# The Physical Effects of Sound; the Unconscious Impact of Sound Waves on Adolescent Heart Rates

Singhal, Sudiksha (School: Red River High School)

At a conscious level, humans react to music with physical changes, where “sad” and “happy” music cause variations in mood and heart rates. The question that then arises is whether the human body responds to sound stimuli on an unconscious level. I hypothesize that if I tested the effect of exposing people to sound in a state where they are not aware of the stimuli, we will see a change in their heart rates as their body’s physical reaction to the sound waves. Indicating that we would see that the physical vibrations associated with sound affect our body’s functions. To test this hypothesis I asked participants to wear headphones that limited their auditory abilities. Once they were not able to hear anything, they were seated in a quiet room and I recorded their pulse rate over 15 minutes. During this time sounds at two different frequencies were introduced periodically: 20Hz and 20,000 Hz frequencies. The data was then tested for significance using T-tests, Hierarchical clustering, and Kruskal-Wallis. W. The result showed that the difference in the pulse rate of participants with and without stimuli is indeed significant at a 0.05 significance level, thus proving my hypothesis. There is great real world application for the findings of this study. The surgeons listen to music during surgery, given the results of the study the presence of music in the operation theater may affect the outcome of the surgery. Additionally, it would highlight the effects of noise pollution on individuals and their health.

**Awards Won:**