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PHYSICAL ACTIVITY

Comparing the Effect of Classical and Popular Music During Physical Activities Among Junior High School Students

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Abstract

Music is a big part of life. It is heard at home, work, and even in the schools. Music is a tool used in the physical education setting. It is used in all grades and in multiple activities with success. Music types played in physical education classes also vary. One type of music that has not been given much chance in physical education is classical music. For this study, popular and classical music was played in junior high school physical education classes during basketball play. Students wore pedometers to measure the steps taken and the time spent in the activity. In this study, 458 junior high school students in grades seventh, eighth, and ninth participated (230 males and 228 females). The junior high school students took more steps and spent more time in activities when popular music was being played. Interestingly, when classical music was played during the basketball gameplay, students had slightly lower step counts and activity time than popular music.

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Introduction

Music can be viewed as ubiquitous in our lives. Yet, people prefer many different types of music, such as rock, country, jazz, blues, hip/hop, classical, and many others. Our listening choices are also applicable while participating in physical activity. Barney et al. (2012) studied the use of personal music players (PMPs) during exercise, how they affect exercise, and what types of music are most commonly listened to during exercise. This study surveyed college-aged students who used their college wellness centers at two Midwestern universities. Hip-hop (27.7%), rock (24%), pop (20.3%), and country (12.7%) were reported to be the most popular music types listened to during exercise. A positive finding from this study was that the participants exercised for longer periods of time at a higher intensity when their preferred music choice was playing. Another study investigating music effects in a physical activity setting examined exercise intensity and music tempo (Karageoghis et. al., 2006). College-aged undergraduate students (N = 128, M age = 20.0 years, SD = 0.9) selected their top three artists for this study. The top three artists were Christina Aguilera, The Stereophonic, and Michael Jackson, which are classified as pop and rock music. It was found that these types of music (medium and fast tempo music) resulted in increased workload intensity.

When investigating the effects of music in a physical activity setting, Priest et al. (2004) established a conceptual framework. This conceptual framework consisted of four topics. They were: 1) rhythm response, 2) musicality, 3) cultural impact, and 4) association. Rhythm response refers to musical rhythm, most notably tempo. Tempo refers to the speed of music as measured in beats per minute (BPM). Musicality refers to the responses to pitch-related elements such as harmony and melody. Cultural impact refers to the pervasiveness of music within society. Finally, association refers to extramusical associations, such as emotions that a piece of music may evoke (Karageorghis et al., 2006).

Because of the potential positive effects of music in a physical activity setting, the K-12 physical education context also bodes well for the same positive effects for students who participate when music is present during class activities. Barney et al. (2016) examined the effects of music on fourth-grade students' enjoyment of two activities

(tossing/catching and hula hoops) during physical education class. For this study, the music utilized consisted of popular, upbeat music with a fast tempo. The tempo of the music was between 120 to 160 beats per minute (bpm). Students compiled a list of 10 popular songs, with investigators reducing the number to six. A portion of the data collected for this study was interviews with study participants. From the interviews, three themes became prominent: 1) music made the physical education (PE) lesson more enjoyable, 2) perceptions of effort during class with music were greater, and 3) the types of songs played during class made the student's PE experience more enjoyable. This last theme from the interview data highlights popular music's effects on fourth graders' PE experience. Brewer et al. (2016) examined the use of music in a junior high school physical education setting. More specifically, this study investigated music's effect on students' physical activity during class activities while music played. Junior high school students participated in two activities (basketball and volleyball). Two lessons for each activity were used to collect data. Both activities had one lesson with music, and the other lesson had no music; for both lessons in both activities, students wore pedometers to measure their movement. Data analyses indicated a significant gender effect in steps taken ($F(1,1059) = 68.687$, $p < .001$), time in activity ($F(1,1059) = 61.234$, $p < .001$), and level of enjoyment ($F(2,1059) = 12.205$, $p < .001$). Follow-up ANOVAs showed a significant activity type effect in steps taken ($F(3,1059) = 7.291$, $p < .001$), time in activity ($F(3,11059) = 5.234$, $p < .001$), and level of enjoyment ($F(3,1059) = 4.543$, $p < .001$). These results help to add to the body of knowledge to support music being played during physical education class, and activities may benefit both physical educators and students.

