Acute Effects of Verbal Encouragement and Listening to Preferred Music on Maximal Repeated Change-of-Direction Performance in Adolescent Elite Basketball Players—Preliminary Report

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Featured Application: Repeated change of direction (R-CoD) is an important capacity in basketball. In this study, we evaluated the potential applicability of the two specific ergogenic methods, listening of preferred music, and verbal encouragement, regarding its effectiveness in improving R-CoD in elite youth basketball players. Results showed beneficial effects of both methods, but with no significant differential effects. As R-CoD in basketball is directly related to competitive success, these findings should be translated into regular basketball training to benefit competitive success.

Abstract: Verbal encouragement (VE) and listening to preferred music (PM) are considered effective ergogenic methods in strength and conditioning, but studies examining the effectiveness of these two methods simultaneously are lacking. This study analyzed the influence of PM and VE on repeated change-of-direction performance (R-CoD) in elite young basketball players. On alternate days, 18 elite young basketball players (17.2 ± 0.61 years; 189.8 ± 7 cm; 71.6 ± 6.7 kg; body fat: 12.3 ± 2.5%) were assessed on R-CoD under three randomized conditions: team-selected PM, VE, and control condition. Total time (TT), peak time (PT), and fatigue index were registered and compared across conditions. Significant differences across conditions were evidenced for TT and PT (F-test = 6.96 and 4.15, p < 0.05; large effect size), with better results in VE and PM than in the control condition and no significant differences between VE and PM. No correlations were evidenced between changes that occurred as a result of VE and those which occurred as a result of PM, indicating individual responsiveness of the players to VE and PM. The results evidenced positive acute effects of VE and PM on R-CoD performance, indicating the usefulness of these training methods in the conditioning of youth basketball players. Future studies should evaluate the applicability of VE and PM in the training of other conditioning capacities and the individual responsiveness of players toward VE and PM.

Keywords: psychophysiological response; fitness test; high-level athletes; agility; motivation
1. Introduction

It is well acknowledged that repeated bouts of high-intensity exercise are an important fitness component in basketball [1–3]. In this context, the high-intensity, intermittent nature of basketball suggests that players are repeatedly required to perform rapid accelerations and decelerations with sudden changes in direction [4,5]. Success in high-intensity events can be influenced by providing instruction that focuses a learner’s attention externally—i.e., verbal encouragement [6,7]—and internally—i.e., pacing strategy [8]. In this context, pacing strategies, referring to the pattern in which athletes distribute work and energy throughout an exercise task, can depend on specific factors, including outer stimuli such as music [9–11]. Additionally, adopting verbal instructions that induce an external focus of attention can be helpful to achieve success when performing movement-related tasks [12].

Music’s properties in multiple areas are widely acknowledged with benefits that may be less visible, taking into account physical characteristics or abilities, including neuronal plasticity or the better response shown towards multi-sensorial actions [13]. Therefore, it is not surprising that different music interventions are studied in sport settings as well [9,14,15]. Despite some promising results, there is no clear consensus about the influence of music on sport-specific performances. For instance, many studies have shown the beneficial effects of music on sport-specific performance, particularly on change-of-direction (CoD) events [9,14,15]. The use of music as an ergogenic aid may enhance performance by influencing exercise intensity (i.e., running speed and CoD speed) [9,14]. Depperma et al. (2013) showed that music therapy, in addition to CoD training, helps improve shuttle run performance in collegiate runners [14]. However, not all studies confirmed the ergogenic effects of music on the execution of sport-related tasks. For example, Ballman et al. found that listening to preferred music (PM) had no ergogenic benefit during repeated anaerobic cycling Wingate tests, despite lowering the perceived exertion and increasing the motivation to exercise [16]. Furthermore, Blasco Lafarga et al. concluded that asynchronous music did not affect the V-Cut test performance, despite reducing the time of high motivating music, followed by low motivating music in young basketball players [9]. The authors showed that very short and submaximal complex agility tasks, including changes of direction (i.e., V-Cut test), do not benefit from the influence of asynchronous music. Hence, reports similar to the studies above, including repeated short-duration events (i.e., repeated CoD test), are warranted.

