

Running Head: THE EFFECTS OF MUSIC ON EMOTIONS AND MOTOR SKILLS

The Effects of Music on the Emotions and Motor Skills of People with Alzheimer's Disease

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Abstract

Alzheimer's disease is a well-known type of dementia that affects millions of elderly people every year. It is a debilitating disease, and there are very few solutions for helping the victims. This study investigates the effects of music on the agitation, emotions, and motor abilities of ten nursing home residents with Alzheimer's disease. It seeks to find whether certain types of music are better than other types of music or the absence of music in reducing levels of agitation, increasing levels of positive affect, and improving patients' ability to complete a motor skills task. Patients were video-recorded while they attempted to roll a ball to the experimenter. During this task, four music conditions (i.e., no music, classical, preferred, and unfamiliar) were played. The conditions were randomized within subjects. The experimenter rated the patients on levels of agitation, positive affect, and task performance. It is expected that the patients will show less agitation, more positive affect, and enhanced performance when the classical music and preferred music are playing than when no music or the unfamiliar music is playing.

The Effects of Music on the Emotions and Motor Skills of People with Alzheimer's Disease

Because listening to music is so often thought of as a recreational activity, the positive health benefits of doing so are often forgotten. Music can be soothing to the soul, relaxing before an exam, or entertaining at a party. Listening to music has advantages, though, that many people never consider. Many studies show how music can be used to help sick, injured, mentally ill or aging people. These studies provide evidence that the presence of music in certain circumstances can be just as beneficial as different types of therapy (e.g., Gerdner & Swanson, 1997; Goddaer & Abraham, 1994; Lou, 2001). The health benefits of music appear to be especially strong among people suffering from Alzheimer's disease and dementia, showing such positive benefits as decreased agitation, less aggressive behavior during bath time, and decreased need for physical restraints (Clark, Lipe & Bilbrey, 1998).

Alzheimer's disease

The facts about Alzheimer's disease (AD) and dementia are becoming increasingly better understood. Peng (2003) describes dementia as a disease that "affects problem-solving ability, decision-making, judgement, our ability to orient ourselves in space, and our ability to put together simple sentences and understand and communicate with words...Dementia is a permanent, progressive disease that affects mostly the elderly." AD is a particular form of dementia that has especially devastating consequences on the individual's mind (e.g., memory loss, language difficulties, poor judgment, and changes in personality). It can change a once well-put-together, prominent adult into someone he or she never hoped or imagined becoming.

The process by which dementia leads to declines in a person's motor and cognitive abilities is often described as a set of stages. These staging systems are a helpful guide when trying to understand what turn the disease may take with its victim. These stages range from "no

cognitive impairment” to “very severe cognitive decline” which is the severe and late stage of Alzheimer’s disease (Alzheimer’s Association, 2004).

Music and Alzheimer’s Disease

Because the symptoms of AD can be incredibly painful, both physically and emotionally, especially during the final stages, finding a way to lessen the severity is an ongoing struggle. That is where the use of music becomes beneficial. Many studies have shown that the use of music, presented in a variety of ways, can help enrich the lives of those dealing with AD. One way that this is seen is with the decrease of agitation in the participants, when agitation is the “inappropriate verbal, vocal or motor activity that is not explained by needs...and may be accompanied by anxiety, panic, depression, delusions, hallucinations, and/or delirium” (Lou, 2001).

Several studies have demonstrated the effectiveness of music on reducing agitation among Alzheimer’s patients. One experiment, which included four weeks of alternating music and no music conditions, found that the overall agitation, physical non-aggressive behavior, and verbal agitated behavior were reduced after the music conditions (Goddaer & Abraham, 1994). Another study that focused on the effectiveness of background music during mealtime at a health care facility found that agitation was greatly reduced during conditions where music was present (Denny, 1997).

Not all studies have shown that music has positive effects, however. For example, Clair and Bernstein (1994) found that music played in the background for participants on an individualized basis did not lessen the participants’ agitated behaviors. Several factors of this study that separate it from others done on this subject could explain the results though. Compared to most other studies done on the effects of music on people with dementia or AD in

nursing homes or other long-term health care facilities, this study took place in a hospital. Having taken place in such a temporary living unit, the effects of the music on the patients may have been altered by an array of other variables such as quick transitions from one living situation to another and the unfamiliarity of the present living conditions. When the studies take place in nursing homes, however, the participants have most likely been given time to adjust to their new environment and may have even been residing there for an extended period of time. A second component of this study that may have drawn such results was the time interval variable. Researchers obtained data three times a day from each patient, which could have led to differing results also. Most studies have not spent such an extensive period of time with the participants in one day, when their moods could be changing dramatically. This extended period of time spent with the participants may have actually led to more generalizable and representative reactions from the participants.