The previously mentioned investigation has discussed popular music as a tool used in physical activity settings. Another genre of music that has had limited research conducted is classical music. Classical music spans a length from the 1600s up to the present. This time frame includes the Renaissance, Baroque, Classical, Romantic, and Contemporary periods (Sharma & Trikha, 2016). Cheng and Grove (2017) studied the effects of classical music (at a tempo of 140 bpm or greater) and no music on cardiovascular disease patients' rehabilitation. As part of their rehabilitation, participants listened to

classical music at a tempo of 140 bpm or faster and no music playing. Study results indicated a modest increase on average of 7 beats per minute in peak heart rate due to exercising with classical music compared to exercising without music. From a rehabilitation perspective, classical music did not negatively impact patients during exercise, suggesting that classical music may be a safe genre to use in this type of setting. Furthermore, Sharam and Trikha (2016), in a multilevel meta-analysis of 139 studies, investigated the effects of classical and jazz music in sports. From 3,599 study participants, a total of 598 effect sizes from four categories of potential benefits (i.e., psychological responses, physiological responses, psychophysical responses, and performance outcomes) were calculated. Significant beneficial effects of music were associated with affective valence ($g = 0.48$, CI [0.39, 0.56]), physical performance ($g = 0.31$, CI [0.25, 0.36]), perceived exertion ($g = 0.22$, CI [0.14, 0.30]), and oxygen consumption ($g = 0.15$, CI [0.02, 0.27]). Performance effects were conducted by study domain (exercise > sport) and music tempo (fast > slow-to-medium), with results supporting the use of music across a range of physical activities to promote more positive affective valence, enhance physical performance (i.e., ergogenic effect), reduce perceived exertion, and improve physiological efficiency. Overall results indicated that classical music decreased distractions, enhanced performers' moods, increased arousal, and released stress, but not to the extent of jazz music. Because of the paucity of research associated with classical music in a physical activity setting, this presented an opportunity to study classical music's effects on physical activity in the PE setting. Thus, the purpose of this study was to investigate classical music and popular music's effect on physical activity rates via pedometric measurements and a scaler measure of enjoyment in junior high school physical education classes.

Methods

For this study, 458 junior high school students (230 males and 228 females) from eight intact seventh-, eighth-, and ninth-grade classes (ages 11-15), separated by grade and gender, participated. The school's classes ran on a block schedule, A-day/B-day, from bell to bell. The participants were of middle-class socioeconomic status, with 73.4% of the students being Caucasian (USA School Info, 2019).

The two teachers (one male and one female) who participated in this study averaged 17 years teaching junior high school PE.

Procedures

The university institutional review board (IRB) and the school district approved of the study. Parental and student consent was also secured. The lead researcher attended the school for one day and instructed the students on how to wear, use, and read a pedometer properly to ensure reliable data collection. Students were instructed that upon entering class they were to get a pedometer and secure it to the waistband of their shorts. Students were further instructed that after class announcements and warm-up activities, they were to reset their pedometers to 0 for correct data collection. Then, after the class activity (basketball), the students were to record their number of steps, time in activity for classical, popular, and no music, and level of enjoyment during the lesson on the student record sheet. A student record sheet was created for each student. Students had a place to record a number of steps, time in activity, and level of enjoyment during the basketball activity on a scale of 1 to 5 (*1=not enjoyable, 2=somewhat enjoyable, 3=neutral, 4=enjoyable, 5= very enjoyable*) (Brewer et al., 2016). The music selection used for this study consisted of popular, upbeat, fast tempo, 120-160 beats per minute (bpm) songs suggested by junior high-aged students. Also, classical music for this study also consisted of music that was upbeat with a fast tempo, 120-160 bpm. Both popular and classical music were played over a loud sound system.

Before data collection, the classroom teachers who participated in this study were briefed by the lead researcher on the basketball activity for the study. For this study, the students participated in a class tournament. The lessons were restricted to 50 minutes of actual gym time. Using this amount of class time, the teachers had a buffer at the beginning and end of the class periods for regular class procedures and data collection. Before data collection, the PE teachers taught their basketball unit, which consisted of skill and other basketball activities. At the beginning of data collection, the students began their basketball tournament. The basketball tournament consisted of two days of no music, two days of popular music, and two days of classical music.

