

PEDAGOGY

Effects of Music on Mood During Basketball Play in Junior High School Physical Education

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Abstract

The incorporation of music in the physical education (PE) environment during physical activity has been shown to be beneficial for participants. Karageorghis et al. (1999) created a conceptual framework focusing on asynchronous music, identifying four factors important to a given piece of music: rhythm response, musicality, cultural impact, and association. The purpose of this study was to investigate the effect of two conditions, with and without the incorporation of music, in the PE environment on student moods in 948 junior high school students (501 males, 447 females). The conditions were measured using the Profile of Mood States (POMS) Short Form. Significant differences were observed in the mean scores of POMS between preintervention (without music) and postintervention (with music) for total mood disturbance, tension, anger, fatigue, depression, and confusion (all p values < 0.0001), as well as significantly higher mean scores for esteem-related affect and vigor (p values < 0.0001). Results from this study, and others, provide an impetus for PE teachers and PE teacher education to incorporate music during games/activities for the purpose of improving student moods and subsequent activity levels.

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A goal for education across all content areas is to create a positive learning environment that will give students opportunities to learn. One opportunity educators have, and continue to use, to assist in student learning is music. Wilkinson (2013) stated that having the “right kind of music” in educational settings has great promise in aiding students in retention and learning. Wilkinson maintained that the right kind of music has the potential to reduce stress, lessen depression and anxiety, improve mood, and enhance a sense of comfort and relaxation. Hallam and Price (1998) found a significant difference, $t(-4.7) = 8.0, p < .002$, in math performance mean score when background music was playing ($M = 38.5, SD = 15.1$) compared to the absence of background music ($M = 21.5, SD = 8.91$).

O’Sullivan (2009) reviewed research related to the Mozart Effect in the classroom and its effects on student moods in relation to learning. The Mozart Effect is associated with the temporary enhancement of spatial-temporal reasoning abilities immediately after listening to a piece of music by Mozart (Ivanov & Geate, 2003). After review of Mozart Effect studies, O’Sullivan established that the original premise of the Mozart Effect could not be verified, yet there was considerable evidence that background music may impact the learning environment. O’Sullivan continued by stating that judicious choices should be made based on the audience (i.e., students) interaction.

Incorporation of Music in the Physical Education Learning Environment

Music incorporated in a physical activity setting has been shown to be beneficial for the participant (Barney et al., 2012; Karageorghis et al., 2008; & Karageorghis & Terry, 1997). In reviewing music’s role in physical activity, Karageorghis et al. (1999) created a conceptual framework focusing on asynchronous (i.e., absence of conscious synchronization between physical movement and accompanying musical rhythm) motivational (i.e., stimulates or inspires physical activity) music in the context of exercise and sport. Within this framework, four factors that contribute to the qualities of a given piece of music have been identified: rhythm response, musicality, cultural impact, and association. Rhythm response is the response to the rhythmical elements of music—key characteristics of music for eliciting a bodily response. Musicality is the response to the pitch-

related elements of music, specifically harmony and melody. Cultural impact is the pervasiveness of the music within society (i.e., the more culturally central music is within society). Association is specific to music evoking physical activities in individuals. Karageorghis et al. (2006) proposed asynchronous motivational music leads to three psychophysical responses, namely, arousal control, reduced ratings of perceived exertion, and improving moods.

Listening to music during physical activity has been associated with longer workout times and training at higher intensities. Barney et al. (2012) explored in a survey the relationship of music during workouts in college-aged students. Results indicated college-aged students participated in activity for longer periods and at higher intensities when listening to music. Barney and Prusak (2015) further investigated the relationship of music during physical activity. They examined the effects of music on physical activity rates in an elementary physical education (PE) class (third, fourth, and fifth graders), measured with pedometers, during walking and Frisbee activities. Results indicated that on average for walking activities, males took 377 more steps than their female student counterparts when music played. For Frisbee activities, male students took an average of 604 more steps than female students (370 steps) throughout the lesson when music played. Brewer et al. (2016) conducted a similar study with music and no music with junior high school-aged PE students participating in volleyball and basketball. On average, male students acquired 41 more steps during volleyball and 220 more steps during basketball while music was playing. On average, female students acquired 380 more steps during volleyball game play and 345 more steps during basketball with music playing.

