The Effect of Music on Performance in Athletics and Physical Education

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Master Teaching Project

Submitted to the School of Education at Aquinas College

in partial fulfillment of the requirements for the degree of

Master in the Art of Teaching

6/19/17
Abstract

Bailey (2009) found that it was possible for physical education to aid in the development of young students in the main educational domains of physical, social, affective and cognitive domains; in particular, physical education contributed to movement skills and physical and social competence. Bailey (2009) expanded to demonstrate that students gained leadership skills, and greater psychological and emotional development, and engagement in physical activity that had the potential to last a lifetime. Through research, Bailey was able to show that exercise was important for people of all ages but especially young students. Additionally, Ratey (2008) found that exercise is important for adults in different areas of life. He explained that when adults exercise, it can lead to improved emotional and psychological state, lower stress levels, and overall well-being (2008). Similar research has shown that when adults exercised, they did so using music as a motivational tool for increased exercise adherence. In the Journal of exercise Physiology, Brooks et al. (2010) found that music as a motivational tool had an impact on exercise.

It is possible there could be a connection between exercise in people of all ages and the use of music, and it was found that it could be possible to increase motivation and engagement in physical education with the use of music during lessons. If athletic performance was increased using music (2008), so could performance in physical education. The researcher found that it was indeed possible for students to be more engaged during physical education if music was playing, based on analysis of articles. The articles reviewed by the researcher described various studies that were conducted on the subject of learning in physical education and adult experiences with exercise when music was or was not playing. Subjects in the studies experienced higher motivation, increased exercise adherence, and better overall learning when music was present.
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Chapter I

Problem to be investigated

According to SHAPE America 2016, Physical education classes are an essential part of school curriculum, and include planned lessons, which develop students’ motor skills, knowledge and behaviors of active living, physical fitness, sportsmanship, self-efficacy, and emotional intelligence. Physical activity has been shown to be positive for a person’s overall well being (Ratey 2008). However, the centers for disease control and prevention (CDC) have published a document that found while physical education is a way for students to be physical active, nine studies have shown that a typical physical education class is not considered a quality program. The definition of this being that the students spend more than fifty percent of their time inactive (2010). Many students come to class unmotivated to exercise because of poor attitudes or unwelcoming environments that they have been exposed to in either physical education or sport. Possible negative experiences could include: poor relationships, peer pressure or parental pressure (2009). The atmosphere of physical education has been found to less enjoyable and dynamic than it could be, so that students are less motivated to exercise. Barney and Prusak (2015) found that if students are listening to music during physical activity they had positive attitudes as well as a positive outlook in regard to physical education and physical activity. Based on athletic and educational research, there is evidence to conclude that students are more engaged in physical education, when music is playing. Can students be more motivated during physical education and have more positive learning outcomes if music is playing?

Purpose of the study

The purpose of this study was to do a critical analysis of literature to find out if students are more engaged during physical education when music is playing, based on studies that encompass music, classroom learning, and athletic performance. Additionally, the purpose is to find out if physical education can be improved to include more activity for all students, since the CDC found that a typical physical education
class is not considered a quality class (2010). While the CDC found most physical education classes need improvement, they also published many reasons why physical education is so important. According to the CDC, physical education has the possibility to decrease a child’s likelihood of heart disease, type 2 diabetes, and obesity. In addition to these positive health benefits, participation in physical activity has the potential to improve academics through increased concentration, memory, and classroom behavior (2010). The CDC recommends improving physical education by implementing a well-designed curriculum, which would include designing classes that “maximize physical activity during lessons and keep students moderately to vigorously active for at least 50% of class time” (2010). Based on this research by the CDC and others, the goal of improving physical education is possible, and could be achieved through the playing of music during class to increase enjoyment and participation.

Justification of the study

Physical education and physical activity are critical for student development and health (Ratey 2008). Increased participation in physical education could lead to increased health and wellness in students, due to more movement and physical activity (Bailey 2009). If studies show that music increases athletic performance and movement in adults, the same could be said for student performance in physical education. Students might be more motivated to move and find physical education to be a more positive experience, if there is music playing.

Research question

Based on athletic performance research, are students more engaged in school when music is playing, leading to increased participation and effort in physical education?
Definition of Terms

Music:

Constitutive Definition: According to Merriam-Webster’s dictionary: vocal, instrumental, or mechanical sounds having rhythm, melody, or harmony

Operational Definition: Across the different articles and studies music can be defined as any vocal or instrumental sound with rhythm or melody; sometimes chosen by the subject, sometimes preselected by the conductor of the study.

Engaged:

Constitutive Definition: Actively involved in classwork or exercise

Operational Definition: An engaged student is one that is fully participatory in classroom or physical activities, to the best of their ability.

