



# CALIFORNIA STATE SCIENCE FAIR 2015 PROJECT SUMMARY

<b>Name(s)</b> Nathan Wong	<b>Project Number</b>  35734
<b>Project Title</b> The Correlation between Quantified Music Aspects and Electrodermal Activity	
<b>Objectives/Goals</b> Electrodermal (Galvanic) activity is measured by the flow of electrolytes in sweat glands when the sympathetic nervous system responds to stimuli (music). Previous studies showed qualitative aspects of music reducing stress responses, but did not identify the quantifiable aspects of music that affect stress. By quantifying music, my objective was to learn how music affects stress so a mathematical equation can be defined to create music that reduces stress. <b>Abstract</b> <b>Methods/Materials</b> Music was defined by its wave energy through an equation derived from (1) dual wave nature of particles postulated by Planck and Einstein, and (2) frequency-intensity ranges from FFT spectrogram analysis. Using GSR electrodes, the electrodermal activities of 16 students were measured while they listened to the analyzed music. Music wave energy was corresponded with normalized electrodermal values after the parameter time was eliminated in order to compute correlation coefficients. <b>Results</b> Pearson's r coefficient, which identified the strength of the relationship between music wave energy and a participant's electrodermal activity, ranged from 0.62 to 0.55. The data could not determine a general relationship between the music energy and stress. One participant's correlation value greatly differed from another participant's, even though many confounding variables, such as situation-relevant ones, were eliminated by hosting the experiments in the same classroom. <b>Conclusions/Discussion</b> Although a correlation between music energy and electrodermal activity was not identified, the inconsistent data indicates the myriad of individual psychological processes and preferences. Since individuals naturally seek optimal levels of physiological arousal, stress-relieving music as defined by the wave energy equation may be perceived as more exciting for some than for others, resulting in different electrodermal responses to the same music. These findings are important in supporting the arousal theory of motivation, serving as biological proof that individuals are so unique that people should embrace their own psychological differences instead of conforming to mainstream influences in order to function optimally. Further research with quantitative approaches to define music includes increasing sample size and developing more precise GSR electrodes so the sound wave energies can be better corresponded with more precise electrodermal activity measurements.	
<b>Summary Statement</b> While attempting to quantify the most stress-relieving music, this project provides scientific evidence of individual psychological differences that posit ways to maximize personal levels of satisfaction.	
<b>Help Received</b> Used Ms. McCarty's classroom to conduct all experiments; Used signal analysis freeware SigView to analyze sound waves	