Music during physical activity may also affect a person's mood. Hayakawa et al. (2000) identified the association of music to physical activity and mood state. They evaluated the mood state of 16 subjects aged 32 to 60 years ($M = 49.9$, $SD = 7.5$), using the short form version of the Profile of Mood States (POMS; Grove & Prapavessis, 1992). Hayakawa et al. compared synchronous music and Japanese traditional folk song to no music during exercise. Their study identified significant scale items related to the type of music (or no music) and exercise, specific to vigor, $F(2,30) = 3.64$, $p < .001$; fatigue, $F(2,30) = 5.72$, $p < .01$; and confusion, $F(2,30) = 3.12$, $p < .10$.

Participants reported more positive mood traits when synchronous music played compared to when no music played. Hayakawa et al. continued by saying that between the two types of music (synchronous and traditional Japanese music), synchronous music generated more positive moods in participants. Barney et al. (2016) also investigated the effects of music on fourth-grade students' enjoyment in two activities during PE class. Fourth-grade students participated in two lessons, one with music and one without music. These students perceived PE as more enjoyable when music was playing during the lesson, compared to lessons without music. However, qualitative follow-up data from student interviews indicated the association of music to mood. From the qualitative results, one student stated, "I love PE class, but when the music was playing it made what we were doing in class funner." Another student stated, "The songs were awesome. I was singing along." Students did not specifically mention mood, yet they mentioned factors that would impact mood, such as having fun and singing. Barney and Pleban (2018) qualitatively examined 26 PE teachers' (1 to 25 years of teaching experience) perceptions of using contemporary music in the classroom. Transcript reviews revealed four major themes regarding the incorporation of music in the PE environment: classroom management, student learning, class climate, and music as a motivational tool. Within the major themes, Barney and Pleban identified additional subcontent factors—11 across all four major themes (Table 1). The purpose of this study was to investigate the effect of two conditions, with and without the incorporation of music, in the PE environment on student moods.

Method

Participants

For this study, 948 junior high school students (501 males, 447 females) from one intact junior high school in the Intermountain West were sampled. Student ages ranged from 11 to 15 years. Junior high grade levels comprised seventh, eighth, and ninth grades. Stratified by grade level, 330 seventh graders, 322 eighth graders, and 296 ninth graders participated in this study. Across all grades, stratified by race/ethnicity, students self-identified as 669 (70.6%) Caucasian,

Table 1

List of Major Physical Education and Music Interview Themes With Subcontent Factors

Major themes	Subcontent factors
Classroom management	<ul style="list-style-type: none"> • Starting activities • Stopping activities • Student listening queue
Student learning	<ul style="list-style-type: none"> • Student focus on learning • Student comfort with learning activity
Class climate	<ul style="list-style-type: none"> • Student preference for contemporary music • Creation of a positive classroom atmosphere • Establishment of positive student mood
Music as a motivational tool	<ul style="list-style-type: none"> • Behavioral reward • Student engagement • Positive messaging

Note. From “An Examination of Physical Education Teachers’ Perceptions of Utilizing Contemporary Music in the Classroom Environment: A Qualitative Approach,” by D. Barney and F. Pleban, 2018, *The Physical Educator*, 75(2), p. 202 (<https://doi.org/10.18666/TPE-2018-V75-I2-7447>).

205 (21.6%) Latino/Hispanic, 32 (3.4%) Pacific Islander, 13 (1.4%) African American, and 10 (1.1%) Native American.

Instrumentation

The instrument used for this study was a short form version of the POMS (Grove & Prapavessis, 1992). The original POMS self-report survey was created by McNair et al. (1971), who incorporated descriptive words that define feelings people have at a certain point in time. Subjects self-reported on each descriptive word adjective on a 5-point Likert scale (0 = *not at all*, 1 = *a little*, 2 = *moderately*, 3 = *quite a lot*, and 4 = *extremely*). The survey instrument consisted of 40 mood adjectives. University Institutional Board and school district approval was obtained prior to study implementation.