Motivation:

Constitutive: According to Merriam-Webster’s dictionary: The art or process of motivating (To provide with a motive)

Operational: In this research, motivation is when adults and students have a desire to complete a task that makes them willing to fully participate in that task or activity.

Effort:

Constitutive: According to Merriam-Webster’s dictionary: A conscious exertion of power, hard work

Operational: The amount of work a subject (an adult or student) puts into an athletic activity, or exercise.
Enjoyment:

Constitutive: According to Merriam-Webster’s dictionary: Something that gives keen satisfaction

Operational: The amount of happiness or joy that is achieved during an activity or exercise

Attitude:

Constitutive: According to Merriam-Webster’s dictionary: A position assumed for a specific purpose

Operational: The perspective or way a person thinks or feels about something, in this case, how a subject perceives an exercise or physical activity.

Increased learning:

Constitutive definition of learning according to Merriam-Webster’s dictionary: Knowledge or skill acquired by instruction or study

Operational: When students are able to take in more information, more quickly

Increased Athletic Performance:

The execution of an action in exercise or sport that is increased in number or duration.

Operational: When athletes are able to increase their work capacity either by time, or amount of work effort
Chapter 2

Background and Review of Literature

Physical education has been part of school curriculum for many years, and has traditionally been focused on student participation in the main components of physical fitness and sports, without much consideration for student motivation (Brooks & Brooks 2010). While many students were successful in physical education and sports using this method, many students were left to fail. Physical education classes that were taught without much motivation and instruction did not provide an opportunity for all students to be successful. Physical education did not provide the optimal atmosphere for students to achieve to their highest possible potential, however, in past years there has not been a great deal of research conducted on specific ways to motivate students to be physically active (Karageorghis et al. 1997). If students were given the tools to motivate themselves, there is a better chance of them achieving high levels of lifelong physical fitness and health. (Karageorghis et al. 1997).

Physical education should be a hands-on, participatory class. However, in the past, the approach to teaching physical education has been focused solely on the participation in sports and not on motivation, instruction, or overall physical fitness (Ratey 2008). Based on this model, students who were already successful in sports would be successful in physical education, and those who were not, would be left to fail. While this model provided an opportunity for many athletic and physical active students a venue for physical activity, the other students would continue on the path of reluctant participation because they lacked the necessary motivation to play. Students who are motivated come to class with a desire to move and practice various motor skills and games and the more they practice it could be concluded that the more they will learn and improve. If students can not be motivated or are not willing to engage in physical education, they will not have the same opportunity to practice their motor skills and will not learn as much as the other students. Additionally, when students exercise, much like adults, their bodies are more balanced and able to focus on tasks at hand, whether that is work, school, or other. Their brains are ready to learn and they can take in the information needed, and apply it to their various tasks.
Physical educators have seen the rise in obesity in the United States and the need for more students to be more physically active. All students need quality physical education, not just those who enjoy engaging in athletics (Ratey 2008). One way to aid in student motivation in physical education is by playing music during class to aid in motivation, engagement, and learning (Barney 2015).

Articles from a variety of educational and athletic performance journals have been analyzed in this research to find connections between the use of music, and an increase in engagement, performance, and learning (Brooks & Brooks 2010). These articles include studies that look at the connection between the presence or absence of music and how that effects people engaged in learning or athletic endeavors and their adherence to physical activity over time (Priest et al. 2008). Multiple studies were reviewed to find out if there is a connection between movement and exercise (Mohammadzadeh et al. 2008). The results demonstrated a connection between music and increased movement, however, while there is a connection between the two, the results of the studies favored a psychological connection between exercise and music, but not necessarily a consistent physiological connection (Mohammadzadeh 2008).

The results of several studies showed that listening to music did not necessarily have an effect on physiological functions such as heart rate, or respiratory rate, because the body has certain physiological limits that cannot be exceeded by playing music. (Brooks and Brooks 2010). Music can however lead to increased time exercising and greater adherence to an exercise program, which has positive overall effects. “Music as a powerful external motive causes distraction and excitement (Dorney, 1992), so the amount of concentration on the exercise decreases, and the perceived exertion rate decreases as well” (Mohammadzadeh, Tartibiyan, Ahmadi 2008).

Priest et al. (2008), found during a study that subjects indicated that music had a positive influence on their attitude toward exercise. The positive influence was present in the form of motivation, mood boost, inspiration, distraction, altered state of awareness, and altered passage of time. These positive factors can lead to increased exercise adherence, increased work load and increased motivation over time. All of these things will lead to a healthier subject both mentally and physically.
In the context of the physical education classroom, the same psychological reasoning can be applied. If students are distracted and enjoying the music alongside the movement, it could be concluded that they will also have a lowered perceived rate of exertion.

