appendix C.

3.3.4 Measures

3.3.4.1 State Paranoia

State paranoia was measured by the paranoid subscale of the Paranoia and Depression Scale (Bodner & Mikulincer, 1998), with participants in the UK completing the original version and participants in HK completing a translated version. The Chinese version was translated for the purpose of this study. The translated measure was then back-translated into English by an independent party to check for accuracy against the original. Any discrepancies between the versions were resolved via discussion. Both versions were 7-item self-report questionnaires with a scale from 1 (not at all) to 6 (very often). Each item score was summed to give a total score ranging from 7 to 42, where higher scores represent higher levels of state paranoia. This measure has shown good discriminant and convergent validity, as well as internal consistency ($\alpha = .79$) (Bodner & Mikulincer, 1998). Cronbach's alpha for state paranoia at baseline in the current study was .87 and .83 for participants in the UK and HK respectively, and .86 for all participants.

3.3.4.2 Mindfulness

Mindfulness was assessed by using Five Facets of Mindfulness Questionnaires (FFMQ). Participants in the UK completed the 15-item English version (Baer et al., 2012) and participants in HK completed the 20-item Chinese version (Hou et al., 2014). Both versions rated items with a scale from 1 (rarely) to 5 (always) and had five subscales, namely observing, describing, acting with awareness, non-reactivity, and non-judgement. For both questionnaires, item scores were summed and divided by the number of items to give a mean score. The mean scores were then standardised into a z-score for the two sites individually before combining the

z-scores for both sites for data analysis. Therefore, baseline differences were not computed between sites. Additionally, due to different versions of the questionnaire being used between the UK and HK populations, it was not appropriate to score or analysis the subscales of the FFMQ. A higher score represents higher levels of mindfulness. The scale has shown adequate to good internal consistency across all five facets ($\alpha = .75-.91$), and has been shown to be reliable across various samples, including meditators, non-meditators, and the general population (Baer et al., 2006; Baer et al., 2008). Cronbach's alpha for the FFMQ at baseline in the current study was .78 and .71 for participants in the UK and HK, respectively. A total Cronbach's alpha for all participants was not calculated due to different versions of the FFMQ being used between sites.

3.3.4.3 Trait Paranoia

Trait Paranoia was measured by using the Revised Green et al., Paranoid Thoughts Scale (R-GPTS), either a UK (Freeman et al., 2021) or Chinese version (Schlier et al., 2024). Both measures had 18-items rated on a scale from 0 (not at all) to 4 (totally) with two subscales: Ideas of Reference (8 items) and Persecutory Thoughts (10 items). The Ideas of Reference items and Persecutory Thoughts items were summed separately to give a total score for each subscale, with a range of 0-32 and 0-40 respectively. Higher scores represent higher levels of trait paranoia. Previous studies reported good internal consistency for both the English and Chinese versions ($\alpha = .94$ and $.96$) (Chau et al., 2022; Schlier et al., 2024). Cronbach's alpha for trait paranoia at baseline in the current study was .95 and .93 for participants in the UK and HK respectively, and .94 for all participants.

3.3.5 Procedure of Original Study

Participants in the UK were recruited via online advertising and a university participant credit pool. Participants in HK were recruited from an existing dataset (Sun et al., 2019) of 1656 adults who had previously completed a trait paranoia measure (Green et al., 2008), with those in the top 25% for trait paranoia scores invited to join the study. Participants completed the study in either English or Chinese, depending on their recruitment site.

The study used Gorilla and Qualtrics to collect data at all three time points. Consenting participants read an information sheet, provided sociodemographic information (e.g. age, gender, education level) and completed baseline measures (state and trait paranoia measures and mindfulness measure), before being randomised to either the AC or MBI condition. Participants received a daily link to an audio file containing either the AC or MBI content for 14 consecutive days. Upon completion of the intervention, participants completed the post-intervention measures (state paranoia measure and mindfulness measure) and reported if they

had listened to more than seven audios. Participants who completed at least half of the intervention were categorised as intervention completers, in line with previous research (Chadwick et al., 2016). The post-intervention measures were sent again at 4-weeks follow-up and those who completed them received debriefing information. AC participants were given the MBI audio files after completing the follow-up measures.

3.3.5.1 Mindfulness Based Intervention Protocol

The MBI consisted of a 10-minute mindfulness meditation exercise developed by (Chadwick, 2006), as used in previous research for non-clinical paranoia (Kingston et al., 2019; Shore et al., 2018). The MBI consisted of a body scan, mindful breathing and choiceless awareness. The Chinese version of the mindfulness meditation script was translated from English for the purpose of this study. The translated measure was then back-translated into English by an independent party to check for accuracy against the original. Any discrepancies between the versions were resolved via discussion.

3.3.5.2 Active Control Protocol

The AC consisted of two 10-minute audio clips of classical music; one from Beethoven's Piano Concerto No. 2 and one from Beethoven's Piano Concerto No. 5. Participants listened to each piece of music on alternating days. This procedure was based on previous use of classic music as an active control for MBI research (Gu et al., 2018).

3.3.6 Secondary Data Analysis

The original dataset was prepared for secondary analysis by calculating an overall score for each measure and participant at all three time points. Missing data at an item level was imputed by using the mode as a single imputation method (Zhang, 2016). Data preparation and analysis was conducted using IBM SPSS Statistics (Version 29).

H1: Comparison of means analyses were carried out as an Intention To Treat analysis (ITT) and Per Protocol (PP) analysis. The ITT analysis included all participants who completed the baseline measures and were randomised to a condition. Missing data at the scale level was found to be missing at random for both conditions due to a non-significant Little's test (Little's test = .20 and .17 for the AC and MBI, respectively) and no patterns found during visual pattern analyses. Therefore, missing data on a scale level was managed using multiple imputation with 100 imputations (Vera & Enders, 2021) and per condition (Sullivan et al., 2018) which were subsequently pooled. Recruitment site and gender were used as the predictor variables in the imputation model. The PP analysis evaluated effects in participants who completed measures

at all three time points, with at least 50% intervention engagement. PP analysis results will be considered as the primary findings to establish whether the MBI is effective under ideal conditions. For both analyses, a two-way repeated measure Analysis of covariance (ANCOVA) was conducted. The ANCOVAs had a within-subjects factor of time with three levels (baseline, post-intervention and follow-up), a between-subjects factor of condition with two levels (AC and MBI) and a covariate of site (UK and HK). The dependent variable was state paranoia. Before conducting the ANCOVAs, the following assumptions were tested: outliers were identified as more than ± 3 standard deviations away from the mean using boxplots, homogeneity of regression slopes were assessed by examining the interactions between condition and site at each time point; the Kolmogorov-Smirnov test of normality was applied due to the large sample size; Levene's test of equality was used to test homogeneity of variance; and sphericity was assessed with Mauchly's test.

