

Exploring Altered States of Consciousness in Anxiety and Depression:

Evidence from Floatation Therapy



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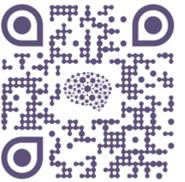
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Introduction

- **Floatation-REST (Reduced Environmental Stimulation Therapy)** is a non-pharmacological intervention that modulates interoception and shows promise for treating anxiety and depression.¹
- Prior studies demonstrate its short-term (<48h) efficacy, safety, and feasibility.^{1,2}
- While participant groups showed improvement in all conditions, those floating in the pool experienced significantly greater reductions in anxiety and negative affect than those in a zero-gravity chair control.
- To explore underlying mechanisms, we examined two core components: (1) the consciousness altering phenomenology of sensory deprivation, and (2) mediation of clinical effects by changes in interoceptive awareness and conscious experience during the float experience.

Methods

- We conducted an exploratory **secondary analysis** of previously collected data^{1,2} from 75 participants randomized to one of three six-session interventions:

1. **Pool-REST ("Pool")**: 1-hour weekly sessions in a floatation pool.
2. **Pool-REST preferred ("Pool Preferred")**: Same as above, but participants could choose the *timing/duration* of their float (up to two hours).
3. **Chair-REST ("Chair")**: Zero-gravity chair control matched to Pool-REST schedule.



Fig. 1: Floatation-REST Pool and Chair-REST at LIBR.

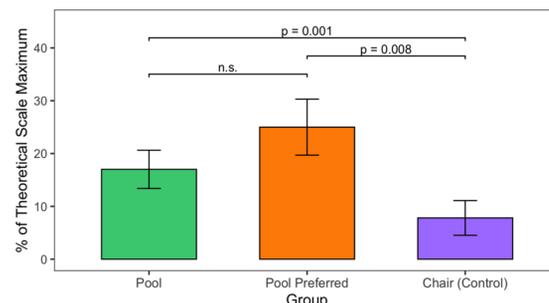
- **Statistical Analyses**:
- Analysis of Variance (**ANOVA**) with Tukey's post-hoc pairwise comparisons and False Discovery Rate (**FDR**) correction for multiple comparisons. When assumptions were violated, Welch's ANOVA and Games-Howell were used. Kruskal-Wallis tests for ordinal data (positive side effects). For the **mediation analysis** we used Structural Equation Modeling (**SEM**) with bootstrapping (5000 replications) and standardized path coefficients.
- **Outcomes**: Affective valence (PANAS-X), anxiety (HAM-A, STAI), and side effect ratings (a custom Effects Checklist). For the scales, **change scores** were calculated by subtracting pre-float scores from post-float scores.
- **Mediators**: Phenomenology of altered states (5D-ASC aka OAV) subscales, interoceptive awareness (MAIA), and pleasantness of interoceptive sensations (from custom Effects Checklist). Participants completed the 5D-ASC scale upon completion of their **sixth float**, with the following instruction: "For each item, please rate how your float experiences compared to your normal waking consciousness."

Conclusion

- Floatation-REST evokes selective alterations in consciousness—especially Oceanic Boundlessness and Anxious Ego Dissolution—in anxious and depressed individuals.
- Therapeutic effects of floatation-REST may be mediated by changes in Oceanic Boundlessness and interoceptive awareness.

Results

5D-ASC – Oceanic Boundlessness



5D-ASC – Anxious Ego Dissolution

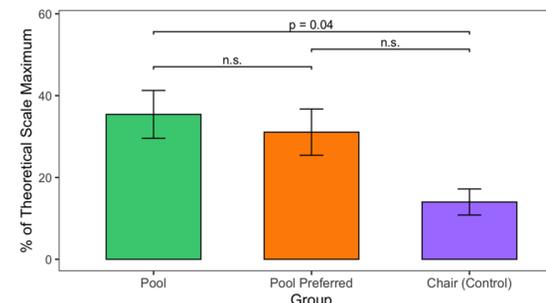


Fig. 2 and 3: 5D-ASC Subscales vary by group after FDR correction. Conducted across five subscales and three groups, totaling 15 pairwise comparisons.

