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BRIEF NOTE

The effects of music during warm-up on anaerobic performances of young sprinters

Les effets de la musique lors de l'échauffement sur les performances anaérobies des jeunes sprinteurs

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KEYWORDS
Short-term maximal performances;
Wingate test;
Warm-up;
Music

Summary
Objective. — To assess the effects of listening to music during warm-up on short-term maximal performances.
Material and methods. — Rate of perceived exertion (RPE) were recorded after 10 min of warm-up with (MWU) or without (NMWU) music and immediately after a 30-s Wingate test in nine young male sprinters (19.56 ± 1.88 yrs, 176 ± 5.34 cm and 71.21 ± 6.31 kg).
Results. — Although RPE, and the Fatigue Index were unaffected, power output during the Wingate test was significantly higher after MWU than NMWU ($P < 0.05$).
Conclusion. — Music could be used during warm-up before performing activities requiring powerful lower limbs' muscles contractions.

MOTS CLÉS
Efforts brefs et intenses ;
Test de Wingate ;
Échauffement ;
Musique

Résumé
Objectif. — Analyser les effets de la musique lors de l'échauffement sur les performances anaérobies.
Matériels et méthodes. — La perception de l'effort (RPE) a été enregistrée après dix minutes d'échauffement avec (EM) ou sans musique (ESM) et après le teste de Wingate chez neuf mâles jeunes sprinteurs (19,56 ± 1,88 ans, 176 ± 5,34 cm et 71,21 ± 6,31 kg).
Résultats. — La puissance musculaire lors du test de Wingate est significativement supérieure après EM qu'après ESM ($p < 0,05$). En revanche, la musique n'affecte pas l'RPE et l'indice de fatigue.

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Conclusion La musique peut présenter une aide supplémentaire lors de l'échauffement avant les efforts brefs et intenses.

1. Introduction

During the last decade, the combination of music and physical activity has received serious consideration. Accordingly, there has been a sharp increase in the number of studies who examined the ergogenic effects of the combination of music and physical activity.

To date, research has demonstrated the efficacy of music in the context of submaximal aerobic performance, and most of them reported positive effects of music on the athlete's perceived exertion and performance [1,2]. However, there has been a distinct lack of data into the effects of music on short-term maximal tasks. In fact, while some studies suggested an enhancing music effect [3—5], others reported no beneficial outcomes [6]. Moreover, studies that have measured physiological responses to music on short-term maximal exercises have examined the effect of music while performing the task. However, these latter findings are not applicable for athletes, since they cannot listen to music during competition. They can use music primarily during warm-up and/or during recovery [3,4].

To the best of our knowledge, there appears to be one study examining the effect of music during warm-up on athletes' short-term maximal performances [4]. They found that peak power (P_{peak}) during the Wingate test was significantly higher in adolescent volleyball players following a warm-up with music. However, they didn't find a significant music effect in the mean power (P_{mean}) and the Fatigue Index.

In view of the above considerations, the purpose of this study was to determine the effect of music during warm-up on young sprinters' power output.

2. Material and methods

2.1. Subjects

Nine males sprinters (19.56 ± 1.88 yrs, 176 ± 5.34 cm and 71.21 ± 6.31 kg) volunteered to take part in this study. They belonged to the national and/or regional team of Tunisia and they were exercising at least 4 days per week for average of 2 hours on each day. After receiving a thorough explanation of the experimental procedures, they gave written informed consent. The experimental design of the study was approved by the University's Ethic Committee and meets the ethical standards of the Declaration of Helsinki.

2.2. Experimental design

Following an initial familiarization session, participants attended the laboratory on two occasions separated by 48 hours. They performed the Wingate test immediately after a 10 min warm-up either with (MWU) or without music (NMWU). During the warm-up, subjects pedaled at 60 rpm against a light load of 1 kg. Rating of perceived exertion (RPE) was assessed using the 6 to 20 point Borg scale [7] after the warm-up and after the Wingate test.

2.2.1. Music protocol

Music was played only during the warm-up with high tempo music (120 to 140 bpm) due to the exercise type (high-intensity). Music was played from recorded cassette tapes through personal headphones.

2.2.2. Wingate test

The Wingate test consisted of a 30-s maximal sprint against a constant resistance related to body mass (0.087 kg•kg^{-1} body mass) on a friction-loaded cycle ergometer (Monark 894^{E}, Stockholm, Sweden). The highest (P_{peak}) and mean (P_{mean}) powers during this test were recorded and stored for further analysis. The Fatigue Index was calculated as follow:

Fatigue Index (%) = [(P_{peak}—lowest power)/P_{peak}] × 100.

2.2.3. Statistical analysis

RPE data were analyzed using a two factors Anova (2 [music] × 2 [measure]) with repeated measures on both factors. When Anovas revealed a significant difference, Post hoc multiple comparisons using the LSD Fischer test was conducted. The paired Student *t*-test was used for the Wingate test performance data to determine differences between non-music and music conditions. The level of significance was set at $P < 0.05$.

3. Results

3.1. Rate of perceived exertion

The two-way Anova indicated that the main effect of measure ($F_{(1.8)} = 51.08$; $P < 0.001$) was significant with post hoc tests showing that RPE values recorded after warm-up were lower than those recorded at the end of the Wingate test in both non-music and music conditions ($P < 0.001$) (Table 1). However, the music effect and the music × measure interaction were not significant.

Table 1 Rate of perceived exertion scores (mean ± SD) measured after the warm-up and at the end of the Wingate test, in the music and the non-music protocols.

	Without music	With music
After warm-up	9.44 ± 1.94	10.22 ± 2.64
End of Wingate	16.11 ± 2.03	17.33 ± 1.66