To better understand the effects of music on patients with Alzheimer's disease, some recent research has looked specifically at the effects of preferred music of the patients. For example, Gerdner and Swanson (1993) played music familiar to each participant in their study. Before this study began, family members of the participants were given a music preference questionnaire about the patient, their loved one. Gerdner & Swanson's main goal was to determine if there is a difference among various types of music presented to the participants. As with most other studies, this particular study also showed that music, especially preferred music, can benefit the participant's mood and behaviors. It was found that there was a decrease in agitation among participants during the classical music condition, but there was an even more dramatic decrease during the preferred music condition.

Similar results were found by Clark, Lipe and Billbrey (1998) who showed that playing preferred music of the nursing home residents during their bath time decreased the amount of agitation during that daily task. With 12 of the 15 participants, increased cooperation was experienced during this task, as reported by the caregivers.

Music

The idea of using music for therapy and healing is not a new concept. Positive effects of music can even be found in biblical references. I Samuel 16 says, “Let the lord command his servants here to search for someone who can play the harp. He will play when the evil spirit from God comes upon you, and you will feel better...David would take his harp and play. Then relief would come to Saul; he would feel better, and the evil spirit would leave him” (NIV). Tame (1984) has found that music has also been known to have positively influenced health and morality in ancient China (Ragneskog, 2000).

As researchers have found music to be beneficial in decreasing the agitation and improving the lifestyles for patients with AD, the question of why music is more beneficial than conversation arises frequently. Why does music have this effect on these patients? Though the answer cannot be determined by the present study, knowledge of research on the subject is beneficial. As Kirkland has explained, music does not just involve one part of the brain as language does. It is actually processed in many parts of the brain. Therefore, whereas speaking with many victims of AD, dementia or stroke may not induce conversation, emotional responses, or even just the hint of awareness from the victim, music has been found to elicit responses of all natures. Kirkland reports that studies have found four general benefits of music for the victims suffering from severe dementia. These include “changes in facial expression and tension, increased eye contact, vocal activity, and physical movement.” It has been found that, although

they lose many abilities, patients with AD often retain musical perception. Evidence that supports this idea can be found in each patient that is unable to speak a single sentence or answer a question, yet can remember and sing the words to a song from decades ago (Gerdner & Swanson, 1993).

Despite the fact that music as a healing agent has been around for years, there are still many questions that need to be answered. Research has been done in many areas, yet not enough to establish that music is an equivalent to medication or similar remedies in decreasing agitation or increasing enjoyment in daily activities. Therefore, the uncertainties have led me to take an interest in several aspects of the effects of music on victims of AD and dementia.

The purpose of the present study is to determine whether music has positive effects on individuals with dementia. Past studies have shown that classical music and participant-preferred music decreases the agitation in Alzheimer's patients. The intentions of this study are to find how significant a difference there is in the effect of three types of music. Four music conditions will be employed (i.e., no music, classical music, preferred music and unfamiliar music) and the effect of these conditions on participants' abilities and emotions will be assessed. Whereas most research has focused primarily on the levels of agitation of the participants, this study will focus on several other variables. Specifically, agitation, including the participants' attempts to leave and whether or not they appear relaxed, positive affect, determined by the participants' enjoyment of the activity, and performance abilities during the motor skills task will be looked at in this study. It is expected that participants will have more positive emotions and be more capable of completing their motor skill tasks during the preferred music conditions. Reasoning behind this hypothesis is that the sound of music from one's earlier years or happier times in life will bring good memories to mind. For many people this will create feelings of

pleasure and satisfaction. So, when participant preferred music is played, it would be expected that the participants would react in a more positive way than when music with which they are unfamiliar is played. Also, past research has shown that classical music has a positive effect on people, whether it be victims of various diseases or students preparing for exams. This can lead to the idea that classical music will also be beneficial to people with Alzheimer's disease. The least amount of change is expected when there is no music present.

