QUALITY IN SPORT
eISSN 2450-3118 · Open Access · Peer-reviewed
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SKALNIAK, Kinga. The Influence of Music on Exercise Performance and Perceived Exertion: A Narrative Review. Quality in Sport. 2026;75:76049. https://doi.org/10.12775/QS.2026.75.76049

ARTICLE TIMELINE
Received: 13.09.2026. Accepted: 17.09.2026. Published: 22.09.2026.

The journal has been awarded 20 points in the parametric evaluation by the Polish Ministry of Higher Education and Science (Annex to the announcement of 05.01.2024, No. 32553). Unique Journal Identifier: 201398. Scientific disciplines assigned: Economics and Finance (Field of Social Sciences); Management and Quality Sciences (Field of Social Sciences).
Punkty Ministerialne z 2019 – aktualny rok 20 punktów. Załącznik do komunikatu Ministra Szkolnictwa Wyższego i Nauki z dnia 05.01.2024 Lp. 32553. Posiada Unikatowy Identyfikator Czasopisma: 201398. Przypisane dyscypliny naukowe: Ekonomia i finanse (Dziedzina nauk społecznych); Nauki o zarządzaniu i jakości (Dziedzina nauk społecznych). © The Authors 2026.

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The Influence of Music on Exercise Performance and Perceived Exertion: A Narrative Review

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Abstract

Introduction and Purpose

Music is widely used during exercise and may influence both physical performance and the subjective experience of effort. This narrative review summarizes current evidence on the effects of music on exercise performance and perceived exertion, with particular attention to exercise modality, intensity, music preference, tempo, and timing of exposure.

Materials and Methods

A literature search of PubMed/MEDLINE and Google Scholar was conducted, focusing mainly on studies published between January 2015 and September 2026. Experimental studies, systematic reviews, and meta-analyses involving healthy adults, recreationally active individuals, and athletes were considered.

Results

Music is generally associated with small improvements in exercise performance and modest reductions in perceived exertion. Benefits are reported most consistently in endurance, muscular endurance, and selected repetition-based tasks, whereas effects on brief maximal and anaerobic performance are less reliable. Preferred or self-selected music appears particularly relevant to motivation and affective responses. Tempo, timing, synchronization, and exercise intensity may modify the response. Lower perceived exertion does not necessarily indicate reduced physiological load, and effects on variables such as heart rate are less consistent.

Conclusions

Music may be useful as a context-dependent training aid rather than a universal ergogenic strategy. Its practical value appears greatest when the music is well matched to the individual, the exercise task, and the purpose of the session.

Keywords: music; exercise performance; perceived exertion; rating of perceived exertion; music preference; exercise

1. Introduction

Music is widely used during exercise and has been studied as a potential way to influence both physical performance and the subjective experience of effort. Research in this area has focused

mainly on exercise performance, perceived exertion, affective responses, motivation, and selected physiological variables. Although many studies report beneficial effects, the findings are not fully consistent and appear to depend strongly on the exercise context.

One of the most reproducible observations is that music can reduce perceived exertion and, in some settings, improve performance. In a large meta-analysis including 139 studies and 3,599 participants, music was associated with better physical performance and lower perceived exertion, with effect sizes of $g = 0.31$ and $g = 0.22$, respectively [1]. These effects were modest, which is important when considering the practical significance of music as an exercise aid. More recent evidence has generally supported a beneficial effect on perceived effort and selected performance outcomes, although the strength of evidence varies between outcomes [2].

The response to music is not uniform. Exercise intensity, exercise modality, timing of music exposure, and individual preference can all influence the result. Preferred or self-selected music may be particularly relevant because its effects are likely to involve not only auditory stimulation but also familiarity, emotional response, and motivation [3]. At the same time, music does not consistently alter physiological variables such as heart rate, suggesting that its effects on exercise experience and performance cannot be explained by a single mechanism [1,2].

This narrative review summarizes current evidence on the influence of music on exercise performance and perceived exertion. Particular attention is given to the conditions under which music appears to be most effective, the possible mechanisms involved, and the factors that may explain differences between studies.

2. Materials and Methods

A literature search was performed in PubMed/MEDLINE and Google Scholar, with the final search completed in September 2026. The review focused mainly on publications from January 2015 to September 2026. Earlier studies were included when they provided relevant background or were frequently cited in later research.

