The Effect of Self-Selected Music on Shooting Performance

Journal of Pharmaceutical Research and Development Research Article

Nur 'Izzah Madihah Binti Baharuddin[1*], Kamaria Kamaruddin[2]

[1,2]*Department of Physiotherapy, Faculty of Health Sciences, Universiti Teknologi MARA, Cawangan Selangor, 42300 Puncak Alam, Selangor, Malaysia*

*Correspondence author
Nur 'Izzah Madihah Binti Baharuddin
Department of Physiotherapy
Faculty of Health Sciences
Universiti Teknologi MARA
Cawangan Selangor
42300 Puncak Alam
Selangor
Malaysia

Submitted : 15 Aug 2020 ; Published : 7 Sep 2020

Abstract

Introduction : *Music has been widely used in our daily life and has an impact on performance in sports and exercise settings. Many researchers have explored the benefits of different type of music during sports activity and athletic performance.*

Purpose : *This study aims to investigate the effect of self-selected/preferred type of music while on shooting performance.*

Method : *This is a quasi-experimental study done among 46 female netball players. Participants need to complete 12 trials shots at three different positions in front of the netball post with and without music within one-week interval between the two settings. Subsequently, after completion of the shooting performance, participants were required to rate the motivational qualities of their selected music using the Brunel Music Rating Inventory-2 (BMRI-2) questionnaire.*

Result : *The result revealed no significant effect on shooting performance between the two settings ($p>0.05$). However, there was a slight increase in shooting performance displayed when listening with self -selected music. Most of the participants preferred to use fast music type compared to slow and medium music during sports activity.*

Conclusion : *Listening to their selected motivational music minimally improve their shooting performance.*

Keywords: Self-Selected Music; Shooting Performance; BMRI-2

Introduction

Music is synonym to the humankind and has been incorporated in our daily life as it prevails in all cultures worldwide. Nowadays music is more diversified in styles/genres which can range from the series of constructed computer-generated tempo to the cultural influence [1, 2]. Each individual has a different preference of music as the music is influenced by various factors such as instrument, vocal, musical type, tempo, age and gender [1]. Today, all listener has easy access for their favourite music as it is widely available via multimedia and internet.

The value of music depends on the individual's purpose and the degree to which they engage with it, which are in turn dependent on the contexts in which they hear it. It can manipulate mood and emotion. Music is used as background music during activities or as rhythmic accompaniment such as during exercising or treatment therapy and learning [3]. Thus creating psychological environments for instance alleviate stress ,create a good mood or emotional arousal states and inspire motivations [4, 5].

Music preference depends on individual personality therefore it varies from one individual to another. It does not only depend on liking but also involve a behavioural choice that is made by the music stimuli. However, music preference can only be made if a comparison is provided, for example when they hear the same music played at different tempo or listening to different music play at altered tempos [6]. A study by LeBlanc has developed an interactive theory of preferred music and served to demonstrate the complex factors of personal, musical

and cultural variables that affect the individual preference decisions [7]. The theory has concluded that the decision of the music preference is based upon three major sources of input information which involve the interaction of the listener's musical stimulus, cultural environment and their characteristic [8].

However, Karageorghis has mentioned that LeBlanc's theory is too complex to be tested empirically [9]. LeBlanc's theory relates to the developmental process rather than the events of musical response; the broad theory maybe contrasts and not suitable to be used in exercise and sport setting. Hence, a revised conceptual model that was developed, it predicts the body reaction to motivational music preference in exercise and sport settings [10]. The authors reported that the physical properties e.g. rhythm, melody or tempo of the musical stimulus comes first in preference decision instead of the cultural factors (Figure 1).

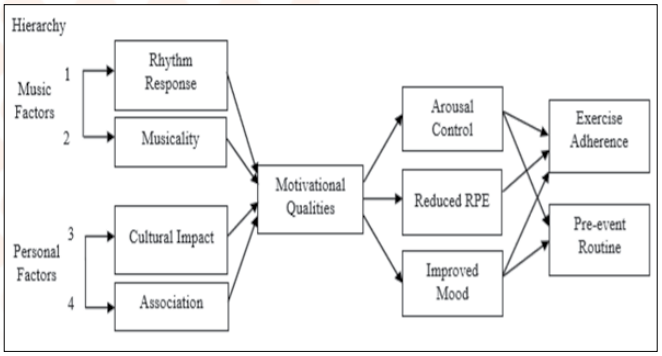

Figure 1: A revised conceptual framework for the prediction of responses to motivational asynchronous music in exercise and sport (Karageorghis et al., 1999).