Pedometer Instrument

The Yamax Digi-Walker LS 2525 was the pedometer used to collect student step counts and time in activity. The pedometer model records step counts, distance covered, calories burned, and time a student is in movement and stops when the student is not moving (standing). Time in activity is recorded in hours, minutes, and seconds. This pedometer was found reliable from previous research (Barney et al., 2008).

Data Analysis

For summary statistics, repeated measures ANOVA for a continuous variable and Mantel-Haenszel Chi-Square for an ordinal variable are used to assess the effect of the types of music played on pedometer measures (step counts and time in activity) and level of enjoyment during basketball games. Also, a mixed linear model was developed to assess the effect of the types of music played on pedometer measures adjusted for demographic characteristics. All data analyses were conducted using SAS software, Version 9.4 of the SAS System for Windows (SAS Institute Inc.).

Results

From the pedometer measures during all the games, on average, the participants had a greater number of steps and time in activity when popular music was played, followed by classical music, compared to when no music was played during the basketball games. Participants had lower pedometer measures during period 2 compared to period 1 for all types of music played. During period 1, the participants had, on average, 360.1 more steps, 2 more minutes with popular music played compared to when no music played, and 270.2 more steps and 1.5 more minutes when classical music played compared to when no music played. Similar results were observed during period 2. The repeated ANOVA analysis indicated that the differences were statistically significant for both the number of steps and time in activity, the P-Value < 0.0001, Table 1 and Figure 1.

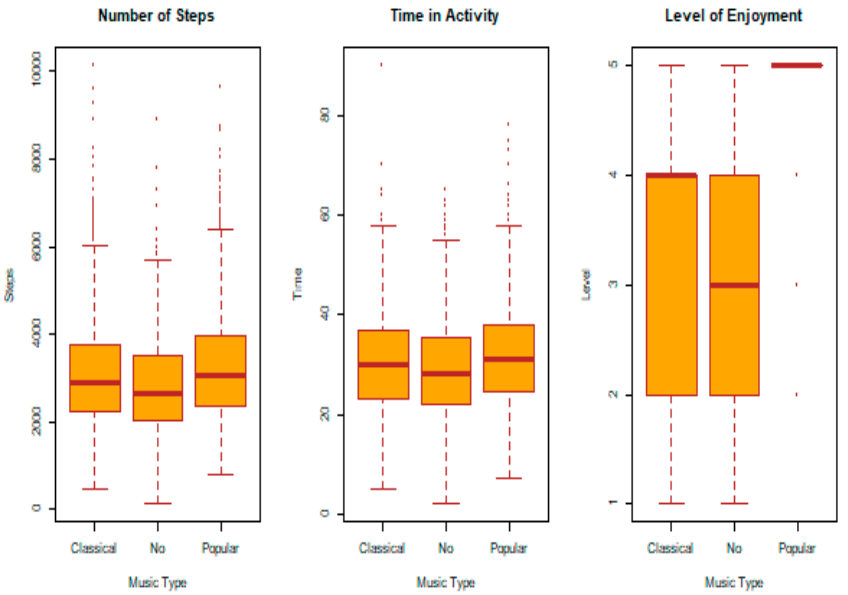
Similar results were observed from the mixed linear model analysis after adjusting for gender and grade. On average, the pedometer measures (number of steps and time in activity) during all the games were the highest for males, eighth-grade participants, and when

Table 1
Average Pedometer Measures by Types of Music Played

Pedometer Measures	No Music [2]	Classical Music [2]	Popular Music [2]	P-Value [3]
Number of steps [1]				<.0001
First Recording	2874.5 (49.95)	3144.7 (59.52)	3234.6 (56.90)	<.0001
Second Recording	2763.9 (51.32)	3091.8 (65.60)	3350.0 (66.26)	<.0001
Time in activity [1]				<.0001
First Recording	30.3 (0.52)	31.8 (0.52)	32.3 (0.50)	0.0014
Second Recording	28.9 (0.52)	30.6 (0.55)	32.0 (0.56)	<.0001

[1] Overall P-value from repeated measures ANOVA after adjusting for gender and grade.
[2] Mean (Standard Error)
[3] P-value from repeated measures ANOVA after adjusting for gender and grade.

Figure 1
Average Pedometer Measures by Types of Music Played



popular music played compared to other groups, and the differences were all statistically significant (P-Values < 0.0001). On average the participants had 473.1 more steps and 2.5 more minutes in activity when popular music played and 299.1 more steps and 1.6 more minutes in activity when classical music played compared to when no music played (P-Values < 0.0001), Table 2.

When comparing the participants by the level of enjoyment during the basketball games, 96.9% of the participants responded to

Table 2
Effect of Types of Music Played During Activities on Pedometer Measures Adjusted for Demographic Characteristics

Characteristics	Estimate	P-Value [1]
Number of Steps		
Gender (ref = Female)		<.0001
Male	486.6	<.0001
Grade (ref = 9th Grade)		<.0001
7th Grade	487.7	<.0001
8th Grade	510.7	<.0001
Type of Music (ref = No Music)		<.0001
Classical Music	299.1	<.0001
Popular Music	473.1	<.0001
Time in Activity		
Gender (ref = Female)		<.0001
Male	5.9	<.0001
Grade (ref = 9th Grade)		<.0001
7th Grade	3.1	0.0005
8th Grade	5.0	<.0001
Type of Music (ref = No Music)		<.0001
Classical Music	1.6	<.0001
Popular Music	2.5	<.0001

[1] P-value from Mixed Linear Model adjusted for gender, grade and Types of Music.

enjoyable or very enjoyable when popular music was played, while the percentage is only 52.6% for classical music and 48% when no music was played (P-Value < 0.0001). Stratifying further, the level of enjoyment by gender and grade showed a statistically significant difference when no music played. However, no statistically significant difference was observed when classical or popular music was played. When no music was played, 51.3% of males responded the physical activity was enjoyable or very enjoyable, while the percentage for female participants was only 44.7% (P-Value = 0.0033); comparing by grade when no music was played, 61.3% seventh-grade participants responded the physical activity was enjoyable or very enjoyable while the percentage for eighth- and ninth-grade participants were respectively only 49% and 26.9% (P-Value < 0.0001), Table 3.

Discussion

This study aimed to investigate classical music and popular music's effect on physical activity rates via pedometric measurement and a scaler measure of enjoyment in junior high school PE. The results revealed that junior high school students, not surprisingly, took more

Table 3
Level of Enjoyment by Types of Music Played, Gender, and Grade

Characteristics	Not Enjoyable [1]	Somewhat Enjoyable [1]	Neutral [1]	Enjoyable [1]	Very Enjoyable [1]	P-Value [2]
Type of Music						
No Music	36 (7.9)	122 (26.6)	80 (17.5)	142 (31.0)	78 (17.0)	
Classical Music	24 (5.2)	92 (20.1)	101 (22.1)	171 (37.3)	70 (15.3)	<.0001
Popular Music	0 (0.0)	3 (0.7)	11 (2.4)	95 (20.7)	349 (76.2)	
No Music						
Gender						
Male	5 (2.2)	68 (29.6)	39 (17.0)	67 (29.1)	51 (22.2)	0.0033
Female	31 (13.6)	54 (23.7)	41 (18.0)	75 (32.9)	27 (11.8)	
Grade						
7th Grade	8 (4.5)	38 (21.3)	23 (12.9)	58 (32.6)	51 (28.7)	
8th Grade	11 (6.8)	43 (26.7)	28 (17.4)	53 (32.9)	26 (16.1)	<.0001
9th Grade	17 (14.3)	41 (34.5)	29 (24.4)	31 (26.1)	1 (0.8)	
Classical Music						
Gender						
Male	7 (3.0)	49 (21.3)	54 (23.5)	75 (32.6)	45 (19.6)	0.1791
Female	17 (7.5)	43 (18.9)	47 (20.6)	96 (42.1)	25 (11.0)	
Grade						
7th Grade	9 (5.1)	35 (19.7)	31 (17.4)	69 (38.8)	34 (19.1)	
8th Grade	13 (8.1)	28 (17.4)	39 (24.2)	57 (35.4)	24 (14.9)	0.1736
9th Grade	2 (1.7)	29 (24.4)	31 (26.1)	45 (37.8)	12 (10.1)	
Popular Music						
Gender						
Male		3 (1.3)	4 (1.7)	42 (18.3)	181 (78.7)	0.4561
Female		0 (0.0)	7 (3.1)	53 (23.2)	168 (73.7)	
Grade						
7th Grade		1 (0.6)	5 (2.8)	30 (16.9)	142 (79.8)	
8th Grade		2 (1.2)	3 (1.9)	35 (21.7)	121 (75.2)	0.3114
9th Grade		0 (0.0)	3 (2.5)	30 (25.2)	86 (72.3)	