Searches combined terms related to music and exercise with terms describing performance, perceived exertion, exercise intensity, music preference, aerobic exercise, anaerobic exercise,

and resistance exercise. Reference lists of relevant reviews and meta-analyses were also checked for additional publications.

Original experimental studies, systematic reviews, and meta-analyses were considered when they examined the use of music before or during exercise and reported outcomes related to physical performance, rating of perceived exertion, affective responses, motivation, or physiological variables. The review focused primarily on healthy adults, including recreationally active individuals and athletes.

Given the differences between studies in exercise protocols, participant characteristics, music selection, and outcome measures, the findings were summarized narratively. When interpreting the evidence, attention was paid to exercise type and intensity, music preference, tempo, and the timing of music exposure.

3. Mechanisms Underlying the Effects of Music on Exercise

The influence of music on exercise is best understood as a combination of attentional, emotional, and behavioral effects rather than as a direct physiological enhancement. These mechanisms overlap, and their importance changes depending on exercise intensity, the type of task, and the characteristics of the music itself.

One of the most discussed mechanisms involves attentional focus. During exercise, the perception of effort is shaped by internal cues such as breathing, muscle discomfort, and fatigue. At lower and moderate intensities, music can compete with these signals for attention, making the effort feel less prominent. This effect appears to weaken as intensity rises. During very strenuous exercise, physiological sensations become more dominant and are harder to override with an external stimulus [4,5]. This may explain why music often has a clearer effect on perceived exertion during submaximal exercise than during short, maximal efforts.

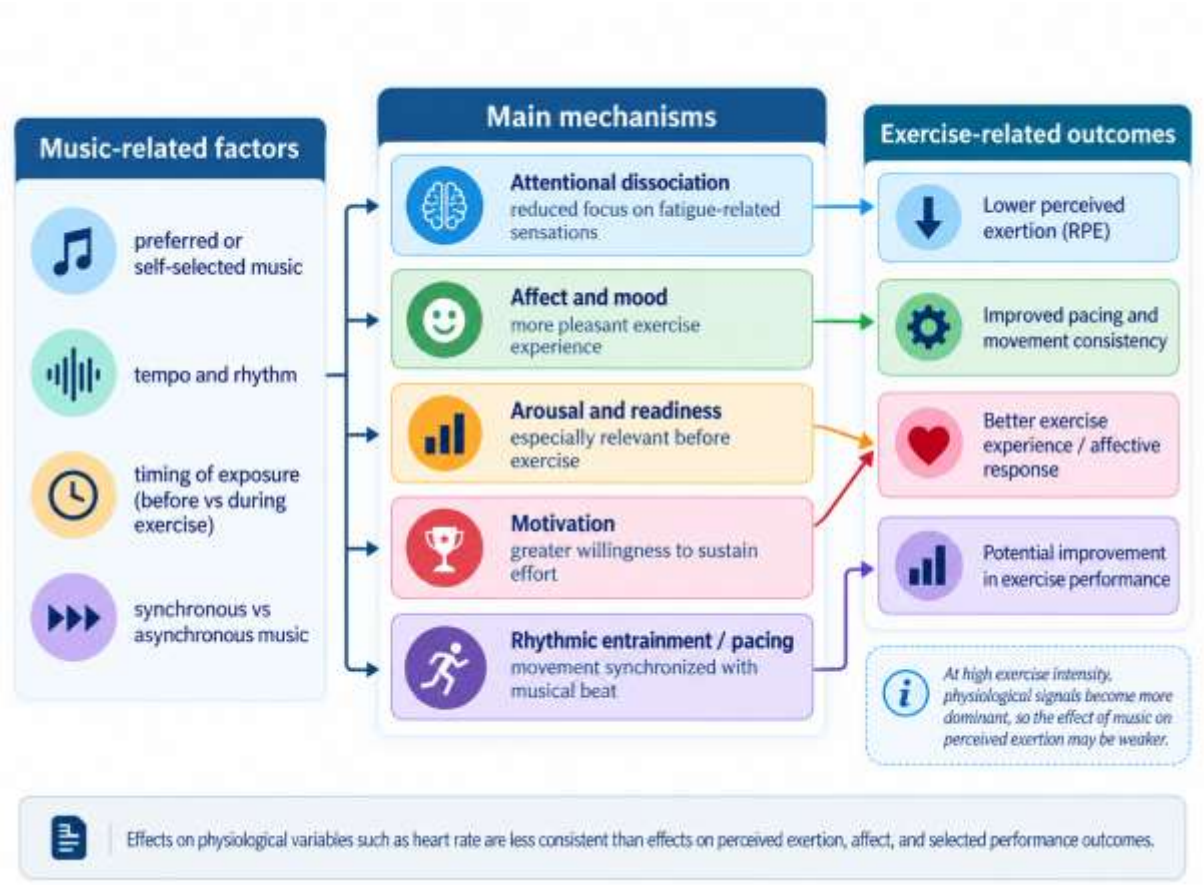
The emotional response to music is equally important. Music that is enjoyable or personally meaningful may improve mood, increase arousal, and make exercise easier to tolerate. This is particularly relevant when participants listen to preferred or self-selected music. In that setting, the effect is not simply caused by the presence of sound. Familiarity, expectation, and personal association with the music may all contribute to the response. This is one reason why studies using researcher-selected music do not always produce the same results as studies based on individual preference [3,6].