Method

Participants

The participants (N = 10) in this study were 90% female and 10% male residents of two southern Indiana nursing facilities. Participants were all over the age of 65. All of the patients suffered from Alzheimer's disease or related symptoms. Nursing home staff identified all participants as being in the moderate to later stages of Alzheimer's disease.

Procedure

The nursing homes contacted family members of the participants to get initial permission for us to contact them about the details of the study. The nursing homes then briefed family members on the purpose of the study and gave them the decision as to whether or not they wanted to know more about the study. Once the family members gave their consent to proceed with the study, we sent them a packet of information including a cover letter, consent form, and survey on which family members could indicate the participants' musical preferences (see Appendix A). If, after reading this material, they gave their consent to allow their loved one to continue with the study, I collected the appropriate music for the preferred music condition. I also decided to use *Minute Waltz in D flat Major* by Chopin for the classical music condition and

Harmony of Strings Tranquil Moods: The New Age for the unfamiliar music condition. I then contacted the nursing home with information on which residents I would be visiting and began introducing myself to the patients. I made a note of each participant's degree of dementia by consulting the nurses who worked with him or her to better my understanding of what he or she would be capable of doing according to their daily interactions with the resident. Though some of the participants were in later stages of the disease, and therefore unable to complete the given task (i.e., rolling a ball), I did not eliminate any participants. With the participants that were capable of cooperating with me for the study, I worked one-on-one, so that they would feel comfortable with me. After familiarizing myself with the participants and them with me, I began my official observations. I visited the participants at approximately the same time of day for each of the two visits. During the visits, participants were played each of three types of music (i.e. classical, familiar, unfamiliar) and no music. The order in which participants encountered these conditions was randomized across participants and visits. The music was played on a CD player for about one minute for each condition while the participants rolled a rubber ball to me or engaged in some other similar activity with which they were familiar. The participant and I continued this activity as long as he or she was able during each condition. We took a one minute break in between each condition to allow for the participant to rest and to allow time for a change in the music. To record the participant's agitation, affect and ability to roll the ball, I videotaped every session. I then recorded the observations on a prepared checklist (Appendix B).

Analysis

Initially, I watched all of the videotaped sessions on mute to get an overall summary of what I would be analyzing. At this point, I omitted any sessions that were found to be irrelevant.

Irrelevant sessions include the initial, trial sessions during which the participants were not asked to roll the ball. Then, both an assistant and I coded twenty-five percent of the observations on the checklist to assess inter-rater reliability. We viewed these sessions by watching them chronologically on mute to avoid the possibility of experimenter bias. The sessions were also randomized at the time of filming to help prevent bias. The reliability scores can be seen on Table 1. After reliability was established, I analyzed the remaining video sessions. I decided to analyze the data myself because of uncertainty that another person would be as attentive to detail as there needed to be.

Results

One way analyses of variance (ANOVA) were used to examine the effect of each condition on the participants. By doing so, the differences in the effects of each condition could be determined easily. With these analyses I found no significant differences between any of the given conditions for any of the variables. The results can be seen in *Figures 1. through 5.* The absence of significance can be seen in all five variables, “Trying to Leave” ($F= 1.13$), “Not Appearing Relaxed” ($F = 1.39$), “Enjoys Performing Task” ($F = 1.00$), “Smiles” ($F = .114$), and “Able to Perform Task” ($F = 1.00$). Though it was expected that the preferred music condition and Classical music condition results would show a slight decrease in agitation and increased ability in motor skills over that of the unpreferred and non-music condition, this was not supported by the given results.

Discussion

I hypothesized that individuals with Alzheimer’s disease will have less agitation, more positive affect, and be better able to perform a simple motor task when listening to classical music or music they prefer than when listening to music they are unfamiliar with or when there

is an absence of music. My results, though, did not support this. There are several possible explanations as to why there were no significant results in my study. The first reason is my sample size. To find significance, more than ten participants were needed. Results are not generalizable with such a small sample size. Unfortunately, it is difficult to get a large number of participants due to the required methods of obtaining them. When using such a specific demography of participants, a large sample is necessary to produce any significance. Even if differences were present in my study, because the sample size was so small, no significance could be distinguished. Therefore, researchers who, in the future, hope to further such research, should aim for a larger sample size than was used in the present study.

