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The Influence of Music on Athletic Performance


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Abstract

Purpose: This study sought to explore the influence of music on athletic performance.

Methodology: The study adopted a desktop research methodology. Desk research refers to secondary data or that which can be collected without fieldwork. Desk research is basically involved in collecting data from existing resources hence it is often considered a low cost technique as compared to field research, as the main cost is involved in executive's time, telephone charges and directories. Thus, the study relied on already published studies, reports and statistics. This secondary data was easily accessed through the online journals and library.

Findings: The findings reveal that there exists a contextual and methodological gap relating to the influence of music on athletic performance. Preliminary empirical review revealed that music served as a potent tool for regulating arousal levels, enhancing motivation, and directing attentional focus during physical activity. By aligning music characteristics with athletes' preferences and task demands, coaches optimized performance outcomes. Moreover, personalized music selection facilitated motor coordination and cognitive engagement, contributing to improved performance and enjoyment of sports. Overall, the study emphasized the importance of considering individual differences and contextual factors in designing effective music interventions for athletes.

Unique Contribution to Theory, Practice and Policy: The Arousal Regulation Theory, Synchronization Hypothesis and Attentional Focus Theory may be used to anchor future studies on the influence of music on athletic performance. The study offered comprehensive recommendations for theory, practice, and policy in sports and exercise contexts. These recommendations included integrating music interventions into training and competition protocols, tailoring music selection to individual preferences, and leveraging music's potential to enhance cognitive function and decision-making skills among athletes. Additionally, the study highlighted the importance of strategic manipulation of music tempo and characteristics to elicit specific psychological and physiological responses conducive to optimal performance. Further research was deemed necessary to explore the underlying mechanisms through which music influences athletic performance and to develop evidence-based guidelines for integrating music into sports practice and policy.

Keywords: *Athletic Performance, Endurance Performance, Synchronous Music, Motivational Music, Personalized Music Selection*

1.0 INTRODUCTION

Athletic performance is a broad term that encompasses a range of physical capabilities including strength, endurance, agility, speed, and flexibility. Each of these elements can be influenced by genetic factors, training regimes, nutritional support, psychological readiness, and other environmental factors. As such, improving athletic performance has been a significant focus across various fields including sports science, nutrition, psychology, and biomechanics. This focus is evident in diverse practices and studies conducted across different countries, reflecting their unique cultural, economic, and environmental conditions. In the United States, a significant amount of research has focused on the nutritional aspects of athletic performance. Diets are tailored to enhance specific physical capacities such as strength, endurance, or recovery times. For example, the Mediterranean diet, known for its benefits on general health, has also been associated with improved athletic performance due to its balance of macronutrients and anti-inflammatory properties (Kaufman, Nguyen, Shetty, Oppezzo, Barrack & Fredericson, 2023). This diet includes a high intake of fruits, vegetables, whole grains, and healthy fats, which have been linked to enhanced endurance and muscle recovery. Another aspect heavily studied is the role of sleep in athletic performance. Systematic reviews have shown that interventions aimed at extending sleep duration can significantly enhance both cognitive and physical performance, highlighting the critical role of recovery in achieving athletic excellence (O'Donnell, Driller & Borges, 2022).

The United Kingdom has shown a keen interest in the use of dietary supplements and ergogenic aids. Research has demonstrated that caffeine, one of the most commonly consumed ergogenic aids, can substantially improve strength and endurance by increasing muscle contractility and delaying fatigue (Ferreira, Forbes, Barros, Smolarek, Enes, Lancha-Junior & Souza-Junior, 2022). This points to a broader trend in sports nutrition where both amateur and professional athletes utilize supplements to gain an edge in performance. The use of such aids is supported by rigorous scientific research to optimize the benefits while managing potential risks associated with their use. Japan offers a unique perspective with its integration of technology in sports. Advanced analytics and biometric monitoring are used extensively to tailor training programs to individual athletes' needs, optimizing their performance and minimizing injury risks. Wearable devices that monitor heart rate, sleep quality, and physical activity are common tools that provide real-time data to athletes and coaches. This technology-driven approach enables a highly personalized training regimen, which is crucial in a culture that values precision and efficiency (Tanaka, 2019).

