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The Effects of Music on Physical Activity Rates of Junior High Physical Education Students

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ABSTRACT

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Music is used and can be found in everyday life and throughout society. With many studies pointing towards music being a motivating stimulus for exercise, it is plausible that music would positively affect the physical activity rates of junior high school students in physical education classes. Thus, the purpose of this study was to examine the effects of popular music on physical activity rates, via pedometry, and enjoyment levels of junior high physical education students. There were 305 junior high physical education students that participated in the study with 151 being male and 154 being female. This was a quasi-experimental study using a two conditions, with and without music, by two activities, basketball and volleyball, cross-over design. It is found that across all grades and gender, more steps were taken with music in both activities versus without music. No statistically significant differences are noted in time in activity between activities with music than without. When comparing the level of enjoyment of the activities with music versus without across genders and all grades, the level of enjoyment is higher with music than without, though the difference is not statistically significant. While statistically significant differences can be found and attributed to the very nature of the differences between volleyball and basketball, there are also several statistical significances found that can be described and attributed to the intervention of the use of music during that activity. Therefore, if teachers are looking for a way for their students to increase step counts and increase the level of enjoyment their students feel throughout an activity, adding music to the background of the activity will help teachers to achieve those goals.

Keywords: music, physical activity, physical education, junior high, pedometers, motivational music

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This was a journey I never saw myself taking, but I am glad I did. I am incredibly blessed. The faculty here at Brigham Young University and my loving family have been very supportive in this endeavor, and for that I am extremely grateful.

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DESCRIPTION OF THESIS STRUCTURE

This thesis, *The Effects of Music on Physical Activity Rates of Junior High Physical Education Students*, has been prepared in the hybrid format. The hybrid format is used to combine both the traditional thesis requirements and journal publication formats.

The preliminary pages of the thesis reflect requirements for submission to the university. The thesis report is presented as a journal article, and conforms to length and style requirements for submitting research reports to journals within the field of physical education. The intended journal this thesis has been prepared for is the Journal of Teaching is Physical Education (JTPE). JTPE is considered one of the top prestigious journals in Physical Education pedagogy.

The literature review is included in Appendix A. A detailed description of the methods used is included in Appendix B. Other appendices include documents used for the research referred to in the journal-ready article.

This thesis format contains two reference lists. The first reference list contains references included in the journal-ready article. The second list includes all citations used in the Appendix entitled “Review of the Literature.”

Background

Music is used and can be found in everyday life and throughout society. Some of its many purposes include forms of communication, a way to convey a special message, or perhaps even symbolism. It's played in shopping centers, in the work place, and many young adults and children listen to music through personal audio devices during their daily activities. Music is also commonly played in the background of recreational centers.

All human movements seem to be rhythmic in nature and tempo (Chen, 1985). Chen (1985) said "that we breathe in rhythm, walk and sleep in rhythm; as children we all move happily and unselfconsciously – just play some music with a definite beat and watch as little ones respond with the joy of moving in space" (p. 19). It seems that music elicits a natural movement response causing physiological effects when played. The physiological effect of music on the body underscores the benefits of music during exercise. Benefits of music accompanying exercise that have been listed by Karageorghis and Terry (1997) are that it can (a) improve motor performance, (b) increase aerobic endurance, (c) enhance the exercise experience by serving as a distractor and lowering perceived effort, and (d) provide a positive environment to learn and practice skill development. These human responses to music are linked to the combination of one or more of four characteristics of the music itself, namely, (a) rhythm response, (b) musicality, (c) cultural impact, and (d) association (Priest, Karageorghis, & Sharp, 2004).

Rhythm response refers to musical rhythm, most notably tempo. Tempo refers to the speed of the music as measured in beats per minute (BPM). Musicality refers to the response to pitch-related elements such as harmony and melody. Cultural impact refers to the pervasiveness of the music within society. Association refers to extramusical associations such as emotions a piece of music may evoke (Karageorghis, Jones & Low, 2006). Karageorghis, Terry and Lane

(1999) presented a conceptual model using these four factors to predict the effects of asynchronous (i.e., absent of conscious synchronization between physical movement and accompanying musical rhythm like background music) motivational music in the context of exercise and sport.

Of the four motivational factors related to music, rhythm response is most influential with association being the least influential in motivating listeners. With rhythm response being the most prominent factor, many studies have been done to discern the appropriate tempo of the music that will yield the beneficial results mentioned earlier. Both Priest et al. (2004) and Karageorghis, et al. (2006) found that loud music, with an up-beat tempo of 120-160 BPM, which is considered moderate to high intensity, will help to match heart rate and exercise intensity while serving as a distractor that causes exercisers to reduce their perceptions of exertion. Also, a positive correlation was found between exercise intensity and a preference for higher tempi music. As exercise intensity increased, so did the preference for higher tempi music over moderate tempi music. Lyrical affirmation and including variety of genres also helps music to serve as a motivating factor.

If music is chosen to act as a motivating stimulus for exercise, it is proposed that music should be selected from among preferred popular music of the day often found on highly rated radio stations (Beckett, 1990). Choosing music preferred by the listeners may prove to be important as it may have a stronger ability to facilitate active focus on an external event rather than on the discomforts that accompany strenuous exercise thus helping to increase muscular endurance/physical activity rates (Gfeller, 1988). The music selection should include tracks that have a tempo of 120 BPM or more (Karageorghis et al., 2006) selected from a variety of genres

such as jazz, pop, rock, and country, and a variety in the age or release date should also be included to maintain interest among the listeners.

With many studies pointing towards music being a motivating stimulus for exercise, it is plausible that music would positively affect the physical activity rates of junior high school students in physical education classes. However, there has been no published study to date supporting that playing music during physical education lessons will improve the physical activity rates of junior high school students. It is proposed that the study done by Barney and Prusak (in press) with elementary students be replicated in a junior high school physical education setting. The purpose of this study, therefore, was to examine the effects of popular music (Karageorghis et al., 2006) on physical activity rates, via pedometry, and enjoyment levels of junior high physical education students.

Methods

Setting and Participants

The setting of this study was a junior high school in the intermountain west made up of male and female students, grades 7-9 (ages 11-15). The school's classes ran on a block schedule, A-day/B-day, with each class lasting approximately 80 minutes from bell to bell. The school days of the week switch between A-day and B-day class schedules, meaning the teachers will see their students two or three times per week.

The participants of this study were junior high school physical education students, grades 7-9, of middle class socioeconomic status with 88.8% of the students being Caucasian (USA School Info, 2013). There were 305 physical education students recruited from eight intact, single gender, cross-grade physical education classes (four male classes, n=151 and four female classes, n=154). Each recruited class had an average enrollment of 37 students. The total numbers for participants broken down by grade for females were 75 seventh graders, 76 eighth

graders, and 3 ninth graders; and the numbers for males were 80 seventh graders, 69 eighth graders, and 2 ninth graders. These numbers are a result of the eight intact classes chosen as a sample of convenience.