A second possible explanation for the results is the level of dementia of the available participants. Most of the participants in this study were in late stages of Alzheimer's disease. Because of the effects of the disease, people in the later stages lose many of their abilities, such as learning, reasoning, making judgments and remembering. They also lose their abilities to perform certain physical tasks. I found with several of my participants that the effort to roll a ball was more than they could handle. The physical strength and coordination to move their arms from their laps to the table, where the ball was being rolled, was not within their ability. In each of these cases, the presence of music did not make a difference. Closer research should be placed on exactly for whom music is beneficial. Then, researchers can undergo more extensive examination on particular participants.

A third explanation for the results is the degree to which the behaviors of the participants were interpreted. What, in many cases, were behaviors that appeared on video as agitation or negative affect, were behaviors that, when within the correct context, were actually positive effects. One example of this could be seen with Participant A. During several of the conditions,

Participant A attempted to or successfully left the area in which we were working. Even after being asked to stay seated, she would stand up and walk away. At one point she even took the ball with her as she left the room. While this appeared to be negative affect, it may have been a reaction due to a positive emotion she was experiencing. According to her husband, Participant A used to dance on a normal basis. She enjoyed dancing up until the days when the disease began to take over her life. Participant A was naturally an active woman. So, before she was affected by Alzheimer's disease, music, to her, was an indication to begin dancing. Music was a release and a way to show her emotions. At the time of the study, when Participant A heard the music, she had a tendency to move around a lot, including walking around the room. According to the coding system that I used, this was a sign of agitation. To Participant A, though, this may have been a flash back to her more youthful years, when she was able to dance and let her emotions flow from her body. Although this is only one specific participant, several others had reactions that could be interpreted in a multitude of ways. Therefore, in the future, researchers should find a more precise way to code the behaviors of the participants. This will discourage interpretations that are unrepresentative of the participants' actual reactions.

Studies such as this can be used as a learning step-stool for the future caregivers and family members of Alzheimer's patients. Though music does not have the curative effects that medications may provide, it has shown a decrease in agitation for many people. Both the small and large differences that music has made in the lives of Alzheimer's patients and their family members have given others hope that it can make a huge difference. Music has changed lives in ways that even the best technology cannot change, and has been doing so for years. Until a cure is found for this debilitating disease, music will have to remain the comforting antidote that it has proven to be.

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Appendix A

Dear _____,

Hello. My name is Jennifer Elpers, and I am a student at Hanover College in Hanover, IN. As a senior psychology major, I am now working on my Independent Study. The goal of my study is to find what effect music has on the emotions and motor skills of nursing home residents with Alzheimer's disease or similar types of dementia.

I know from personal experience that dementia of any kind is a troubling ailment. It is also hard for family members to deal with. As my own grandma passed away just a few weeks ago after suffering from Alzheimer's disease, this is a very important issue for me. I hope to find ways of making this debilitating process much easier for the victims and their families. Because much of my life has revolved around music, including singing in choirs at school and church and performing for an array of audiences, I am interested in discovering how this passion in life can be of comfort to people suffering from a variety of diseases, especially dementia. My hypothesis is that individuals with Alzheimer's will be better able to perform a simple motor task when listening to classical music or music they are familiar with.

To test this hypothesis, I want to observe each person completing a simple motor task (e.g. rolling a rubber ball) while listening to different styles of music. Sessions will be videotaped so that I may later watch the session again to make more detailed observations. The tapings of the sessions will be viewed by only my advisor and me. No names or locations will ever be used, to keep the anonymity of your loved one. Only ID numbers will be used throughout the study. The findings of my study may be helpful in developing a new type of daily therapy for patients with Alzheimer's disease or dementia.

Included in this envelope is an informed consent sheet. If you agree to let me work with your family member, you must read and sign this sheet before the study can begin. The third sheet in this envelope is a music evaluation sheet about your family member. If you could answer the given questions about music and its relation to your loved one, I can begin to collect the music necessary to carry through with my study. If you have any questions about this sheet, feel free to contact me at the places given below. If there is anything you think I would find beneficial to my study, you can include it at the bottom of the music sheet. When you have completed these sheets, please send them to me at the address below or give them to Jennifer Greathouse at New Harmonie Health Care. I hope to begin my study as soon as possible (hopefully during or soon after my Christmas break), so if you could get these filled out as soon as possible, that would be greatly appreciated.