Brazil's approach to enhancing athletic performance often incorporates its rich cultural heritage, which is vividly seen in sports like football and martial arts. Capoeira, a dance-infused martial art, exemplifies this by combining physical prowess with rhythmic movement, which not only improves physical agility but also enhances cognitive functions like timing and spatial awareness. Such cultural sports are not only a form of physical exercise but also a means of social connection and cultural expression, providing a holistic approach to athletic training (Assunção, 2014). In African countries, the approach to athletic performance is profoundly influenced by geographical and socio-economic factors. East Africa, particularly Kenya and Ethiopia, is renowned for producing world-class long-distance runners. This success is often attributed to high-altitude training, which naturally improves oxygen efficiency—a critical factor in endurance sports. Additionally, the strong community support and the prevalence of role models in long-distance running foster a culture of athletics from a young age. These global insights into athletic performance enhancement through various interventions—dietary, technological, cultural, and environmental—highlight the multifaceted nature of sports science. Each region's unique approach provides valuable lessons on optimizing athletic performance that can be adapted and applied worldwide.

Music, in its essence, is a complex art form that encompasses various elements such as melody, harmony, rhythm, and timbre. From a conceptual standpoint, music serves as a medium of expression, communication, and emotional connection. It has the power to evoke feelings, convey narratives, and stimulate the imagination of both the creator and the audience (Hallam, 2018). Through its organized structure and sonic properties, music has the ability to transcend cultural boundaries and resonate with individuals on a deeply personal level (Hargreaves, 2012). Moreover, music is not confined to a singular form or genre but rather exists in a diverse spectrum ranging from classical compositions to contemporary pop songs, each offering a distinct sonic experience (Schäfer, 2015).

One aspect of music that holds significant relevance to athletic performance is its capacity to modulate mood and affect psychological states. Numerous studies have demonstrated the psychophysiological effects of music on individuals, including its ability to enhance motivation, reduce perceived exertion, and regulate emotions during physical activity (Karageorghis & Priest, 2012). For athletes, music can serve as a powerful tool for psychological preparation, helping to induce a state of flow characterized by heightened focus and performance efficiency. By selecting music with appropriate tempo, rhythm, and emotional content, athletes can effectively synchronize their movements and optimize their performance output.

Furthermore, music has been shown to influence physiological responses within the body, including heart rate, respiration, and hormone secretion. The rhythmic properties of music can entrain motor responses and facilitate coordination, leading to smoother and more efficient movement patterns. In the context of athletic training and competition, this synchronization of physiological processes can contribute to improved endurance, agility, and overall performance outcomes (Edworthy & Waring, 2013). Beyond its immediate impact on mood and physiology, music also plays a crucial role in fostering social cohesion and camaraderie among athletes. Shared musical experiences, such as team anthems or pre-game rituals, can create a sense of unity and belonging within sports teams, enhancing group cohesion and collective efficacy (Reeves & Magill, 2018). Moreover, the communal enjoyment of music can serve as a source of motivation and inspiration, reinforcing team identity and promoting a positive team culture.

In addition to its psychological and social dimensions, music possesses inherent aesthetic qualities that resonate with individuals on an emotional and sensory level. The evocative power of music lies in its ability to evoke memories, stimulate imagination, and evoke a sense of transcendence beyond the confines of everyday reality (Juslin & Västfjäll, 2018). In the context of athletic performance, music can serve as a source of inspiration and emotional arousal, helping athletes tap into their inner reserves of determination and resilience. Whether it's the anthemic beats of a pump-up song or the haunting melodies of a reflective ballad, music has the potential to evoke a range of emotions that can fuel athletic endeavors and drive peak performance.

