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The Effects of Music on Student Step Counts and Time in Activity in College Basketball Activity Classes

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Authors

David C. Barney, Keven A. Prusak, and Lindsey Brewer

1 The Effects of Music on Student Step Counts and Time in Activity in a College
2 Basketball Activity Classes

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5
6 **Abstract**

7
8 Music is a powerful influence in life. We hear music at work, in the car,
9 at the mall, and in our homes. Music has also been found to have an affect during
10 physical activity. The purpose of this study was to examine the effects of music on
11 physical activity rates, via pedometers, of college-aged students in basketball class. For
12 this study 106 college-aged students participated in this study. Two classes played
13 basketball with no music playing during game play. Two other classes played basketball
14 with music playing during game play. It was found that the two classes that played
15 basketball with music took more steps and were in more time in activity.

24 The literature has found music to be a positive tool when used in a physical
25 activity setting. For example, background music has been shown to reduce perceived
26 exertion by 10% (Nethery, 2000), enhances endurance (Rendi, Szabo, & Szabo, 2008),
27 and helps ‘colour’ how a person interprets their perceptions of fatigue (Karageorghis &
28 Lee-Priest, 2012). With the increased number of studies dealing with the effects music
29 has on physical activity, a conceptual framework has been established to provide support
30 to the research. Karageorghis, Jones, and Low (2006) proposed a conceptual framework
31 of four factors how music in a physical activity setting can affect a person: they are a)
32 rhythm response, b) musicality, c) cultural impact, and d) association. Rhythm response
33 refers to the musical rhythm, most notably tempo, or speed of music as measured in beats
34 per minute. Musicality refers to the response to pitch-related elements, such as harmony
35 and melody. The cultural impact refers to the pervasiveness of the music within society.
36 And association pertains to the extramusical association a piece may evoke. The factors
37 exhibit a hierarchical structure (i.e., rhythm response is the most important contributor to
38 the motivational quotient of a piece of music).

39 As mentioned previously, a body of research has been established in a variety of
40 context within the physical activity setting. For example, Karageorghis, Jones, and Low
41 (2006) investigated the link between exercise intensity and music tempo and music tempo
42 preference. College-aged students were to pick their top-three artists for use in the study
43 then walk on a treadmill at levels of intensity while wearing a heart rate monitor and
44 listening to the selecting of music. Results indicated, that the college-aged students
45 preferred fast-tempo music and the fast-tempo music accompanied increases in workload
46 intensity. In a similar study, Copeland and Frank (1991) compared college-aged students

47 walking on a treadmill, listening to soft/slow tempo music and upbeat/fast tempo music.
48 It was found that the students listening to the soft/slow tempo music generally exhibited a
49 lowered heart rate compared to an exercise group that listened to upbeat/fast tempo
50 music.

51 For much of the research dealing with the effects of music on physical activity, it
52 has been conducted in laboratories or in fitness clubs. Another context music research
53 has taken place in is the physical education setting. Deutsch and Hetland (2012)
54 examined 4th and 5th grade students' scores and impact of music, perceived enjoyment
55 and perceived work effort throughout the PACER (Progressive Aerobic Cardiovascular
56 Endurance Run) test in elementary physical education classes. For this study students
57 experienced one of three variation provided by the PACER CD: version 'A' with a high-
58 tempo background music; version 'B' with a mild-tempo background music; and a
59 version 'w/o' that included no music. After the completion of the PACER test students
60 filled out a survey regarding the effort they gave, if they enjoyed the music that played
61 during the PACER test, if the music motivated the student during the test, and their rating
62 of their performance. It was found that the student's generally scored higher on the
63 PACER test when one of the two music versions was played during the test. The
64 researchers went on further to suggest that the female students performed better with
65 version 'A' (faster tempo) music. The male student's performed better in the PACER
66 test with the version 'B' (mild tempo) music. The results from the survey after the
67 PACER test found students had a better attitude toward the PACER test when music was
68 played.

69 A second study in a physical education setting investigated the effects of music on
70 physical activity of elementary children during physical lessons (Barney & Prusak,
71 2015). For this study 115 3rd, 4th and 5th graders participated in two Frisbee lessons and
72 two walking activities lessons. One lesson for both activities had music and the other
73 lesson had no music playing. It was found that the students were more active in both
74 lessons with music playing. Another finding from this study was that the student's
75 preferred fast-tempo music and when the fast-tempo was playing, the workload intensity
76 increased.