I hope you are able to fully understand the importance of this study, both for me and for the future of Alzheimer's research. Thank you for taking time to consider this. If you agree to let me work with your family member and have questions before committing, feel free to contact me. You can reach me at elpersj@hanover.edu or 812-673-4388 during most weekdays, or 812-480-9579 on my cell phone at most any time of the day.

Thanks again,
Jennifer Elpers

6993 Briar Ridge P.O. Box 4
Wadesville, IN 47638

Check all that apply:

- My family member was very involved with music throughout his/her life.
- My family member participated in some form of musical activity (choir, orchestra, music lessons) sometime in his/her life.
- My family member seemed to enjoy music in many aspects of his/her life.
- My family member led a life that revolved around music (Career was in music, assisted in music programs at church, etc.)
- I do not know or remember if music played any role in my family member's life.

Please list types of music that the family member enjoys or has enjoyed in the past (for example, classical, jazz, country, etc.):

Please list titles of any songs that you know your family member likes or liked in the past:

Other comments or concerns:

Informed Consent

Your family member is being asked to participate in a study that is being conducted by Jennifer Elpers for her Independent Study in psychology at Hanover College. This study has been designed to find the effect of music on the emotions and motor skills of people with Alzheimer's disease or dementia. The participation of your loved one will be of great help in finding ways to help decrease the negative effects of this deteriorating disease. Participants will be observed while performing a motor activity such as rolling a ball. This activity will be one that your family member is used to. While this task is being performed, different types of music will be played or there will be no music at all. These sessions, which will last between 15 and 20 minutes each, will be videotaped for later viewing only by Jennifer Elpers and her advisor, Ellen Altermatt. No names or residential locations will be included in the study. Instead, ID numbers will be issued, and all personal information will be kept confidential. There are no known causes of harm, only possible benefits for the participant. If at any time you wish to discontinue your family member's participation in this study, you may do so.

Participant Name (Printed)

Date

Participant or Guardian Signature

Table 1. Percent Agreement and Cohen's Kappa showing reliability between coders for all variables

	% Agreement	Cohen's Kappa
Agitation		
Trying to leave	100	1.00
Not appearing relaxed	85	.67
Positive Affect		
Enjoys performing task	95	.88
Smiles	100	1.00
Performance		
Able to perform task	100	1.00

Figure Captions

Figure 1. No significant difference is shown in the participants' attempt to leave between the four music conditions

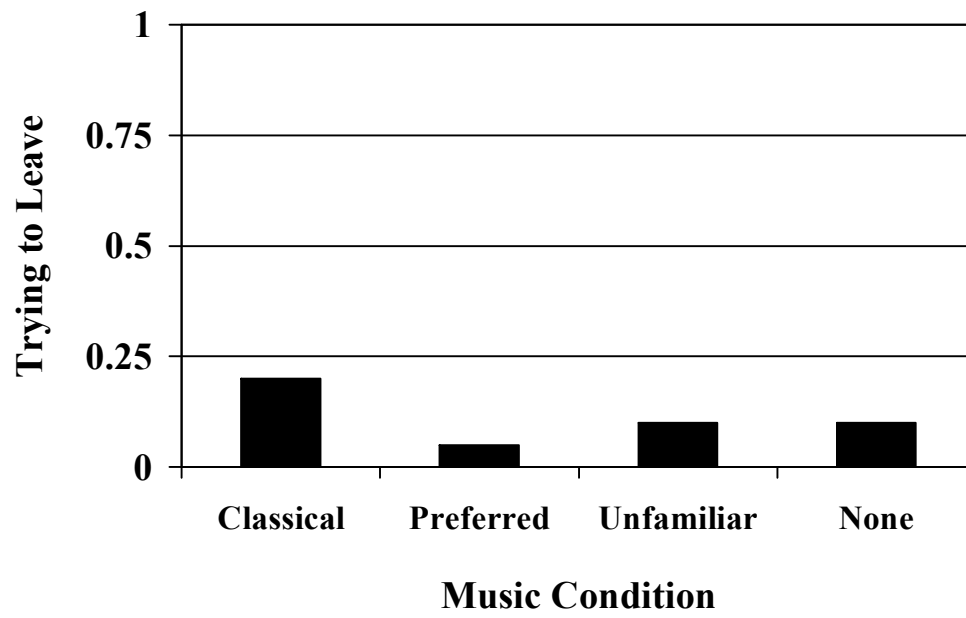
Figure 2. No significant difference is shown in the appearance of relaxation between the four music conditions