In addition to the effects of music stimuli, including PM, the direct influences of other psychological factors, such as motivation (i.e., verbal encouragement (VE)), related to an enhanced capacity to act or engage in different achievement tasks [12] are considered mediators on the physical, technical, and tactical abilities of athletes, affecting their performance [17,18]. For example, a positive comment in basketball such as “Good match today!” and a positive comment such as “Your match today was very good in person-to-person defense” [19] elicit very different reactions in players. Jaffri and Saliba recently showed that providing VE resulted in a greater increase in dynamic balance performance among participants with chronic ankle instability Jaffri and Saliba [20]. However, to the best of the authors’ knowledge, no study has evaluated the effects of VE on sport-specific capacities in basketball.

From the previous literature overview, it is evident that both VE and PM may be potentially effective methods (ergogenic aid) to improve sport-specific capacities. Considering that basketball is a sport where the repeated maximal shuttle running speed with changes of direction (CoD) is an important physical capacity [21,22], reports investigating the acute effects of both listening to preferred music and receiving verbal encouragement on maximal CoD speed in youth basketball players will be particularly beneficial. Finally, although both VE and PM have been evaluated as methods of improving training effectiveness, there is an evident lack of studies where these two methods are simultaneously examined regarding their concurrent effectiveness in the context of sport-specific performance.

Therefore, the main aim of the present study was to examine the acute effect of VE and PM on different indices of repeated maximal CoD speed (R-CoD) performance in
young basketball players. Additionally, we examined specific anthropometric correlates of the R-CoD performance. Based on the relevant literature, first, we hypothesized that both VE and PM stimuli would enhance the maximal repeated CoD speed performance in youth basketball players compared to control conditions [23,24]. Second, given that listening to preferred music is an ergogenic aid when distracting from unpleasant sensations and fatigue, we expected a greater improvement across the different outcome measures [9,25,26].

2. Materials and Methods

2.1. Participants

With reference to previous investigations on the effects of high versus low motivating music on intermittent fitness and agility in young, well-trained basketball players [9], an a priori power analysis with a type I error rate of 0.05 and 80% statistical power was computed. Overall, the analysis indicated that 10 participants are sufficient to observe significant, large-sized acute effects (Cohen’s d = 0.80). Accordingly, this study originally involved 20 participants, but only 18 were observed as a final sample (due to exclusion criteria; please see later for details) of male elite adolescent basketball players, all recruited from the national team of Tunisia (age: 17.2 ± 0.6 years; BF: 12.3 ± 2.5%; BMI: 19.9 ± 1.6 kg.m⁻²; body mass: 71.6 ± 6.7 kg; body height: 189.8 ± 7.0 cm). All participants regularly played basketball over the past 10 years before the start of the study. All players exercised 4–5 times per week throughout the study period, with each session lasting ~90 min. It is worth noting that all subjects had regularly performed R-CoD exercises as part of their regular conditioning program over the past 5 years. Thus, the participants were familiar with R-CoD.

The study was conducted according to the latest version of the Declaration of Helsinki, and the protocol was fully approved by the Local Ethics Committee of the National Centre of Medicine and Science of Sports of Tunis (CNMSS-LR09SEP01) before the commencement of the assessments. Before the study, signed consent for study participation was obtained from participating athletes and parents of the underage participants. The exclusion criteria were recreational athlete, athletes with less than five training sessions per week, athletes with a history of muscle or joint injuries, athletes who had already followed a pre-operative rehabilitation program.

2.2. Procedures

In addition to indices derived from the R-CoD (see next paragraph for details), we measured anthropometric indices. Each player’s body height and mass were measured using a wall-mounted stadiometer (OHAUS, Florham Park, NJ, USA) and an electronic scale (Baty International, West Sussex, UK), respectively. Body mass index (BMI) was calculated as weight/height squared (kg/m²). Skinfold thickness of biceps, triceps, supra-iliac and subscapular areas were measured by Harpenden skinfold calipers (Baty International, West Sussex, UK) to the nearest mm, except for low values (usually 5 mm or less) when it was taken to the nearest 0.5 mm. All anthropometric measures were taken by ISAK accredited nutritionists according to the previously proposed and explained protocols [27].

The R-CoD test consisted of 10 maximal sprints of 20 m with 30-s rest periods in between (Figure 1).

