



# The Relationship Between Musical Composition and Emotional Response

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## Introduction

- Music composition is the structure in which a piece of music follows.
- A musical composition is determined by factors such as tempo, key, chord progression, and dynamics. Music is capable of invoking noticeable behavioral reactions among individuals. This is illustrated by Bonassi (2023) who studied the connection between musical composition and individual emotional reaction.
- Examining the effect musical compositions have on decision making, Zhou and colleagues(2022), found that more positive compositions led to alternative decision making than negative compositions.

## Hypotheses

Building on these findings;

- 1) It was hypothesized that:
  - the second group with a slow tempo (40-60 bpm) a soft dynamic, and performed in the key of E Minor, will demonstrate noticeably dismal responses,
  - the third group with a medium tempo (70-90 bpm), a medium dynamic level, and performed in the key of A Minor, will demonstrate responses similar to those within the control group, and the fourth group with a fast tempo (100-130 bpm), a loud dynamic, and performed in the key of E Major will demonstrate noticeably optimistic responses.

## Procedure

The subjects were divided into four equal groups. Each group was administered a unique musical composition ranging from slow-paced and somber, to fast-paced and exciting.

- Group one was the control group. Instead of listening to an assigned musical composition, they listened to white noise. The second group was administered a musical composition that contains a slow tempo (40-60 bpm), a soft dynamic, and performed in exclusively minor keys. The third group was administered a musical composition that contains a medium tempo (70-90 bpm), a medium dynamic level, and performed in both major and minor keys. The fourth group was administered a musical composition that contains a fast tempo (100-130 bpm), a loud dynamic, and performed exclusively in major keys.
- Research has been conducted to determine the best musical aspects, including tempo, key, and dynamic to be included in the three compositions(Liu, Ying, 2018 and Steblin, 1983).
- After the selected musical composition has been played in its entirety, each of the subjects were administered a Thematic Apperception Test (TAT) (Murray, H. A., 1943). Each subject was tasked with answering a series of questions about 10 unique images within the TAT image collection. Each subject was given four minutes to respond to each image, and each image had the same four questions associated.

## Procedure Cont.



Figure 1. Procedure timeline.



Figure 2. Thematic Apperception Test Images

## Demographics

N=8	n=	% of N
<b>Gender</b>		
Male	5	62.50%
Female	3	37.50%
<b>Ethnicity</b>		
Caucasian	7	87.50%
Asian/PI	1	12.50%
<b>Household Income</b>		
Below 10k	4	50.00%
50k-100k	1	12.50%
Over 150k	3	37.50%

## Results

Results show significance as the four groups containing different musical compositions displayed significantly different mean levels of positive, negative, and neutral responses,  $n^{\wedge}3 = .99$ ,  $p < .001$ .

Effect	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power <sup>d</sup>	
Intercept	Pillai's Trace	1.000	2147.190 <sup>b</sup>	3.000	2.000	<.001	1.000	6441.571	1.000
	Wilks' Lambda	.000	2147.190 <sup>b</sup>	3.000	2.000	<.001	1.000	6441.571	1.000
	Hotelling's Trace	3220.786	2147.190 <sup>b</sup>	3.000	2.000	<.001	1.000	6441.571	1.000
	Roy's Largest Root	3220.786	2147.190 <sup>b</sup>	3.000	2.000	<.001	1.000	6441.571	1.000
group_key	Pillai's Trace	2.524	7.071	9.000	12.000	.001	.841	63.640	.993
	Wilks' Lambda	.000	53.290	9.000	5.018	<.001	.975	199.512	1.000
	Hotelling's Trace	1057.806	78.356	9.000	2.000	.013	.997	705.204	.983
	Roy's Largest Root	1028.568	1371.425 <sup>c</sup>	3.000	4.000	<.001	.999	4114.274	1.000

Figure 3. Multivariate Output of a performed MANOVA Test. Displays significant readings such as Wilk's Lambda, and the tests respective significance value.