Figure 3. No significant difference is shown in the enjoyment of performing the task between the four music conditions

Figure 4. No significant difference is shown in participants smiling between the four music conditions

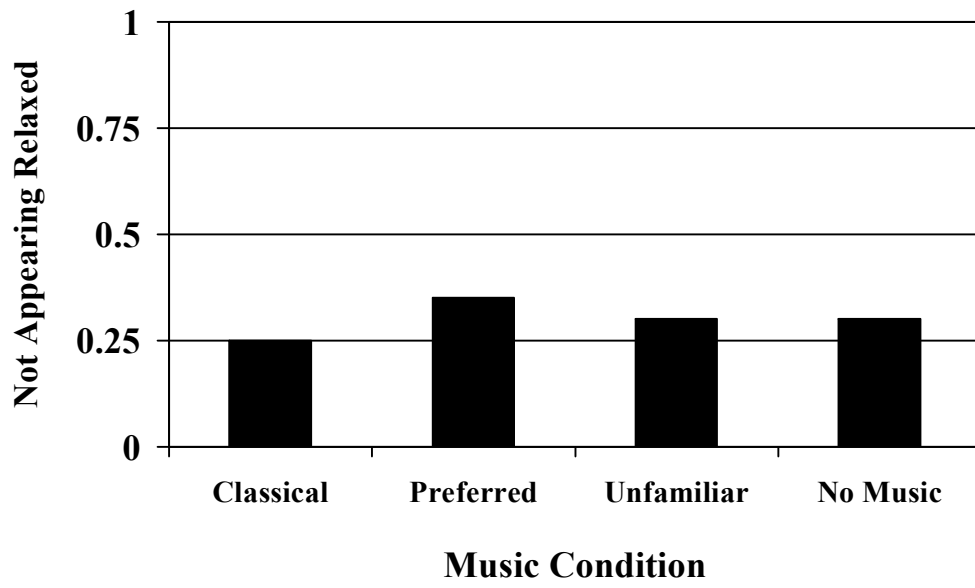
Figure 5. No significant difference is shown in participants' ability to perform the task between the four music conditions

Figure 1.



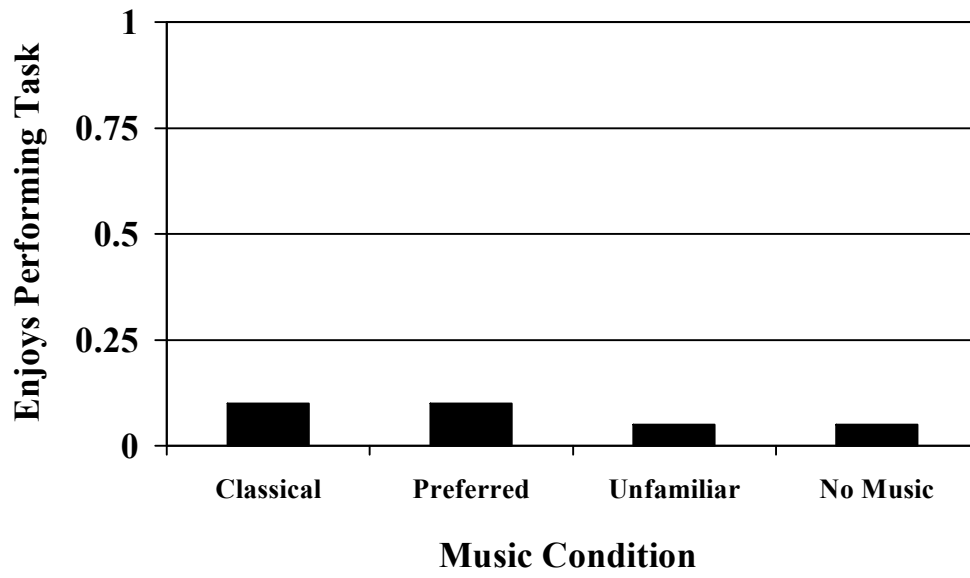
$F = 1.13, ns$

Figure 2.