Data Sources

Pedometers are cost effective, easy to use, reliable and valid instruments that measure physical activity rates in step counts and time in activity (Barfield, Rowe, & Michael, 2004; Beighle, Pangrazi, & Vincent, 2001; Welk, Corbin, & Dale, 2000). *Yamax 2500* pedometers were used in this study to track the step counts and time in activity. Pedometers measured time in activity in seconds, minutes, and hours. A Likert scale ranging one to four was used for students to record their level of enjoyment for the class period with one being the lowest level of enjoyment and four being the highest level of enjoyment. Step counts, time in activity, and level of enjoyment were recorded daily by the participants on a student record sheet (see Appendix C) and transcribed later to an Excel worksheet. No recording was made for students who were absent that particular day of recording. Only the teachers and researcher had access to the record sheets and excel documentation. SPSS Statistical Package (2007), a data analysis software program, was used to analyze the data.

Design

This quasi-experimental study was conducted comparing two conditions, with/without music, across two activities, basketball and volleyball, in a cross-over design (see Figure 1), with students acting as their own controls. By design, the two activities chosen for this study were basketball and volleyball. The purpose of these chosen activities was to have one more inherently active, basketball, and one less inherently active, volleyball. Two male classes and two female classes (comprised group one) were taught a lesson for basketball with music, while

two different male classes and two different female classes (comprised group two) were taught the same lesson for basketball, without music. After the numbers were recorded, the classes switched conditions and repeated the lesson. The intervention was repeated for volleyball with group one having received a lesson for volleyball with music first, and group two having received that same lesson for volleyball without music. Then the data were collected and both groups switched conditions and repeated the same lesson for volleyball (see Figure 1).

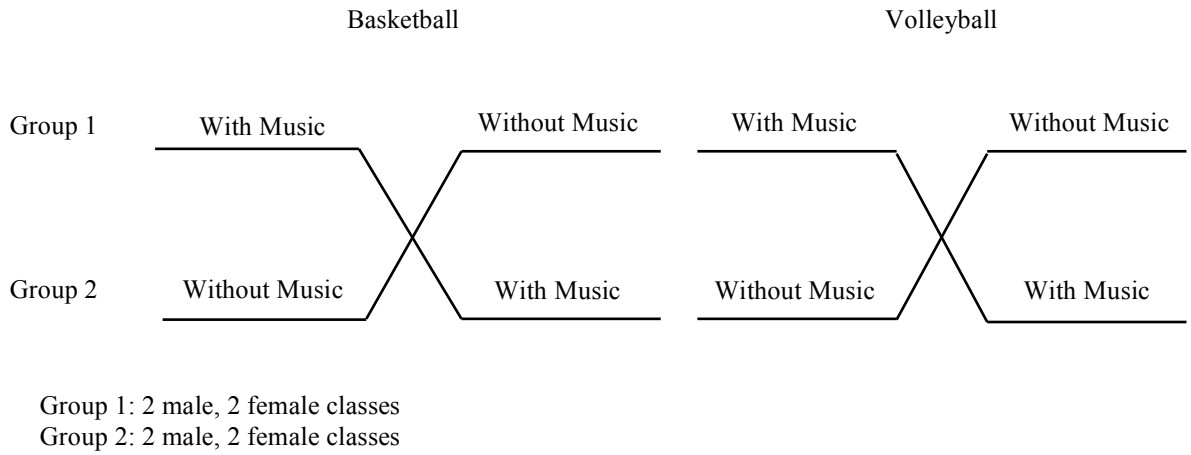

Figure 1. Model of Crossover Design - 2 by 2 within and within repeated measures.

Procedures

The researcher obtained the university Institutional Review Board (IRB) and district approval before beginning the study. After obtaining appropriate IRB and district approval, forms of assent/consent were given to the students and their parents to sign for agreement to participate in the study (see Appendix D). The students were given one week to return the forms to their teacher in order to participate in the study. As soon as the forms were collected, the researcher attended the school for one day and instructed the students in how to properly wear, use and read a pedometer to assure reliable collection of data, as well as control for reactivity.

The music selection used for the study consisted of popular, upbeat, fast tempo, 120-160 BPM, songs suggested by polled junior high age students. The researcher asked students of junior high age to list the songs they enjoy working out to most. The students polled to help the researcher in selecting music were not involved in the data collection of the study. After compiling a list of 30-40 songs, the researcher listened to the songs and narrowed them down to school appropriate songs that fit the tempo requirement. The songs that fit the requirements were made into a playlist that could be played through an iPod or CD player over a loud sound system.

Prior to data collection, the teachers received training from the researcher on the lessons that were taught for the study (see Appendix E). The lessons were restricted by the researcher in content and time as to create a controlled environment for the study. The lessons were restricted to 40 of the 65 minutes of actual gym time. By only using two-thirds of the class time, teachers had a buffer at the beginning and at the end of the class periods for regular class procedures and data collection. Following training, the teachers began by teaching the designed lesson for basketball for both groups. The teachers taught the lesson for basketball for four lessons, two days for each group using both conditions (music/no-music), with data collection at the end of each lesson. The second round of data collection for volleyball took place the following week using the same design as basketball. Pedometer data, step counts and time in activity, and level of enjoyment were again recorded at the end of each lesson by the students.

A manipulation check was done through observation of lessons by the researcher to ensure consistency between lessons in what was being taught and how long each part of the lesson was taught. For half of the lessons taught, one basketball and one volleyball lesson, the teacher incorporated music into the class period. No music during lessons served as the control and music during lessons served as the intervention. Two conditions or treatment groups, music

and no-music, were the independent variables. The number of steps, time in activity, and level of enjoyment rating were the dependent variables.

Data Analysis

SPSS Statistical Package 15.0 (2007) was used to analyze the data using two conditions, music/no music, by two activity types, basketball/volleyball, within and within repeated measures analysis of variance (ANOVA). Multiple ANOVAs (MANOVA) were also used to further test for significant differences. Post-hoc comparison (Tukey Honestly Significant Difference) tests were run to reveal significant differences in step counts, time in activity, and level of enjoyment between activities with and without music.

Results

Descriptive Statistics

Means, standard deviations, and effect sizes for steps taken, time in activity, and level of enjoyment are shown for females in Table 1, males in Table 2, and combined genders in Table 3. All means differences between conditions, music/no music, are in the anticipated direction. That is, the music condition demonstrated increased number of steps, time in activity and level of enjoyment over no music.

MANOVA Omnibus Test

A MANOVA omnibus test indicated significant differences between conditions (music/no music; λ (3, 1057) = .222, $p < .001$), activities (basketball/volleyball; λ (9,2572) = .97, $p < .001$), gender (λ (3,1057) = .932, $p < .001$), and grade (λ (6,2114) = .975, $p < .001$).

A significant interaction effect is found between gender and activity (λ (9,2572.61) = .966, $p < .001$) and between grade and activity (λ (18,2990.13) = .971, $p < .05$). No significant interaction effects were found between gender and grade (λ (6,2114) = .991, $p > .05$) or among gender, grade, and activity (λ (18,2990.13) = .984, $p > .05$).

Follow up ANOVAs 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 indicated 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 ($F(3,1059) = 4.543$, $p < .001$). Results also indicated an interaction between gender and the type of activity ($F(3,1059) = 8.013$, $p < .001$) with boys taking more steps than girls in both activities. Further, boys spent significantly more time than girls in activity ($F(3,1059) = 10.952$, $p < .001$) in volleyball. Lastly, there was a significant interaction between grade and activity type ($F(6,1059) = 2.313$, $p < .05$) with 7th grade students showing the highest levels of enjoyment.

