

Do adverse childhood experience moderate digital meditation-based intervention responsiveness? Evidence from the BeWell randomized controlled trial

Amun Asnani^{1,2}, Cecilia Nam², Wendy S. Lau², Richard J. Davidson^{2,3}, Simon B. Goldberg^{2,4}

1 Department of Psychiatry, Washington University in St. Louis, St. Louis, MO, USA; 2 Center for Healthy Minds, University of Wisconsin-Madison, Madison, WI, USA; 3 Department of Psychology, University of Wisconsin-Madison, Madison, WI, USA; 4 Department of Counseling Psychology, University of Wisconsin-Madison, Madison, WI, USA

Introduction

Adverse childhood experiences (ACEs) are associated with heightened anxiety symptoms and dysregulated emotional states across a lifespan. Digital meditation-based interventions (MBIs) have been shown to have been shown to improve emotional regulation and reduce anxiety symptoms¹. However, it remains unclear whether ACEs are associated with treatment response.

Research Question: Do ACEs moderate trajectories of anxiety symptoms during and after a 4-week digital MBI?

Hypothesis: The effectiveness of a digital MBI will not differ in anxiety symptom trajectories based on ACEs both during the intervention and at a later follow-up.

Method

Data were drawn from the **Behavior, Biology, and Well-being (BeWell)** trial evaluating the effects of the Healthy Minds Program (HMP) digital MBI of U.S. adults with elevated depressive symptoms (PHQ-9 ≥ 5).

- Participants ($N=1,157$) were randomly assigned to either HMP-Full (guided meditation and psychoeducational content), HMP-Control (psychoeducational content only), or Usual Care (UC; no HMP use).
- They completed assessments at baseline, weekly during the 4-week intervention, and at a 3-month follow-up.
 - ACEs were assessed at baseline using the **Behavioral Risk Factor Surveillance System (BRFSS)**², and anxiety was assessed at all timepoints with the **GAD-7**³.

Analysis: Piecewise linear mixed-effects models (lmer) estimated GAD-7 trajectories throughout the intervention and linear mixed effects models (glht) estimated trajectories from pre-intervention to follow-up, testing ACEs as moderators of treatment effects. Separate models were run for each of the ACEs domains (emotional/physical abuse, household dysfunction, sexual abuse).