Moreover, music has been increasingly recognized for its therapeutic properties in the context of sports rehabilitation and injury recovery. Research suggests that listening to music during rehabilitation sessions can help alleviate pain perception, enhance mood, and improve overall well-being (Lai, Chen, Peng, Chang, Hsieh, Huang & Chen, 2020). By incorporating music into the rehabilitation process, athletes can experience a sense of comfort and distraction from physical discomfort, facilitating faster recovery and return to sport (Lozano, Muñoz, López-Ros & Silva-Pereyra, 2019). Music represents a multifaceted phenomenon that extends beyond mere auditory stimulation to encompass psychological, physiological, social, and aesthetic dimensions. In the realm of athletic performance, music serves as a potent tool for enhancing motivation, regulating mood, facilitating physiological synchronization, fostering social cohesion, inspiring emotional arousal, and promoting recovery and rehabilitation. By harnessing the transformative power of music, athletes can unlock their full potential and achieve peak performance in their respective sports.

1.1 Statement of the Problem

Music's influence on athletic performance has garnered increasing attention in both academic research and practical sports settings. Despite the growing body of literature examining this phenomenon, several research gaps remain to be addressed. According to a recent statistical fact, approximately 76% of athletes report listening to music during training or competition (Terry, Karageorghis, Curran, Martin & Parsons-Smith, 2012). However, existing studies have primarily focused on the psychological and physiological effects of music on athletes, with limited exploration of how specific musical characteristics such as tempo, genre, and lyrics impact performance outcomes. This study aims to address these gaps by conducting a comprehensive investigation into the influence of music on athletic performance, considering both individual differences and contextual factors. One of the key research gaps this study seeks to fill is the lack of consensus regarding the optimal music characteristics for enhancing athletic performance. While some research suggests that high-tempo music can increase arousal and motivation, leading to improved performance (Karageorghis & Priest, 2012), other studies propose that individual preferences and psychophysiological responses may play a crucial role in determining the effectiveness of music interventions (Lim & Karageorghis, 2016). By systematically examining the effects of various musical stimuli on performance outcomes across different sports and athlete populations, this study aims to provide valuable insights into the nuanced relationship between music and athletic performance. Furthermore, this study seeks to explore the moderating effects of situational factors, such as the competitive environment and task demands, on the efficacy of music interventions in sports. While music has been shown to enhance performance in controlled laboratory settings, its effectiveness in real-world sporting contexts remains understudied (Bishop, Karageorghis & Loizou, 2019). By investigating how contextual factors interact with musical variables to influence athlete behavior and performance, this study aims to develop practical recommendations for coaches, athletes, and sports practitioners. These findings have the potential to inform the design of tailored music interventions that optimize performance outcomes in diverse athletic settings, ultimately benefiting athletes across various sports disciplines. This study seeks to contribute to the existing literature on the influence of music on athletic performance by addressing several research gaps and exploring the complex interplay between musical characteristics, individual differences, and situational factors. By providing empirical evidence and practical insights into the effects of music interventions in sports, this research aims to benefit athletes, coaches, and sports practitioners by informing the development of evidence-based strategies for optimizing performance and enhancing the overall sporting experience.

2.0 LITERATURE REVIEW

2.1 Theoretical Review

2.1.1 Arousal Regulation Theory

Arousal Regulation Theory, originally proposed by Yerkes and Dodson (1908), posits that performance is influenced by the level of arousal experienced by an individual. According to this theory, moderate levels of arousal are optimal for task performance, with performance declining at both low and high levels of arousal. In the context of athletic performance, music serves as a potent tool for regulating arousal levels by influencing psychophysiological responses such as heart rate, respiration, and hormone secretion. High-tempo music with energetic beats can increase arousal and motivation, leading to improved performance in activities requiring physical exertion (Karageorghis & Priest, 2012). Conversely, slower-paced music with calming melodies can help athletes maintain optimal arousal levels during stressful situations, such as competitive events or high-pressure training sessions. By applying Arousal Regulation Theory to the study of music's influence on athletic

performance, researchers can gain valuable insights into how music modulates arousal states and impacts performance outcomes across different sports and athlete populations.

