

Protocol & SAP

Airways to Alteration (A2A): Investigating the Impact of Breathwork & Meditation on Conscious State (NCT06916312)

Comparing Effects of Intense Breathwork to Meditation on Altered States of Consciousness (A2A)

Summary

This study aims to investigate the impact of high ventilation breathwork (HVB) and meditation on altered states of consciousness (ASCs). The study will compare the effects of a single guided HVB session to a single guided body scan meditation session. The primary aim is to explore the impact of HVB and meditation on ASCs, while secondary aims relate to mental health and wellbeing.

Guy William Fincham

Original document date: May 21, 2025

Edited document data: June 09, 2025

Reason for edit: Had EBI listed as secondary outcome measure (incorrect) in the Protocol instead of a primary outcome measure (correct) as per the pre-registration NCT06916312.

Abstract

Breathing is fundamental to life, rooted in the Latin word "spiritus," meaning spirit or life force. Through this project, we aim to explore the impact of high ventilation breathwork (HVB), a practice that uses deliberate, intensified breathing to create altered states of consciousness (ASCs). These states have been described as lived experiences that expand perception, foster a sense of connection, and bring deep personal insights. While substances like psychedelics are known to induce ASCs, they are often restricted due to costs, legal limitations, and health concerns. HVB, however, offers an accessible, drug-free way to reach similar states. Early research even suggests that HVB can lead to experiences comparable to those produced by medium-to-high doses of certain psychedelics, like psilocybin. Yet, unlike meditation or other therapeutic practices, HVB has not been rigorously studied in clinical trials. Our study plans to take an important first step by conducting a randomised controlled trial (RCT) on the effects of a single guided HVB session. This will involve experienced breathwork practitioners and will assess a range of outcomes, including ASCs, mystical experiences, emotional breakthroughs, and overall mental wellbeing. To help us understand the unique effects of HVB, we will also have a comparison group, where participants will engage in a meditation session led by the same facilitator. Essentially, we will be comparing a single guided session of HVB (intervention) to a single guided session of body scan meditation (active comparator). Then, using the Altered States Database, an open-science project based on systematic literature reviews, we can compare to prior data on altered state-induction methods like meditation and psychedelics. The primary aim is the impact of HVB and meditation on ASCs. Secondary aims relate to mental health and wellbeing. For the first time we will also examine the relationship between predictiveness of the psychedelic experiences emerging from HVB and meditation. By conducting this study, we hope to create a foundation for future clinical research and build evidence on HVB's potential as a therapeutic tool. This project responds to the growing interest in non-drug methods for achieving profound mental and emotional states—showing that the key to these transformative experiences may be as close as our own breath.

Introduction

High ventilation breathwork (HVB), mind-body practices which increase respiratory rate and/or depth, has been used to relieve various forms of psychological distress for millennia. Recently HVB has started receiving an unprecedented surge in public interest owing to its potential to induce altered states of consciousness (ASCs) and improve mental/physical health. Psychoactive substances represent one way to evoke ASCs but unquestionably not the only one[1]. Whilst there has been an explosion in psychedelic research in the West, ancient cultures across the globe have used physical challenges to evoke ASCs in ceremonial settings, i.e., extreme temperatures, fasting and sleep deprivation. However, arguably the most accessible of which is HVB—techniques that are observed worldwide and have complex historical roots grounded in both religious and secular traditions [2]. Such practices have been used since time immemorial for spiritual and healing purposes, being frequently described in the rituals of many cultures [2]. We aim to meticulously explore the phenomenological effects of HVB. With thoughtfully curated set and setting, HVB has been reported to elicit profound mystical experiences and ASCs akin to those evoked by psychedelics [1,3], including medium to high doses of psilocybin [4]. Current research on ASCs has predominantly focused on pharmacological methods, however there is a growing interest in nonpharmacological approaches, which are often more accessible and culturally acceptable. This also removes medical, legal and financial barriers [1].

Our Lab has started characterising phenomenological and neurophysiological effects of HVB to inform its mechanism of therapeutic action, safety profile and future application. Clinical observations and data from neurophysiological studies indicate that HVB is associated with extraordinary changes in subjective experience, and profound effects on central and autonomic nervous systems functions through modulation of neurometabolic parameters and interoceptive sensory systems [2]. Nondrug alternatives for eliciting and working with ASCs are needed, as many individuals wish to derive therapeutic benefit via experiencing psychedelics' effects without the need to ingest substances. Breathing provides a potential resource that we have at our disposal (here and now) for improving wellbeing, and its consciousness expanding effects can be stopped at any point by simply returning to a normal cadence. With HVB we are not solely relying on an external source in the form of a drug compound, but our own innate inner capacity for healing. However, like psychedelics, as HVB becomes increasingly popular, it is extremely important that the hype is grounded in—and calibrated with—robust research evidence. This translates to rigorous clinical testing.