Participants were subsequently assured that their voluntary decision to participate or not participate in the study would not affect their grade in class or class standing.

Music Criteria

Music selection for this study consisted of a variety of appropriate popular music from contemporary music artists that students were familiar with (Barney et al., 2016). Tempo of the music was 120 to 160 beats per minute (Karageorghis et al., 2006; Priest et al., 2004). Before data collection, we and the PE teachers compiled a list of 50 popular songs. After discussion, we and the PE teachers chose and played 15 songs during the PE lesson.

Setting

Before study implementation, we contacted the junior high school physical educators, explaining both the purpose of the study and the survey instrument. Before data collection, we instructed each junior high school physical educator on proper survey administration. The school's classes ran on block schedule, A-day/B-day, with each class lasting approximately 80 min from bell to bell. Explanation, administration, and survey completion took approximately 15 min. A 99% survey response rate was recorded.

Research Design

Convenience sampling was employed for data collection in this study. The study was quasi-experimental, comparing the effect of two conditions, with and without the incorporation of music, during one class activity (basketball) in the PE environment on student mood. The POMS-Short Form is a psychological rating scale that measures six distinct mood states over time. Advantages of incorporating the POMS-Short Form include ease of instrument administration and quick assessment of the 5-point scale. The short form of the assessment was developed principally for administration to children and young adults, thus factoring into its inclusion in this study. POMS-Short Form self-report data were collected from each of the 948 participants. Data analyses were conducted using SAS software, Version 9.4 of the SAS System for Windows (SAS Institute Inc., Cary, NC, USA).

Results

Profile of Mood States

A significant difference was observed in the mean scores of POMS between preintervention (without music) and postintervention (with music; Table 2). The postintervention group showed significantly lowered mean scores for total mood disturbance, tension, anger, fatigue, depression, and confusion (all p values < 0.0001), and significantly higher mean scores for esteem-related affect and vigor (p values < 0.0001).

Table 2

Scores of Profile of Mood States (POMS) Short Form Comparing Pre (Without) and Post (With) Music During Junior High School Basketball Play

Variables	Without music ^a	With music ^a	p value ^b
Total mood disturbance	7.8 \pm 1.00	-12.6 \pm 0.69	$< .0001$
Tension	5.2 \pm 0.22	2.3 \pm 0.16	$< .0001$
Anger	5.1 \pm 0.23	1.9 \pm 0.15	$< .0001$
Fatigue	4.7 \pm 0.17	2.8 \pm 0.14	$< .0001$
Depression	5.9 \pm 0.29	1.7 \pm 0.16	$< .0001$
Esteem-related affect	11.5 \pm 0.16	14.2 \pm 0.18	$< .0001$
Vigor	5.6 \pm 0.19	8.4 \pm 0.21	$< .0001$
Confusion	4.0 \pm 0.19	1.4 \pm 0.13	$< .0001$

^a $M \pm SE$. ^b paired sample t test.

Profile of Mood States by Demographic Characteristics

The mean score for total mood disturbance improved for all demographic characteristic groups postintervention. There was no statistically significant difference among the groups: gender ($p = 0.1135$), ethnicity ($p = 0.6569$), and grade ($p = 0.0611$; Table 3). Preintervention, seventh-grade students had the lowest mean score for total mood disturbance and ninth-grade students had the highest.

Table 3

Scores of Profile of Mood States (POMS) Short Form Comparing Pre (Without) and Post (With) Music During Junior High School Basketball Play by Demographic Characteristics

Characteristics	Without music^a	With music^a	<i>p</i> value^b
Gender			
Male	7.5 ± 1.24	-11 ± 0.99	0.1135
Female	8.1 ± 1.63	-14 ± 0.97	
Ethnicity			
African American/Asian/Native American/Pacific Islander	7.2 ± 3.45	-9.6 ± 2.65	0.6569
Caucasian	8.3 ± 1.17	-13 ± 0.83	
Latino/Hispanic	6.0 ± 2.28	-13 ± 1.51	
Grade			
7th	4.3 ± 1.74	-13 ± 1.25	0.0611
8th	9.1 ± 1.63	-14 ± 1.05	
9th	10.4 ± 1.79	-11 ± 1.37	

^aM ± SE. ^bANOVA test.