Music used before exercise may work in a slightly different way. Rather than reducing awareness of effort, it may mainly influence arousal, readiness, and motivation before the task begins [7]. This distinction is important because pre-task and in-task music are often discussed together, even though they may affect performance through different pathways.

Rhythm also plays a role, especially in repetitive forms of exercise. In running, cycling, rowing, or walking, movement may become synchronized with the musical beat. A regular rhythm can help maintain pacing and movement consistency, although the effect is unlikely to be equally important in every activity. In tasks with irregular movement patterns or rapidly changing external demands, rhythmic synchronization probably contributes less [8].

The available evidence therefore suggests that music mainly changes how effort is perceived and regulated rather than substantially reducing the physiological cost of exercise. A lower rating of perceived exertion should not be interpreted as proof of lower cardiovascular or metabolic strain. This distinction is supported by studies in which music improved perceived exertion or performance while producing little or no consistent change in heart rate or other physiological measures [1,2]. The practical effect of music seems to arise from the interaction between attention, emotional response, motivation, and pacing, rather than from one isolated mechanism.

Figure 1. Proposed mechanisms by which music may influence exercise performance and perceived exertion



Source: Own elaboration based on the reviewed literature. [1–8]

4. Effects of Music on Exercise Performance

The influence of music on physical performance has been examined in endurance exercise, resistance training, sprinting, and tests of muscular power. Across these settings, the average effect appears to be favorable but modest. In the meta-analysis by Terry et al., based on 139 studies, music was associated with better physical performance, with an overall effect size of $g = 0.31$ [1]. The magnitude of this effect indicates a modest average benefit rather than a large ergogenic effect.

Endurance exercise is one of the areas in which positive findings are reported most often. A recent meta-analysis of 15 studies involving 339 physically active adults found better fixed-duration aerobic performance with music (SMD = 0.39) [2]. Some studies also recorded longer time to exhaustion, but this outcome showed considerable between-study variation. Differences in workload, participant training status, and testing protocols make it difficult to assign a single expected benefit to endurance exercise as a whole.

Resistance exercise shows a different pattern. The largest effects have often been observed when participants were allowed to listen to preferred music. One recent meta-analysis reported improvements in strength endurance (SMD = 0.72), maximal strength (SMD = 0.53), and power output (SMD = 0.47) compared with non-preferred or no-music conditions [3]. These findings are notable, but they describe the effect of preference as much as the effect of music itself. Studies using standardized tracks may therefore not be directly comparable with studies in which participants select their own music [9,10].

Short anaerobic efforts are less predictable. Earlier Wingate-based studies reported increases in relative peak or mean power in some conditions, whereas other outcomes remained unchanged [11]. A later meta-analysis of 21 studies found a benefit for repetition-based performance (SMD = 0.46), but results for peak power, mean power, movement velocity, time-based performance, and fatigue index were uncertain [12]. Confidence in several of these estimates was low or very low, which limits firm conclusions about maximal anaerobic performance.

Part of this variation may reflect the demands of the task itself. During prolonged or repetition-based exercise, pacing, persistence, and tolerance of discomfort can influence the amount of work completed. A brief maximal effort leaves less opportunity for these factors to affect the result. Current studies, however, do not clearly separate these behavioral influences from physiological limitations.

Overall, performance benefits appear more consistently in endurance and repeated-effort tasks than in brief maximal exercise.