H2: A mediation analysis was conducted with the PP data using Model 4 of the PROCESS Macro Version 4.0 (Hayes, 2022) based on 5000 bootstrap samples. The predictor variable was condition (AC or MBI), the mediator variable was mindfulness score at post-intervention, and the dependant variable was state paranoia score at follow-up. Baseline state paranoia score and mindfulness scores were included within the model as covariates.

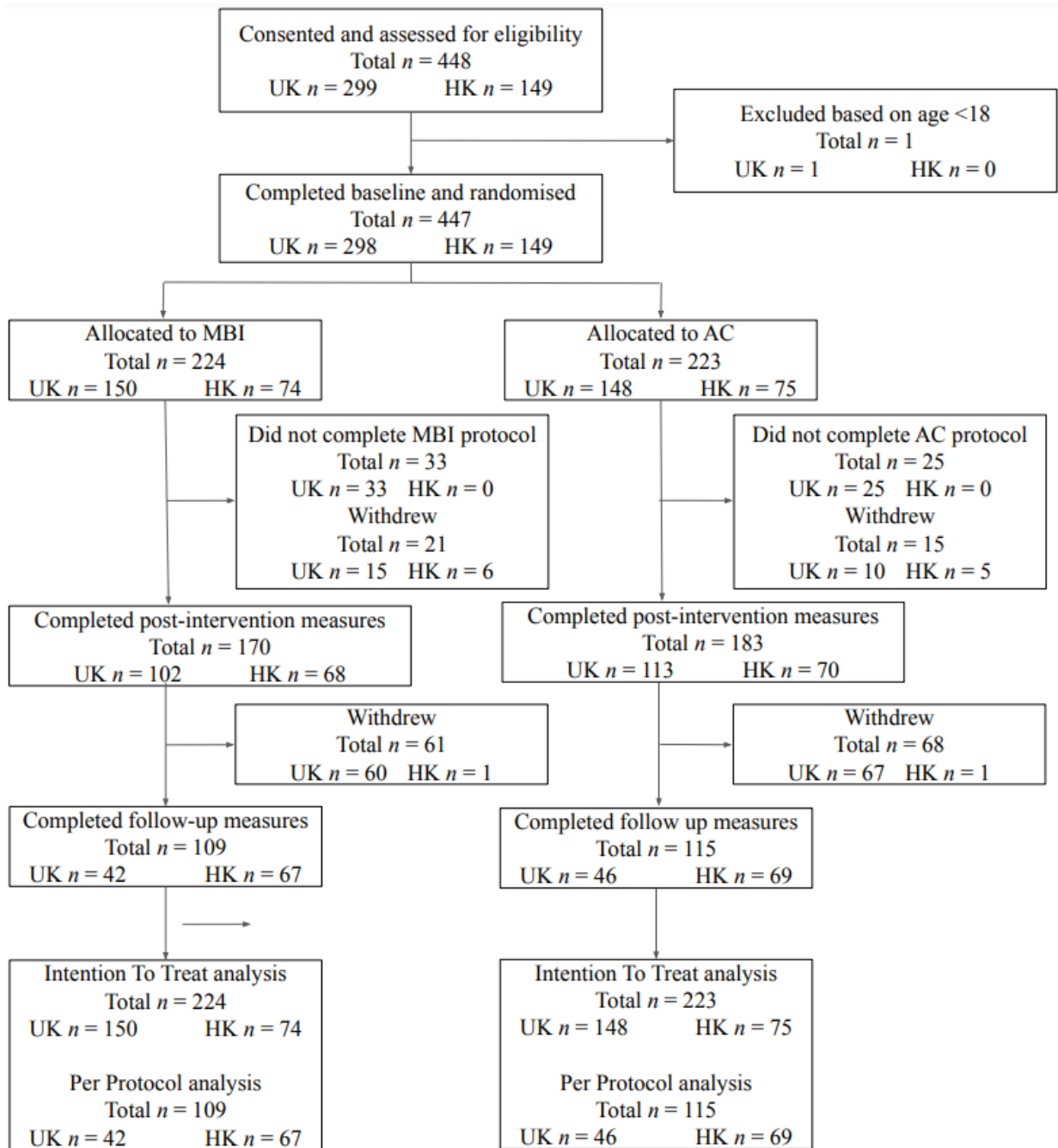
3.4 Results

3.4.1 Participant Characteristics

The data from 447 participants was used in the secondary data analysis. Figure 2 shows a CONSORT diagram of participant allocation and withdrawal. The ages of eligible participants ranged from 18 to 79 years old. See Table 5 for a summary of sociodemographic characteristics and Table 6 for a summary of the baseline measures for the AC and MBI conditions. Two-tailed independent t-tests and Fisher's Exact Tests were used to analyse differences between the two conditions at baseline and no significant differences were found. Additionally, correlations between all measures at baseline are shown in Table 7.

Baseline participant characteristics between the two sites were investigated. See Table 8 for a summary of the participants' sociodemographic characteristics and Table 9 for a summary of the baseline measures for participants in the UK and HK. Two-tailed independent t-tests and Fisher's Exact Tests were used to analyse differences between the two sites at baseline. Every comparison was found to be significantly different apart from the persecution subscale of the trait paranoia measure.

Furthermore, two-tailed independent t-tests, Chi-Square and Fisher's Exact Tests were used to explore differences in baseline characteristics between participants who were included in the PP analysis (completers; $n = 224$) and those who were not (non-completers; $n = 223$), regardless of condition. It was found that there was no significant difference between the two groups with respect to gender ($p = .49$) and baseline mindfulness scores ($t(445) = -1.42, p = .16$). However, there was a significant difference between the completers and non-completers with regards to site ($p < .001$) with participants in HK were more likely to complete the intervention compared to participants in the UK; age ($t(445) = -2.52, p = .01$) with younger participants were more likely to complete the intervention compared to older participants; previously practiced mindfulness ($p < .001$) with participants who had not previously practiced mindfulness more likely to complete the intervention than participants who had previously practice mindfulness; and baseline state paranoia scores ($t(445) = 3.12, p = .002$) with participants scoring higher on state paranoia at baseline more likely to complete the intervention than those reporting lower levels of paranoia.