Discussion

The purpose of this study was to investigate the effect of two conditions, with and without the incorporation of music, in the PE environment on student moods during basketball play. The findings suggest that music incorporated in the PE environment may positively impact student moods. Paired-sample *t* test data revealed seven moods (tension, anger, fatigue, depression, esteem-related affect, vigor, and confusion) were positively affected when music was incorporated in this sample of junior high school PE students during basketball play. POMS-Short Form data indicated that in the intervention of music, compared to no music, students were more likely to have positive self-reported responses to vigor adjectives. Barney et al. (2016) studied the effects of music on fourth-grade students' enjoyment in two activities (toss/catch with music and Hula

Hoop activities with no music). From qualitative interview data, students stated, music “gives me more energy. I know I was working harder,” and when music was playing, one student reported that it got him “pumped up.” Barney and Pleban (2018) studied PE teachers’ perceptions of incorporating music in PE lessons, qualitatively evaluating the influence of music on the classroom environment. Teachers voiced that music positively affected the class climate. Some of the responses expressed were “I believe music has a strong influence over our emotions, so if I’m playing happy upbeat music, my students are happy and active” and “If a student comes in upset from another class, listening to a song they really like it can help change their mood from negative to positive, as they associate the song with happy uplifting feelings.” Other words and/or phrases included “happy,” happier,” “more excited,” and “upbeat mood.” The results from Barney and Pleban (2018) associate with the findings of this study that a positive class environment helps students work through tension, anger, fatigue, depression, and confusion.

To note, Hayakawa et al. (2000) compared synchronous music and Japanese traditional folk song to no music during exercise and evaluated the mood states of 16 subjects aged 32 to 60 years ($M = 49.9$, $SD = 7.5$). Their study reported significant scale adjectives specific to vigor and confusion. These findings, along with this study’s findings related to items of vigor and confusion, may suggest more positive mood characteristics when music is played compared to when no music is played. In addition, Hallam and Price (1998) speculated music may have positive application outside the PE environment, in other academic classroom settings (e.g., math). However, it may be hypothesized that for mood to be positively impacted by the incorporation of music, attention should be given to the aforementioned four-factor framework contributing to the qualities of a given piece of music (i.e., rhythm response, musicality, cultural impact, and association).

Study Implications

This study identified seven mood scale items (tension, anger, fatigue, depression, esteem-related affect, vigor, and confusion) as being positively affected when music was playing in the PE classroom. This study investigated the effects of music on junior high school students’ moods. We believe that these results can apply to

and benefit all K–12 students. With the results from this study, PE teachers should consider implementing music during games/activities for the purpose of improving student moods and subsequent activity levels. Another implication from this study is specific to PE teacher education (PETE) programs and PETE majors. Study concepts may be implemented when PETE majors are immersed in their methods of teaching PE courses. After didactic instruction, PETE majors participate, and subsequently incorporate, music during their practicums and student teaching experiences.

Suggestions for Implementing Music in Physical Education

The results of this study generally show that popular upbeat music positively impacts student moods, reducing tensions, anger, fatigue, depression, and confusion, along with enhancing esteem-related affect and vigor. This study took place in a junior high school gymnasium. Barney and Prusak (2015) studied the effects of music on elementary-aged students' physical activity rates when music was and was not played. In Barney and Prusak's study, music was played while students were in the class activity (walking and Frisbee). Pangrazi and Beighle (2013) suggested music be played while students are participating in fitness activities. There is no set method when to play music and/or for how long. We feel that music is a tool PE teachers can use and that when it is used as much as possible, students will positively respond to it when it is being played during activity, thus positively affecting their moods.

Study Limitations

This study examined self-reported mood responses without incorporating biophysiological measures, Borg Scale ratings of perceived exertion, or pedometer step counts. In addition, this study has a number of limitations. The participants came from one intact junior high school. Because the participants came from one school, findings cannot be generalized or reflective of junior high school students in other junior high schools or junior high schools in other geographic regions.

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