Post-hoc Comparisons: Tukey's Honestly Significant Difference (HSD)

A Tukey's HSD test revealed significant differences in step counts, time in activity, and level of enjoyment between activities with and without music. Basketball with ($M = 3012$, $SD = 85.9$) or without ($M = 2728$, $SD = 827.2$) music resulted in more steps than volleyball with ($M = 2393$, $SD = 1118.3$) or without ($M = 2227$, $SD = 1193.7$) music. More steps were taken in basketball with music ($M = 3012$, $SD = 855.9$) than without ($M = 2728$, $SD = 827.2$).

Results indicate a similar pattern with time in activity in basketball with ($M = 28.4$, $SD = 6.5$) or without ($M = 26.2$, $SD = 6.3$) music resulted in more time in activity than volleyball with ($M = 24.2$, $SD = 9.0$) our without ($M = 23.1$, $SD = 10.4$) music. Also, basketball with music ($M = 28.4$, $SD = 6.5$) resulted in significantly more time in activity than basketball without music ($M = 26.2$, $SD = 6.3$). Lastly, results indicate that level of enjoyment was higher in volleyball with music ($M = 4.3$, $SD = .86$) than either volleyball ($M = 3.9$, $SD = 1.0$) or basketball without ($M = 3.8$, $SD = 1.1$) music.

Table 1

Descriptive Statistics for Females in Their Respective Grades for Step Counts, Time in Activity, and Level of Enjoyment

	Females			
	Grade			
	7 (*n*=75)	8 (*n*=76)	9 (*n*=3)	All (*n*=154)
	M (SD)	*M (SD)*	*M (SD)*	*M(SD)*
	Step Counts			
VB Music	1671 (644)	1718 (693)	1462 (574)	1690 (664)
VB No Music	1287 (627)	1492 (528)	874 (111)	1382 (586)
BB Music	2897 (979)	2777 (837)	2955 (471)	2839 (905)
BB No Music	2600 (832)	2388 (808)	2524 (805)	2494 (821)
	Time in Activity			
VB Music	18.2 (5.8)	18.7 (6.5)	16.6 (6.1)	18.4 (6.1)
VB No Music	15.3 (7.3)	16.8 (5.2)	11.5 (2.1)	16 (6.4)
BB Music	28.7 (7.4)	27.3 (6.2)	28 (4.2)	28 (6.8)
BB No Music	25.6 (5.7)	24.8 (7.4)	25.6 (7.7)	25.2 (6.6)
	Level of Enjoyment			
VB Music	4.58 (.64)	4.47 (.72)	4 (1)	4.51 (.69)
VB No Music	4.1 (.91)	3.81 (1.02)	3 (-)	3.94 (.97)
BB Music	4.31 (.77)	3.95 (.92)	5 (-)	4.14 (.86)
BB No Music	3.92 (1.01)	3.34 (1.04)	3.33 (1.15)	3.62 (1.06)

Note. VB = Volleyball, BB = Basketball.

Table 2

Descriptive Statistics for Males in Their Respective Grades for Step Counts, Time in Activity, and Level of Enjoyment

	Males			
	Grade			
	7(*n*= 80)	8(*n*= 69)	9(*n*= 2)	All (*n*= 151)
	M (SD)	*M (SD)*	*M (SD)*	*M(SD)*
	Step Counts			
VB Music	3264 (1143)	3046 (771)	3788 (1296)	3174 (995)
VB No Music	3086 (1064)	3176 (921)	3454 (1434)	3133 (998)
BB Music	3116 (753)	3282 (767)	3673 (241)	3199 (758)
BB No Music	3127 (826)	2804 (645)	3098 (-)	2979 (760)
	Time in Activity			
VB Music	31.9 (8.3)	28.8 (5.4)	36 (8.4)	30.6 (7.3)
VB No Music	29.7 (8.4)	32 (7.8)	34 (8.4)	30.8 (8.1)
BB Music	27.8 (5.3)	29.8 (7.2)	35 (-)	28.8 (6.3)
BB No Music	28 (6.4)	26.5 (5)	28 (-)	27.3 (5.8)
	Level of Enjoyment			
VB Music	4.11 (1.04)	4.29 (.9)	3 (-)	4.18 (.98)
VB No Music	4.13 (1.03)	3.78 (1.12)	2.5 (.7)	3.95 (1.09)
BB Music	4.34 (.82)	4.11 (1.08)	4 (-)	4.23 (.94)
BB No Music	4.21 (.93)	3.98 (1.04)	3 (-)	4.09 (.99)

Note. VB = Volleyball, BB = Basketball.

Table 3

Descriptive Statistics for Step Counts, Time in Activity, and Level of Enjoyment for Combined Gender and Grade

	Step Counts		
	M	*SD*	*N*
VB Music	2393	1118	268
VB No Music	2227	1193	259
BB Music	3012	855	285
BB No Music	2728	827	271
Total	2600	1050	1083
	Time in Activity		
	M	*SD*	*N*
VB Music	24	9	268
VB No Music	23	10	259
BB Music	28	6	285
BB No Music	26	6	271
Total	25	8	1083
	Level of Enjoyment		
	M	*SD*	*N*
VB Music	4.3	.8	268
VB No Music	3.9	1	259
BB Music	4.1	.9	285
BB No Music	3.8	1	271
Total	4.1	.9	1083

Note. VB = Volleyball, BB = Basketball.

Discussion

The purpose of this study was to examine the effects of popular music on physical activity rates of junior high physical education students. It appears that music served as a motivator in taking more steps, therefore increasing the activity rates of junior high physical education students. These findings are congruent with the findings of Barney and Prusak (in press) and add to previous studies by Priest et al. (2004) and Karageroghis et al. (2006) on music as a motivator is exercise.

Dependent Variables

It appears music served as a motivator to increase activity rates in females, who took more steps with music in both activities than without music. It was observed that during less intense moments of the activities, a physical reaction of wanting to move or dance to the music occurred. Because overall results indicate that more steps were taken with music in both activities across grade and gender (see Table 3), it appears music served as a motivator and environmental stimulus for movement.

It was observed by the researcher that females spent significantly more time in activity with music than without music. Because the female population responded with more physical activity while music was being played, junior high school physical education teachers would be wise to capitalize on the notion of implementing music in as many curricular units possible for female students. Although there is no magic bullet that will increase female physical activity in physical education classes, the results of this study strongly hint to the idea that music could help junior high school female students to be more physically active in class activities.

Because females recorded a higher level of enjoyment in both of the activities with music than without music it appears females preferred having something to listen or dance along with. The same can be inferred for males, as they too recorded a higher level of enjoyment in both of

the activities with music. The level of enjoyment across gender, activities and conditions, showed a decrease as age/grade level increased except for in volleyball with music between 7th and 8th grade. These findings are consistent with Malina (1996) who says that as adolescents get older, their interest and enjoyment in physical activity decreases due to such things as lack of curricular variety and the resulting loss of interest (Scantling, Strand, Lackey, & McAleese, 1995). However, this study indicates that activities like basketball and volleyball may be more enjoyed when accompanied by music. Because basketball and volleyball are popular curricular units, it is suggested that junior high physical educators use music to try to increase physical activity and enjoyment regardless of intensity of the activity.