Previous studies have explored the use of music on exercise performance and the effect of music on an individual. In the realm of sports and exercise, music can be a source of motivation and inspiration during sport and exercise to enhance the performance of athlete [11]. In this context, psychological function of music will affect the individual; in term of their emotional, cognitive and social functions as well as it enhances the psychophysical of the individual [4, 12]. Terry & Karageorghis reported that listening to music before or during training/exercise can improve their mood, increased activation, visual and auditory imagery, and recall of associated films or music videos [13].

Music has the potential for blocking the afferent signals of physical strain and reduces the sympathetic signal of the autonomic nervous system, therefore music helps to reduce excessive anxiety and anticipation [14, 15]. Subsequently, the presence of music will thus elevate excitement during exercise. This physiological change can be monitored through heart rate and respiratory rate [16, 17].

Most literature explained that listening to music will improve the exercise performance or even training in the sport especially that involve endurance aspect such as treadmill, anaerobic endurance, cycling or track running [11, 8-21]. Nevertheless, based on reviewed evidence, there is insufficient information and lack of studies that focus on the effect of music on a specific skill sports performance such as kicking, throwing or shooting. As the specific skill requires the athlete attention, focus and concentration.

A study has investigated the effect of music on shooting performance of a netball player, however, that gap of the study was using small sample size, lack of parameter measuring the intervention (music) applied before the shooting task [22]. Thus, this study is to explore the effect of using preferred self-selected music type on shooting performance of the netball player.

Methodology

Participants

The research procedure was approved by the Ethical Communities of UiTM Puncak Alam before this study. Participants were female final year Physiotherapy degree students of UiTM Puncak Alam. Forty-eight students agreed to volunteer as participants for this study. Participants were selected based on inclusion including female, age range 18-25 years old, have involved in netball sport and answer 'NO' in every 7-items in PAR-Q questionnaire. Participants having any illness or traumatic injury that limit the students to perform the tasks based on PAR-Q (one or more 'YES' in any 7-items) were excluded.

Procedure

The procedure method was adopted from Pates et al. and was explained to all of the participants [22]. Each participant was required to perform 12 shooting performance at three different positions in front of the netball post. The participants need to take four shots at the left and right side from the netball rim at an angle of 45° from the backline of the netball post and with a distance of 3 m. The residual four shots were taken directly in front of the netball post (middle position) with the same distance of 3 m (refer to Figure 2). Each participant had six trial shots for familiarization of the distance with two shots at each position as two familiarization trials have the slight influence of learning effect [23]. The familiarization trial limits the potential of learning effect that might compromise the internal validity of the experimental task. Each attempt of the 12 shots was recorded by the researcher following scoring table below:

Score	Description
0	Complete miss
1	Hit the rim and miss
2	Hit the rim and score the basket
3	Clean' basket

Table 1: Scoring description for shooting performance

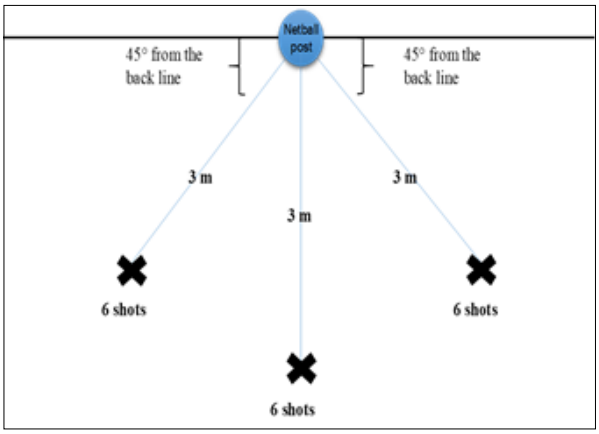

Figure 2: A diagrammatic representation of the shooting performance procedure

The participants shooting performance were measured by summating the total scores for all the 12 shots taken. Performance reliability was assessed by comparing results from two independent observers.

A week after the completion of the baseline trial, the participants repeat the shooting performance based on the procedure. The self-selected music based on the participants' preference using the earphone of their respective smartphone's throughout the shooting task. One week interval was conducted to avoid the learning effect of the shooting skill following the methodology of previous studies [22, 24].