Table 1. Summary of the effects of music on performance across different exercise modalities

Exercise modality	**Main outcomes assessed**	**Main findings**	**Key caveat**
Aerobic / endurance exercise	Fixed-duration performance, time to exhaustion	Music may improve fixed-duration performance (**SMD = 0.39**) and, in some	Results for time to exhaustion vary considerably between studies

		studies, prolong time to exhaustion	
Maximal strength and power	Maximal strength, power output	Preferred music has been associated with higher maximal strength (**SMD = 0.53**) and power output (**SMD = 0.47**)	These effects largely reflect comparisons with non-preferred or no-music conditions and should not be generalized to all music exposure
Muscular endurance / repetition-based exercise	Repetitions completed, strength endurance	Benefits are relatively consistent; preferred music improved strength endurance (**SMD = 0.72**), while repetition-based performance improved in anaerobic protocols (**SMD = 0.46**)	Findings from repeated-effort tasks cannot be directly extrapolated to brief maximal exercise
Sprint / maximal anaerobic exercise	Peak power, mean power, velocity, fatigue index, completion time	Results are mixed, with no consistent improvement across maximal-performance outcomes	Evidence for several outcomes is of low or very low certainty and protocols differ substantially

Abbreviation: SMD, standardized mean difference.

Source: Own elaboration based on the reviewed literature [2,3,11,12].

5. Music and Perceived Exertion

Perceived exertion is one of the most frequently studied responses to music during exercise. In the meta-analysis by Terry et al., music was associated with lower perceived exertion, with an overall effect size of g = 0.22 [1]. The effect is modest, but it may still be relevant during prolonged exercise, where small changes in perceived effort can influence tolerance and pacing.

More recent evidence is particularly supportive in aerobic exercise. A 2026 meta-analysis of 15 studies reported lower RPE with music (SMD = −0.36) [2]. Between-study variation for this outcome was limited, and the certainty of evidence was rated as moderate. Compared with several performance and physiological outcomes examined in the same analysis, the effect on perceived exertion was relatively consistent.

The influence of music preference is less clear. A meta-analysis comparing preferred music with non-preferred or no music found a similar reduction in perceived exertion (SMD = −0.36) [3]. Another analysis restricted to recreational athletes, however, found no significant effect on RPE [13]. Differences in exercise protocols, participant characteristics, and the definition of preferred music make direct comparison difficult. Preference should therefore not be assumed to reduce perceived effort in every setting.

The reduction in RPE appears most evident during submaximal exercise and becomes less consistent as exercise intensity approaches maximal levels [4,5]. This is in line with the increasing prominence of physiological sensations during strenuous exercise, as discussed earlier.

RPE should also be interpreted separately from physiological load. In the recent aerobic meta-analysis, perceived exertion decreased while heart rate did not change significantly [2]. Similar findings have been reported in broader analyses [1]. A lower RPE therefore does not imply that the cardiovascular or metabolic cost of exercise has fallen; it reflects a change in how the effort is experienced rather than a proportional reduction in physiological demand.

Current evidence supports a modest reduction in perceived exertion, particularly during aerobic and submaximal exercise. The response is less consistent at very high intensities and when individual responses to the music differ.

6. The Role of Music Preference and Self-Selection

Music preference can influence the response to music during exercise. A self-selected track differs from researcher-selected music not only in genre or tempo, but also in familiarity and personal meaning. The same song may therefore be stimulating for one person and neutral or distracting for another [3,10].

A meta-analysis of 41 studies including 855 participants found that preferred music was associated with greater motivation, more positive affective responses, and lower perceived exertion than non-preferred or no music [3]. The strongest effect was observed for motivation (SMD = 0.85), while the effect on perceived exertion was smaller (SMD = −0.36). Improvements were also reported for strength endurance, maximal strength, and power output, whereas effects on speed and aerobic endurance were less consistent. Outcome-specific responses have also been reported in active women, with preferred music improving motivation and selected isometric measures without improving countermovement-jump height or peak power [14].

Preference is difficult to isolate experimentally. When participants choose their own music, they also select characteristics such as tempo, genre, familiarity, and emotional tone. The problem is made more complex by differences in how preferred music is defined. Some studies allow free choice, others use a restricted playlist, and some classify music as preferred only after it has been rated. These conditions are not equivalent and may produce different levels of personal engagement. Studies grouped under the same label of "preferred music" may therefore be testing substantially different interventions [3,10]. Music volume can also modify psychological responses without necessarily changing performance, adding another source of variation across protocols [15].