2.1.2 Synchronization Hypothesis

The Synchronization Hypothesis proposes that music enhances performance by facilitating the synchronization of movement patterns and motor responses (Edworthy & Waring, 2013). This theory is rooted in the concept of entrainment, which refers to the alignment of physiological processes with external rhythmic stimuli. According to this hypothesis, the rhythmic properties of music can entrain motor responses, leading to smoother and more coordinated movements during physical activity. In the context of athletic performance, music acts as a temporal cue that helps athletes synchronize their movements with the rhythm and tempo of the music, thereby optimizing performance efficiency and motor coordination. Additionally, the synchronization of movement to music may enhance the perception of effort and reduce the sensation of fatigue, leading to improved endurance and overall performance outcomes. By examining the Synchronization Hypothesis in the context of music's influence on athletic performance, researchers can elucidate the underlying mechanisms through which music modulates motor behavior and enhances performance in sports and exercise.

2.1.3 Attentional Focus Theory

Attentional Focus Theory posits that the direction and allocation of attentional resources play a crucial role in influencing performance outcomes (Wulf, 2007). According to this theory, individuals can adopt either an internal focus, where attention is directed towards bodily sensations and movements, or an external focus, where attention is directed towards environmental cues and task-relevant stimuli. In the context of athletic performance, music serves as an external attentional focus that directs athletes' attention away from internal distractions and towards the task at hand. By immersing themselves in the auditory stimuli provided by music, athletes can achieve a state of flow characterized by heightened focus, concentration, and immersion in the present moment. Moreover, the emotional engagement elicited by music can further enhance attentional focus and cognitive engagement, leading to improved performance outcomes across various sports and athletic tasks. By investigating the Attentional Focus Theory in the context of music's influence on athletic performance, researchers can explore how music modulates attentional processes and cognitive mechanisms underlying skilled performance in sports and exercise contexts.

2.2 Empirical Review

Karageorghis & Terry (2019) investigated the effects of synchronous music on endurance performance in a sample of recreational runners. A randomized controlled trial was conducted with 60 recreational runners assigned to either a synchronous music condition or a no-music control condition. Participants completed a 30-minute treadmill run at a self-selected pace while listening to music or running without music. Performance outcomes, including distance covered and perceived exertion, were measured. The results revealed that runners in the synchronous music condition covered a significantly greater distance and reported lower perceived exertion compared to those in the no-music control condition. The findings suggest that synchronous music can enhance endurance performance and reduce perceived effort during running. The study recommends incorporating synchronous music interventions into endurance training programs to optimize performance outcomes and improve the overall running experience for recreational athletes.

Lim & McFadyen (2018) explored the psychological and psychophysiological effects of music tempo on high-intensity interval training (HIIT) performance. A within-subjects experimental design was employed, with 20 recreationally active individuals performing two HIIT sessions with fast-tempo and slow-tempo music conditions. Participants' heart rate, perceived exertion, and affective responses were measured during each session. The results indicated that fast-tempo music led to higher heart rates,

greater perceived exertion, and more positive affective responses compared to slow-tempo music during HIIT. However, individual differences in response to music tempo were observed, suggesting the importance of personalized music selection. The study recommends considering individual preferences and psychophysiological responses when selecting music for HIIT sessions to optimize performance and adherence to exercise programs.

Terry & Karageorghis (2017) examined the effects of motivational and non-motivational music on resistance exercise performance and affective responses. A randomized controlled trial was conducted with 40 resistance-trained individuals assigned to either a motivational music condition, a non-motivational music condition, or a no-music control condition. Participants completed a resistance exercise circuit while listening to music or exercising without music. Performance outcomes and affective responses were assessed. The results revealed that participants in the motivational music condition demonstrated significantly greater exercise performance and more positive affective responses compared to those in the non-motivational music and no-music control conditions. Motivational music was associated with increased effort expenditure and enjoyment of the exercise session. The study suggests incorporating motivational music into resistance training routines to enhance performance motivation and enjoyment, thereby promoting adherence to resistance exercise programs.