Interaction Effects

An interaction effect between grade and activity type was noted, playing an important role in the level of enjoyment suggesting that music affects ages/grades significantly in their enjoyment of the activity. Significant grade differences were noted between 7th and 8th, and 7th and 9th grade in levels of enjoyment. It may be suggested that 7th grade males and females recorded higher levels of enjoyment because junior high may be their first formal physical education course beyond elementary school. For this study, the students that participated did not have an organized elementary physical education experience. An organized elementary physical education experience is considered having a trained physical education specialist to teach each class. These students had their classroom teacher or a parent come to the school and teach physical education, which consists of games with little structure or organization (personal communication, Penny [PE teacher at the school]).

Significant differences were noted between the interaction of gender and activity type resulting that the activities with music increased steps taken and time in activity. It was found

that the activities with music increased steps taken and time in activity for both males and females. The findings from this study concur with the study conducted by Barney and Prusak (in press). In their study with elementary-age students in a physical education setting, it was found that when music was being played in the class activities student step counts significantly increased in the activities for both genders. The activities used in the Barney and Prusak study were walking and playing Frisbee. The results from both of these studies strongly imply that music can positively affect student activity, despite gender, in physical education class. Thus, aside from the inherent differences in basketball and volleyball, music positively affected the steps taken, time in activity, and level of enjoyment.

Activity Types

It can be inferred that significant differences in step counts were found between activity types because by nature, basketball requires higher intensity or more movement to participate in and thus more steps were found in basketball compared to volleyball whether or not music was played. Significant differences in step counts, however, were noted between basketball with music and without music. This suggests that music does play a role in increasing step counts. Similar to Barney and Prusak's (in press) study, music had a more pronounced effect on basketball than volleyball in steps taken because it was a higher intensity activity. This suggests music affects higher intensity activities more so than less intense activities. This may be due to the fact that the music played was of a fast tempo which is similar to the fast paced nature of the sport of basketball.

When looking at comparisons between activity types, significant differences were noted in time in activity between volleyball with music and basketball with music, volleyball without music and basketball with music, and between volleyball without music and basketball without

music. These significant differences may be explained by the nature of basketball compared to the nature of volleyball. Basketball, regardless of music or no music, is more intense and requires more movement by nature as there are few moments of pausing within the game. On the other hand, volleyball is less intense by nature as it includes many built-in pauses throughout the game where the volleyballs are chased down, the ball is on the other side of the net, in between serves, or simply the game does not require everyone to move since only three touches are allowed per side.

When looking at the level of enjoyment and comparing between activities, significant differences were noted between volleyball with music and volleyball without music, volleyball with music and basketball without music, and basketball with music and basketball without music. When comparing within the same sport, it can be inferred that the level of enjoyment was affected by whether or not music was played. The level of enjoyment was higher with music in both volleyball and basketball. The literature suggests this may be due to the qualities of music (Harms & Ryan, 2012; Karageorghis, Jones, & Low, 2006; Ward & Dunaway, 1995). Music may serve as a distractor to some, a regulator of energy output for others, and a motivator to still others. All would add to increased enjoyment levels. Distractors help students to listen to the music and possibly sing a long versus pay attention to all the energy they are expending or even notice the time spent standing while waiting for the volleyball to come their direction (Gfeller, 1988; Potteiger, Schroeder, & Goff, 2002). Music tempo can help regulate the pace and therefore, energy output during exercise (Elliott, Carr, & Orme, 2005; Karageorghis & Jones, 2000; Nethery, 2002; Priest & Karageorghis, 2008). Motivators help to rouse the students to want to expend more energy because the songs may include lyrical affirmation (Karageorghis et

al., 2006) or simply the beat and tempo of the song encourage students to dance thus increasing the level of enjoyment (Karageorghis & Terry, 1997; Potteiger et al., 2002).

Limitations

Limitations of this study include the sample of participants. Though there is a fairly even number of males and females, there are significantly less 9th grade participants compared to 7th and 8th grade participants. Another limitation is the design, more specifically how music is only implemented twice compared to a longer period of data collection.

Conclusions and Implications for Junior High Physical Education

While significant differences can be found and attributed to the very nature in the differences between volleyball and basketball, several significant differences found can be described and attributed to the intervention of the use of music during activity. Music can help to increase step counts, increase levels of enjoyment, and raise levels of enjoyment not just for the activity, but also for the physical education classes for upper level grades. Therefore, if teachers are looking for a way for their students to increase step counts, time in activity and level of enjoyment, adding music to the background of the activity may help teachers to achieve those goals. Teachers will find that when they play music in their classes, many of their students will dance when the activity allows them to do so, students will sing a long if they know the lyrics, and many students' energy levels will increase. Music is a positive factor in the classroom and will help set a more enjoyable atmosphere for students while achieving increased physical activity rates.

Future Research Recommendations

Due to the design of this study, the results of this study cannot be generalized for more than junior high school physical education programs and their students. Using this study as a

foundation, future research ideas for this topic will help to strengthen music as a positive influence in PE. These research ideas may include modifications to the research design such as examining a long-term effect of continuous versus intermittent music, using a new population such as high school physical education students, measuring the physiological effects of music on heart rate during exercise through a heart rate monitor, or repeating the study using a qualitative approach or component such as interviews, observations, or free response surveys.

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APPENDIX A

Review of Literature

Introduction

Music can be found almost anywhere. It is heard at sporting events, played in public places such as stores, work place, and religious gatherings, and it is heard in personal settings such as a home, a bedroom, and a car. The places in which music is being played are many and varied, as are the reasons for listening to music. An increasingly popular reason to play music is to use it as a motivational tool during exercise. Karageorghis, Terry, and Lane (1999) identify four main characteristics of a piece of music that listeners find motivating: rhythm response, musicality, cultural impact, and association. Through one or more of these characteristics of music, listeners find the motivation to increase their endurance or heightened their work rate (Priest & Karageorghis, 2008). One of the outcomes related to endurance is reduction of perceived exertion. This result of using music during exercise is "particularly important in an educational context" as it will encourage students to increase intensity, work-rate, and endurance of activity while overall increasing the rate of physical activity throughout one physical education lesson (Priest & Karageorghis, 2008, p. 348). Though this connection may actually exist, there is little research to support that the use of music in a physical education setting can affect physical activity rates.

This review of literature will discuss (a) music's influence in society; (b) the motivational characteristics of music; (c) music as a motivational tool in exercise and physical activity; and (d) music as a motivational tool for physical activity in an educational setting. The purpose of this study was to examine the effects of music on physical activity rates and enjoyment in junior high school physical education students.

Music's Influence in Society

"Humans appear to seek musical experiences on a daily basis" (Dunn, 2010, p. 7). "From birth, listening to music is linked with affective expression, embedded in a social context" (Dunn, 2010, p. 4). Children are surrounded with the social context of music from a young age. It may start with lullabies and continue with family and cultural beliefs, such as the importance of religion and its expression through music, music lessons for an instrument such as the piano, and eventually music education in schools. As a child grows their exposure to music continues. They hear it on the radio, played in the home, in the car, in the halls of school, at sporting events, and at the malls. Music, like cranberries in juice, is making a place for itself in almost any situation available.

As a child approaches the teenage years of life, their relation to music shifts from simplistic to complex. The explanation for this shift in teens' relation to music is in their reasons for listening to music. Teens listen to music "in order to enjoy the music; to be creative/use their imagination; to relieve boredom; to help get through difficult times; to be trendy cool; to relieve tension/stress; to create an image for him/herself; to please friends; and to reduce loneliness" (North, Hargreaves, & O'Neill, 2000, p. 263). Another popular reason for listening to music is as a means of mood regulation. When trying to study the effects of music on teen listeners, many explanations have to be considered.

