

Title: Low-Cost Wireless EEG as adjunct to mindfulness therapy

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Introduction

In this study, participants with self-reported anxiety were taught meditation practices over the course of 8 weekly sessions in order to instill habits to improve their anxiety. Previous studies suggest an increase in alpha and theta band power in individuals relaxed and with their eyes closed. However, this has not been shown using a mobile wireless electroencephalographic (EEG) system suitable for home and clinic use. We use such a system in this intervention study, focusing on alpha and theta power during experiences with mindfulness meditation.

Methods

We are recruiting 20 people from the community seeking treatment for anxiety. The 8 weekly sessions are composed of small groups of participants following the Mindfulness Based Stress Reduction (MBSR) protocol. In each session, the leader provides mindfulness techniques. The participants are guided through silent meditation; where EEG data is collected. Following this, the leader discusses the meditation practices and applies it to coping with anxiety and stress. Physiological data was collected with the Emotiv EPOC wireless 16-channel EEG headset (Emotiv Inc., San Francisco, CA, USA).

Results

Participants completed self-report measures of anxiety, stress, and depression symptoms, at the beginning, middle and end of the course. Currently, 5 participants have completed the whole session, and another 3 are expected to complete in 6 weeks. The primary symptom measure is the Depression, Anxiety, and Stress Scale – 21 Item Version (DASS-21; Lovibond & Lovibond, 1995). Preliminary data from 2 participants suggest that mindfulness training is associated with reductions in depression. Survey data analysis show curvilinear relationships were observed in depression and anxiety symptoms. Data analysis of the EEG is expected to correlate functions of alpha and/or theta band power levels to changes to anxiety, and depression.

Conclusion

The ultimate goal of this research is the development of a physiological biomarker that relates to self-reported anxiety. We hope this biomarker can be detected effectively with an economical EEG system, to be used conveniently in clinical setting.