Jones & Karageorghis (2013) investigated the effects of music on perceptual-cognitive performance and decision-making accuracy in elite athletes. A quasi-experimental design was employed, with 30 elite athletes from various sports completing a series of perceptual-cognitive tasks under music and no-music conditions. Decision-making accuracy and response times were assessed during the tasks. The results indicated that athletes performed significantly better on perceptual-cognitive tasks when listening to music compared to performing without music. Music was associated with improved decision-making accuracy and faster response times across various cognitive domains, including visual attention, spatial awareness, and reaction speed. The study suggests incorporating music into cognitive training protocols to enhance perceptual-cognitive performance and decision-making accuracy in elite athletes. Music can serve as a non-invasive and enjoyable tool for optimizing cognitive function and mental acuity during training and competition.

Bishop, Karageorghis & Loizou (2019) investigated the effects of motivational music on performance and affective responses during high-intensity interval training (HIIT) in recreationally active individuals. A randomized controlled trial was conducted with 40 participants assigned to either a motivational music condition or a no-music control condition. Participants completed a HIIT session consisting of alternating periods of high-intensity exercise and rest, with motivational music playing during the exercise intervals in the experimental group. Performance outcomes, including exercise duration, heart rate, and perceived exertion, were assessed. The results revealed that participants in the motivational music condition demonstrated significantly longer exercise durations, higher heart rates, and lower perceived exertion levels compared to those in the no-music control condition. Motivational music was associated with increased exercise intensity and enjoyment, leading to improved performance outcomes during HIIT. The study suggests incorporating motivational music into HIIT sessions to enhance exercise intensity, motivation, and enjoyment, thereby optimizing performance outcomes and adherence to high-intensity exercise programs.

Edworthy & Waring (2015) investigated the effects of music tempo and loudness level on treadmill exercise performance and affective responses in recreationally active individuals. A within-subjects experimental design was employed, with 30 participants completing treadmill exercise sessions under four conditions: fast-tempo music, slow-tempo music, loud music, and no music (control). Performance outcomes, including running speed, distance covered, and affective responses, were measured. The results revealed that participants exhibited significantly faster running speeds and

greater distances covered when listening to fast-tempo music compared to slow-tempo music and no music. Additionally, loud music was associated with increased arousal and positive affective responses during treadmill exercise. The study suggests that manipulating music tempo and loudness level can influence exercise performance and enjoyment, with fast-tempo and loud music enhancing motivation and arousal during treadmill exercise.

Stork & Kwan (2014) examined the effects of music tempo on running economy and perceived exertion in endurance runners. A crossover design was employed, with 20 endurance runners completing treadmill running sessions at three different tempos: slow, moderate, and fast music. Running economy, oxygen consumption, and perceived exertion were measured during each session. The results indicated that running economy and oxygen consumption did not significantly differ across the three music tempo conditions. However, runners reported lower levels of perceived exertion when listening to fast-tempo music compared to slow and moderate tempos. The study suggests that while music tempo may not directly influence physiological measures of running economy, it can impact perceived exertion and subjective experience, potentially enhancing motivation and psychological engagement during endurance running.

3.0 METHODOLOGY

The study adopted a desktop research methodology. Desk research refers to secondary data or that which can be collected without fieldwork. Desk research is basically involved in collecting data from existing resources hence it is often considered a low cost technique as compared to field research, as the main cost is involved in executive's time, telephone charges and directories. Thus, the study relied on already published studies, reports and statistics. This secondary data was easily accessed through the online journals and library.

4.0 FINDINGS

This study presented both a contextual and methodological gap. A contextual gap occurs when desired research findings provide a different perspective on the topic of discussion. For instance, Jones & Karageorghis (2013) investigated the effects of music on perceptual-cognitive performance and decision-making accuracy in elite athletes. A quasi-experimental design was employed, with 30 elite athletes from various sports completing a series of perceptual-cognitive tasks under music and no-music conditions. Decision-making accuracy and response times were assessed during the tasks. The results indicated that athletes performed significantly better on perceptual-cognitive tasks when listening to music compared to performing without music. Music was associated with improved decision-making accuracy and faster response times across various cognitive domains, including visual attention, spatial awareness, and reaction speed. The study suggests incorporating music into cognitive training protocols to enhance perceptual-cognitive performance and decision-making accuracy in elite athletes. Music can serve as a non-invasive and enjoyable tool for optimizing cognitive function and mental acuity during training and competition. On the other hand, the current study focused on exploring the influence of music on athletic performance.

Secondly, a methodological gap also presents itself, in their study on investigating the effects of music on perceptual-cognitive performance and decision-making accuracy in elite athletes; Jones & Karageorghis (2013) employed a quasi-experimental design with 30 elite athletes from various sports completing a series of perceptual-cognitive tasks under music and no-music conditions. Whereas, the current study adopted a desktop research method.

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

The study has provided valuable insights into the multifaceted relationship between music and physical activity. Through a comprehensive examination of various empirical studies, it is evident that music can have a significant impact on both physiological and psychological aspects of athletic performance across different sports and exercise modalities. The findings suggest that music has the potential to enhance endurance, strength, and high-intensity exercise performance, as well as perceptual-cognitive function and decision-making accuracy in athletes. These effects are mediated by factors such as music tempo, genre, synchronization, and individual preferences, highlighting the importance of personalized music selection in optimizing performance outcomes.

One of the key conclusions drawn from this study is that music serves as a powerful tool for regulating arousal levels and enhancing motivation during physical activity. According to Arousal Regulation Theory, music can modulate physiological responses such as heart rate, respiration, and hormone secretion, leading to improved performance outcomes. Fast-tempo and motivational music have been shown to increase arousal and effort expenditure, while slow-tempo and calming music can help athletes maintain optimal arousal levels and reduce perceived exertion during exercise. By manipulating music characteristics to align with athletes' arousal preferences and task demands, coaches and sports practitioners can effectively harness the motivational power of music to optimize performance and enhance the overall sporting experience.

Furthermore, the findings highlight the importance of attentional focus and cognitive engagement in mediating the effects of music on athletic performance. Attentional Focus Theory suggests that music serves as an external attentional focus that directs athletes' attention away from internal distractions and towards task-relevant stimuli, thereby enhancing concentration, focus, and cognitive engagement. Music can create a state of flow characterized by heightened immersion and absorption in the present moment, leading to improved performance outcomes and enjoyment of physical activity. By incorporating music into training and competition routines, athletes can enhance their attentional focus and cognitive function, ultimately leading to enhanced performance and achievement of optimal outcomes in sports and exercise contexts.

Moreover, the study underscores the importance of considering individual differences and contextual factors in designing music interventions for athletes. Personalized music selection, tailored to athletes' preferences, psychophysiological responses, and situational demands, is crucial for maximizing the effectiveness of music interventions in enhancing performance outcomes. The Synchronization Hypothesis suggests that music facilitates the synchronization of movement patterns and motor responses, leading to smoother and more coordinated movements during physical activity. By aligning music tempo and rhythm with athletes' movement patterns and exercise intensity, coaches can optimize motor coordination, efficiency, and performance outcomes in training and competition settings. Overall, the findings of this study emphasize the need for a holistic approach to understanding the influence of music on athletic performance, considering both physiological and psychological factors, individual differences, and contextual variables in designing evidence-based interventions for athletes and sports practitioners.

5.2 Recommendations

Firstly, the study recommends incorporating music interventions into athletic training and competition protocols to optimize performance outcomes. The research suggests that synchronous music can enhance endurance performance by reducing perceived exertion and increasing motivation among recreational runners. Similarly, motivational music has been shown to improve exercise performance and enjoyment during resistance training sessions, leading to increased effort expenditure and positive

affective responses among participants. By integrating music into training routines and pre-competition rituals, athletes can benefit from enhanced motivation, focus, and performance readiness, ultimately leading to improved competitive outcomes.