Most of music's biggest influences in society are when it is found as a background accompaniment to social gathering environments. A study by Sloboda, O'Neill, and Ivaldi (2001) gave participants pagers for a week and asked them to fill out an open ended survey every time the pager was activated. The study found that the times music was being played when the pager activated, participants were not listening to it as their primary focus. However, despite

music not being the primary focus of the situation, participants reported feeling more positive, alert, and focused on the situation. Another similar study done by North, Hargreaves, and Hargreaves (2004) also found that the majority of listening episodes took place in the presence of other people rather than alone. That same study also found that the most common reasons for listening to music during those episodes were for enjoyment, to pass the time, as a habit, and to create the right atmosphere. Perhaps these effects of and reasons for music being played in the background of a condition may be influential if transferred and used in an educational setting.

Another major influence music has on society is its effect on emotion. Emotion is strongly related to the main reasons people listen to music (Dunn, 2010; Juslin & Laukka, 2004). Emotion is a regulator and functional aspect of a person's actions. If the emotions of a person can be influenced through music, then music is vital to creating the atmosphere desired either by the music player. This is most notable at sporting events when music is played to excite the crowd. Another prime example of music as an emotional influencer is the use of music in movies. Movies that want the viewers to feel the anxiety or tension of the situation, or perhaps even anger, sadness, or joy use music as an undertone of the scenes to help engage the viewer and manipulate their emotions to better experience the movie. The influence of music has on emotion is extremely apparent and when used correctly can be used as a motivator for teenagers in increasing their physical activity rates in physical education setting.

Motivational Characteristics of Music

Music is frequently described as a motivator. It serves as a motivation to improve one's daily actions, to change from idleness to action, get excited for an upcoming situation, to increase intensity or work harder, and to increase one's endurance (Priest & Karageorghis, 2008). In order to describe why music can be so influential and serve as a motivator,

Karageorghis et al. (1999) presented a conceptual framework (Figure 1) that can explain the effects of *motivational music* in the context of exercise and sport. Motivational music in the context of exercise and sport is defined as "that which stimulates or inspires physical activity" (Priest & Karageorghis, 2008). Four factors are identified as contributors to the 'motivational qualities' of a piece of music: rhythm response, musicality, cultural impact, and association (Priest & Karageorghis, 2008).

Rhythm response refers to the response to the rhythmical elements of music, most notably tempo (speed of the music as measured in BPM), "which has been identified as the key characteristic of music in terms of eliciting a bodily response" (Priest & Karageorghis, 2008, p. 348). This suggests that "people have an underlying predisposition to react to rhythmical stimuli because they replicate natural forms of physical activity such as walking" (Karageorghis et al., 1999, p. 714). The rhythm response is felt through the accentuated beat of a piece, thus pairing with the natural accentuated beats of our actions. For example, taking the first step in walking is stressed just like the first beat of a song may be stressed.

Musicality refers to the response to pitch-related elements such as harmony and melody. These aspects of music shape a listener's interpretation of the song and the environment around them, as well as influence mood state (Douglas, 1985). The mood state refers to just more than the disposition of the listener, but also to the temperament of the environment. This is evident as mentioned earlier on the manipulation music can play when used in movies or at sporting events. This is the second highest motivating factor in music after rhythm response.

Cultural impact refers to the pervasiveness of the music within society. Because of sociocultural upbringing and previous exposure to music, the listener's immediate response to a song may be categorized as a reaction due to cultural impact (Lucaccini & Kreit, 1972). For

example, if the listener is Latino in ethnicity, they may like Shakira (a popular Columbian singer) who songs have a Latin vibe (rhythm and musicality) to them. However, they may strongly dislike Eminem (a popular American rapper) whose songs have less musicality and hold a different rhythm than the Latin rhythms to which they are accustomed.

Association refers to extramusical associations a piece of music may evoke (e.g., Vangelis's *Chariots of Fire with Olympic Glory*) (Karageorghis et al., 2006). In simplistic terms, Gfeller (1988) explained that the sound can promote thoughts that inspire physical activity. An example of this may include the top songs from the Rocky movie series, such as *Final Countdown*, *Eye of the Tiger*, and *Burning Heart*. Association is the least motivating of the four motivational factors in the proposed framework of motivational music.

Of the four motivational factors related to music, rhythm response is most influential with association being the least influential in motivating listeners. With rhythm response being the most prominent factor, many studies have been done to discern the appropriate tempo of the music that will yield the beneficial results mentioned earlier. Both Priest, Karageorghis, and Sharp (2004) and Karageorghis et al. (2006) found that loud music, with an up-beat tempo of 120-160 BPM (moderate to high intensity) will help to match heart rate and exercise intensity while serving as distractor that causes exercisers to reduce their perceptions of exertion. Also, a positive correlation was found between exercise intensity and a preference for higher tempi music. As exercise intensity increased, so did the preference for higher tempi music over moderate tempi music. Lyrical affirmation and including variety of genres also helps music to serve as a motivating factor.

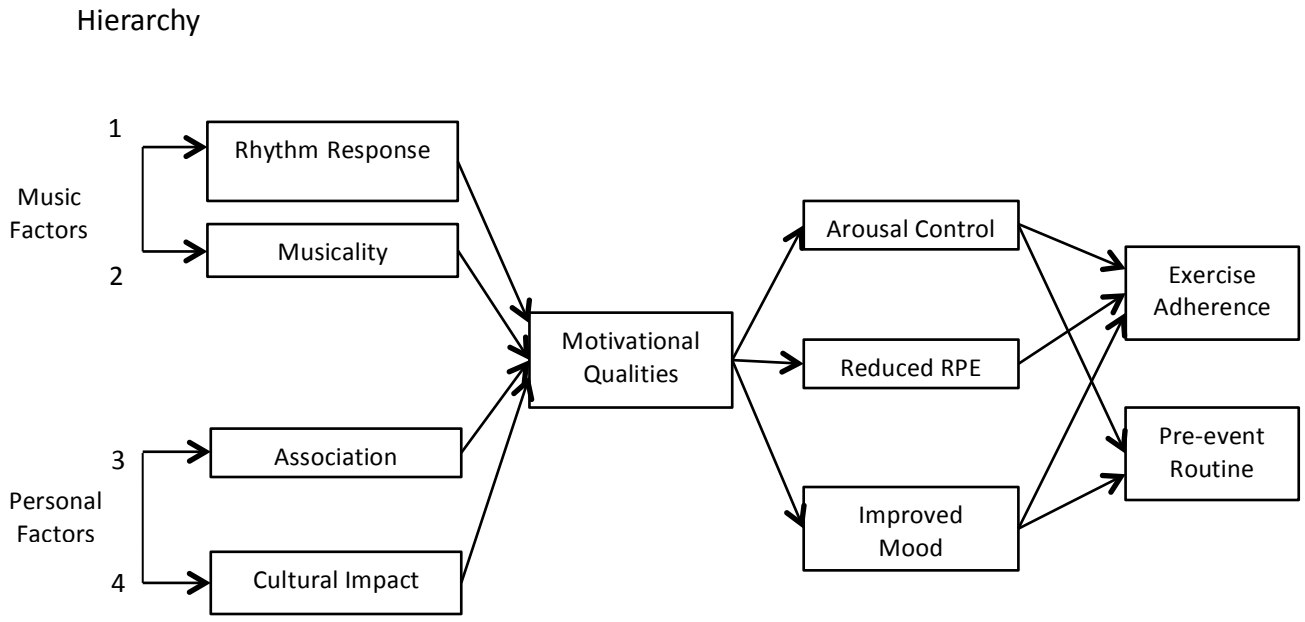

Figure 2. Conceptual framework for the prediction of responses to motivational music (Karageorghis et al., 1999, p. 714).