The study is a randomised controlled trial (RCT) involving up to 24 healthy adult participants who have prior experience with HVB. Participants will be randomly allocated to either the HVB or meditation group. The study will assess outcomes such as ASCs, mystical experiences, emotional breakthroughs, psychological insight, and overall wellbeing.

Motivation

Despite ancient and modern use paired with countless anecdotal evidence of its profound effects, empirical research on HVB is limited [2]. No published study has yet examined the effects of HVB on ASCs through an RCT. To put the ASC field in perspective, only data from one published HVB study [3] are currently listed on the Altered States Database* [5] (an open-science project based on systematic literature reviews) for an established psychological measure of ASCs, in comparison to 40 and 44 entries on psilocybin and LSD, respectively. Moreover, there are no published data on HVB for an established psychological measure of mystical experiences on the Altered States Database, but there are 33 and 23 entries for psilocybin and LSD, respectively. Most breathwork research at present has been on slow-paced techniques [6,7], however the field of HVB is currently in its infancy [2,8].

**The database is powered by the Collaboration for Interdisciplinary Research on Conscious Experiences (CIRCE).*

Impact/Significance

Such (breath)work has the potential of helping pioneer a new therapeutic modality in the form of the breath, a tool which can be accessed by anyone instantaneously. This may pave the way for larger, robust RCTs on HVB to occur. In doing so, at a societal level, we could help establish HVB as an accessible, low-cost nondrug alternative for expanding global consciousness. Large-scale robust clinical testing is a necessary step for the evolution of HVB if it is to be integrated into healthcare systems across the world. The perturbed psychophysiological state induced by HVB may also have broader applications regarding how it can be harnessed in a therapeutic context. Deeper knowledge of the ASCs induced by HVB—through rigorous testing of its effects—may deliver societal benefit, in a time where raising global consciousness is needed most. This research represents a step to doing just that.

Research Aims/Questions

Principal research questions/objectives include: 1. Investigate potential differences in ASCs induced by a single session of HVB—in particular Conscious Connected Breathing (CCB)—versus a body scan meditation. 2. Examine whether HVB (CCB) induces ASCs comparable to psychedelics (via the Altered States Database, an open-science project based on systematic literature reviews). 3. Investigate potential differences on mental health and wellbeing after HVB or a body scan meditation. 4. Examine correlation between ASCs and changes on mental health and wellbeing, in addition to the relationship between preparedness/predictiveness of participants to experience psychedelic effects and ASCs.

Materials/Methods

Unlike slow breathwork, high ventilation breathwork (HVB) has not been exposed to the same level of robust clinical testing to date [2,6-8], a necessary step to realise its potential application as a therapeutic modality. We will conduct the first randomised-controlled trial (RCT) of HVB on altered states of consciousness (ASCs). This will take the form of a small pilot study wherein participants are randomised to in-person, guided HVB or a meditation group.

Study type

This will be an experimental study, where participants are randomly assigned to a HVB intervention or body scan meditation. This will be a small-scale pilot RCT, hopefully leading to a large-scale clinical trial in the future (depending on funding).

Data collection procedures

Quantitative data: The primary outcomes will be ASCs as measured by the Five Dimension ASC Rating Scale (5D-ASC) [9], the short Mystical Experience Questionnaire (MEQ) [10], and Emotional Breakthrough Inventory (EBI) [11].

Secondary outcomes include: the Psychological Insight Questionnaire (PIQ) [12], Depression Anxiety Stress Scales (DASS) [13], Short Warwick-Edinburgh Mental Wellbeing Scale (SWEMWBS) [14], Imperial Psychedelic Predictor Scale (IPPS) [15], PROMIS Sleep-Related Impairment Scale (PROMIS-4a) [16], Shortened Fatigue Questionnaire (SFQ) [17], and Cambridge Depersonalisation Scale-State Version (CDSS) [18].

There will also be optional open-ended responses on overall experience of the meditation or breathwork. The following state measures will be completed immediately after the HVB and meditation sessions: 5D-ASC, MEQ, EBI and CDSS. The following trait measures will be completed 7-10 days before and 7-10 days after the breathwork and meditation sessions: DASS, SWEMWBS, PROMIS and SFQ. The IPPS will be completed when subjects consent to participating, and the PIQ will be completed 7-10 days after the breathwork and meditation sessions.

Qualitative data: Optional open-ended responses will capture participants' lived experiences after the breathwork and meditation sessions.

Sample

Given this is a small pilot study, 24 participants (12 per group) will be recruited. The studies of Bahi et al. (2023) and Havenith et al. (2024) report HVB having comparable effects on ASCs to moderate-high doses of psilocybin, which has large-very large effect sizes on ASCs. This is an ethical number of participants for a single session HVB intervention with two breathwork facilitators present. It is ideal to have no more than six breathworkers per facilitator.

Accordingly, there will be two groups of 12 for our study (12 in the HVB group, and 12 in the meditation group). At 80% power with an alpha of 0.05, based on Havenith et al.'s HVB study's between-groups effect size (1.29) on the self-completion depressive symptomology survey, a sample size of 22 is needed, allowing room for potential attrition. Effect sizes reported by Bahi et al. were greater, but this was a within-groups design.

Participants will be recruited from the local area using advertisements online (social media/email) via the PI and (co)facilitators' networks. It will be incumbent upon those people interested in taking part to contact the PI. Participants will be comprehensively screened and the inclusion criteria will be adults with experience of HVB, living in Brighton (UK) and the surrounding area. Given the nature of HVB, the comprehensive eligibility criteria are as follows:

Inclusion Criteria: Healthy adults (18-65) in Brighton and the surrounding area; Prior experience practising high ventilation breathwork in the form of conscious connected breathing; No history of adverse events during such prior breathwork sessions. *Exclusion Criteria:* History of hypotension; Hypertension; Respiratory or cardiovascular problems; Fainting or syncope; Epilepsy or seizures; Panic disorder or panic attacks; Cerebral aneurysm; Pregnancy (and possibility one might be pregnant, trying to get pregnant, or are breastfeeding); Breathlessness; Bradypnea; Tachypnoea; Any mental/physical issues affecting the ability to engage in breath control activities.

Procedure

Prospective participants will be emailed an Information Sheet—and they will be given as long as needed to decide if they wish to participate. A Consent Form will be completed prior to any study related procedure. The informed consent process will include aims, rationale, methods and potential adverse effects of the study and will be followed by the completion of the Consent Form. The participant will be allowed as much time as they wish to consider the information, and the opportunity to question the PI, their GP, or any other independent parties to decide whether they will participate in the study. The PI taking consent will explain to the potential participants that they are free to refuse any involvement within the study or alternatively withdraw their consent at any point during the study—for any reason. The informed consent of the participant will be recorded and retained using an online form, with a copy of the signed Consent Form of which they can keep. No study procedure will be carried out until informed consent has been obtained from the participant.

Participants will be able to withdraw from the study at any time, and for any reason, without having to provide any explanation for their decision. Participants will be told that they can withdraw from the study at any time. If they request it, their data can be removed from the database. The deadline for the withdrawal of their data will be at the time of completion of data analysis. We expect this to be around 3 months after the session.

Participants will be briefly screened for eligibility prior to taking part into the study. They will be randomly allocated to HVB or meditation groups using block randomisation (1:1), stratified by scores on the brief 9-item Imperial Psychedelic Predictor Scale (IPPS), which will be completed shortly after the Consent Form has been signed. Short self-completion questionnaires will be administered to participants ~1 week pre and post the HVB or body scan meditation, along with once immediately after the HVB and meditation. The platform used for questionnaires will be Qualtrics and, where visual analogue scales are used, will contain a scale with 0 (%) on the left and 100 (%) on the right. The single sessions of breathwork and meditation will take place at Little Dippers in Brighton, a naturalistic setting where the facilitator regularly teaches HVB.

Participants will be compensated 5GBP, 10GBP and 15GBP (money) per questionnaire completed (30GBP total but in a phased manner to increase retention). Moreover, participants, regardless of group, will be participating in an active intervention (HVB or body scan meditation) which will be provided free of charge.

Processing and Analysis Plan

Results will be analysed using the software programme *R*. The outcome measures collected on the day of the HVB or meditation will be analysed using simple quantitative analyses (i.e., unpaired t-test or Mann-Whitney U-test depending on distribution of the data), whilst the outcomes ~1-week pre-post will be analysed using repeated-measure analysis of variance (ANOVA) or Friedman's test depending on distribution of the data. Changes on the mental health and wellbeing measures will be correlated with scores on the ASC measures. Simple qualitative content analysis will be used to analyse any responses to open-ended questions of participants' experience of the HVB or meditation.

Ethical considerations

The Brighton and Sussex Medical School Research Governance and Ethics Committee (RGEC) has assessed this project and granted Ethical and Research Governance Approval to proceed (Reference Number: ERA/GF221/9/1).