Figure 2. CONSORT diagram depicting participant allocation and withdrawal

Note. UK = United Kingdom recruitment site; HK = Hong Kong recruitment site; MBI = Mindfulness-based intervention; AC = Active control

Table 5. Participant sociodemographic characteristics across condition

Sociodemographic	AC (<i>n</i> = 223)	MBI (<i>n</i> = 224)	Statistics
Mean age – years (SD)	23.30 (8.20)	23.46 (8.06)	$t(445) = -.21, p = .83$
Gender – <i>n</i>			$p = .62$
Female inc. transgender female	166	167	
Male inc. transgender male	52	54	
Prefer to self-describe or not disclose	5	3	
Education level – <i>n</i>			$p = .65$
Minimum school leaving age	5	4	
Further education e.g. A level	45	44	
Bachelor's degree	154	148	
Master's degree	15	24	
PhD	4	3	
Unknown	0	1	
Employment status – <i>n</i>			$p = .78$
Student	97	98	
Part-time employment	21	19	
Full-time employment	84	87	
Unemployed	21	18	
Unknown	0	2	
Previously practiced mindfulness – <i>n</i>			$p = .95$
Yes	72	72	
No	109	107	
Unknown	42	45	

Note. SD = Standard deviations; AC = Active control; MBI = Mindfulness-based intervention

Table 6. Participant baseline measures showing means (standard deviations) across condition

Baseline measure	AC (<i>n</i> = 223)	MBI (<i>n</i> = 224)	Statistics
State Paranoia	18.83 (7.17)	18.83 (6.31)	$t(445) = .01, p = .99$
Mindfulness	.051 (.99)	-.051 (1.00)	$t(445) = 1.07, p = .28$
Trait Paranoia			
Reference subscale	12.75 (8.05)	13.13 (7.35)	$t(445) = -.52, p = .61$
Persecution subscale	8.50 (9.51)	7.91 (7.83)	$t(445) = .72, p = .47$

Note. AC = Active control; MBI = Mindfulness-based intervention

Table 7. Correlations between measures at baseline

	1	2	3	4
1. State paranoia	-			
2. Mindfulness	-.43*	-		
Trait Paranoia				
3. Reference subscale	.69*	-.42*	-	
4. Persecution subscale	.58*	-.25*	.70*	-

Note. * Correlations significant at the .01 level (2-tailed)

Table 8. Participant sociodemographic characteristics across sites

Sociodemographic	UK (<i>n</i> = 298)	HK (<i>n</i> = 149)	Statistics
Mean age – years (SD)	22.94 (9.88)	24.26 (1.38)	$t(445) = -1.62, p < .001$
Gender – <i>n</i>			$p < .001$
Female inc. transgender female	238	95	
Male inc. transgender male	52	54	
Prefer to self-describe or not disclose	8	0	
Education level – <i>n</i>			$p < .001$
Minimum school leaving age	9	0	
Further education e.g. A level	89	0	
Bachelor's degree	166	136	
Master's degree	28	11	
PhD	5	2	
Unknown	1	0	
Employment status – <i>n</i>			$p < .001$
Student	181	14	
Part-time employment	37	3	
Full-time employment	45	126	
Unemployed	33	6	
Unknown	2	0	
Previously practiced mindfulness – <i>n</i>			$p < .001$
Yes	127	17	
No	84	132	
Unknown	87	0	

Note. SD = standard deviation; UK = United Kingdom recruitment site; HK = Hong Kong recruitment site

Table 9. Participant baseline measures showing means (standard deviations) across sites

Baseline measure	UK (<i>n</i> = 298)	HK (<i>n</i> = 149)	Statistics
State Paranoia	17.81 (6.93)	20.89 (5.87)	$t(445) = -4.66, p = .01$
Trait Paranoia			
Reference subscale	12.42 (8.18)	13.98 (6.55)	$t(445) = -2.03, p < .001$
Persecution subscale	8.08 (8.90)	8.46 (8.34)	$t(445) = -.43, p = .28$

Note. UK = United Kingdom recruitment site; HK = Hong Kong recruitment site

3.4.2 Main Analyses

3.4.2.1 Intention To Treat Analysis

The assumption testing for the ANCOVA for the ITT analysis identified seven outliers, however they were not excluded as they were within the feasible range of the state paranoia measure (Tabachnick & Fidell, 2013). The interactions between condition and site were explored at each timepoint to test the homogeneity of regression slopes assumption, they were found to be non-significant at all three time points, therefore not violating the assumption. The normality assumption was violated as the Kolmogorov-Smirnov test found $p < .05$ for both conditions at all timepoints. However, the violation of this assumption was not seen as critical as there was a large sample size (Field, 2013). The homogeneity of variance assumption was violated at baseline and follow-up as Levene's test of equality was less than .05. However, this assumption was met at post-intervention. The violation of this assumption was interpreted as non-critical as the conditions had relatively equal group sizes (Field, 2013). Mauchly's test of sphericity indicated that the assumption had been violated, $\chi^2(2) = 77.60, p < .001$. Furthermore, it was found that Greenhouse-Geisser $\varepsilon = .86$, and as this was greater than .75 the Huynh-Feldt correction was used. The means and standard deviations for state paranoia for each condition at each time point are presented in Table 10.

The main effect of time on state paranoia scores was non-significant, $F(1.74, 771.23) = 2.16, p = .12, \eta_p^2 = .005$. This suggests that state paranoia scores overall did not significantly change over the three time points. Additionally, the main effect of condition on state paranoia scores was non-significant, $F(1, 444) = 1.00, p = .32, \eta_p^2 = .002$. This suggests there was no significant difference between the AC and MBI in their state paranoia scores overall. The main effect of site as a covariate was significant, $F(1, 444) = 25.03, p < .001, \eta_p^2 = .05$. This indicates significant differences between participants in the UK and HK with regards to their state paranoia scores, with participants in HK scoring higher.

The interaction of time and condition on state paranoia was significant, $F(1.74, 771.23) = 4.22, p = .02, \eta_p^2 = .009$. This indicates a significant difference of state paranoia between the AC and MBI conditions over time. Bonferroni's correction was used for post hoc analysis investigating the significant interaction of time and condition. Simple main effects analysis for condition was explored at each time point. It was found that there was no significant difference with regards to state paranoia between AC and MBI at baseline ($p = .98$) or post-intervention ($p = .43$), but there was a significant difference at follow-up ($p = .03$). Additionally, investigating the difference between timepoints for each condition separately found that in the AC condition there was a significant difference in state paranoia between baseline and post-

intervention ($p < .001$), and baseline and follow-up ($p = .01$), but a non-significant difference between post-intervention and follow-up ($p = .17$). A similar pattern was found in the MBI condition with a significant difference in state paranoia between baseline and post-intervention ($p < .001$), and baseline and follow-up ($p < .001$), but a non-significant difference between post-intervention and follow-up ($p = .62$). Taking these results together, the hypothesis that engagement in an online MBI would lead to a greater reduction of state paranoia at post-intervention and follow-up compared to the AC, whilst controlling for differences between sites, was partially supported.

3.4.2.2 Per Protocol analysis

The assumption testing for the ANCOVA for the Per Protocol analysis identified three outliers, however they were not excluded as they were within a feasible range of the state paranoia measure (Tabachnick & Fidell, 2013). The interactions between condition and site were explored at each timepoint to test the homogeneity of regression slopes assumption, they were found to be non-significant at all three time points, therefore not violating the assumption. The normality assumption was met as the Kolmogorov-Smirnov test found $p > .05$ for both conditions at all timepoints. The homogeneity of variance assumption was violated at baseline as Levene's test of equality was less than .05. However, this assumption was met at post-intervention and follow-up. The violation at baseline was seen as non-critical as there were relatively equal group sizes between the conditions (Field, 2013). Mauchly's test of sphericity indicated that the assumption had been violated, $\chi^2(2) = 17.46$, $p < .001$. Furthermore, it was found that Greenhouse-Geisser $\epsilon = .93$, and as this was greater than .75 the Huynh-Feldt correction was used in the interpretation of the ANCOVA. The means and standard deviations for state paranoia for each condition at each time point are presented in Table 10.

The main effect of time on state paranoia score was non-significant, $F(1.89, 417.76) = 1.85$, $p = .16$, $\eta_p^2 = .008$. This suggests that state paranoia scores did not significantly change over the three time points. Additionally, the main effect of condition on state paranoia score was non-significant, $F(1, 221) = .67$, $p = .42$, $\eta_p^2 = .003$. This suggests that there was no significant difference between AC and MBI in state paranoia scores. The main effect of site as a covariate was significant, $F(1, 221) = 13.09$, $p < .001$, $\eta_p^2 = .056$. This indicates significant differences between the sites with regards to their state paranoia scores, with participants in HK scoring higher.

The interaction of time and condition on state paranoia was non-significant, $F(1.89, 417.76) = 2.60$, $p = .08$, $\eta_p^2 = .012$. This indicates that there were no significant differences in state paranoia between AC and MBI conditions over time. Taking these PP results together, the hypothesis that engagement in an online MBI would lead to a greater reduction of state paranoia

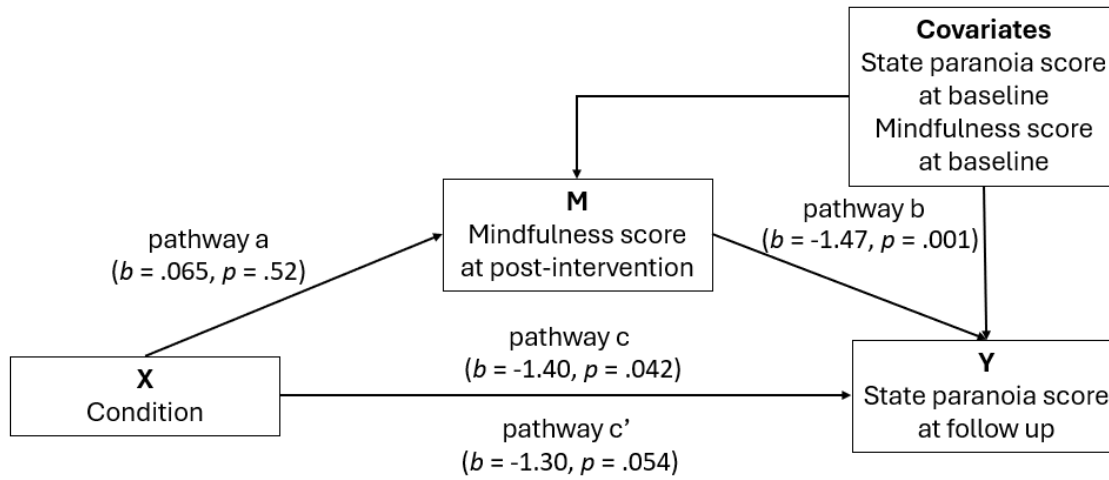
at post-intervention and follow-up compared to the active control condition, whilst controlling for differences between sites, was rejected.

Table 10. Means (standard deviations) for the state paranoia scores for the Intention To Treat and Per Protocol Analyses

Timepoint	Intention To Treat Analysis		Per Protocol Analysis	
	Active Control	Mindfulness Based Intervention	Active Control	Mindfulness Based Intervention
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Baseline	18.83 (7.17)	18.83 (6.31)	19.72 (7.15)	19.92 (5.74)
Post-intervention	17.50 (6.19)	17.04 (5.75)	18.32 (6.45)	17.76 (5.93)
Follow-up	17.92 (6.34)	16.77 (5.12)	18.82 (7.24)	17.47 (6.01)

3.4.3 Mediation Analysis

Model 4 of the PROCESS Macro Version 4.0 (Hayes, 2022) based on 5000 bootstrap samples with the predictor variable as condition (AC or MBI), the mediator variable as mindfulness score at post-intervention, and the dependant variable as state paranoia score at follow-up and covariates of baseline state paranoia score and mindfulness scores was used for analysis. It found that the indirect effect was non-significant, suggesting that mindfulness scores at post-intervention did not mediate the effect of condition on state paranoia at follow-up (unstandardised $b = -.096$, bootstrapped SE = .15, bootstrapped 95% confidence intervals (CI) [-.42, .22]; Partially standardised Beta = -.014, bootstrapped SE = .023, bootstrapped 95% CI [-.063, .032]). The unstandardised b coefficients for the pathways are shown in Figure 3. The effects of the covariates on the mediator and dependent variable were also investigated and are shown in Table 11. Taking these results together, the hypothesis that mindfulness score at post-intervention will mediate the effect of condition on state paranoia at follow-up whilst controlling for baseline state paranoia and mindfulness scores was rejected.