Music's Role in Exercise/Physical Activity

If music is to be viewed at as a motivator, it is important to understand music's role as a motivator in exercise/physical activity as this is the environment in which music is most used for that purpose. A handful of studies have been done in looking at the effects of music on exercise with most of them citing Karageorghis's work on motivational music. The studies first looked at the motivational characteristics of music on a deeper level in trying to understand rhythmic tempo, volume and genres. Then they looked at the results of their studies of these characteristics as well as any gender differences or genre preferences.

It is important to understand that some researchers, such as Priest et al. (2004), use the terms *motivating music* and *stimulating music* interchangeably. This is in part due to how the term *stimulating music* is described. Stimulating music is described variously as dance music,

loud music, fast music, or rhythmical music (Priest et al., 2004). A study that looked at stimulating music found that participants had a preference for loud and upbeat or lively music compared to slower, melodious music (Priest et al., 2004). A closer look at this inclination shows that the preference for the faster tempo is due to the exercise intensity or increased work intensity. The explanation for this is that the faster tempo of music is a reflection of the listener's physiological arousal level (Berlyne, 1971; Gfeller, 1988; Karageorghis et al., 2006; North & Hargreaves, 1997). Karageorghis et al. (2006, p. 247) suggests that "individuals often require a moderate increase in arousal to initiate physical activity" and faster tempi music can provide this stimulus to arousal. Knowing this helps onlookers as sporting events understand why the athletes listen to music before beginning a basketball game. Some athletes use personal listening devices to control the music selection, while others enjoy the warm-up music that is played for them just as much as it is played for the fans.

There are many benefits to listening to loud, upbeat music that contains a tempo of 120-160 BPM. One of these benefits as outlined in Karageorghis et al.'s (1999; Priest & Karageorghis, 2008) revised hierarchy model is reduced ratings of perceived exertion (RPE). Elliott, Carr, and Orme (2005) support this in their study of the effects of motivational music on sub-maximal exercise. The study found that motivational music appears to "reduce perceptions of effort during sub-maximal exercise (Elliott et al., 2005; Karageorghis & Jones, 2000; Nethery, 2002; Priest & Karageorghis, 2008). This factor is influential is explaining that the use of listening to motivational music during exercise helps increase the endurance or duration of exercise of the exerciser. Another suggested reason music can lower RPE is that it may serve as a passive distractor, giving a positive focal point to the task at hand (Potteiger, Schroeder, & Goff, 2002; Gfeller, 1988). Another benefit to the use of stimulating music during exercise is its

positive effect on the exercise experience and overall adherence to exercise (Karageorghis & Terry, 1997; Potteiger et al., 2002). This positive experience may be due to the increased performance found in both sensory and motor tasks (Beckett, 1990; Priest & Karageorghis, 2008).

The selection of music used during exercise should be a conscious decision. Priest et al. (2004) suggest that the music playlist for exercise should include a variety (differing in age or date of release and genres) of loud, upbeat music. Barney, Gust, and Liguori (2012) support this suggestion in their survey of popular genres of music listened to while exercising. They found that there was a variety in types of music played by the participants to provide motivation during a workout (Barney et al., 2012). By providing variety, the interest and engagement of the exerciser is not lost. Another consideration that has been well backed up is the important of choosing music of a faster tempo (120-160 BPM). This tempo will not only help to arouse the listener to action, but will also help to increase the workout intensity of the listener (Priest et al., 2004). Another important consideration when selecting music is the role of positive association. Choosing music with a positive or inspiring message through lyrical affirmation, such as "work your body" or "search for the hero inside yourself" (Karageorghis et al., 2006), helps to improve exercise performance and mood (Atkinson, Wilson, & Eubank, 2004; Elliott, Carr, & Savage, 2004; Hohler, 1989; Karageorghis & Lee, 2001; Karageorghis & Terry, 1997; Matesic & Comartie, 2002; Priest & Karageorghis, 2008; Simpson & Karageorghis, 2006; Szabo, Small, & Leigh, 1999). This can also help to create the ideal environment that supports and encourages exercise in a positive view. A few other suggestions for selecting music include choosing music that participants prefer and are accustomed to based on their sociocultural background (Karageorghis et al., 2006), and choosing music based on the "newest, most popular songs of the

day" that are played on the most listened to radio stations in the region the listener is in (Beckett, 1990).

Music in Physical Education

Of all exercise and physical activity environments in which music can be used, physical education has been observed to be increasing its use of music (Harms & Ryan, 2012). Up to this point, studies have mainly looked at the use of music as a beneficial management tool in keeping students on task (Harms & Ryan, 2012). So the question is: why are there so few studies to support the use of music as a motivator for physical activity in a physical education environment? Hill (2000) and Harms and Ryan (2012) suggest that music can be a strong motivator for maintaining intensity and student interest. Both of these outcomes are desired in physical education. In a study done on laps run in a physical education class, Ward and Dunaway (1995) found that a significant increase in physical activity rates of the running students when music accompanied the run compare to when it was not used. Ha and Wong (2002) discovered that when music accompanies physical activity, students find more satisfaction in the exercise.

In a physical education environment, the use of music to accompany physical activity can serve many beneficial purposes. One of these purposes may include creating a positive and attractive atmosphere (Chen, 1985). This type of environment invites students to learn and enjoy class and helps to maintain their interest. The use of music as an accompaniment to physical activity also encourages freedom of body expression. For many, music provides a security that lessens their self-consciousness of their performance and allows them to feel more at ease with trying their best in the activity (Chen, 1985). Other beneficial purposes in the use of music are that "it contributes to the development of memory and distributive attention" and it facilitates the internalization of motor skills and abilities (Tatiana, 2010, p. 14).

Summary

Music is a growing influence in society. It can be heard in various places. One of the leading uses for music is for its motivational impact on the listeners. This motivational impact is broken down into four main characteristics and categorized as either music factors or personal factors. These characteristics include rhythm response (music factor), musicality (music factor), cultural impact (personal factor), and association (personal factor) (Karageorghis et al., 1999; Priest & Karageorghis, 2008). The biggest motivational characteristic is rhythm response, followed by musicality. The least motivational characteristic is association. Other influencers in music include lyrical affirmation, tempo, and volume.

Music is becoming popularly used as an accompaniment to exercise. This becomes evident with a simple observation of a recreation center where many of the members use personal listening devices to play the music that accompanies their workout as well as with the recreation center itself playing music in the background. The use of music as a motivator in exercise provides many benefits. These benefits may include reduced RPE, thus allowing exercisers to increase work-rate or intensity and exercise for longer periods of time, and a positive experience thus reinforcing exercise adherence (Karageorghis & Terry, 1997).