Deutsch (2008) found the effect music would have on the Progressive Aerobic Cardiovascular Endurance Run test, also known as the PACER test. The PACER test is a common test administered to upper elementary students during physical education. In this study, sixty-nine fourth and fifth grade students (males, 37, females, 32) performed the test with and without music. The results showed that both males and females performed better during the test that was accompanied with music. Additionally, the students commented that they had increased enjoyment when participating when music was playing with the test.

In addition to a lowered perceived rate of exertion, much of what is taught in the physical education classroom is related to rhythm (Anshel 1978). Movement itself often has a rhythmic quality that students learn by participating (Wang 2008). When Wang conducted research to discover connections between movement and rhythm in children and found that the two are associated; if students were singing and clapping, their movement patterns were improved. This teaching technique is evident in the Dalcroze approach to teaching movement. Dalcroze believed in using music as a way to inspire children to learn to move their bodies, and that “Body movement is the predominant experience, but listening is the key to this experience since the individual’s sensitivity to sound determine the sensitivity of the physical response” (Jacques- Dalcroze, 1967). When students are in touch with their bodies, they are able to develop their motor skills effectively, which is the goal of learning in physical education, thus showing an example of how an improved physical education program can improve learning.
Chapter 3

Procedures

This study was conducted through content analysis, so articles found in academic journals were used to gather information about music, athletic performance, and learning. The articles that were chosen were relevant and recent, and shed light on the topic of music and physical performance. Four articles were ultimately chosen for analysis; these four articles were the most relevant to the topic and provided the most information relating to all topics being researched (music, athletic performance, and physical education). In other words, the articles chosen were the most all-encompassing of the topic and provided the most information to draw conclusions from.

Description of research design:

Is it possible there could be a way to improve physical education by increasing student engagement through the playing of music during physical education class? This question was tested through content analysis of articles on the topic of music in education, and music in athletic performance. By looking at themes within the text, the researcher was able to draw conclusions about music influencing physical activity in the classroom.

The articles were analyzed to determine whether or not there is a connection between music and engagement of students during physical education. The articles were examined for the concepts of music and athletic performance to draw conclusions in the form of a narrative. Four different articles were used following the theme of music, education, and physical activity, and identified four key ideas to look for in the text, in order to draw a conclusion about physical education. Articles were read looking for whether or not music was present during exercise or physical activity, what the type of activity was, what the type of music was, and whether or not there was a positive or negative effect on performance. Once this information was determined for each article, it was entered into a table to be analyzed.

Description of the sample:
The sample for this research came from articles from a variety of journals on the topics of athletic performance, physical education, education, and music.

Description of the instruments used (scoring procedures; reliability and validity)

The articles were read for noted themes, in order for conclusions to be drawn about similarities and differences in the articles, in regard to athletic performance and physical education under the context of using music as a way to increase engagement. This is a reliable method because it can be checked and re-checked by the researcher, or another researcher and the results would be the same, based on noted themes. This research is internally valid due to the fact that studies come from a variety of locations, and the studies use a control and examine exercise with and without the presence of music. This ensures that the results are influenced by the relationship between exercise and music, not another outside variable.

The research has external validity because a variety of populations have been studied, in varying environments. The basic principle of using music during exercise can be applied across differing populations and environments, and the results are the same. The themes to be analyzed are: Use of music, type of music, type of activity, effect on performance (increased learning, increased athletic performance).

After the articles were read and chosen, they were analyzed for results, which will be discussed in the next chapter.
Chapter 4: Results, Analysis, and Data

Four articles were selected for analysis for the themes relating to music, exercise, and education. As previously stated, these articles were chosen for their content as it relates to the overall topic. The articles were all from academic journals and contained studies that help answer the research question. The four articles chosen represented different populations, and aspects of the overall research questions of whether or not music has an effect of physical performance and physical education. The information from the four articles was entered into a table. Putting the information in a table made any relationship between music, exercise, and education clear, so conclusions could be drawn about how physical education might be improved.

The articles were analyzed for the themes of learning, music, motivation, and physical activity specifically, if music was present during physical activity and how it affected motivation and/or learning. Motivation was measured in the articles by whether or not subjects were inclined to continue to engage in physical activity, and how much they enjoyed the physical activity. In research where learning is studied, increased focus and higher test scores are often the result when students have music present during their physical activity, or physical education. One of the reasons for this could be that students, like their adult counterparts, are more likely to engage in exercise over time if they are motivated and enjoying the activity. If students engage in physical activity more often during physical education, they will increase their learning because they are increasing their practice time.