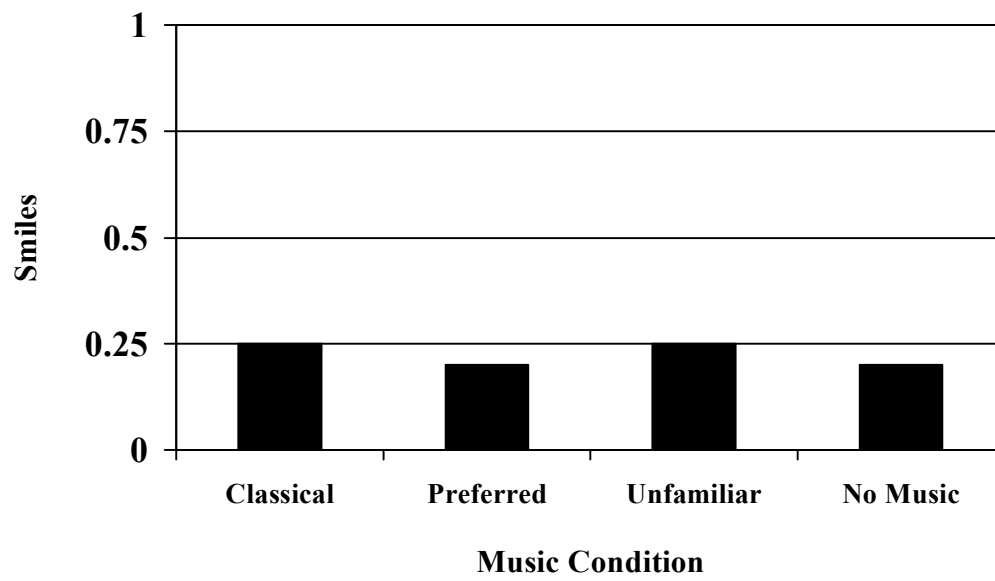
$F = 1.39, ns$

Figure 3.



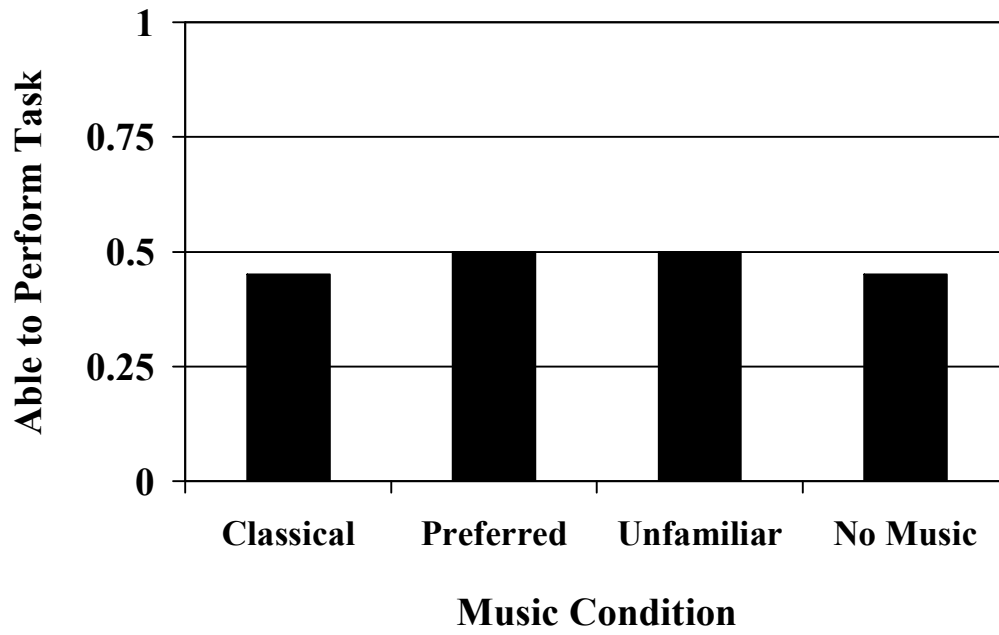
F = 1.00, *ns*

Figure 4.



$F = .114, ns$

Figure 5.



$F = 1.00, ns$