77 One last study in a physical education setting, investigated the effects of
78 contingent music on laps run in a high school physical education class (Ward &
79 Dunaway, 1995). For this study the researchers used a high school physical education
80 class of 36 students. The researchers randomly selected four students to observe their
81 running of laps during class. It was found that the number of laps ran increased from one
82 lap to nearly three laps per minute when music was played for the four students. Thus
83 representing an increase in the exercise pattern of half a mile per lesson. These research
84 studies have shown that music can positively affect student output in a physical education
85 class. With the results from these studies in a physical education setting, further research
86 is needed to investigate the effects of music on student physical activity in a physical
87 education setting.

88 The physical education setting offers students a multitude of curricular offerings
89 for all grades. Of the many curricular offerings, basketball is on of the more popular
90 curriculum units. Because of the nature of the game of basketball, it has plenty to offer to
91 those that participate. The Sport Business Daily (2009) reported that in 2008, 26 million

92 people participated in basketball as a form of physical activity. With these numbers of
93 participants and the amount of physical activity basketball has to offer, this presents an
94 opportunity to investigate music's affect along with basketball. Thus, the purpose of this
95 study was to examine the effects of music on physical activity rates (step counts and time
96 in activity) via pedometers, of college-aged students in basketball class.

97 **Methods**

98 **Participants and Setting**

99 Participants were 106 college-aged students (102 males and 4 females) from a
100 private university located in the western United States. The university Institutional
101 Review Board (IRB) granted approval to conduct this study. Student consent was also
102 secured. The participants were enrolled in four intermediate basketball classes at a
103 private university in the western United States. The lessons for all four classes consisted
104 of 10 minutes for the students to shoot around, to serve as a warm-up and 30 minutes of
105 game play.

106 **Pedometer Instrument**

107 The method of measuring the effects of music on physical activity rates during the
108 basketball classes was with pedometers. Pedometers are practical, easy to use, and very
109 cost effective (Barfield, Rowe, & Micheal, 2004; Beighle, Pangrazi, & Vincent, 2001; &
110 Welk, Corbin, & Dale, 2000). The pedometers have been found to be reliable and valid
111 instruments to measure activity in the basketball classes (Vincent & Pangrazi, 2002). For
112 this study the Yamaz Digi-Walker LS 2525 was the pedometer used to collect student
113 step counts and time in activity (LeMasurier, Beighle, Corbin, Darst, Morgan, Pangrazi,
114 Wilde, & Vincent, 2005).

115 Music Selection

116 The music selection used for this study consisted of popular, upbeat fast tempo
117 (120 to 160 BPM) songs suggested by researchers (Priest, Karageorghis & Sharp, 2004 &
118 Karageorghis, Jones & Low, 2006). This researcher compiled a list of 40 songs, and then
119 the researchers listened to the songs and narrowed them down to songs they felt
120 appropriate to play during game play in the basketball classes. The songs that fit the
121 requirements were made into a playlist, put on a CD to be played over a loud sound
122 system in the gymnasium.

123 Procedures and Data Collection

124 A convenience sampling of four college activity basketball classes was employed
125 in a quasi-experimental design to collect data for this study. The researchers contacted
126 the instructors for the basketball classes to explain both the study and the method of
127 collecting the data. After each instructor agreed to have their classes participate in the
128 study, the researchers attended the basketball classes and explained the study. All
129 students were assured that their voluntary decision to participate or not participate in the
130 study would not affect their grade in class or class standing. Also, the researchers
131 demonstrated how to successfully wear their pedometer while playing basketball.
132 Students were instructed to reset the pedometers to zero before they began the game play
133 portion of the lesson. On the days of data collection two of the researchers attended class
134 and passed out the pedometers and then at the conclusion of the class, collected the
135 pedometers and student record sheets. On the student record sheet the students would
136 write how many steps they took and how much time they were in activity after they
137 played basketball. Two class periods were allotted to collect data for both classes. Only

138 the researchers had access to the student record sheets. Pedometer data was collected
139 from four separate intact intermediate basketball classes. For the study two classes were
140 randomly selected (one class from each instructor) to play music during game play. The
141 other two classes (one class from each instructor) played basketball with not music
142 during game play. For this study game play was considered full-court games. The lesson
143 format was the same for all lessons, 10 minutes of warm-up, which consisted of shooting
144 around and 30 minutes of game play.

145 **Data Analysis**

146 Data was analyzed using a one-way ANOVA to assess the effects of having
147 music/no music on pedometer step counts and time in activity during two days of
148 basketball class.