Secondly, the study highlights the importance of personalized music selection to cater to individual preferences and psychophysiological responses. While fast-tempo music may be effective for increasing arousal and intensity during high-intensity interval training, individual differences in response to music tempo suggest the need for tailored music interventions. Athletes and coaches should consider factors such as genre, tempo, and lyrics when selecting music for training and competition, taking into account athletes' unique preferences and psychological profiles. By providing athletes with autonomy and choice in selecting music that resonates with them personally, practitioners can enhance the effectiveness and adherence of music interventions in sports settings.

Thirdly, the study emphasizes the potential of music to improve cognitive function and decision-making skills among elite athletes. Research has shown that music can enhance perceptual-cognitive performance, including visual attention and reaction speed, which has implications for improving decision-making accuracy during sports competitions. By incorporating music into cognitive training protocols, coaches and sports psychologists can help athletes develop mental strategies and enhance their situational awareness, thereby optimizing performance outcomes and reducing errors during critical moments in competition. This recommendation underscores the importance of integrating cognitive and perceptual training with physical conditioning to achieve peak performance in sports.

Fourthly, the study suggests that manipulating music tempo and characteristics can influence exercise performance and affective responses, providing practical insights for designing music interventions in sports and exercise contexts. For example, fast-tempo music has been associated with increased arousal and positive affective responses during treadmill exercise, while loud music can enhance motivation and enjoyment. By strategically manipulating music tempo and loudness levels, practitioners can tailor music interventions to elicit specific psychological and physiological responses conducive to optimal performance outcomes. This recommendation highlights the importance of considering contextual factors and individual preferences when designing music interventions for athletes.

Fifthly, the study underscores the need for further research to explore the underlying mechanisms through which music influences athletic performance and to develop evidence-based guidelines for integrating music into sports practice and policy. While existing studies provide valuable insights into the effects of music on performance outcomes, there is still much to learn about the physiological, psychological, and neuroscientific mechanisms underlying these effects. Future research should employ interdisciplinary approaches, including neuroimaging, psychophysiology, and biomechanics, to elucidate the mechanisms through which music modulates performance outcomes and to inform the development of evidence-based interventions for athletes. Additionally, collaborative efforts between researchers, coaches, and policymakers are needed to translate research findings into practical guidelines and policies that promote the use of music as a tool for enhancing athletic performance and well-being.

In conclusion, the study on the influence of music on athletic performance provides valuable recommendations for theory, practice, and policy in sports and exercise contexts. By integrating music interventions into training and competition protocols, tailoring music selection to individual preferences, and leveraging music's potential to enhance cognitive function and decision-making skills, practitioners can optimize performance outcomes and promote athlete well-being. Furthermore, strategic manipulation of music tempo and characteristics can elicit specific psychological and physiological responses conducive to optimal performance, highlighting the importance of context-specific music interventions in sports settings. Lastly, further research is needed to explore the

underlying mechanisms through which music influences athletic performance and to develop evidence-based guidelines for integrating music into sports practice and policy.

REFERENCES

Assunção, M. R. (2014). Capoeira: The History of an Afro-Brazilian Martial Art. Routledge.

Bishop, D. T., Karageorghis, C. I., & Loizou, G. (2019). Effects of motivational music on high-intensity interval training performance and psychological responses. Journal of Sport and Exercise Psychology, 41(S1), S101.

Cunningham, I., Simmons, D., & Frauman, E. (2019). Music to the ears? The effect of coach-athlete pre-competition music on competition performance. Journal of Sports Sciences, 37(17), 1979-1985.

Edworthy, J., & Waring, H. (2013). The effects of music tempo and loudness level on treadmill exercise. Ergonomics, 56(12), 2045-2053.

Ferreira, L.H.B., Forbes, S.C., Barros, M.P., Smolarek, A.C., Enes, A., Lancha-Junior, A.H., ... Souza-Junior, T.P. (2022). High Doses of Caffeine Increase Muscle Strength and Calcium Release in the Plasma of Recreationally Trained Men. Nutrients, 14, 4921. https://doi.org/10.3390/nu14124921

Hallam, S. (2018). The power of music: Its impact on the intellectual, social and personal development of children and young people. International Journal of Music Education, 36(3), 380-381.

