

ORIGINAL RESEARCH

The effect of different types of music on aerobic performance in football players

Hatice Okay^{ID}, Abdullah Arguz^{ID}, Ali Osman Kivrak^{ID}

Faculty of Sports Sciences, Selcuk University, Konya, Türkiye.

Abstract

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The aim of this study was to investigate the effect of different music types on aerobic performance of football players. Amateur football players participated in the study. The mean age of the athletes was 20.75 ± 1.60 years, the mean height was 175.33 ± 9.08 cm and the mean body weight was 67.25 ± 10.39 kg. Before and after 12 min Cooper test, heart rate (HR) and perceived fatigue level (RPE) were recorded. The distances run by the athletes after listening to classical music, traditional music and popular music on different days were determined. Classical music HR and RPE values of the athletes were higher in the post-test compared to the pre-test ($p < 0.05$). Similarly, traditional music and popular music had higher HR and RPE values at posttest compared to pre-test ($p < 0.05$). However, no significant difference was found in the pre-test and post-test HR and RPE values of classical music, traditional music and popular music ($p > 0.05$). It was determined that different types of music played to the athletes did not affect the running distance ($p > 0.05$). As a result, it can be said that listening to different music does not affect HR, RPE and running distance in athletes.

Introduction

Physical activity is identified as any bodily action that requires energy expenditure as a outcome of the contraction of skeletal muscles. These activities can take place in various areas of daily life and have many positive effects on health (Warburton et al., 2006). Among these effects, depression, anxiety and stress levels decrease with activity. In addition, physical activity improves mental health and increases social interactions (Blumenthal, 1999). Moderate intensity exercises improve immune system functions, reduce inflammation and increase the efficiency of immune cells (Nieman, 1994). Sport is the planned and systematic form of physical exercise. It has a great positive impact on cognitive and physically health in short and long term (Malm et al., 2019).

Research reveals that music helps individuals to show longer endurance performance during aerobic exercise by increasing the motivation of the person. In particular, fast-paced and rhythmic music has been found to growing the motivation of individuals during exercise and make exercise more enjoyable (Karageorghis & Priest, 2012). Aerobic training is a type of exercise that aims to increase the oxygen use capacity of the heart and lungs in which large muscle groups are exercised with continuous and

rhythmic movements. Such exercises are usually performed for a extended period of time and at low or moderate intensity (Warburton et al., 2006). Therefore, it has been observed that listening to music or dealing with music can increase people's performance and endurance in activities that require physical effort. Studies have shown that especially rhythmic and motivating music can increase athletes' performance at higher intensity for more time during exercise (Çelik & Karabilgin, 2022).

The relationship between music and sports is based on the effects of music on motivation and performance. Music can positively affect the performance of athletes in training and competition. Especially rhythmic and high tempo music can increase the effort capacity and endurance of athletes (Aydın, 2014).

The tempo of music can increase physical endurance by regulating heart rate and breathing during training. In addition, the psychological effects of music can help athletes feel better during training and increase their performance. These effects become more apparent especially in sports activities that require long-term endurance (Patania et al., 2019).

Music has been found to decrease the perceived level of difficulty during aerobic exercise. This allows individuals to perceive exercise as less challenging and therefore to

✉ A. Arguz, e-mail: aarguz46@gmail.com

continue exercising for longer. This effect is particularly pronounced at low and moderate intensity exercises (Terry & Karageorghis, 2006). The effects of music on athletes made possible by the present study were. Therefore, the aim of this study is to investigate the effects of various treatments with different music genres on athletes' aerobic performance.

Methods

Participants

Twelve healthy (3 females and 9 males) amateur football players who had not been injured in the last six months, had no motor control problems, and had no neurological disorders were voluntarily involved in the study. The age of the participants was 20.75 ± 1.60 years, height 175.33 ± 9.088 cm and body weight 67.25 ± 10.39 kg. Participants were informed about all risks and possible harms before the study and signed a voluntary consent form. The study was approved by the University Ethical Committee (Date: 04.09.2024, No: 101). Participants were included in the measurements on different days and with 3 different music genres (traditional, classical and popular).