References

1. Havenith, M. N., Leidenberger, M., Brasanac, J., Corvacho, M., Carmo Figueiredo, I., Schwarz, L., ... & Jungaberle, A. (2025). Decreased CO₂ saturation during circular breathwork supports emergence of altered states of consciousness. *Communications Psychology*, 3(1), 59.
2. Fincham, G. W., Kartar, A., Uthaug, M. V., Anderson, B., Hall, L., Nagai, Y., ... & Colasanti, A. (2023). High ventilation breathwork practices: An overview of their effects, mechanisms, and considerations for clinical applications. *Neuroscience & Biobehavioral Reviews*, 105453.
3. Lewis-Healey, E., Tagliazucchi, E., Canales-Johnson, A., & Bekinschtein, T. A. (2024). Breathwork-induced psychedelic experiences modulate neural dynamics. *Cerebral Cortex*, 34(8), bhae347.
4. Bahi, C., Irmischer, M., Franken, K., Fejer, G., Schlenker, A., Deijen, J. B., & Engelbregt, H. (2024). Effects of conscious connected breathing on cortical brain activity, mood and state of consciousness in healthy adults. *Current Psychology*, 43(12), 10578-10589.
5. Prugger, J., Derdiyok, E., Dinkelacker, J., Costines, C., & Schmidt, T. T. (2022). The Altered States Database: Psychometric data from a systematic literature review. *Scientific data*, 9(1), 720.
6. Fincham, G.W., Strauss, C., Montero-Marin, J. and Cavanagh, K., 2023. Effect of breathwork on stress and mental health: A meta-analysis of randomised-controlled trials. *Scientific Reports*, 13(1), p.432.
7. Fincham, G.W., Strauss, C. and Cavanagh, K., 2023. Effect of coherent breathing on mental health and wellbeing: a randomised placebo-controlled trial. *Scientific Reports*, 13(1), p.22141.
8. Fincham, G.W., Epel, E., Colasanti, A., Strauss, C. and Cavanagh, K., 2024. Effects of brief remote high ventilation breathwork with retention on mental health and wellbeing: a randomised placebo-controlled trial. *Scientific Reports*, 14(1), p.16893.
9. Studerus, E., Gamma, A., & Vollenweider, F. X. (2010). Psychometric evaluation of the altered states of consciousness rating scale (OAV). *PloS one*, 5(8), e12412.
10. Strickland, J. C., Garcia-Romeu, A., & Johnson, M. W. (2024). The Mystical Experience Questionnaire 4-Item and Challenging Experience Questionnaire 7-Item. *Psychedelic Medicine*, 2(1), 33-43.
11. Roseman, L., Haijen, E., Idialu-Ikato, K., Kaelen, M., Watts, R., & Carhart-Harris, R. (2019). Emotional breakthrough and psychedelics: Validation of the Emotional Breakthrough Inventory. *Journal of psychopharmacology*, 33(9), 1076-1087.
12. Davis, A. K., Barrett, F. S., So, S., Gukasyan, N., Swift, T. C., & Griffiths, R. R. (2021). Development of the Psychological Insight Questionnaire among a sample of people who have consumed psilocybin or LSD. *Journal of Psychopharmacology*, 35(4), 437-446.
13. Lovibond, S.H. & Lovibond, P.F. (1995). Manual for the Depression Anxiety & Stress Scales. (2 Ed.) Sydney: Psychology Foundation.
14. Ng Fat, L., Scholes, S., Boniface, S., Mindell, J., & Stewart-Brown, S. (2017). Evaluating and establishing national norms for mental wellbeing using the short Warwick-Edinburgh Mental Well-being Scale (SWEMWBS): findings from the Health Survey for England. *Quality of Life Research*, 26, 1129-1144.

15. Angyus, M., Osborn, S., Haijen, E., Erritzoe, D., Peill, J., Lyons, T., ... & Carhart-Harris, R. (2024). Validation of the imperial psychedelic predictor scale. *Psychological Medicine*, 54(12), 3539-3547.
16. Hanish, A. E., Lin-Dyken, D. C., & Han, J. C. (2017). PROMIS sleep disturbance and sleep-related impairment in adolescents: examining psychometrics using self-report and actigraphy. *Nursing research*, 66(3), 246-251.
17. Penson, A., van Deuren, S., Worm-Smeitink, M., Bronkhorst, E., van den Hoogen, F. H., van Engelen, B. G., ... & Knoop, H. (2020). Short fatigue questionnaire: Screening for severe fatigue. *Journal of Psychosomatic Research*, 137, 110229.
18. Schweden, T. L., Konrad, A. C., & Hoyer, J. (2019). Die Cambridge Depersonalisation Scale-Situational (CDS-S) zur Erfassung von situationsabhängigem Depersonalisationserleben. *Diagnostica*.