Not every analysis has shown a clear benefit. A meta-analysis restricted to recreational athletes found no significant effect of preferred music on mean heart rate or perceived exertion [13]. Most of the included studies were small and used different exercise protocols, which limits the strength of this conclusion. Still, the finding is important because it shows that preference alone does not guarantee lower RPE or better performance.

Preference appears to be most relevant to motivation and affective responses, while its effect on objective performance is less predictable. Studies comparing preferred music with no music

should therefore be interpreted carefully, because any observed difference may reflect both exposure to music and the personal relevance of the selected track [3,10,14,15].

7. Music Tempo and Timing of Exposure

Tempo is one of the most commonly manipulated features of music in exercise research. Faster music has often been associated with greater arousal and, in some studies, better performance than slow- or moderate-tempo music [1,16]. The relationship is not straightforward. A higher number of beats per minute does not necessarily produce a larger benefit, and the tempo imposed in an experiment may differ from what a participant would naturally choose during exercise. Comparisons between studies are also complicated by inconsistent definitions of slow, moderate, and fast music.

Tempo may also influence the affective response to exercise. A 2025 meta-analysis found that it moderated affective valence and arousal, with faster music generally producing stronger responses [6]. These findings do not establish an optimal tempo for performance. The most suitable tempo may differ according to exercise intensity, movement cadence, and individual preference.

Timing of exposure is relevant for a different reason. A multilevel meta-analysis of 30 studies examining pre-exercise music reported improvements in completion time (SMD = −0.24), relative mean power (SMD = 0.38), and relative peak power (SMD = 0.53) [7]. Perceived exertion was not significantly reduced. Pre-exercise music may therefore be more relevant to preparation for the task than to how effort is perceived once exercise has begun. Warm-up studies have similarly reported benefits of preferred music for selected performance and motivation outcomes without uniform changes in RPE [17,18].

Music used during exercise has been associated with a different set of outcomes. In aerobic protocols, in-task music was linked to lower RPE and improved fixed-duration performance [2]. A direct comparison of preferred music during a 6-min test and during warm-up also showed that timing can alter pacing and performance responses [19]. Pre-task and in-task music should therefore be distinguished when results are compared rather than treated as a single form of music exposure.

Synchronization with the musical beat has mainly been examined in activities with a regular cadence, including running, walking, cycling, and rowing. Some studies have reported

improvements in pacing or performance with synchronous music, but the evidence is less extensive and study protocols vary considerably [8]. Its relevance is also likely to be lower in activities where movement rhythm changes frequently.

Table 2. Key factors modifying the response to music during exercise

Factor	Main outcomes	When the effect may be stronger	Key limitation
Music preference / self-selection	Motivation, affect, RPE; selected strength and power outcomes	With personally preferred or self-selected music	Definitions of "preferred music" vary, and preference is difficult to separate from familiarity, tempo, and emotional meaning
Tempo	Arousal, affect; selected performance outcomes	Faster tempo may be useful when greater arousal or movement cadence is desirable	No universal optimal tempo has been established
Timing of exposure	**Pre-task:** readiness and power-related outcomes. **During exercise:** RPE, pacing, endurance	Pre-task before brief efforts; during exercise in prolonged or self-paced tasks	Pre-task and in-task music should be treated as different interventions

Exercise intensity	RPE and affective responses	Mainly during low- to moderate-intensity or submaximal exercise	At very high intensity, physiological sensations may reduce the effect on RPE
Synchronization with movement	Pacing, movement consistency, selected endurance outcomes	In repetitive activities with a stable cadence	Evidence is limited and less applicable to irregular movement patterns

Source: Own elaboration based on the reviewed literature [1–8,13,16–19].

8. Practical Applications in Training and Sport

Music may be useful as a supportive element of training, particularly when pacing, persistence, or tolerance of effort influence the amount of work completed. This is most relevant to endurance exercise, repeated-effort tasks, and some forms of resistance training. The expected effect is usually modest, so music should be viewed as an adjunct to training rather than as a major performance-enhancing strategy.

For most athletes, self-selected music is likely to be more practical than a standardized playlist. Preference appears to influence motivation and affective responses more consistently than objective performance [3,10]. This makes universal recommendations concerning genre or tempo difficult to justify. A track that is stimulating for one athlete may be neutral or distracting for another, and preferences may also change with the type of session.

