

The Effects of Music on Cardiovascular Activity

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**Abstract**

This study explores the effects of music on blood pressure. Pulse pressure is used to measure results. Pulse pressure is defined as the difference between systolic and diastolic blood pressure. Three different genres of music are taken into account in this experiment: classic, dance, and metal. Subjects from the Island between ages 24-26 both male and female are tested. Results from this experiment suggest that there is no significant difference on genre of music and it's effect on blood pressure.

### **Introduction**

For many people, music is a vital part of how they express their individuality. It is a great part of how they perceive themselves to be individuals, separate from the whole, instead of just a uniform mass. It is a motivator for some or a way to release mood changes or emotion in general. For this study, we would like to quantify any effects of music on humans.

### **Literature Review**

A study was conducted by George H. Zimny and Edward W. Wetidenfeller to examine the effects of music on heart rate and GSR. The study attempted to see if the different kinds of music would have discernable differences in their effects. The test results produced distinguishable sets with respect to the GSR, but not for heart rate. The GSR response to the exciting music firmly decreased in resistance, indicating an increase in arousal, however, there was no response to neutral and calming music.

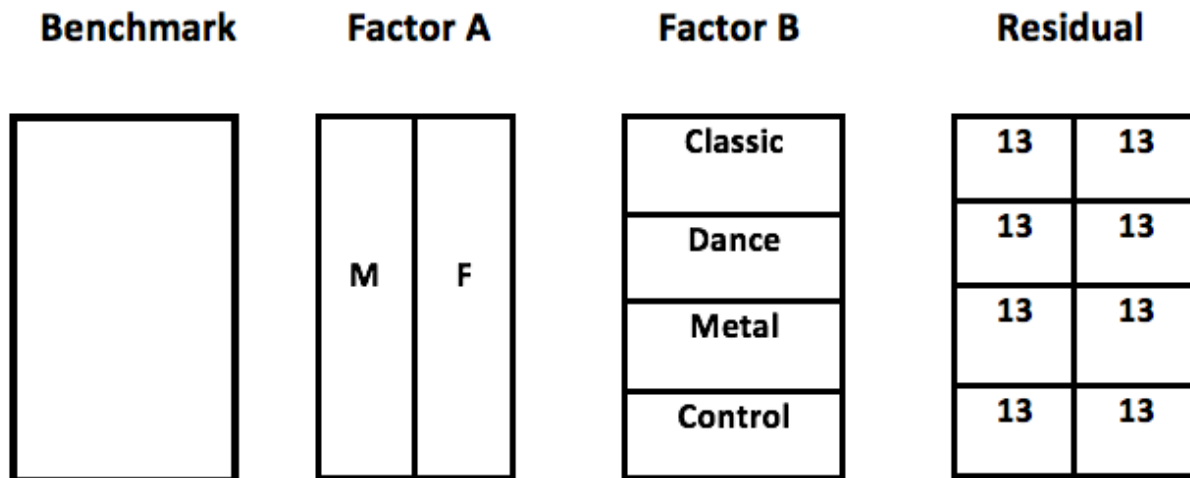
### **Methods**

The blood pressure is selected response variable. Since we need to see the difference of subjects' condition between before and after the experiment, we measured their blood pressure (Diastolic and Systolic) right before and after they listened to music.

There are two factors for this experiment. Gender is a factor with two levels and genre of music is another factor with four levels. We decided to use a homogeneous group to reduce the amount of variance errors, by holding the age group constant at 24-26. We chose gender as one of the factors rather than dividing our subjects into different sets of age ranges. We used three different genres of music: classic, dance, metal and control (sitting).

Two factor factorial design has been selected for this design. Since the total sample size is 104, each group has 13 people. Therefore, we can say that  $n = 13$ .

Diagram 1: Factor Diagram



### Procedure

1. Fill out a pre-experiment survey
  - Before we experiment on our subjects, we should check the subject's music preferences and his or her emotional state. A short survey of 10 questions is sufficient to get an overview of their mental condition.
2. Check pre-experiment blood pressure
  - This is the first of two measurements.
3. Listen to music
  - Each group is going to participate in their assigned treatment.
4. Check the post-experiment blood pressure
  - This is the second of two measurements
5. Fill out the survey
  - To check if there are any differences in their mental states , we present them with another survey before the experiment ends.

## Results

To improve our analysis, we decided to use a new response variable not analyzed in the original study: pulse pressure, which is defined as the difference between the systolic and diastolic pressure.

Table 1: Regression Results

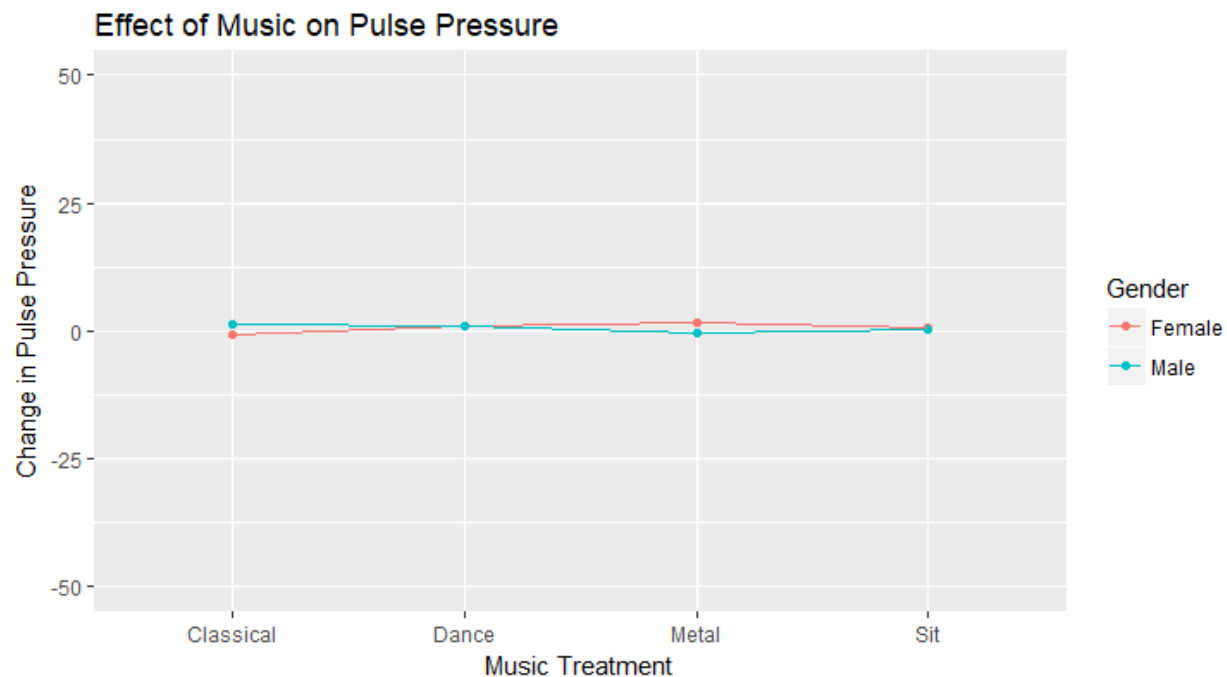
	Estimate	Std. Error	t value	Pr(> t )
(Intercept)	-0.8462	1.6717	-0.51	0.6139
GenderMale	2.0769	2.3641	0.88	0.3819
‘Music Treatment‘Dance	1.9231	2.3641	0.81	0.4180
‘Music Treatment‘Metal	2.4615	2.3641	1.04	0.3004
‘Music Treatment‘Sit	1.4615	2.3641	0.62	0.5379
GenderMale:‘Music Treatment‘Dance	-2.1538	3.3434	-0.64	0.5210
GenderMale:‘Music Treatment‘Metal	-4.1538	3.3434	-1.24	0.2171
GenderMale:‘Music Treatment‘Sit	-2.2308	3.3434	-0.67	0.5062

Table 2: ANOVA Table

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Gender	1	0.09	0.09	0.00	0.9612
‘Music Treatment‘	3	9.41	3.14	0.09	0.9673
Gender:‘Music Treatment‘	3	56.18	18.73	0.52	0.6726
Residuals	96	3487.54	36.33		

As seen in the tables above, the p-values for all variables are larger than 0.05. This means that there is no significant difference between before and after blood pressure (Systolic and Diastolic). Unfortunately, we are unable to significantly conclude anything from our experiment.

Graph 1: Interaction Plot



According to interaction graph, we can visually see that there is no significant difference between different types of music genre by gender.

### Conclusion

Parallel to Jimmy's study, our experiment also shows no significant results. The conclusion was that different types of music led to no significant differences between pulse pressure. We are able to reach this result by examining the regression, ANOVA, and interaction plot. In the ANOVA table, all the p-values of variables are extremely high, almost close to 1. In addition, the interaction graph of music treatment didn't present any differences. During the course of our study, we thought of several ways we could improve future iterations of a similar experiment. To reduce the nuisance factor, using blocking factors such as music preferences would produce more granular results. If we take into consideration their preferences and make those into blocks, the music choice we subject them to may produce different results than what we found in this experiment.

**Bibliography**

Zimny, G. H., & Weidenfeller, E. W. (1963). Effects of Music upon GSR and Heart-Rate. *The American Journal of Psychology*, 76(2), 311. doi:10.2307/1419170