

PILOT STUDY

The Efficacy of Binaural Beats as a Stress-buffering Technique

Katherine Kelton, MS; Terri L. Weaver, PhD; Lisa Willoughby, PhD;
David Kaufman, PhD; Anna Santowski, MFT

ABSTRACT

Context • Distress has deleterious effects on health. While complementary and alternative medicine (CAM) is a growing system of practices in the treatment of health and mental-health conditions, many individuals have limited access to mind-body interventions. Creating accessible stress-inoculation strategies may augment traditional mental-health interventions and services.

Objective • This pilot study intended to assess the effectiveness of a theta binaural beat (TBB) auditory stimulus on heart rate and self-reported stress, which was experimentally induced by the Trier Social Stress Test (TSST).

Design • The repeated measures study compared the stress levels after a stimulus and stressor for two groups, within an experimentally induced psychological stress paradigm, the Trier Social Stress Test (TSST).

Setting • The study occurred at a private Midwestern university.

Participants • Participants were 64 US adults recruited from undergraduate classes at the university, with a mean age of 19 years and a range from 18 to 30.

Intervention • Participants were randomly assigned to the intervention or the control group. The intervention group listened to pink sound, carrier tones, and embedded TBB, while the control group listened to pink sound and carrier tones without embedded TBB.

Outcome Measures • Participants completed self-report assessments about the auditory stimulus, perceived stress, and mindfulness and then engaged in the Trier Social Stress Test (TSST). Subsequently, they completed measures

on perceived stress using a visual analogue scale (VAS), and heart rate variability (HRV) was recorded throughout the study.

Results • With respect to the evaluation of subjective stress using the VAS, psychological stress increased significantly between the exposure to the stimuli and the TSST— $F_{(1.28, 53)} = 42.76, P = .01, \text{partial } \eta^2 = 0.44$. The change in stress levels for the intervention group, however, was not significantly different from that of the control group at any time point $F_{(1.28, 53)} = 1.03, P = .33, \text{partial } \eta^2 = 0.02$. With respect to the evaluation of physiological response to stress using the HRV, the changes in HF HRV between the 4, five-minute segments during stimulus exposure were not significantly different between the groups $F_{(3, 55)} = 0.90, P = .44, \text{partial } \eta^2 = 0.02$. A significantly greater change— $F_{(1, 55)} = 4.84, P = .03, \text{partial } \eta^2 = 0.08$ —in the HF HRV occurred over the TSST period for the intervention group compared to the control group suggesting that on average across the TSST stress tasks, those in the intervention group demonstrated higher HF signals.

Conclusions • The current study found that the intervention group, who listened to TBBs, had greater parasympathetic dominance during TSST than the control group. This suggests that TBB exposure may dampen subsequent stress responses to an acute, psychological stressor. This finding, however, should be interpreted with caution, because further research and independent replication are warranted. (*Altern Ther Health Med*. 2021;27(4):28-33).

Katherine Kelton, MS, Diversity Fellow, Psychology Department, Saint Louis University, Missouri, United States
Terri L. Weaver, PhD, Professor, Psychology Department, Saint Louis University, Missouri, United States. **Lisa Willoughby, PhD**, Associate Professor, Psychology Department, Saint Louis University, Missouri, United States.
David Kaufman, PhD, Associate Professor, Psychology Department, Saint Louis University, Missouri, United States.

Anna Santowski, MFT, Family Therapist, Compass Behavioral Health Center, Northbrook, Illinois, United States.

Corresponding author: Katherine Kelton, MS
E-mail address: katherine.kelton@slu.edu