5D-ASC individual subscales

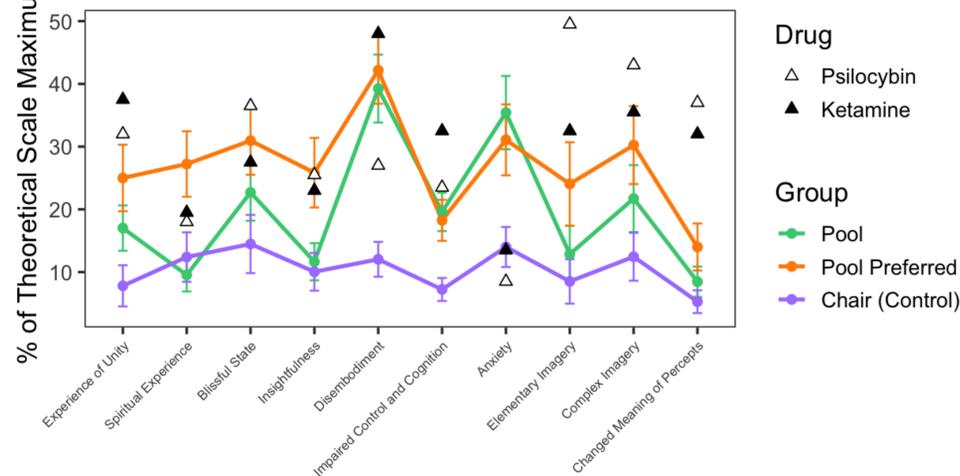


Fig. 4: Phenomenology of Floatation-REST vs. Psychedelic Drugs. Group differences across all 10 subscales of the Altered States of Consciousness Rating Scale are plotted alongside means of psilocybin (N = 327) and ketamine (N = 162) from a meta-analysis of 43 experimental studies in healthy volunteers³.

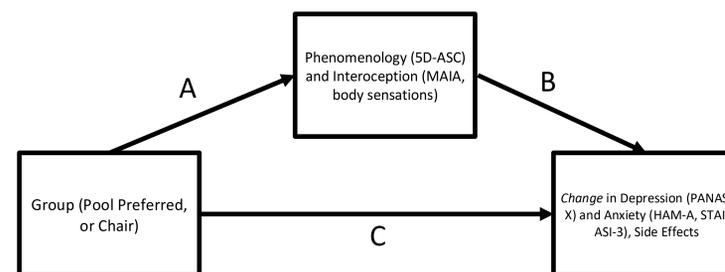


Fig. 5: Mediation analysis. Focusing on the relationship between group (Pool Preferred vs. Chair) and outcome variables.

Model	A	B	C	Indirect Effect
Group Oceanic Boundlessness Positive Affect	0.54 (p < 0.001)	0.539 (p < 0.001)	-0.06 (p = 0.728)	p = 0.005
Group Oceanic Boundlessness Feeling Refreshed	0.53 (p < 0.001)	0.532 (p < 0.001)	0.055 (p = 0.706)	p < 0.001

References

1. Garland MM, ... Stein MB, Paulus MP, Feinstein JS, Khalsa SS. (2023). Reduced Environmental Stimulation Therapy (REST) in anxiety and depression: An experience sampling study. *J Mood and Anxiety Disorders*, 1, 100003.
2. Garland MM, Wilson R, Thompson WK, Stein MB, Paulus MP, Feinstein JS, Khalsa SS. (2024). A randomized controlled safety and feasibility trial of floatation-REST in anxious and depressed individuals. *PLoS One*, 19, e0286899.
3. Studerus E, Gamma A, Vollenweider FX. (2010). Psychometric evaluation of the altered states of consciousness rating scale. *PLoS One*, 5, e12412.

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- **Oceanic Boundlessness** significantly mediated many pre-registered outcome variables (explaining up to 96% of the total effect); Anxious Ego Dissolution did not.
- **Body sensation pleasantness ratings** significantly mediated many outcome variables; the MAIA did not. Heartbeat pleasantness strongly **predicted** (p < 0.001) lower negative affect (PANAS-X), and anxiety sensitivity (ASI-3R) at a six-week follow-up.