## Results Cont.

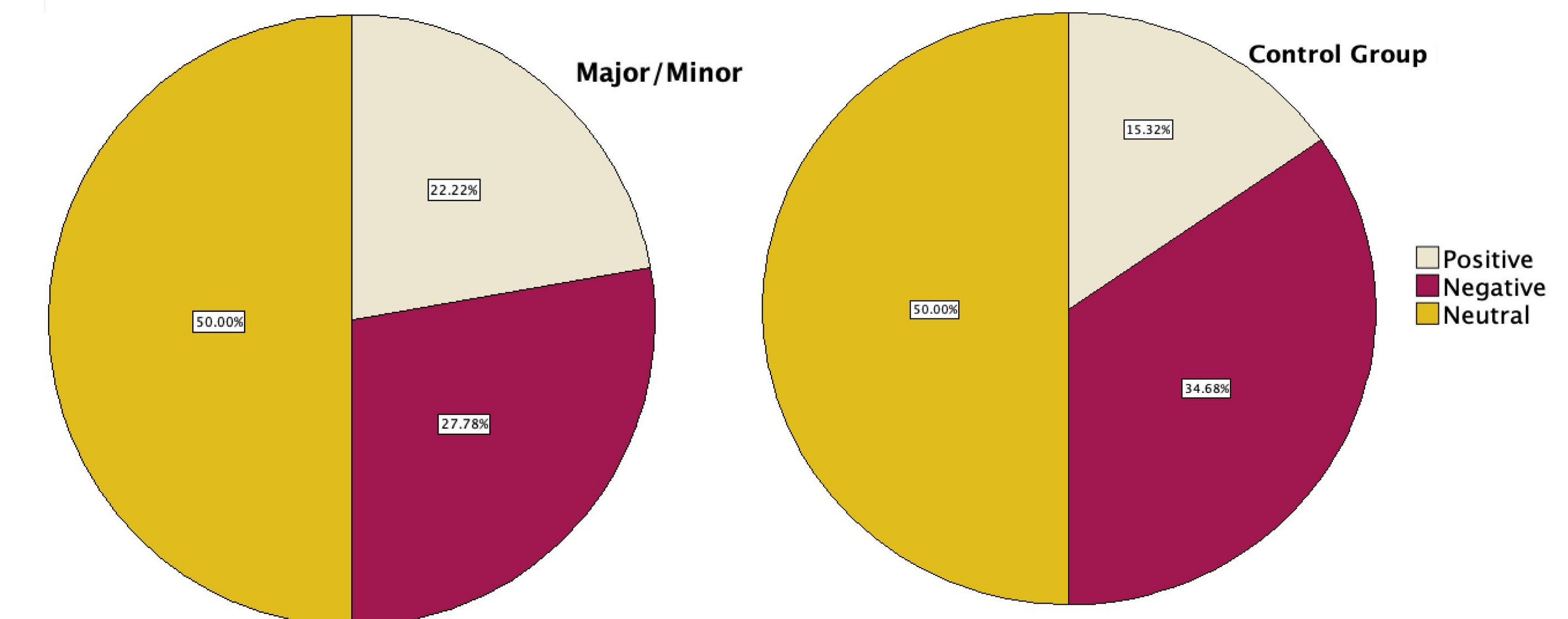


Figure 4. The results of the major/minor and control group testing

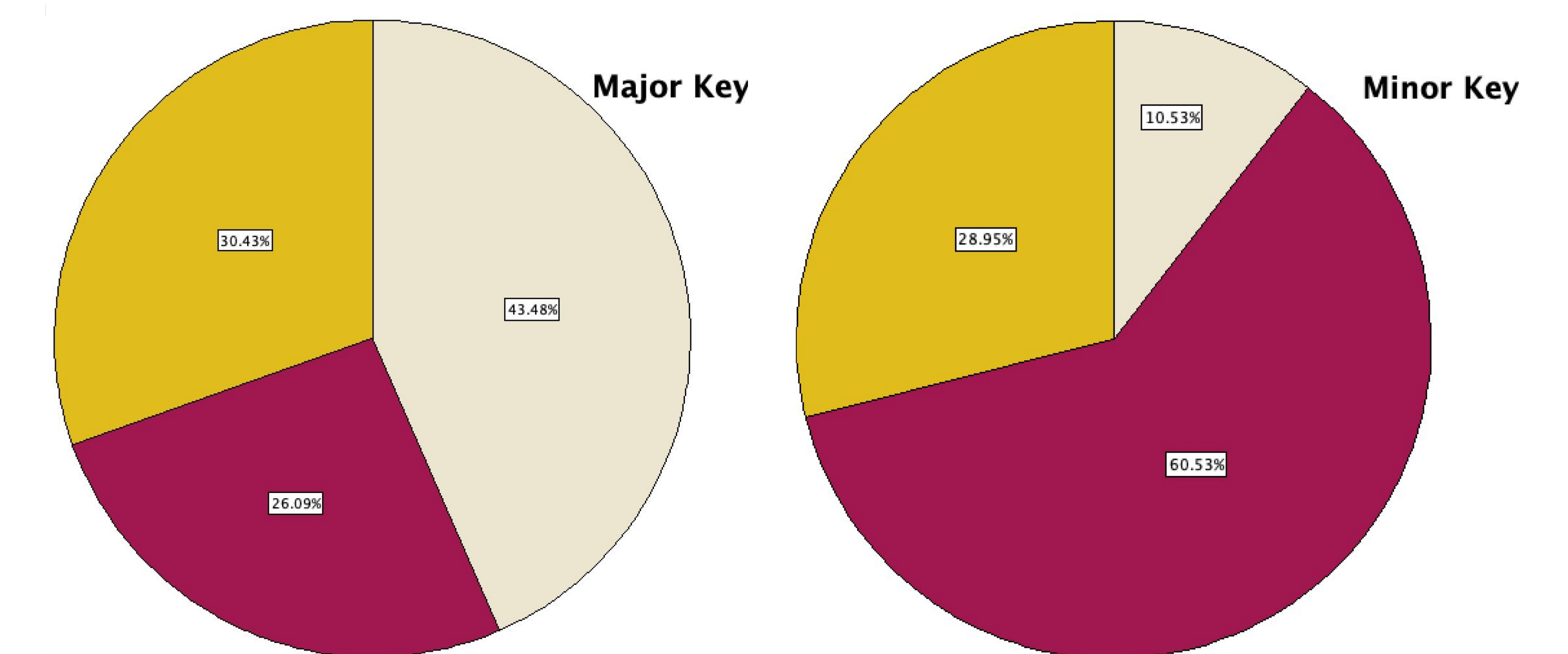


Figure 5. The results of the Major and Minor group testing

## Discussion

The study's significant findings reveal how different musical compositions elicit distinct emotional responses. Participants exposed to slower, softer compositions showed more dismal reactions, while those exposed to faster, louder compositions demonstrated optimism. These results emphasize music's profound influence on emotions and cognition, suggesting its potential for therapeutic use and emotional regulation. Further research could delve into the underlying mechanisms and therapeutic applications of tailored music interventions.

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