Figure 3. Mediation pathways with unstandardised *b* coefficients**Table 11.** Summary of the covariates from the mediation analyses

Covariate	Mediating Variable	Dependent Variable	Effect of C on M		Effect of C on DV	
			<i>b</i>	95% CI	<i>b</i>	95% CI
(C)	(M)	(DV)				
State paranoia score at baseline	Mindfulness score at post-intervention	State paranoia score at follow-up	-.005	(-.02, .01)	.68*	(.57, .79)
Mindfulness score at baseline	Mindfulness score at post-intervention	State paranoia score at follow-up	0.72*	(.60, .83)	1.59*	(.61, 2.57)

Note: * $p < .05$; CI = confidence intervals

3.5 Discussion

The aim of the study was to investigate the effects of an online MBI on paranoia in a non-clinical sample recruited from the United Kingdom and Hong Kong. It also investigated whether reductions in paranoia were explained by increases in mindfulness. The ITT analysis found a significant difference in state paranoia between the AC and MBI conditions over time, with a small effect size, such that both conditions reported reduced paranoia at post-intervention and follow-up compared to baseline. This finding might be explained by common mechanisms induced in both conditions such as general relaxation factors, or an expectation effect. Additionally, the MBI had a further small reduction of paranoid experiences between post-intervention and follow-up, while the AC showed a slight increase. This might suggest that MBI may provide longer-term benefits of reducing paranoia, possibly due to its focus on mindfulness skills that participants could continue to use as well as in the moment relaxation. In contrast, the AC may have only offered short-term relaxation, although, this would need to be tested in future research.

The PP analyses found no significant difference between the AC and MBI conditions on paranoia over time. This may be due to differences in participant characteristics between completers and non-completers. For example, participants in HK were more likely to complete the intervention compared to participants in the UK; younger participants were more likely to complete the intervention compared to older participants; participants who had not previously practiced mindfulness were more likely to complete the study compared to participants who had previously practiced mindfulness; and participants with higher state paranoia scores at baseline were more likely to complete the intervention than those reporting lower levels of paranoia. Based on these findings, the data indicate that participants who experienced less paranoia were more likely to drop out, perhaps due to lack of motivation for sustained involvement in an intervention targeting an experience that they did not view as a concern. Conversely the findings also indicated that the online MBI was more likely to be completed by people with existing levels of high trait paranoia, and therefore may have an increased likelihood of being beneficial for them, though both of these predictions would need to be tested in future research. Furthermore, there is limited research into attrition rates of online MBIs, but one systematic review and meta-analysis found a weighted average attrition rate of 24% from RCTs using mindfulness apps (Linardon, 2023). Additionally, similar previous research by Shore et al. (2018) and Kingston et al. (2019) showed 45.45% and 2.86% attrition rates at post-intervention and follow up, respectively. The current study showed relatively high levels of attrition, with only 79.02% and 50.11% of participants retained at post-intervention and follow-up respectively. Therefore, the high dropout rates and the participant characteristics of the completers

compared to the non-completers may have contributed to the difference in findings between the ITT and PP analyses. Future research might usefully examine the acceptability of online MBIs for individuals with non-clinical paranoia, to identify factors that might be involved in decision-making around intervention completion. This might usefully be done using qualitative methodology.

Both ITT and PP analyses were conducted in this study to compare ‘real-world’ effectiveness with efficacy of the intervention under ideal conditions. ITT preserved randomisation by including all participants, while PP focused on completers to assess outcomes when the intervention was delivered as intended (Ranganathan et al., 2016). Given that currently there is a limited evidence base for using MBIs to reduce paranoia, and the proof-of-principle nature of this study, the PP findings are considered the primary findings. This approach helps clarify the intervention’s potential under optimal conditions, minimising the confounding effects of non-adherence. Prioritising the PP analysis helps to explore the MBIs’ theoretical basis and therapeutic potential in the context of reducing paranoia in non-clinical populations.

The primary PP findings do not support previous research that demonstrated MBIs reduce paranoia in non-clinical populations. For example, Shore et al. (2018) reported that a two-week online MBI significantly reduced paranoia compared to a waitlist control using a PP analysis. Similarly, Kingston et al. (2019) found that both a one-week MBI and a guided visual imagery exercise as an AC led to reductions in state paranoia at post-intervention, though neither was superior, again based on PP analysis. In contrast, the PP results from the current study did not show a clear benefit of the MBI over the active control. However, it was found that participants with higher baseline paranoia were more likely to complete the MBI, which may have implications for engagement and targeted intervention.

Although the PP findings diverge from previous literature, the ITT results showed significant reductions in paranoia across both conditions from baseline to post-intervention and follow-up. These findings partially align with those of Kingston et al. (2019), where both conditions showed comparable improvements. The ITT results also support the broader evidence base, suggesting that MBIs can reduce paranoia in clinical populations through improved cognition and emotion regulation (Collip et al., 2013; Ellett, 2013; Ellett et al., 2020; McDonald et al., 2024). While the current ITT analysis aligns with this literature, the lack of support from the primary findings in the PP analysis highlights the need for further research to understand the conditions under which MBIs are most effective.

Furthermore, in the current study, mindfulness was not found to mediate the effect of condition on state paranoia. However, mindfulness score at post-intervention significantly

predicted state paranoia score at follow-up. Taken together, these findings suggest that increased mindfulness predicts lower levels of paranoia but there was no difference between the conditions in increasing mindfulness. The mediation analysis found no significant relationship between condition and mindfulness at post-intervention nor condition and state paranoia score at follow-up, aligning with the ANCOVA results from the PP analysis. These current findings are incongruent with Shore et al. (2018), who reported that changes in mindfulness skills, specifically the observe, describe and non-react facets of the FFMQ, mediated the relationship between condition and changes in paranoid experiences. However, comparisons between the two studies are limited as Shore et al. (2018) explored each of the five facets of mindfulness as individual mediators, whereas the current study used overall mindfulness score.