Relations between the presence of the music and rates of physical activity have rarely been, if at all, subject to experimental analysis in physical education settings, more specifically a junior high physical education setting (Ward & Dunaway, 1995). Gaston (1968) suggests that the use of music can help organize behavior during motor activities, but this only exposes a sliver of what music may do for physical activity rates in physical education. This review of literature supports the proposal to look deeper at music in a physical education setting. This deeper observation and analysis will be replicated from Barney and Pursak's (in press) study on music's

effects on physical activity rates in elementary physical education students and transferred to junior high physical education students. It is suggested that the replication of Barney and Prusak's (in press) study using a different population (junior high physical education students) will add to the limited literature on music's effects in physical activity rates in physical education classes and will inform practice for junior high physical educators in using music during their lessons. Thus, this study on music's effects of physical activity rates in physical education has a relationship to the limited research in this area of music and physical education. This study will examine the effects of music as an accompaniment to exercise on physical activity rates of junior high physical education students.

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APPENDIX B

Methods

Context

The context of this study took place at Oak Canyon Junior High school in Utah's Alpine School District. This school was chosen because it was the school where the researcher did their student teaching. Oak Canyon Junior High School is made up of male and female students, grades 7-9 (ages 11-15). The school's classes run on a block schedule (A-day/B-day) with each class lasting approximately 80 minutes from bell to bell. A block schedule is when the students have an A-day where they have four classes and a B-day where they attend 4 different classes than A-day. This allows the students to take a total of eight different classes. The school days of the week switch between A-day and B-day class schedules, meaning the teachers will only see their students two to three times per week.

Participants

The participants of this study were junior high school physical education students (grades 7-9) of middle class socioeconomic status with most of the students being of Caucasian decent. There were 305 physical education students recruited for the study. The students were recruited from eight physical education classes (four male and four female). Each recruited class had an average enrollment of 37 students.

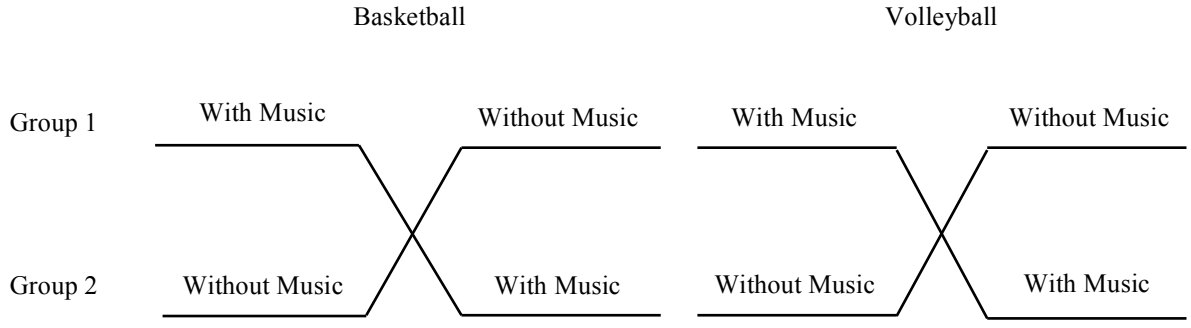
Data Sources

Pedometers are cost effective, easy to use, reliable and valid instruments that measure physical activity rates in step counts (Barfield, Rowe, & Michael, 2004; Beighle, Pangrazi, & Vincent, 2001; Welk, Corbin, & Dale, 2000). Step counts and level of enjoyment were recorded daily by the participants on a student record sheet (see Appendix C) and transcribed later to an

Excel worksheet. Only the teachers and researcher had access to the record sheets and excel documentation. SPSS (a data analysis software program) was used to analyze the data.

Design

This was a quasi-experimental study (the students act as their own controls) using a two (conditions: with music/without music) by two (activities basketball & volleyball) cross over design (see Figure 1). By design basketball is more active, and volleyball is less active. Two male classes and two female classes (group one-total of four classes) were taught a lesson for basketball with music, while two different male classes and two different female classes (group two) were taught the same lesson for basketball, without music. After the numbers were recorded, the classes switched conditions and repeated the lesson. The intervention was repeated for volleyball with group one having received a lesson for volleyball with music first, and group two having received that same lesson for volleyball without music. Then the data were collected and both groups switched conditions and repeated the same lesson for volleyball (see Figure 1).



Group 1: 2 male, 2 female classes
Group 2: 2 male, 2 female classes

Figure 1. Model of crossover design—2 by 2 within and within repeated measures.

Procedures

The researcher obtained Institutional Review Board (IRB) and district approval before beginning the study. After obtaining appropriate IRB and district approval, forms of assent/consent (see Appendix D) were given to the students and their parents to sign for agreement to participate in the study. The students were given one week to return the forms to their teacher in order to participate in the study. As soon as the forms were collected, the researcher attended the school for one day and instructed the students in how to properly wear, use and read a pedometer to assure reliable collection of data, as well as control for reactivity. Prior to data collection, the teachers also received training from the researcher on the lessons that were taught for the study (see Appendix E). What is taught and how long each part of the lesson is taught for were restricted by the researcher. The lessons were restricted to 40 of the 65 minutes of class time students have left for a lesson after changing into their activity clothes. By only using two-thirds of the class time, teachers had a buffer at the beginning and at the end of the class periods for regular class procedures and data collection. Following training, the teachers began by teaching the designed lesson for basketball for both groups. The teachers taught the lesson for basketball for four lessons (two days for each group using both conditions [music/no-music]) with data collection at the end of each lesson. The second round of data collection for volleyball took place the following week using the same design as basketball. The planned lesson for volleyball was taught for four lessons (using both conditions with each group) with data collection at the end of each lesson. Pedometer data and level of enjoyment were again recorded at the end of each lesson.

A manipulation check was done through observation of lessons by the researcher to ensure consistency between lessons in what was being taught and how long each part of the

lesson was taught. For half of the lessons taught, the teacher incorporated music into the class period. No music during lessons served as the control and music during lessons served as the intervention. Two conditions or treatment groups (music and no-music) were the independent variables. The number of steps, time in activity, and level of enjoyment rating were the dependent variables. Only the two physical education teachers and researcher had access to the student record sheets.

The music selection used for the study consisted of popular, upbeat, fast tempi (120-160 BPM) songs suggested by polled junior high age students. The researcher asked students of junior high age to list the songs they enjoy working out to most. After compiling a list of 30-40 songs, the researcher listened to the songs and narrowed them down to school appropriate songs that fit the tempo requirement. The songs that fit the requirements were made into a playlist that could be played through an iPod or CD player over a loud sound system.

Data Analysis

SPSS Statistical Package 15.0 (2007) was used to analyze the data using two conditions (music/no music) by two activity types (basketball/volleyball) within and within repeated measures analysis of variance (ANOVA). Multiple ANOVAs (MANOVA) were also used to further test for significant differences. Post-hoc comparison (Tukey Honestly Significant Difference) tests were run to reveal significant differences in step counts, time in activity, and level of enjoyment between activities with and without music.