After completion of the shooting task performance, each participant was required to complete The Brunel Music Rating Inventory (BMRI-2) questionnaire and state the preferred type of music they used. The BMRI-2 is originally validated and provides validity and internally consistent tool for selecting music to accompany an exercise or training [25, 26]. The BRMI-2 consists of 'six' items; which are rhythm, style, melody, tempo, instrumental sound and beat of the music. It consists of a 7-point scale from 1 (strongly disagreed) to 7 (strongly agreed). The alpha coefficient for each factor reported by the authors is 0.89. The sum of the ratings will indicate the extent of the motivational properties. The rating score is as follow;

Score	Description
36-42	Highly motivating
24-35	Moderately motivating
< 24	Oudeterous

Table 2: Total score description for BMRI-2 questionnaire

The participants were explained on how to answer the questionnaire and they were given 5 to 10 minutes to fill the forms. Then the forms were collected and analyzed by the researcher.

Result and Discussion

Majority of the participants felt that their self-selected music has the motivational qualities that make them motivated to perform the shooting task better as shown in table 3. Fifty percent of the participants felt that their self-selected music was moderately motivating whereby 39.1% was highly motivating and 10.9% of them felt their music was oudeterous (neutral, neither motivating nor not motivating).

Variables	Mean±(SD)	Frequency (f)	Percentage (%)
BMRI-2 score	32.98 (6.675)		
Scoring category Oudeterous		5	10.9
Moderately motivating		23	50.0
Highly motivating		18	39.1

Table 3: The extent of the motivational properties scoring of the BMRI-2 questionnaire

The paired t-test was performed to analyze shooting performance with music and non-music intervention. The finding showed that there was an increase in shooting performance with music compared to non-music intervention; with mean postintervention to pre-intervention was 12.09 to 11.50 (Table 4). However, the result was not significant ($p = 0.206$). This may due to the difference in the methodology with other studies such as the selection of the participants, the location of the study, the period of familiarization and the timing used of music intervention before the shooting task. Nevertheless, similar finding with the previous study which reported that listening to music and its rhythm while performing high-intensity exercise did not enhance anaerobic performance and change the physiological response [27].

However, current study findings are contradictory with the previous study that investigated the effect of asynchronous music on flow states and shooting performance of three netball players [22]. In this study, the participants need to listen to their preferred music and have imagery of flow while performing in the sport before completing the task. The different findings may due to the selection of the participants whereby in the previous study used an active professional netball player that had played in the primary shooting position at any point of their careers as. Whereas in the present study, the requirement of the participants was those that have involved in netball sport at any point of their life and not a professional player. Hence, each participant may have varied experience in netball sport, which might affect the overall result due to lacking shooting skill experience.

Another contributing factor may be the location used in

this study. Most of the participants may never be trained or participate in the competitive netball game in an indoor situation. Therefore, these may disturb the visual and spatial orientation of some participants which cause them unable to anticipate the trajectory of the ball into the netball goal post [28]. For this reason, the two familiarization trial was done prior to the shooting performance to minimize the effect of visual and spatial orientation disturbance. However, the previous study among a sprint cyclist may have a prolonged period of familiarization session [23].

Previous studies have examined the effect of music before performing the shooting task [22, 24] while this study investigated the effect of music during the shooting task. Hence, the difference in the timing used of music may be the reason for the inconsistency of the finding between the previous studies and the current study. Nevertheless, some of the participants show improvement in their shooting performance task in the presence of music. Hence, the use of music during the task may provide benefits to the participants by improving positive mood and reduce negative mood such as anxiety, increase motivation to perform better or promote physiological response by enhancing relaxation and calmness [13].

Variables	Pre-music intervention (n =46) Mean (±SD)	Post-music intervention (n=46) Mean (±SD)	Mean diff. (95% CI)	t-stats* (df)	p-value
Shooting performance	11.50 (2.811)	12.09 (3.352)	0.587	1.28 (45)	0.206

Table 4: The difference in shooting performance between pre and post-music intervention

In addition, the previous studies also did not use the BMRI-2 questionnaire to rate the motivational qualities of the selected music [22, 24]. Hence, both of the studies paid no attention to whether the selected music was motivational to the participants. Therefore, it is unknown whether the chosen music was due to the individual components (e.g., cultural, peer or extra-musical association) or motivational qualities of the music that possibly able to influence the shooting performance as compared to the present study. The study by John et al. may use music as a sedative agent prior to the shooting task, hence it may be the reason for not using the BMRI-2 as the questionnaire is not suitable to rate the sedative qualities of the music [13, 24]. While Pates et al. used self-selected music to enhance participants' autonomy and promote flow state (imaginary of intrinsically enjoyable experience) to achieve intrinsic motivation [22]. In this context, the motivation does not come from the music itself but rather comes from the participants' self-directed behaviour (autonomy).