A strength of this study was the use of an ITT analysis with multiple imputations used to handle missing data. This approach enabled the inclusion of all randomised participants, thereby reducing potential bias and retaining statistical power. Unlike single imputation methods, multiple imputation accounted for uncertainty by generating 100 plausible data points for the missing data and then pooling the results. However, the multiple imputation model may have been limited by the inclusion of only recruitment site and gender as predictor variables, which may not have fully captured the underlying mechanisms of missingness within the dataset. Furthermore, as most complete cases were from the HK site, the model may have been disproportionately influenced by HK-specific data patterns. This may have limited the accuracy of imputed values for UK participants, where dropout was more common.

Additionally, there are several limitations of the study that should be considered. Firstly, differences in recruitment strategies between the sites may introduced confounding factors. Specifically, participants in HK who were invited based on previous reports of high trait paranoia, reported more paranoia at baseline than participants in the UK who were recruited via convenience sampling. Secondly, there was a large difference in attrition rates between the UK and HK cohorts. Participants in HK, who had previously been involved in research, may have been more motivated to complete the study. Additionally, cultural factors may also have played a role in these differences. Additionally, the study relied on self-report measures, which can be influenced by social desirability bias and expectation effects. Participants reported how often they listened to audio tracks without objective verification, and engagement in the intervention (e.g., number of sessions completed) may be a crucial factor for effectiveness as previous research has shown a dose-response effect of MBIs (Kingston et al., 2019). Finally, the study did not measure other cognitive factors known to influence paranoia, such as beliefs about self or jumping to conclusions (Ashford et al., 2012; Freeman et al., 2008). Future studies could include more diverse populations in terms of age, ethnicity, gender, socioeconomic status, and

multiple cross-cultural comparisons in order to determine whether findings generalise. Additionally, future research could explore the mechanisms of mindfulness and the impact on paranoia by exploring the role of individual facets of mindfulness or other related processes such as meta-cognitive awareness or emotional regulation. These potential studies could also investigate the possible mechanism of benefits from active control conditions, such as restful alertness or self-relaxation. Furthermore, as there is guidance for MBIs targeting psychosis to reference and normalise psychotic experience throughout the mindfulness practice (Ellett, 2024), future research could explore potential optimal content for MBIs aiming to reduce paranoia in non-clinical populations. Continued exploration in this field could yield a more robust and generalisable understanding of how MBIs can be effectively and efficiently applied in non-clinical settings to reduce paranoid experiences and potentially prevent progression up the continuum of paranoia.

In conclusion, this study contributes to the literature by investigating the effects of mindfulness on paranoia from a cross-cultural perspective, inclusion of an AC condition, and extended follow-up period. Both the MBI and the active control were found to reduce state paranoia using ITT analyses, providing some support for the use of online MBIs in reducing state paranoia. However, the results were not consistent across ITT and PP analyses. The findings also indicated that the online MBI was more likely to be completed by people with existing levels of high trait paranoia, and therefore may have an increased likelihood of being beneficial for these groups. Future research could explore underlying mechanisms of MBI and active control conditions, optimise MBI content, and target diverse populations, in order to gain a robust and generalisable understanding of how MBIs can be effectively and efficiently utilised to reduce paranoia in non-clinical settings.

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Appendix A Mindfulness journal submission guidelines

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Submission guidelines | Mindfulness

Instructions for Authors

Important Information on Manuscript Preparation and Submission

This journal recently switched to a different submission and peer review system. In order to ensure that the author(s) remain anonymous to the reviewers throughout the peer review process, you will be asked to submit certain information and statements directly in the system's interface instead of including it in the manuscript or on a separate title page. We are currently working on revising our submission guidelines to reflect this properly. When preparing your manuscript, please make sure to have all the necessary author details and statements as described below at hand, but please note that you will have to submit some of them via the according fields in the system's interface during submission and not on a separate title page.

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Editorial procedure

Double-blind peer review

This journal follows a double-blind reviewing procedure. This means that the author will remain anonymous to the reviewers throughout peer review. It is the responsibility of the author to anonymize the manuscript and any associated materials.

Author names, affiliations and any other potentially identifying information should be removed from the manuscript text and any accompanying files (such as figures of supplementary material);

A separate Title Page should be submitted, containing title, author names, affiliations, and the contact information of the corresponding author. Any acknowledgements, disclosures, or funding information should also be included on this page;

Authors should avoid citing their own work in a way that could reveal their identity.

This journal also publishes special/guest-edited issues. The peer review process for these articles is the same as the peer review process of the journal in general.

Additionally, if a guest editor authors an article in their issue/collection, they will not handle the peer review process.

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Manuscript Submission

Manuscript Submission

Submission of a manuscript implies: that the work described has not been published before; that it is not under consideration for publication anywhere else; that its publication has been approved by all co-authors, if any, as well as by the responsible authorities – tacitly or explicitly – at the institute where the work has been carried out. The publisher will not be held legally responsible should there be any claims for compensation.

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Online Submission

Please follow the hyperlink "Submit manuscript" and upload all of your manuscript files following the instructions given on the screen.

Source Files

Please ensure you provide all relevant editable source files at every submission and revision. Failing to submit a complete set of editable source files will result in your article not being considered for review. For your manuscript text please always submit in common word processing formats such as .docx or LaTeX.

Submitting Declarations

Please note that [Author Contribution Information](#) and [Competing Interest Information](#) must be provided at submission via the submission interface. Only the information submitted via the interface will be used in the final published version. Please make sure that if you are an editorial board member and also a listed author that you also declare this information in the Competing Interest section of the interface.

Please see the relevant sections in the submission guidelines for further information on these statements as well as possible other mandatory statements.

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Suggested Reviewers

Authors of research and review papers, excluding editorial and book review submissions, are allowed to provide the names and contact information for, maximum, 4 to 6 possible reviewers of their paper. When uploading a paper to the Editorial Manager site, authors must provide complete contact information for each recommended reviewer, along with a specific reason for your suggestion in the comments box for each person. The journal will consider reviewers recommended by the authors only if the reviewers' institutional email is provided. A minimum of two suggested reviewers should be from a university or research institute in the United States. You may not suggest the Editor or Associate Editors of the journal as potential reviewers. Although there is no guarantee that the editorial office will use your suggested reviewers, your help is appreciated and may speed up the selection of appropriate reviewers.

Authors should note that it is inappropriate to list as preferred reviewers researchers from the same institution as any of the authors, collaborators and co-authors from the past five years as well as anyone whose relationship with one of the authors may present a conflict of interest. The journal will not tolerate this practice and reserves the right to reject submissions on this basis.