Results

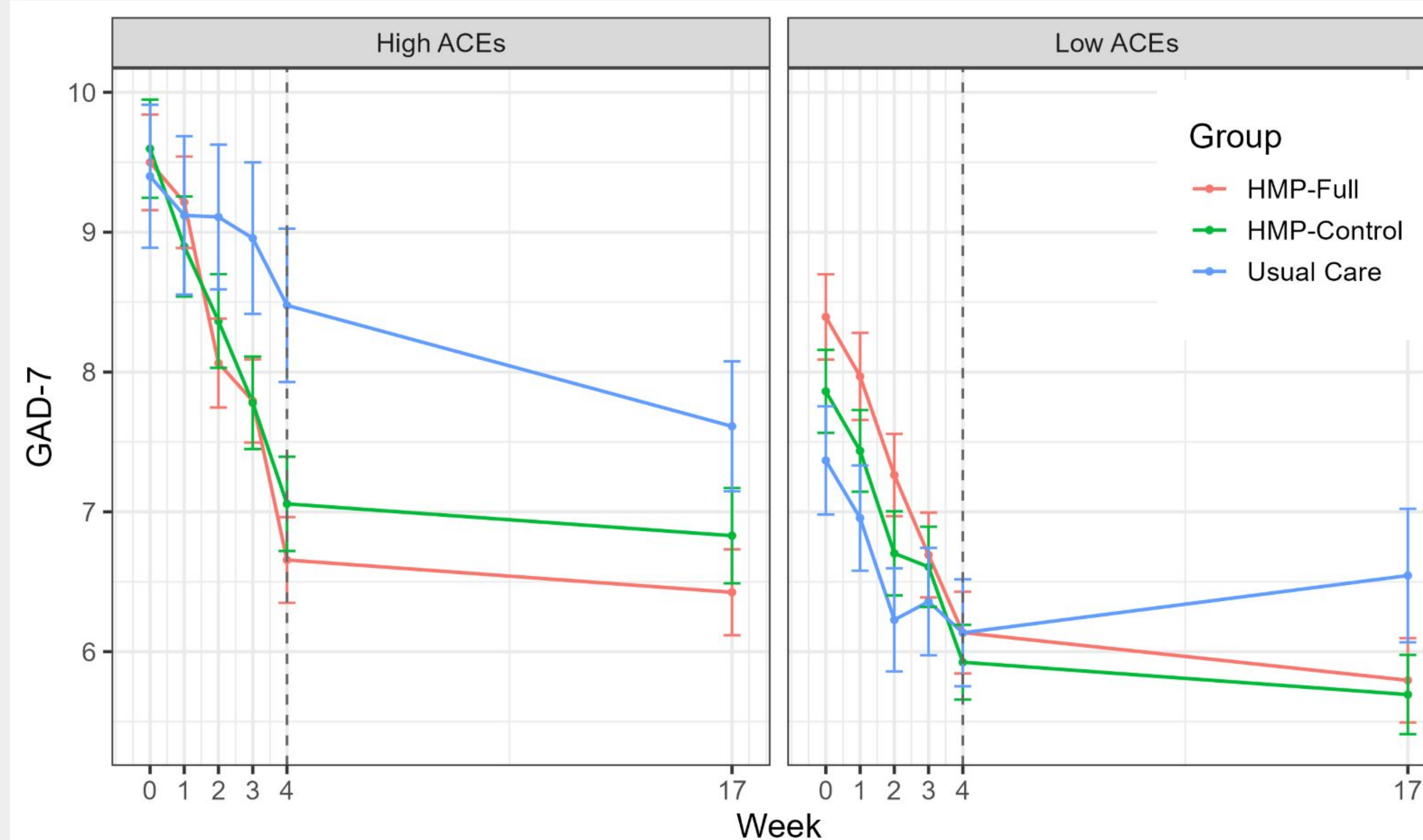
Table 1. HMP-Full vs UC Comparison of GAD-7 Trajectories Moderated by ACEs (BRFSS)

	Post-intervention		3-month Follow-up	
	Estimate	p	Estimate	p
ACEs				
HMP-Full vs. HMP-Control	-0.33	.708	-1.29	.754
HMP-Full vs. UC	2.34	.026*	8.03	.100
Sexual Abuse				
HMP-Full vs. HMP-Control	0.06	.921	0.21	.944
HMP-Full vs. UC	1.65	.021*	6.09	.067

Note. ACEs \times time \times group interactions represented. HMP-Full: intervention group, also the reference group; HMP-Control: active control group (psychoeducation only); UC: usual care control group.

* Denotes statistical significance.

Figure 1. Changes in GAD-7 moderated by ACEs



Note. The figure uses a median split displaying GAD-7 trajectories between those with high versus low ACEs for each of the three randomization groups.

Discussion

- ACEs moderated anxiety symptom improvement during the 4-week intervention for HMP-Full relative to UC.
 - Those with higher ACEs experienced greater reductions in anxiety post-intervention.
 - Results were not maintained at the 3-month follow-up.
 - Of the 3 domains, only sexual abuse demonstrated a significant ACE \times time \times group interaction.
 - There were no significant interactions observed between HMP-Full and HMP-Control.
 - Exposure to meditation may not directly impact the effect of ACEs.
- HMP-Full appears to be more effective in decreasing anxiety symptoms for those with ACEs than those without during an active intervention period, supporting its dissemination in populations who have experienced ACEs.

References

1. Moyes et al. (2022). *J Child Adolesc Trauma*, 15(4):1165-1177.
2. Ford et al. (2015). *Psychology of violence*, 4(4), 432-444.
3. Spitzer et al. (2006). *Arch Intern Med*, 166(10):1092-7.

Acknowledgements

I would like to thank my mentor, Cecilia Nam, and PI, Dr. Simon Goldberg, for their guidance throughout every step of this project. We also thank the BeWell study team and collaborators at the Center for Healthy Minds for their contributions to study design, implementation, and data collection. This project was supported by the National Institute of Health (NCT05183867).