The following chart provides the data collected from the articles used in this research. The first item analyzed was whether or not music was being played during the physical activity, during the study. In the situations that were studied, there was also a control where music was not playing, but this chart shows that happened when music was playing in the background of exercise or physical education. The types of music varied from study to study so that was noted in the chart. Since rhythm is such an important part of movement, the type of music used is significant. Some studies used music that was chosen by the participant, and some was chosen because it had a specific rhythm that the researchers
conducting the study felt would be motivational due to the upbeat rhythm, or fast pace. The type of physical activity is noted in the chart under “Type of Activity.” The studies looked at participants engaged in a variety of physical movements including both anaerobic and aerobic exercises. Anaerobic exercise focuses more on muscle strength and power activities such as lifting weights, while aerobic exercise is mainly focused on cardiovascular endurance exercise such as long distance running or cycling. In addition to these factors, the articles were examined to see what effect the music had on each type of exercise studied. The results are written in the table under “Effect on Performance,” which shows whether or not there is a positive effect on exercise when music was playing.

Of the four articles chosen for analysis, the results showed that there was a connection between music and exercise, and overall athletic performance. It was found that the presence of music influences exercise in a variety of positive contexts including: enjoyment, adherence to exercise, improved performance, focus, and motivation. The studies in the following articles attend to these same issues of exercise adherence, enjoyment, and performance. One study even took place in a physical education class during units on walking and ultimate Frisbee- positive results were documented during both activities.

Based on these positive outcomes from exercise experiences when music was present, it appears there is a connection between music and exercise, in several different ways. The next chapter will analyze the data further in order to draw conclusions about the results of content analysis.
<table>
<thead>
<tr>
<th>Theme</th>
<th>Article #1</th>
<th>Article #2</th>
<th>Article #3</th>
<th>Article #4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use of Music:</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>YES</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type of Music</td>
<td>Dance music, music that progresses from slow to fast</td>
<td>Mild and fast tempo music</td>
<td>Variety</td>
<td>“motivational music” that which stimulates or inspires physical activity due to rhythm response, musicality, cultural impact, and association</td>
</tr>
<tr>
<td>Type of Activity</td>
<td>Aerobic and Anaerobic</td>
<td>Physical Education Lessons</td>
<td>Moderate physical activity, progressive</td>
<td>Single bout of exercise</td>
</tr>
<tr>
<td>Effect on performance</td>
<td>Positive effect on cardiovascular exercise;</td>
<td>Increased physical activity for both genders</td>
<td>Positive effect on performance and Rate of</td>
<td>Increased exercise adherence,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>physical activity for both genders</td>
<td></td>
</tr>
<tr>
<td>Improved performance, mental arousal, and physical arousal</td>
<td>Across different activities; increased scores on PACER test, increased enjoyment</td>
<td>Perceived Exertion (RPE)</td>
<td>Increased learning</td>
<td></td>
</tr>
</tbody>
</table>
Chapter 5: Discussion and Conclusion

After the critical analysis was completed, conclusions could be drawn about the results. Each category in the critical analysis table was analyzed to see if there was a positive or negative connection between music and physical activity, and in what way. The research concludes that there is a positive connection, and playing music in physical education class would have a positive effect on activity levels in the gym. As stated previously, increasing activity levels is the ultimate goal for physical educators so that students may increase their capacity for exercise and decrease their risk for certain diseases that come with inactivity and obesity. The CDC recognizes the physical education classroom as an important venue for both physical activity and health, and playing music during class could be a way to enhance the experience for students.

Based on the results of critical analysis, it can be concluded that the presence of music in physical education class would be a positive attribute. Students would be encouraged to engage in physical activity for longer periods of time, more often, as shown by the increased adherence to exercise, as well as the perceived rate of exertion. Students would also have more opportunities to move to rhythm which could help their overall learning in physical education and in learning at school as a whole. The studies examined in this content analysis focused on physical activity, and the most studied activities were aerobic, and were in the cardiovascular endurance category of physical fitness. Further research needs to be conducted on anaerobic exercise with the addition of music as an aid to performance. Additionally, it has been suggested that while music can aid in motivation, adherence to exercise, and learning, it does not change a person’s physiology in any way to make them a better athlete, or student. It is only a
psychological difference that music creates, leading to better performance. Further research could be conducted on the ways music effects psychology in order to best maximize this tool for learning. Teachers and trainers could use this information to their benefit if they knew how music effected the brain in more detail. It would also help the teacher or trainer if they knew exactly what type of music was best for exercise. Some research has been conducted in this area but more needs to be done on both rhythm, beat, volume, and lyrics in order to best effect students and athletes. If this information could be more detailed, the better music could be used as a tool to help students and athletes achieve their full potential due to the fact they would be able to be more focused for longer, over a longer period of time since the results of this study indicate that the presence of motivational music can increase physical activity, enjoyment, and learning, which are the goals of physical education class and sports performance in athletics. In addition to increases in these areas, there is a slower rate of perceived exertion, so students would be enjoying themselves, and would take longer to notice they were becoming fatigued. This is a positive development, due to the fact they would be less distracted and more likely to have more time in class for physical activity. Based on these findings I will be using music at every opportunity possible during my physical education classes.
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