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Appendix A

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Title Page

The title page should include:

- The name(s) of the author(s)
- A concise and informative title
- The affiliation(s) and address(es) of the author(s)
- The e-mail address, and telephone number(s) of the corresponding author
- If available, the 16-digit [ORCID](#) of the author(s)

Abstract

Please provide of structured abstract of up to 250 words

Keywords

Please provide 4 to 6 keywords which can be used for indexing purposes.

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Structured Abstract

The structured abstract of up to 250 words with four labeled sections should containing the following, with sub-section headers in bold:

- Objectives:** Problem being addressed in the study
- Methods:** The participants, essential features of the study method
- Results:** The basic findings, including effect sizes and confidence intervals and/or statistical significance levels
- Conclusions:** What the authors conclude from study results

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Text

Text Formatting

Manuscripts should be submitted in Word.

Use a normal, plain font (e.g., 12-point Times Roman) for text.

Use Italics for emphasis.

Use the automatic page numbering function to number the pages.

Do not use field functions.

Use tab stops or other commands for indents, not the space bar.

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Use the table function, not spreadsheets, to make tables.

Use the equation editor or MathType for equations.

Save your file in docx format (Word 2007 or higher) or doc format (older Word versions).

Headings

Please use no more than three levels of displayed headings.

Abbreviations

Abbreviations should be defined at first mention and used consistently thereafter.

Acknowledgments

Acknowledgments of people, grants, funds, etc. should be placed in a separate section on the title page. The names of funding organizations should be written in full.

Footnotes

This journal does not allow the use of footnotes, except in reprinted papers.

Article length

Papers accepted for publication in this journal are 45 double-spaced pages, in 12-point font, inclusive of text, references, tables and figures. For manuscripts exceeding this length, authors should contact the Editors-in-Chief, Christian U. Krägeloh (chris.mind@outlook.co.nz) or Oleg N. Medvedev (oleg.mind@outlook.co.nz).

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Terminology

· Please always use internationally accepted signs and symbols for units (SI units).

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Scientific style

Generic names of drugs and pesticides are preferred; if trade names are used, the generic name should be given at first mention.

Please use the standard mathematical notation for formulae, symbols etc.: Italics for single letters that denote mathematical constants, variables, and unknown quantities Roman/upright for numerals, operators, and punctuation, and commonly defined functions or abbreviations, e.g., cos, det, e or exp, lim, log, max, min, sin, tan, d (for derivative) Bold for vectors, tensors, and matrices.

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References

Citation

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Cite references in the text by name and year in parentheses. Some examples:

Negotiation research spans many disciplines (Thompson, 1990).

This result was later contradicted by Becker and Seligman (1996).

This effect has been widely studied (Abbott, 1991; Barakat et al., 1995; Kelso & Smith, 1998; Medvec et al., 1999).

Authors are encouraged to follow official APA version 7 guidelines on the number of authors included in reference list entries (i.e., include all authors up to 20; for larger groups, give the first 19 names followed by an ellipsis and the final author's name). However, if authors shorten the author group by using et al., this will be retained.

Reference list

The list of references should only include works that are cited in the text and that have been published or accepted for publication. Personal communications and unpublished works should only be mentioned in the text.

Reference list entries should be alphabetized by the last names of the first author of each work.

Journal names and book titles should be *italicized*.

If available, please always include DOIs as full DOI links in your reference list (e.g. "https://doi.org/abc").

Journal article Grady, J. S., Her, M., Moreno, G., Perez, C., & Yelinek, J. (2019). Emotions in storybooks: A comparison of storybooks that represent ethnic and racial groups in the United States. *Psychology of Popular Media Culture*, 8(3), 207–217. <https://doi.org/10.1037/ppm0000185>

Article by DOI Hong, I., Knox, S., Pryor, L., Mroz, T. M., Graham, J., Shields, M. F., & Reistetter, T. A. (2020). Is referral to home health rehabilitation following inpatient rehabilitation facility associated with 90-day hospital readmission for adult patients with stroke? *American Journal of Physical Medicine & Rehabilitation*. Advance online publication. <https://doi.org/10.1097/PHM.0000000000001435>

Book Sapolsky, R. M. (2017). *Behave: The biology of humans at our best and worst*. Penguin Books.

Book chapter Dillard, J. P. (2020). Currents in the study of persuasion. In M. B. Oliver, A. A. Raney, & J. Bryant (Eds.), *Media effects: Advances in theory and research* (4th ed., pp. 115–129). Routledge.

Online document Fagan, J. (2019, March 25). *Nursing clinical brain*. OER Commons. Retrieved January 7, 2020, from <https://www.oercommons.org/authoring/53029-nursing-clinical-brain/view>

Please note:

If you are citing journal articles by their DOI please make sure to also include the volume and page numbers, if already available, e. g. as follows: "Slifka, M. K., & Whitton, J. L. (2000) Clinical implications of dysregulated cytokine production. *Journal of Molecular Medicine*, 78(2), 74–80. <https://doi.org/10.1007/s001090000086>".

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Tables

All tables are to be numbered using Arabic numerals.

Tables should always be cited in text in consecutive numerical order.

For each table, please supply a table caption (title) explaining the components of the table.

Identify any previously published material by giving the original source in the form of a reference at the end of the table caption.

Footnotes to tables should be indicated by superscript lower-case letters (or asterisks for significance values and other statistical data) and included beneath the table body.

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Artwork and Illustrations Guidelines

Electronic Figure Submission

Supply all figures electronically.

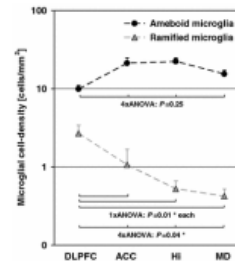
Indicate what graphics program was used to create the artwork.

For vector graphics, the preferred format is EPS; for halftones, please use TIFF format. MSOffice files are also acceptable.

Vector graphics containing fonts must have the fonts embedded in the files.

Name your figure files with "Fig" and the figure number, e.g., Fig1.eps.

Line Art



Definition: Black and white graphic with no shading.

Do not use faint lines and/or lettering and check that all lines and lettering within the figures are legible at final size.

All lines should be at least 0.1 mm (0.3 pt) wide.

Scanned line drawings and line drawings in bitmap format should have a minimum resolution of 1200 dpi.