Inconsistent findings to another study which investigate the effect of personalized pre-performance music and imagery in competitive soccer [29]. In this study conducted by Pain, Harwood, & Anderson (2011), participants rate their selected music using BMRI-2 and performed the intervention during their pre-match warm-up to facilitate flow states and performance. The result concluded that motivational music with the addition of imagery able to achieve a positive effect on flow and perceived performance. Notably, the use of music has motivational qualities and able to facilitated the intrinsic motivation to enhance their performance. The result differs from the current study as this study does not employ another measure on the effect of motivational music on either the physiological, psychological or psychophysical aspect.

In reference Table 5, 58.7% of the participant preferred to listen to fast type music when performing the exercise tasks while 32.6% and 8.7% preferred to listen to slow and medium music respectively. This result was consistent with a previous study that suggested fast tempo music are more preferred during physical activity [13]. In another study which investigates the relationship between heart rate and preferred tempo; it was reported that the participants favored either fast or medium tempo during low or moderate exercise and preferred fast tempo music over high-intensity exercise [30]. Findings from previous studies mentioned that slow music tempo is not preferred to be used during exercise or training. Hence, this result is contravened with the current study since some of the participants preferred to use slow tempo music. The reason for this contradictory findings may be due to the exercise task had no particular intensity prescribe during the intervention, hence some of the participants select their music depending on the environment as to reinforce the level of arousal needed [15].

Types of music use	Frequency (f)	Percentage (%)
Fast	27	58.7
Medium	4	8.7
Slow	15	32.6

Table 5: The preferred types of self-selected music used during the shooting task

Current study findings are consistent with another study that investigates the effect of different types of music on exercise performance in normal individuals [31]. It was reported that the exercise duration was increased in the presence of music as compared to without music, and the result is higher when listening to fast music compared to slow music. Consequently, participants preferred to listen to music when exercising to improve the intrinsic motivation to exercise for a longer duration and have a better performance result in shooting task.

Conclusion

The findings of this study suggested that the use of self-selected music has no significant effect during a skilled sports performance. Majority of the participants preferred to listen to fast music type while performing the shooting performance. Most of the participants felt that the use of their self-selected music on physical activity improve motivational qualities and was able to make them felt more motivated to perform better in the shooting performance. Thus, music is beneficial to enhance performance during exercise training.

Acknowledgements

My gratitude and thanks go to participants that took part in this study, my supervisor Pn Kamaria Kamaruddin for her invaluable guidance that enables me to develop an understanding of this research and to my parents and family members for providing me with unfailing support and encouragement throughout the whole process of completing this thesis.