Cooper Running Test Measurement

Cooper test was performed for 12 minutes to determine the aerobic endurance performance of the participants. A heart rate monitor (Polar M430) was used to determine the resting and maximal heart rates of the athletes before and after the Cooper test.

Rating of Perceived Exertion (RPE)

In order to determine the rate of perceived exertion, a 10-point Borg scale (Borg, 1970) was used to identify the perceived exertion level before and after the 12-min Cooper test performed by the athletes on different days. Before and after the study, each athlete was asked to score the scale with numbers between 1-10 to determine their own of fatigue.

Analysis of Data

After the data were transferred to a computer, they were analyzed using the SPSS 22.0 (Statistical Package for the Social Sciences) software. The obtained variables were presented as mean (M) and standard deviation (SD). Normality analysis results determined the use of the Repeated Measures test. To find the differences between the groups, a Post-Hoc Tukey test was applied. The statistical significance level was set at 0.05.



Figure 1. Cooper running test measurement.



Figure 2. Cooper running test measurement.

Results

Table 1 provides the descriptive statistics of the participants. The mean age was 20.75 ± 1.60 years, the body weight was 67.25 ± 10.39 kg, and the height was 175.33 ± 9.08 cm.

As shown in Figure 3, as expected, found a statistically significant difference when comparing the pre and post

Cooper test HR values of the research group in both classical music ($p = .000$) and traditional music ($p = .000$), and popular music ($p = .000$) ($p < 0.05$). In contrast, no statistically significant difference was found between music types before the HR Cooper test ($p > 0.05$). Again, there was no statistically significant difference between music types after the HR Cooper test ($p > 0.05$).

Table 1

The participants' demographic information.

	n	Mean $\pm$ SD	Minimum	Maximum
Age (years)	12	20.75 ± 1.60	19	24
Body Weight (kg)	12	67.25 ± 10.39	47	78
Height (cm)	12	175.33 ± 9.08	157.00	185.00

Table 2

Heart rate of the participants in different music listening conditions (Mean $\pm$ SD).

Variables	Classical Music	Traditional Music	Popular Music
Resting KAH	68.17 ± 7.12	67.92 ± 8.49	65.33 ± 9.73
Maximal KAH	151.00 ± 27.13	154.00 ± 20.36	159.17 ± 19.25

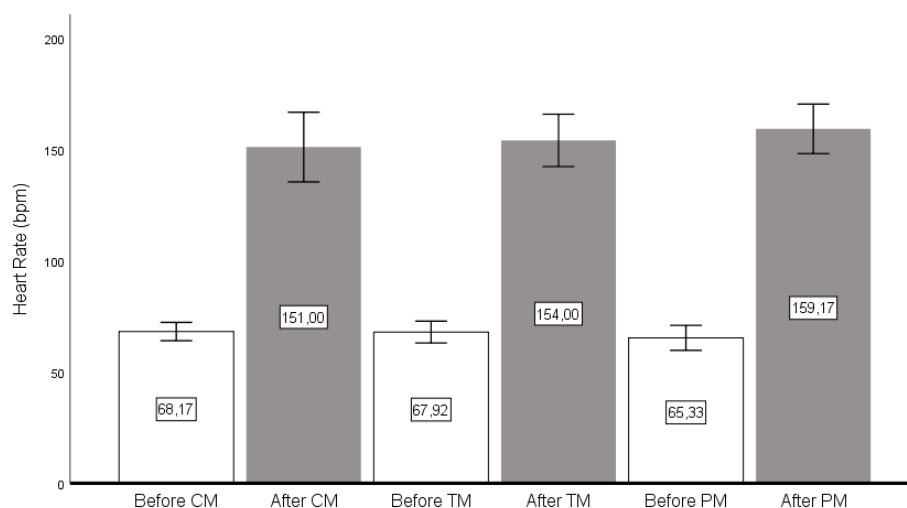


Figure 3. Heart rates before and after running with listening music.
CM: Classical music; TM: Traditional music; PM: Popular music.