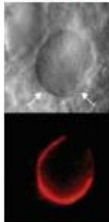
Vector graphics containing fonts must have the fonts embedded in the files.

Halftone Art

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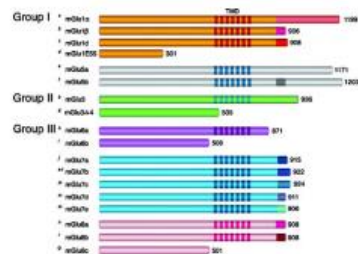


Definition: Photographs, drawings, or paintings with fine shading, etc.

If any magnification is used in the photographs, indicate this by using scale bars within the figures themselves.

Halftones should have a minimum resolution of 300 dpi.

Combination Art



Definition: a combination of halftone and line art, e.g., halftones containing line drawing, extensive lettering, color diagrams, etc.

Combination artwork should have a minimum resolution of 600 dpi.

Color Art

Color art is free of charge for online publication.

If black and white will be shown in the print version, make sure that the main information will still be visible. Many colors are not distinguishable from one another when converted to black and white. A simple way to check this is to make a xerographic copy to see if the necessary distinctions between the different colors are still apparent.

If the figures will be printed in black and white, do not refer to color in the captions.

Color illustrations should be submitted as RGB (8 bits per channel).

Figure Lettering

To add lettering, it is best to use Helvetica or Arial (sans serif fonts).

Keep lettering consistently sized throughout your final-sized artwork, usually about 2–3 mm (8–12 pt).

Variance of type size within an illustration should be minimal, e.g., do not use 8-pt type on an axis and 20-pt type for the axis label.

Avoid effects such as shading, outline letters, etc.

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Do not include titles or captions within your illustrations.

Figure Numbering

All figures are to be numbered using Arabic numerals.

Figures should always be cited in text in consecutive numerical order.

Figure parts should be denoted by lowercase letters (a, b, c, etc.).

If an appendix appears in your article and it contains one or more figures, continue the consecutive numbering of the main text. Do not number the appendix figures, "A1, A2, A3, etc." Figures in online appendices [Supplementary Information (SI)] should, however, be numbered separately.

Figure Captions

Each figure should have a concise caption describing accurately what the figure depicts. Include the captions in the text file of the manuscript, not in the figure file.

Figure captions begin with the term Fig. in bold type, followed by the figure number, also in bold type.

No punctuation is to be included after the number, nor is any punctuation to be placed at the end of the caption.

Identify all elements found in the figure in the figure caption; and use boxes, circles, etc., as coordinate points in graphs.

Identify previously published material by giving the original source in the form of a reference citation at the end of the figure caption.

Figure Placement and Size

Figures should be submitted within the body of the text. Only if the file size of the manuscript causes problems in uploading it, the large figures should be submitted separately from the text.

When preparing your figures, size figures to fit in the column width.

For large-sized journals the figures should be 84 mm (for double-column text areas), or 174 mm (for single-column text areas) wide and not higher than 234 mm.

For small-sized journals, the figures should be 119 mm wide and not higher than 195 mm.

Permissions

If you include figures that have already been published elsewhere, you must obtain permission from the copyright owner(s) for both the print and online format. Please be aware that some publishers do not grant electronic rights for free and that Springer will not be able to refund any costs that may have occurred to receive these permissions. In such cases, material from other sources should be used.

Accessibility

In order to give people of all abilities and disabilities access to the content of your figures, please make sure that

All figures have descriptive captions (blind users could then use a text-to-speech software or a text-to-Braille hardware)

Appendix B PRISMA 2020 Checklist

Section and Topic	Item #	Checklist item	Location where item is reported
TITLE			
Title	1	Identify the report as a systematic review.	P21
ABSTRACT			
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	P21
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	P23
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	P23
METHODS			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	P23&24
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.	P23&24
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	P24
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.	P23&24
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process.	P25
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which results to collect.	P25
	10b	List and define all other variables for which data were sought (e.g. participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.	P25
Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.	P25
Effect measures	12	Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results.	P25
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g. tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)).	Figure 1

Appendix B

Section and Topic	Item #	Checklist item	Location where item is reported
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	P25
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	Table 1
	13d	Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.	P25&26
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).	P25
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	n/a
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	P25
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	P24&25
RESULTS			
Study selection	16a	Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram.	Figure 1 & P28
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	Figure 1
Study characteristics	17	Cite each included study and present its characteristics.	Figure 1
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	Figure 1
Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g. confidence/credible interval), ideally using structured tables or plots.	Figure 1
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	Figure 1
	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g. confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect.	P30-32 & Figures 2-4
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	P30-32
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	n/a
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	P30-32
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	P30-32
DISCUSSION			

Appendix B

Section and Topic	Item #	Checklist item	Location where item is reported
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	P44
	23b	Discuss any limitations of the evidence included in the review.	P45
	23c	Discuss any limitations of the review processes used.	P45&46
	23d	Discuss implications of the results for practice, policy, and future research.	P46
OTHER INFORMATION			
Registration and protocol	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.	P21&23
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	P23
	24c	Describe and explain any amendments to information provided at registration or in the protocol.	-
Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.	-
Competing interests	26	Declare any competing interests of review authors.	-
Availability of data, code and other materials	27	Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review.	-

Appendix C Ethics approval

27/02/2025, 14:04

Submission View

ERGO II

Ethics and Research Governance Online



99706 - A secondary data analysis of a randomised controlled trial of an online mindfulness-based intervention on paranoid experiences in a non-clinical population.

Details

Status

Approved

Category

Category D

Submitter's Faculty

Faculty of Environmental and Life Sciences (FELS)

The end date for this study is currently 30 September 2025

Request extension (/ExtensionReq/ViewCreate?submissionId=99706&showSubmissionLink=False)

If you are making any other changes to your study please create an amendment using the button below.

Latest Review Comments

25/09/2024 09:53:43 - Committee: Approved

No comments

Amendment History

Original Submission 99706 (Created 24/09/2024)

User Uploaded Documents

0

Title	Version Number	Document Date	Document Type	Size
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27/02/2025, 14:04

Submission View

1.  Ethics Application Form for Secondary Data Analysis - Katrina Mysko 24.09.24 version 1 (/Document/DownloadSubmissionAttachment?submissionId=99706&docId=4313697) 	1	24/09/2024	Ethics Form	66 Kb
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Checklist

Submission Questionnaire ✓

Attachments ✓

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→ Create Amendment

⌛ Abandon Study