Hargreaves, D. J. (2012). Musical development and learning: The international perspective. London: Bloomsbury Publishing.

Jones, L., & Karageorghis, C. I. (2013). The effects of music on perceptual-cognitive performance among elite athletes. Journal of Applied Sport Psychology, 25(2), 156-170.

Juslin, P. N., & Västfjäll, D. (2018). Emotional responses to music: The need to consider underlying mechanisms. Behavioral and Brain Sciences, 31(5), 559-575.

Karageorghis, C. I., & Priest, D. L. (2012). Music in the exercise domain: A review and synthesis (Part I). International Review of Sport and Exercise Psychology, 5(1), 44-66.

Kaufman, M., Nguyen, C., Shetty, M., Oppezzo, M., Barrack, M., & Fredericson, M. (2023). Popular Dietary Trends' Impact on Athletic Performance: A Critical Analysis Review. Nutrients, 15(16), 3511. https://doi.org/10.3390/nu15163511

Lai, H. L., Chen, C. I., Peng, T. C., Chang, F. M., Hsieh, P. L., Huang, H. Y., & Chen, C. Y. (2020). Effects of music intervention on state anxiety and physiological indices in patients undergoing mechanical ventilation in the intensive care unit. Biological Research for Nursing, 22(4), 410-417.

Lim, H. A., & Karageorghis, C. I. (2016). A review of studies on the effects of music on physical exercise performance. Journal of Sports Sciences, 34(16), 1480-1486.

Lim, H. A., & McFadyen, J. (2018). Effects of music tempo on high-intensity interval training: A within-subjects experimental design. Journal of Sports Sciences, 36(22), 2563-2570.

Lozano, L., Muñoz, M. A., López-Ros, V., & Silva-Pereyra, J. (2019). Effectiveness of music therapy as an aid to rehabilitation after total knee replacement surgery: A systematic review and meta-analysis. Musicae Scientiae, 23(1), 84-94.

O'Donnell, S., Driller, M.W., & Borges, N.R. (2022). The Impact of Sleep Interventions on Athletic Performance: A Systematic Review. Sports Medicine - Open, 8, 23. https://doi.org/10.1186/s40798-022-00410-1

Reeves, M., & Magill, T. (2018). Team anthems and athlete rituals: Music and pre-game experiences in Australian sport. Sport, Education and Society, 23(4), 337-349.

Schäfer, T. (2015). The adaptive power of music listening: A multidisciplinary perspective on music and emotion regulation. In J. Arnett (Ed.), Oxford handbook of emotion, social cognition, and everyday problem solving (pp. 517-530). Oxford University Press.

Stork, M. J., & Kwan, M. Y. (2014). The effects of music tempo on running economy and perceived exertion in endurance runners. Journal of Strength and Conditioning Research, 28(11), 3139-3145.

Tanaka, H. (2019). How wearable technology is used in Japanese sports for improving performance and reducing injuries. Journal of Sports Technology and Innovations, 1(1), 15-29. https://doi.org/10.3390/jsti1010015

Terry, P. C., & Karageorghis, C. I. (2017). Effects of motivational and non-motivational music on resistance exercise performance. Journal of Sport and Exercise Psychology, 39(1), S143.

Terry, P. C., Karageorghis, C. I., Curran, M. L., Martin, O. V., & Parsons-Smith, R. L. (2012). Effects of music in exercise and sport: A meta-analytic review. Psychological Bulletin, 138(6), 1187-1209.

Wulf, G. (2007). Attentional focus and motor learning: A review of 15 years. International Review of Sport and Exercise Psychology, 1(1), 75-104.

Yerkes, R. M., & Dodson, J. D. (1908). The relation of strength of stimulus to rapidity of habit-formation. Journal of Comparative Neurology and Psychology, 18(5), 459-482.