References

1. M. Iwanaga (1995). Relationship between heart rate and preference for tempo of music. *Percept. Mot. Skills, 81*(2), 435-440.
2. C. H. Hansen and R. D. Hansen (1991). Constructing personality and social reality through music: Individual differences among fans of punk and heavy metal music. *J. Broadcast. Electron. Media, 35*(3), 335-350.
3. T. Chamorro-Premuzic and A. Furnham (2007). Personality and music: Can traits explain how people use music in everyday life?. *Br. J. Psychol., 98*(2), 175-185.
4. D. J. Hargreaves and A. C. North (1999). The functions of music in everyday life: Redefining the social in music psychology. *Psychol. Music, 27*(1), 71-83.
5. J. A. Sloboda, O'Neill, and Ivalidi (2001). Functions of music in everyday life. *Musicae Scientiae, 5*(1), 9-32.
6. A. Leblanc (1995). Differing results in research on preference for music tempo. *Percept. Mot. Skills, 81*(3), 1253-1254.
7. A. LeBlanc (1982). An interactive theory of music preference. *J. Music Ther., 19*(1), 28-45.
8. A. Leblanc, J. Colman, J. Mccrary, C. Sherrill, and S. Malin (1988). Tempo preferences of different age music listeners. *J. Res. Music Educ., 36*(3), 156-168.
9. C. I. Karageorghis (1998). Affective and psychophysical responses to asynchronous music during submaximal treadmill running. http://europepmc.org/article/ETH/388932
10. C. I. Karageorghis, P. C. Terry, and A. M. Lane (1999). Development and initial validation of an instrument to assess the motivational qualities of music in exercise and sport: The brunel music rating inventory. *J. Sports Sci., 17*(9), 713-724.
11. S. D. Simpson and C. I. Karageorghis (2006). The effects of synchronous music on 400-m sprint performance. *J. Sport Sci., 24*(10), 1095-1102.
12. C. I. Karageorghis and P. C. Terry (1997). The psychophysical effects of music in sport and exercise: A review. *J. Sport Behav., 20*(1), 54-68.
13. P. C. Terry and C. I. Karageorghis (2006). Psychophysical effects of music in sport and exercise: An update on theory, research and application. *Katsikitis, Mary Ed*. ISBN 0-909881-30-8
14. L. Crust and P. J. Clough (2007). The influence of rhythm and personality in the endurance response to motivational asynchronous music. *J. Sports Sci., 24*(2), 187-195.
15. C. I. Karageorghis and D. Priest (2011). Music in the exercise domain : A review and synthesis (Part I). *International Review of Sport and Exercise Psychology, 5*(1), 44-66.
16. L. Bernardi, C. Porta, and P. Sleight (2006). Cardiovascular, cerebrovascular, and respiratory changes induced by different types of music in musicians and non-musicians: The importance of silence. *Heart*, *92*(4), 445-452.
17. H. Nakahara, S. Furuya, S. Obata, T. Masuko, and H. Kinoshita (2009). Emotion-related changes in heart rate and its variability during performance and perception of music. *Ann. N. Y. Acad. Sci., 1169*(1), 359-362.
18. M. J. Barwood, N. J. V Weston, R. Thelwell, and J. Page (2009). A motivational music and video intervention improves high-intensity exercise performance. *J. Sport. Sci. Med., 8*(3), 435-442.
19. J. Edworthy and H. Waring (2007). The effects of music tempo and loudness level on treadmill exercise. *Ergonomics*, *49*(15), 1597-1610.
20. J. C. Hutchinson, T. Sherman, L. Davis, D. Cawthon, N. B. Reeder, and G. Tenenbaum (2011). The influence of asynchronous motivational music on a supramaximal exercise bout. *Int. J. Sport Psychol., 42*(2), 135-148.
21. 21. H. Lim, G. Atkinson, C. Karageorghis, and M. Eubank (2009). Effects of differentiated music on cycling time trial. *Int. J. Sports Med., 30*(6), 435-442.
22. J. Pates, C. I. Karageorghis, R. Fryer, and I. Maynard (2003). Effects of asynchronous music on flow states and shooting performance among netball players. *Psychol. Sport Exerc., 4*(4), 415-427.
23. P. V Capriotti, W. M. Sherman, and D. R. Lamb (1999). Reliability of power output during intermittent high-intensity cycling. *Med. Sci. Sports Exerc.,* 31(6), 913-915.
24. S. John, S. K. Verma, and G. L. Khanna (2010). The effect of music therapy on salivary cortisol as a reliable marker of pre competition stress in shooting performance. *Journal of Exercise Science and Physiotherapy, 6*(2), 70-77.
25. C. I. Karageorghis, D. L. Priest, P. C. Terry, N. L. D. Chatzisarantis, and A. M. Lane (2006). Redesign and initial validation of an instrument to assess the motivational qualities of music in exercise: The brunel music rating inventory-2. *J. Sports Sci., 24*(8), 899-909.
26. I. N. Clark, F. A. Baker, C. L. Peiris, G. Shoebridge, and N. F. Taylor (2016). The brunel music rating inventory-2 is a reliable and valid instrument for older cardiac rehabilitation patients selecting music for exercise. *Psychol. Music, 44*(2), 249-262.
27. T. Atan (2013). Effect of music on anaerobic exercise.

Biol. Sport, 30(1), 35-39.
28. D. Knudson and D. A. Kluka (1997). The impact of vision and vision training on sport performance. *J. Phys. Educ. Recreat. Danc., 68*(4), 17-24.
29. M. A. Pain, C. Harwood, and R. Anderson (2011). Pre-Competition imagery and music: The impact on flow and performance in competitive soccer. *Sport Psychol., 25*(2), 212-232.
30. C. I. Karageorghis, L. Jones, and D. C. Low (2006). Relationship between exercise heart rate and music tempo preference. *Res. Q. Exerc. Sport, 77*(2), 240-250.
31. A. M. Thakur and S. S. Yardi (2013). Effect of different types of music on exercise performance in normal individuals. Indian *J. Physiol. Pharmacol., 57*(4), 448-451.