149 **Results**

150 For this study a one-way ANOVA was used comparing steps taken and time in
151 activity in two basketball classes that had music playing during game play and two
152 basketball classes that had no music playing during game play. A significant difference
153 in both steps taken and time in activity was found between the classes that played music
154 during game play and the classes that did not play music during game play ($F(1,94) =$
155 $22.132, p < .001$), ($F(1, 94) = 23.007, p < .001$) respectively. This analysis revealed that
156 the students in the basketball classes with music playing took more steps ($M = 3788, SD$
157 $= 424.07$) than the students with no music playing during game play ($M = 3418, SD =$
158 344.00). The same applied to time in activity, music played ($M = 30, SD = 3.77$), no
159 music played ($M = 27, SD = 2.41$).

160 **Discussion**

161 The purpose of this study was to examine the effects of music on physical activity
162 rates (step counts & time in activity), via pedometers, of college-aged students in
163 basketball classes. The findings indicate that when music is being played during game
164 play in a college physical activity basketball class, students take more steps and are in
165 activity more. Thus the results indicate that when music was playing during game play in
166 the basketball classes the intensity of playing basketball increased. The results from this
167 study concur with previous research dealing with the effects of music on physical
168 activity. These results are similar to what Barney and Prusak (2015), found when they
169 studied the effects of music on elementary-aged students on two different physical
170 education activities (Frisbee and walking activities). When analyzing the results, each
171 lesson consisted of 30 minutes of game play with music playing; they took more steps
172 then the students that were in game play with no music. These results indicate that these
173 students increased their intensity. Karageoghis, Jones, and Low (2006) had similar
174 results with college-aged students when walking on a treadmill at three levels of
175 intensity. The researchers found that fast-tempo music was preferred and when students
176 picked fast tempo music their workload intensity increased. Also, Barney, Gust, and
177 Liguori (2012) studied college students that listened to their MP3 player while they
178 worked out at the campus fitness center. For the study students were surveyed. The
179 college students were asked what type of music they listened to while they worked out,
180 what mode of exercise did they participate in while they worked out, why they listened to
181 an MP3 player when they worked out, and the frequency of the students' work out with
182 music. The college students perceived that the MP3 player helped them to work out more
183 frequently, more intensely, and for longer durations. The results from this study, along

184 with other studies, make a strong case for physical educators to implement music during
185 their lessons for the purpose of increasing physical activity.

186

Conclusions

187 The purpose of this study was to examine the effects of music on physical activity
188 rates (step counts & time in activity), via pedometers, of college-aged students in
189 basketball classes. The researchers feel that the findings from this study will help
190 increase and strengthen the literature for the betterment of increasing physical activity in
191 a college activity setting, as well as all grade levels. The results of this study appear to
192 coincide with the tenants of Karageorghis et., al. (2006) conceptual theory regarding
193 music and physical activity. The application of this conceptual theory for this study
194 states that music can affect a person's physical activity. The areas that music can affect
195 physical activity are: a) rhythm response, b) musicality, c) cultural impact, and d)
196 association. Because of the type of music (rhythm response) used in this study, most
197 notably the tempo or speed of the music, student's steps and time in activity increased.
198 These results are in agreement with previous research findings that music increases
199 student output during physical activity (Karageoghish, Jones, and Low, 2006; Deutsch &
200 Hetland, 2012; & Barney & Prusak, 2015).

201 The findings from this study bare the fact that those students during game play
202 with music playing had significantly more steps and more time in activity, then those
203 student that played during game play with no music. Having students in activity for more
204 then half the class period is an objective physical educator's want to achieve (Malina,
205 1996). Music is a tool that can assist physical educators in meeting the objective of
206 having students in physical activity for a majority of class time. The findings from this

207 study should hint to physical educators of implementing music in game play situations
208 during class. Chen (1985) has said, “Just play some music with a definite beat and watch
209 as little ones respond with the joy of moving in space.” Even though Chen is singling out
210 small children the same can apply to any person of any age. Music can move us and, and
211 this can also apply to music being played during game play in college basketball classes.

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299 Table 1: Means, Standard Deviations and Effect Sizes
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	No Music		Group Music		<i>ES</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Steps	3428	344.00	3788	424.07	0.96
Time in Activity	27	2.41	30	3.77	0.98

301 *Note:* * = $p < .05$, ** = $p < .01$, *** = $p < .001$, ES = Cohen's $d = (M_1 - M_2) / SD_{pooled}$;
 302 $\leq .2$ = small, $\geq .41$ = medium, $\geq .7$ = large