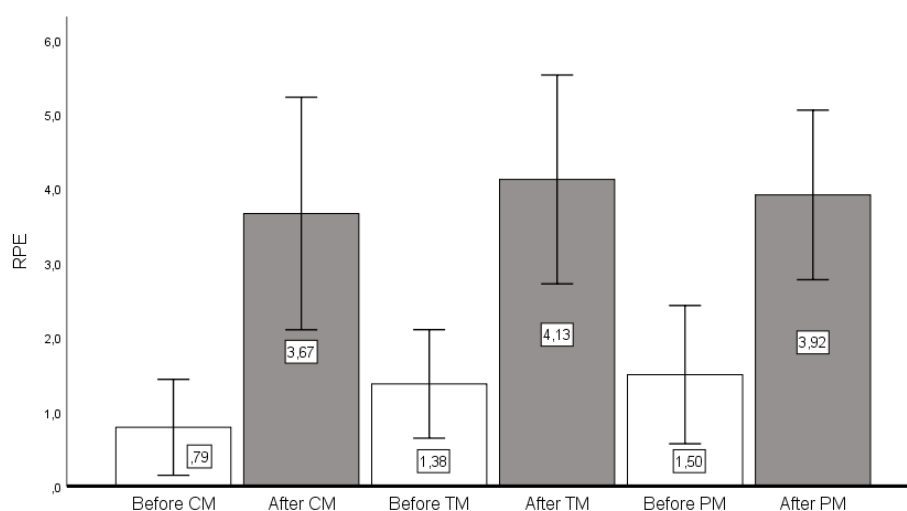


Figure 4. The RPEs before and after running with listening music.
CM: Classical music; TM: Traditional music; PM: Popular music.

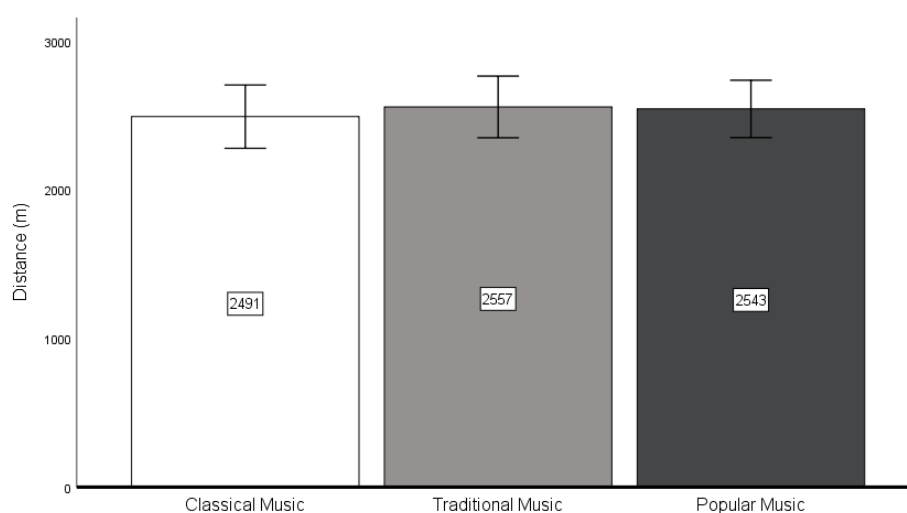


Figure 3. The Running distances with listening music.

When Figure 4 was analyzed, it was statistically determined that classical music ($Z=-2.661^b$; $p=.008$), traditional music ($Z=-2.812^b$; $p=.005$) and popular music ($Z=-2.587^b$; $p=.010$) had higher fatigue levels in the post-test compared to the pre-test ($p<0.05$). In contrast, the comparison revealed no statistically significant difference of RPE scores of classical, traditional and popular music before the Cooper running test ($p>0.05$). Similarly, there was no significant difference between music types after the Cooper running test ($p>0.05$).

As seen in Figure 3, no statistically significant difference was found in the comparison of running distances of both classical and traditional music and popular music ($F_{(2, 22)} = 2.501$; $p=.105$; $\eta^2=.185$).

