

EaseApp: Personalized and Adaptive Mobile App to Treat Misophonia / Inbal Tzafrir

Introduction and Background:

Misophonia is a sound sensitivity disorder that triggers extreme emotional responses, such as anger, disgust, and panic when exposed to certain sounds like chewing, typing, or even loud breathing. Although not widely diagnosed, it is estimated that one in five people experiences moderate to severe symptoms. This condition typically develops in childhood or early adolescence and current treatments range from coping strategies and cognitive behavioral therapy to dedicated hearing devices. However, these treatments are often costly, rely on external sources, and may not be suitable for children.

Procedure:

I focused on children and explored whether misophonia symptoms can be reduced through adaptive self-auditory training. Applying principles of brain plasticity and Pavlovian conditioning, I developed EaseApp, a mobile app that encourages children to change their reactions to triggering sounds and gain resilience over time. EaseApp uses video games to create positive experiences and gradually introduces triggering sounds in the games' background, helping users disassociate these sounds from negative responses.

I created personalized soundtracks containing a mixture of relaxing and triggering sounds with Adobe After Effects and coded them into various JavaScript and HTML video games. I then coded in Python an adaptive mechanism that randomizes the soundtracks and modifies their intensity level based on the child's feedback. Finally, I added daily challenges and awards to encourage children to watch mindfulness videos and listen to relaxing audio.

Results:

In an A/B test with 26 children, half diagnosed with misophonia, participants were split into a group using EaseApp and a control group. Both groups completed surveys measuring misophonia and stress levels before and after six weeks. EaseApp users experienced a 45.4% reduction in misophonia symptoms and a 26.7% drop in stress, both statistically significant.

Conclusion:

Misophonia symptoms can be significantly reduced and self-treated at home using low-cost, personalized, and adaptive tools. This approach represents a promising advancement in mental health and psychiatric treatment and has the potential to improve the quality of life for many individuals.

Acknowledgments:

I am grateful to Dr. Goldberg at the UBC Department of Psychology, my Delta Secondary School teachers, and especially my sister, whose experiences inspired this project.

Reference List:

1. **Jastreboff, P. J., & Jastreboff, M. M.** (2023). The neurophysiological approach to misophonia: Theory and treatment. *Frontiers in Neuroscience*, 17, 895574. <https://doi.org/10.3389/fnins.2023.895574>
2. **Siepsiak, M., & Dragan, W.** (2019). Misophonia: A review of research results and theoretical concepts. *Psychiatria Polska*, 53(2), 447-458. <https://doi.org/10.12740/PP/92023>
3. **The Sound Learning Centre.** (n.d.). Sound therapy. *The Sound Learning Centre*. <https://www.thesoundlearningcentre.co.uk/therapies/sound-therapy>
4. **Raising Children Network.** (n.d.). Auditory integration training (AIT). *Raising Children Network*. <https://raisingchildren.net.au/autism/therapies-guide/ait>
5. **Siepsiak, M., Śliwerski, A., & Dragan, W. L.** (2020). Development and psychometric properties of MisoQuest: A new self-report questionnaire for misophonia. *International Journal of Environmental Research and Public Health*, 17(5), 1797. <https://doi.org/10.3390/ijerph17051797>
6. **Emmanouil, C., Bacopoulou, F., Vlachakis, D., Chrousos, G. P., & Darviri, C.** (2020). Validation of the Stress in Children (SiC) Questionnaire in a Sample of Greek Pupils. *Journal of molecular biochemistry*, 9(1), 74–79.

Bibliography:

1. **McMahon, K., Cassiello-Robbins, C., Greenleaf, A., Guetta, R., Frazer-Abel, E., Kelley, L., & Rosenthal, M. Z.** (2024). The unified protocol for transdiagnostic treatment of emotional disorders for misophonia: A pilot trial exploring acceptability and efficacy. *Frontiers in Psychology*, 14, 1294571. <https://doi.org/10.3389/fpsyg.2023.1294571>
2. **Norris, J. E., Kimball, S. H., Nemri, D. C., & Ethridge, L. E.** (2022). Toward a multidimensional understanding of misophonia using cluster-based phenotyping. *Frontiers in Neuroscience*, 16, 832516. <https://doi.org/10.3389/fnins.2022.832516>
3. **Henry, J. A., Theodoroff, S. M., Edmonds, C., Martinez, I., Myers, P. J., Zaugg, T. L., & Goodworth, M.-C.** (2022). Sound tolerance conditions (Hyperacusis, Misophonia, Noise Sensitivity, and Phonophobia): Definitions and clinical management. *American Journal of Audiology*, 31(3), 651-663. https://doi.org/10.1044/2022_AJA-22-00035

EaseApp Photos:

