



# Brain Tingles:

## Exploring a Holistic Approach to Alleviate Anxiety through EEG Brainwave Monitoring

Onur Bas, Doreta Biba, Maddalena Carpignano, Sophia Cassera, Daniel Currier, Erisa Ganellari, Bryant Gomez, Jacqueline Gonzalez, Evan Greenbaum, Hahyung Jung, Amina Muka, Sebastian Nazal, Elda Pere, Luis Sanchez, Jenna Santacroce, Adelajda Turku, and Rafael Zarifa  
Mentors: Dr. Coleen DiLauro, Dr. Lenore Lerer, and Angie Goldszmidt

### ABSTRACT

Existing literature on music and its ability to activate various parts of the brain inspired us to look into music and sounds therapy as a natural remedy for anxiety. We focused on classical music and a new phenomenon called Autonomous Sensory Meridian Response (ASMR). ASMR is a physical response that consists of light and pleasurable tingles, typically felt in the head, and often causes a deep and soothing feeling of relaxation.

Our project consisted of developing a double-blind experimental study to analyze the cognitive effects of classical music and ASMR media using electroencephalographic (EEG) brainwave monitoring. We focused on the assessing the short-term effects on reducing anxiety.

A total of 86 individuals participated in our study. Our sample was randomly assigned to one of two groups; the first listened to classical music and the second listened to ASMR media. Once we completed the scans, we collaborated with BrainMaster Technologies and qEEG Pro to analyze the data.

The results indicate that both ASMR media and classical music reduced anxiety in participants at a statistically significant level. We also discovered that participants who listened to classical music were as likely to report that they experienced the tingling sensation associated with ASMR. Participants from both groups who reported feeling the tingling sensation were significantly more likely to have a reduction in the Beta and Hi-Beta brainwave frequencies which are associated with anxiety level.



### Experimental Design

In total, 86 students from Bergen Community College participated in this study. All participants were randomly assigned to one of two groups. The first listened to ASMR media and the second listened to Beethoven's "Symphony No. 6." Each participant completed two consecutive EEG sessions, one while sitting in silence with their eyes closed for five minutes, and a second while listening to music or ASMR media with their eyes closed for five minutes. We also used a pre and post treatment questionnaires to supplement our EEG scans with self-reported data.

We chose to pursue a double-blind experimental study to negate the placebo effect often associated with this type of experiment. Therefore, neither the study participant or the researchers knew to which treatment group the individuals were assigned.

### References

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### Results

We collaborated with BrainMaster Technologies, qEEG Pro, STEM faculty, local neurologists, and EEG experts to analyze the data. Our analysis focused on Beta and Hi-Beta brainwave frequencies between 19-20 Hz and 20-24 Hz, which are associated with anxiety levels. We analyzed the effect the treatment had on each participant individually using the first silent EEG session as the control. We then used ANOVA to study the variation between the two treatment groups.

According to the pre and post treatment questionnaires, 82% of participants in both treatment groups reported that they felt the tingling sensation associated with ASMR. The questionnaires also revealed that the average response to how overwhelmed they felt was reduced from 5.20 to 3.57 post treatment.

According to the EEG scans, participants who listened to classical music had an average reduction of 0.52 in the ROI Z scores for the Beta and Hi-Beta frequencies throughout the whole brain, and a 0.57 average reduction in the frontal lobe specifically. Participants who listened to ASMR had an average reduction of 0.45 in the ROI Z scores for the Beta and Hi-Beta frequencies throughout the whole brain, and a 0.54 average reduction in the frontal lobe.

Participants in the classical music group have achieved stress reduction at a slightly higher level than its ASMR counterpart. In addition to these findings, we concluded that classical music can also elicit an ASMR effect on the human brain. This reveals that regardless of the media used, ASMR related sensations and responses can be triggered by various types of sounds.

However, our statistical analysis showed that individuals who reported that they experienced the tingling sensation were more likely to have a reduction in Beta and Hi-Beta frequencies throughout the whole brain and the frontal lobe than those who did not feel the tingling sensation. This suggests that ASMR does reduce anxiety, but ASMR media was not more effective at producing ASMR than classical music.

#### One-Sample T: Tingling

Test of  $\mu = 0$  vs  $\mu > 0$

Variable	N	Mean	StDev	SE Mean	95% Lower Bound	T	P
Tingling	80	0.820000	0.388088	0.054984	0.727784	14.94	0.000

#### Paired T-Test and CI: Pre, Post

Paired T for Pre - Post

	N	Mean	StDev	SE Mean
Pre	49	5.20408	2.69242	0.38463
Post	49	3.57143	2.38921	0.34132
Difference	49	1.63265	2.36502	0.33843

95% CI for mean difference: (0.95219, 2.31311)  
T-Test of mean difference = 0 (vs not = 0): T-Value = 4.82 P-Value = 0.000

#### One-Sample T: All 1

Test of  $\mu = 0$  vs  $\mu > 0$

Variable	N	Mean	StDev	SE Mean	95% Lower Bound	T	P
All 1	31	0.52360	0.312765	0.116077	0.301199	4.49	0.000

#### One-Sample T: All 2

Test of  $\mu = 0$  vs  $\mu > 0$

Variable	N	Mean	StDev	SE Mean	95% Lower Bound	T	P
All 2	31	0.45355	0.308979	0.055025	0.342425	8.07	0.000

#### One-Sample T: All 1 Frontal

Test of  $\mu = 0$  vs  $\mu > 0$

Variable	N	Mean	StDev	SE Mean	95% Lower Bound	T	P
All 1 Frontal	31	0.518487	0.308793	0.116077	0.301199	4.49	0.000

#### One-Sample T: All 2 Frontal

Test of  $\mu = 0$  vs  $\mu > 0$

Variable	N	Mean	StDev	SE Mean	95% Lower Bound	T	P
All 2 Frontal	31	0.548387	0.308979	0.055025	0.342425	8.07	0.000

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