APPENDIX C

Student Record Sheet

Name _____ Gender _____ Grade _____ Class Period _____

_____

For Researcher use Only

Practice Recording Days

Date _____ Activity _____ Date _____ Activity _____

Steps _____ Time in Activity _____	Steps _____ Time in Activity _____
Level of Enjoyment 1 2 3 4 5	Level of Enjoyment 1 2 3 4 5

Enjoyment Rating of Class Key:

1 Not at all
2 Somewhat
3 Neutral
4 Enjoyable
5 Very Enjoyable

Recording Days

Date _____ Activity _____ Steps _____ Time in Activity _____ Music: Yes / No Level of Enjoyment 1 2 3 4 5	Date _____ Activity _____ Steps _____ Time in Activity _____ Music: Yes / No Level of Enjoyment 1 2 3 4 5
Date _____ Activity _____ Steps _____ Time in Activity _____ Music: Yes / No Level of Enjoyment 1 2 3 4 5	Date _____ Activity _____ Steps _____ Time in Activity _____ Music: Yes / No Level of Enjoyment 1 2 3 4 5

APPENDIX D

Forms of Assent/Consent

Student Assent

.....

What is this study about?

My name is Lindsey Benham. I am from Brigham Young University. I would like to invite you to take part in a research study. Your parent(s) know we are talking with you about the study. This form will tell you about the study to help you decide whether or not you want to be in it.

In this study, we want to learn about the effects of music on physical activity rates of junior high physical education students.

What am I being asked to do?

If you decide to be in the study, we will ask you to wear a pedometer (a device that tracks the number of steps you take and your time in activity) during your regular physical education classes for 4 days. At the end of each of those 4 days you will look at the number of steps recorded and your time in activity and write those numbers down on a personal recording sheet.

What are the benefits to me for taking part in the study?

Taking part in this research study may not help you in any way, but it might help future physical education students.

Can anything bad happen if I am in this study?

We think there are a few risks to you by being in the study, but some kids might feel uncomfortable wearing the pedometer. The researchers and the teacher will help you wear the pedometer correctly and if you still feel uncomfortable, then you do not have to wear one.

Who will know that I am in the study?

We won't tell anybody that you are in this study and everything you record will be private. Your parent may know that you took part in the study, but we won't tell them anything you recorded. When we tell other people or write articles about what we learned in the study, we won't include your name or that of anyone else who took part in the study.

Do I have to be in the study?

No, you don't. The choice is up to you. No one will get angry or upset if you don't want to do this. You can change your mind anytime if you decide you don't want to be in the study anymore.

What if I have questions?

If you have questions at any time, you can ask us and you can talk to your parents about the study. We will give you a copy of this form to keep. If you want to ask us questions about the study, contact Lindsey Benham at Lindsey.benham@gmail.com or contact David Barney at david_barney@byu.edu or (801) 422- 6477.

You will not receive any compensation for being in this research study. Before you say yes to be in this study what questions do you have about the study?

If you want to be in this study, please sign and print your name.

Name (Printed): _____ Signature_____ Date:_____

Parental Permission

Introduction

My name is Lindsey Benham. I am a graduate student from Brigham Young University. I am conducting a research study about the effects of music on physical activity rates of junior high physical education students. I am inviting your child to take part in the research because (he/she) currently taking a physical education class at a junior high school.

Procedures

Your child will attend their physical education class as regular, including their participation in class. Before class starts, after changing into their PE clothes, your child will be asked to grab a pedometer (device that records number of steps taken and time in activity) and hook it onto the waist band of their shorts or pants. Your child will participate in class as normal. At the end of class, your child will be given time to read their pedometers and record the number of steps taken and time in activity on a personalized recording sheet. Then your child will be dismissed to change.

If you agree to let your child participate in this research study, the following will occur:

- Your child will be asked to wear a pedometer during class
- Your child will be asked to record steps taken and time in activity at the end of class
- This will take place in their regular classroom as part of the scheduled curriculum

Risks

Minimal risks are involved. There may be some discomfort in wearing the pedometers. The teacher and researchers will take two days before starting the study to show your child the most comfortable way to wear the pedometer and how to use/read it. Your child's identity and recordings will remain anonymous after data collection.

There is a risk of loss of privacy, which the researcher will reduce by giving your child their own record sheet. Their name will be erased after full completion of data recording. During data collection the classroom teacher will store the record sheets in their locked office. And then the researchers will take the data and transfer the data onto a password protected computer in a locked office and original record sheets will be destroyed. Only the researcher will have access to the data.

Confidentiality

The research data will be kept in a secure location (password protected computer) and only the researcher will have access to the data. At the conclusion of the study, all identifying information will be removed and the data will be kept in a locked office.

Benefits and Compensation

There are no direct benefits for your child's participation in this project.

There will be no compensation for participation in this study.

Questions about the Research

Please direct any further questions about the study to Lindsey Benham at Lindsey.benham@gmail.com. You may also contact David Barney at (801) 422-6477 or david_barney@byu.edu.

Questions about your child's rights as a study participant or to submit comment or complaints about the study should be directed to the IRB Administrator, Brigham Young University, A-285 ASB, Provo, UT 84602. Call (801) 422-1461 or send emails to irb@byu.edu.
You have been given a copy of this consent form to keep.

Participation

Participation in this research study is voluntary. You are free to decline to have your child participate in this research study. You may withdraw you child's participation at any point without affecting your child's grade/standing in school.

Child's Name: _____

Parent Name: _____ Signature: _____ Date: _____

APPENDIX E

Lesson Plans

1. Roll Call – Students put on their pedometers *(15 to 20 minutes)*
2. Calisthenics
3. Run/Walk
4. Write Down Run/Walk data

BASKETBALL

Stations with a partner *(12 minutes; 3 minutes at each station)*

1. Dribbling/Ball Handling:
    a. Length of the gym (w/ non-dominant hand)
    b. Figure 8 (walking)
    c. Dribble with a defender

2. Passing:
    a. Partner passes to other partner breaking to the basket (chest, bounce, or overhead). A student will position himself or herself at the foul line, the other student will be on the wing. The student on the wing will pass the ball to student at the foul line. As soon as the student makes the pass he/she will break to the basket and receive a pass (chest, bounce, or overhead) shooting a lay-up.
    b. Partner slides the length of the court using a bounce or chest pass.

3. Lay-ups:
    a. Right handed lay-ups
    b. Left handed lay-ups
    c. Down the middle lay-ups

4. Jump Shots:
    a. Shoot 5 jump shots and exchange with partner. The other partner is the rebounder. Five spots for student to shoot at: 1) the corner/baseline; 2) the elbow; 3) the wing; 4) 7 footers; and 5) 3 footers

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Game Play *(30 minutes)*

Make teams

*** Either make 12 teams that play half courts game or 6 teams for full court games. This all depends on the number of students in the classes.

Students Record Pedometer Data & Put Pedometers Away *(2 minutes)*

1. Roll Call – Students put on their pedometers *(15 to 20 minutes)*
2. Calisthenics
3. Run/Walk
4. Write Down Run/Walk data

VOLLEYBALL

Stations with a partner *(12 minutes; 3 minutes at each station)*

1. Passing:
    a. Partner Passing
    b. Pass to Self

2. Setting
    a. Set to Partner
    b. Set to Target (Line)

3. Hitting
    a. Hit ball out of partner's hand (partner is standing on a chair)
    b. Hit ball off a toss

4. Serving
    a. Serve to Partner (back & forth)
        i. Stand on service line
        ii. 5 feet in to court
        iii. Overhand
        iv. Underhand

Game Play *(30 minutes)*

- 3 games (1 game per court), division of student's perceived skill levels (advanced skills court, intermediate skills court & beginning skills court)
- Regular Tournament Play

Students Record Pedometer Data and Put Pedometers Away *(2 minutes)*