[1] Frequency (percent).
[2] P-value from Mantel-Haenszel Chi-Square.

steps and had higher times in activity when popular music played during the class basketball tournament. Yet, the researchers were pleasantly surprised to learn that when classical music was playing, junior high school students recorded higher step counts and time in activity. This could be attributed to the students finding classical music either enjoyable or very enjoyable while playing basketball. The findings from this current study concur with popular music in a junior high school PE setting. Brewer et al. (2016) examined popular music's effect on junior high school students playing volleyball and basketball. High-tempo popular music was played during gameplay

in both volleyball and basketball. Junior high school students took over 300 more steps compared to when no music was played. Both volleyball and basketball are different activities requiring different amounts of physical activity. Yet, music positively affected the student's physical activity in both sports. The result from this study once again reinforces music's positive effect on student physical activity during class activities. PE teachers should look to plan activities that will allow the implementation of music to maximize students' physical activity in class. Also, when using music, it would be wise to play music the students are familiar with (Barney et al., 2016). Students' familiarity with songs they hear while participating in an activity motivates them to participate when learning a new skill (Barney & Pleban, 2018).

Another study component was classical music and its effects on junior high school students' physical activity. The literature is quite limited in regard to classical music in a PE setting. Yet, Sharma and Trikha (2016) investigated classical and jazz music in sports. This study revealed that classical music helped decrease distractions, enhance a positive mood, and release stress for these participants. This current study has established that junior high school students took more steps when popular music was played during basketball. When looking closer at the data, on average, the junior high students had 299 more steps when the classical music was played compared to when no music was played. These results show that classical music can potentially assist students' physical activity in PE class.

One final finding of this study was student enjoyment during class participation when classical and popular music were played. Generally, both the male and female students felt that both types of music made their PE experience enjoyable while participating in class activities. Digelidis et al. (2014) studied the effects of music on lesson satisfaction and four types of motivation of high school students. It was discovered that high school students had lower satisfaction with the lessons when music was not played. The researchers concluded that music during the lessons creates a pleasant atmosphere and thus is likely to motivate students to engage in a given task with greater intensity. Once again, popular music can serve as a tool to make a student's PE experience positive and productive. Overall, classical

music did not make the junior high school students' PE experience unpleasant or less enjoyable; it also served as a motivational tool.

Conclusions

The findings from this study once again strengthen the notion that music can increase a student's physical activity while participating in class activities. The results from this study concur with the conceptual framework of Karageorghis et al. (2006). As mentioned, this conceptual framework includes (a) rhythm response, (b) musicality, (c) cultural impact, and (d) association. The popular and classical music played (rhythm response) in this study, most notably the tempo or speed of music, positively affected junior high school students' step counts and time inactivity.

Study findings may encourage K-12 physical educators that students may become more physically active while music is being played. Music can be a tool to assist physical educators in meeting the objective of having students stay physically active for the majority of class time. Chen (1985) said, "Just play some music with a definite beat and watch as little ones respond with the joy of moving in space" (p. 19). Chen was pointing out small children; the same can be said for all ages. Music can move us, which can also apply to classical music played while participating in physical activities.

Study Limitations

The researchers have noted a couple of limitations to the study. For this study, the participants came from two junior high schools. Because the participants came from one school, it may not allow a representative sampling of junior high school students in other junior high schools or in other geographic regions, thus limiting the generalization of the findings. In addition, the participants came from segregated classes, all male and all female classes, as compared to nonsegregated classes.

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