The timing of music can be matched to the purpose of the exercise. Pre-exercise music may be useful during warm-up or immediately before a short, explosive effort when greater arousal or readiness is desirable [7,17,18]. During prolonged exercise, in-task music is more relevant to pacing, perceived exertion, and sustained effort [2,19]. These approaches should not be treated as interchangeable, because they target different phases of the exercise task.

The effect on perceived exertion is particularly relevant in practice. Music can make a given workload feel easier without producing a comparable reduction in cardiovascular or metabolic demand [1,2]. A lower RPE should therefore not be interpreted as evidence that the physiological or external training load has decreased.

Music may also be useful when the aim of a session is not maximal performance. Enjoyment and affective responses are relevant in recreational exercise and in repetitive training sessions that may otherwise be monotonous. However, most available studies examine acute responses, so it remains uncertain whether these short-term effects persist over longer training periods.

The usefulness of music also depends on the sporting environment. In individual or repetitive exercise, it can usually be incorporated without disrupting the task. In team sports, technical drills, or activities requiring continuous communication and rapid responses to external cues, its value may be lower. In these settings, attention to tactical and environmental information may take priority over the potential benefits of music [20].

Music is therefore most useful when it supports the aim of the session without interfering with task-relevant information. Its practical value appears greatest in individual training where motivation, pacing, or tolerance of sustained effort are important.

Figure 2. Practical considerations for the use of music during exercise and training



Source: Own elaboration based on the reviewed literature. [2,3,7,10,16–20].

9. Limitations of Current Evidence and Future Directions

Research on music and exercise is extensive, but many individual studies are small and use highly variable experimental protocols. Crossover designs are common and help reduce the influence of between-participant differences, yet small sample sizes still limit the precision of estimates, particularly when the expected effects are modest. This problem is especially relevant for strength, power, and anaerobic outcomes, where conclusions may depend on relatively few studies [2,3,10,12,13,20].

The music intervention itself is another source of inconsistency. Tempo, genre, volume, duration, and timing differ between protocols, as does the method used to select the music. The term “preferred music” is particularly problematic. It may refer to a freely chosen track, a selection from a predefined playlist, or music rated as preferable after exposure. These conditions are not equivalent, yet they are sometimes discussed as if they represented the same intervention [3,10,15,16].

Differences between exercise tests further complicate interpretation. Time-to-exhaustion protocols, resistance exercise, repeated sprints, Wingate tests, and sets performed to failure assess different aspects of performance. Outcomes such as repetitions completed, peak power, movement velocity, or completion time should not be expected to respond to music in the same way. Broad pooled estimates are useful for identifying general tendencies, but they can obscure effects that are specific to a particular task [2,3,11,12].

Most available studies examine the response to music during a single exercise session. This is sufficient for assessing acute changes in performance, RPE, or affect, but it provides little information about repeated use. Whether the response remains stable over longer training periods, diminishes with familiarity, or changes with repeated exposure remains uncertain [10].

Future studies should define the music intervention more precisely and report its main characteristics consistently. Pre-task and in-task exposure, preferred and non-preferred music, and synchronous and asynchronous use should be analyzed separately where possible. Larger samples and exercise protocols built around clearly specified outcomes would make results easier to compare, while field-based studies could help establish whether laboratory effects remain meaningful in ordinary training settings.

The priority for future research is not simply to confirm that music can influence exercise, but to determine the magnitude, reproducibility, and practical relevance of these effects for specific tasks and populations.

10. Conclusions

Music can improve selected aspects of exercise performance and reduce perceived exertion, but the magnitude of these effects is usually modest and depends on the exercise task. The clearest benefits are seen in endurance and repeated-effort exercise, whereas findings from brief maximal and predominantly anaerobic tasks are less consistent. Psychological responses, particularly perceived exertion, motivation, and affect, appear to be influenced more reliably than physiological variables such as heart rate.

The practical value of music lies mainly in modifying how effort is experienced and sustained rather than in producing a large direct improvement in physical capacity. Its effect is more likely to be meaningful when the music is well matched to the individual and to the demands

of the exercise. Music is therefore best viewed as a flexible training tool whose usefulness depends on the setting, rather than as a universally effective ergogenic aid.

Declaration of the use of generative AI and AI-assisted technologies in the writing process

During the preparation of this manuscript, the author used ChatGPT (OpenAI) to assist with language refinement, improvement of clarity and readability, and manuscript structuring and formatting. After using this tool, the author critically reviewed and edited the content as needed and takes full responsibility for the final content of the manuscript.

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