Discussion

The objective of this study is to explore how different music genres (classical, traditional, and popular) affect aerobic performance. According to the findings of the study, it was found that classical music, traditional music and popular music groups had higher HR values after the Cooper test results showed higher values in the post-test compared to the pre-test across all music groups (classical, traditional, and popular). However, no statistically significant differences were observed between the groups in either the pre-test or post-test. When comparing the Rating of Perceived Exertion (RPE) scores from the pre-test and post-test across the three music groups, an increase in fatigue levels was noted in the post-test. Nevertheless, no significant differences were found in the RPE values between the groups. It was determined that classical music, traditional music and popular music did not change the running distance.

Benefiting from musical memory has an important place in maximizing performance today. It has been determined that exercise with music has a positive influence on mechanism (Erdal, 2005). Some research has shown that the following results have been reported music keeps athletes fit at the time of exercise and delays fatigue and maintains training continuity (Szmedra et al., 1998; Nethery, 2002).

It was determined that the findings of the research showed that HR did not change in different music genres. This result supports the research conducted by Van Dyck et al (2017), Da Silva et al (2014), Nakamura et al (2010). Van Dyck et al (2017) report indicated that different music tempos had no effect on HRV. Da Silva et al (2014) similarly stated that different music genres did not cause HR changes. Nakamura et al (2010) reported that preferred and

non-preferred music during high-intensity cycling exercise did not make a difference in HR. On the other hand, Ramezan-Pour et al (2012) reported that upbeat music increased HR and relaxing music decreased it in their study on women.

According to another result of our study, it was found that different types of music did not have a important effect on the RPE values of the athletes. Thakur & Yardi (2013) compared the walking performance of 3 different groups with slow rhythm music, fast rhythm music and no music, and stated that there was no difference in the RPE values of both the group listening to music and the group without music. Similarly, Stork et al. (2015) reported that exercise with and without music did not affect RPE values. Furthermore, the following points are also reported in the literature music has a positive effect on RPE values (Balman et al., 2019; Pottaiger et al., 2000). In the study investigating the effect of preferred and non-preferred music on sprint performance, it was reported that preferred music increased motivation and decreased RPE values (Balman et al., 2019). Pottaiger et al. (2000) reported that after moderate-intensity exercise for 20 minutes, different types of music (classical music, fast and moving, preferred music and no music) had lower RPE values than no music.

Supporting exercise with music contributes positively to the maximum performance of athletes and supports them to increase their endurance. It is stated that listening to music during exercise can reduce fatigue and therefore prolong the duration of exercise (Pilutti et al., 2013; Peretz, 2016; de Andrade et al., 2022).

The findings of this study identified the following issues classical music, traditional music and popular music did not causes a change in running distance in athletes. Elliakim et al. (2012), who reported similar results with this research, reported that music did not cause a difference in the anaerobic power values of the repeated sprint skills of basketball players by listening to motivational music. Kartal & Ergin (2018) examined the effect of light-moving and preferred music on aerobic performance of football players and found that music types did not affect aerobic performance. Aslan et al (2023) investigated the effect of different music genres (classical music and preferred music) on visual reaction time in a study conducted on 11-14 year old participants and found no change in the reaction time of the music, without music, classical music and preferred music. However, in the study conducted by Vatansever et al. (2018), it was stated that fast and slow tempo music positively affected exercise performance and listening to fast tempo music during aerobic exercise increased the

running time, while listening to slow tempo music after exercise increased the recovery speed.

Consequently, different music genres during aerobic exercise had no significant effect on heart rate (HR), perceived difficulty (RPE) and running distance of football players. This may suggest that athletes may have different personal reactions to a particular music genre or that the benefit of music may be more at the level of providing psychological relaxation and motivation.

Ethical Approval

The study was approved by Selcuk University, Faculty of Sports Sciences Non-interventional Ethical Committee (Date: 04.09.2024, No: 101).

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Data Availability

Data are available upon reasonable request from the corresponding author.

Authors' Contribution

Study Design; HO, AA, AOK; Data Collection: HO; Statistical Analysis: AA; Manuscript Preparation: HO, AA, AOK.

Conflict of Interest

The authors declare no conflict of interest concerning the authorship and/or publication of this study.

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