Each sprint involved 4 changes of direction with 3 displacement modes: forward (A-to-B), lateral (B-to-C, and C-to-D, and D-to-B), and backward (B-to-A) [28]. The subjects began with both feet behind the starting line. At their own discretion, for the first sprint, the subjects sprinted forward to the front cone (cone B) and touched the base of it with the right hand. Facing forward and without crossing feet, they shuffled to the right and touched the base of the cone C with the right hand. Participants then shuffled to the left and touched the base of cone D with the left hand; then, they shuffled back to the right (cone B). Finally, they ran backward as quickly as possible and returned to cone A. The second sprint started at the end of the 30 s counted since the departure of the first sprint. Within each recovery
The R-CoD test was performed in 3 steps: without music (CON), with verbal encouragement (R-CoD-VE), and with preferred music (R-CoD-PM). Each session began with a standardized 15-min warm-up led by certified strength and conditioning specialist and included: submaximal-intensity running, dynamic stretching, calisthenics, and preparatory exercises (e.g., squatting and jumping exercises at a progressively increasing intensity). Participants were also instructed to refrain from any strenuous activities one day before the test session. To minimize confounding factors, instructions related to sleep (to go to bed and wake up in regular hours), and diet (to avoid late-night meals, to stay properly hydrated) were given to all athletes before the experiment started. For PM, the music played for each participant was self-selected by the players. Specifically, the participants were asked to select a minimum of 10 min of music, specifically that which they preferred for 4 of 10 exercises of sprinting and CoD. One investigator quantified the average tempo for each song selected by “Free BPM Detector” software to verify that it was within the required tempo range of >120 beats per minute [29,30].
During the music, trial music was played from an integrated mp3 player headset (Sony NWWS413BM 4GB Sports Wearable MP3 Player) with comfortable and moderate volume intensity. Although the used headset assured proper fixation due to its design, it was also secured by a sweat headband. During the trial without music, the mp3 player and headset were still used to assure the same testing conditioning, but no music was played.

For VE testing, all players were encouraged by the same person who tried to use consistent VE for all players (i.e., “Keep on trying!”, “Go for it!”, “You worked really hard!”, “Thumb up!”). The encouragements were provided in similar order at the beginning and end of each sprint. Moreover, the instructor tried to keep the decibels of verbal encouragements on a similar level for each participant.

The testing was conducted in an indoor basketball center. One week before the commencement of the study, all athletes participated in an orientation session to become familiar with the applied R-CoD test. After the warm-up, participants performed the three R-CoD exercise protocols (CON, R-CoD-VE, and R-CoD-PM) in a randomized order on consecutive days with at least 48 h between the different experimental conditions. All participants were properly familiar with R-CoD since this test they regularly perform in their training sessions. However, for the additional analysis of the test reliability, the intra-session reliability of the protocol was checked in this research (see later for details).

2.3. Statistics

Data are presented as means and standard deviations (SDs). Data were tested and confirmed for normal distribution using the Shapiro–Wilk test.

In order to evaluate the reliability of the R-CoD test, the intraclass coefficient of the correlation (ICC3,1), coefficient of the variation (CV), and standard error of measurement (SEM) were calculated for test performances.

To compare the TT, PT, and FI across the three conditions, analysis of variance (ANOVA) for repeated measurements was computed. If differences reached the level of significance of $p < 0.05$, post hoc tests (i.e., calculated by Scheffe test) were computed to identify the statistically significant comparisons. To present the effect size (ES), the partial eta-squared values ($\eta^2$) were calculated (small ES: >0.02; medium ES: >0.13; large ES: >0.26).

Pearson’s product-moment correlation coefficients were calculated to establish the associations between the study variables in the three conditions. Additionally, to evaluate the eventual associations between changes in performances that occurred as a result of MP and VE, the correlations were calculated between “variables of differences.” In brief, we first calculated differences between: (i) results achieved during MP and CON, and (ii) results achieved during VE and CON. This was done for all performance variables (e.g., TT, PT, and FI). Later, calculated variables of the differences ($TT_{\text{diff}}, PT_{\text{diff}}, FI_{\text{diff}}$) were correlated, which allowed us to identify whether the changes resulting from VE and CON were intercorrelated.

The alpha level of significance was set at $p < 0.05$. All data analyses were performed using Statistica ver. 13.5 (Tibco Inc., Palo Alto, CA, USA).

3. Results

Descriptive statistics for the general characteristics of the participants are presented in Table 1.

| Variable            | Mean   | Minimum | Maximum | Std. Dev. |
|---------------------|--------|---------|---------|-----------|
| Age (yrs)           | 17.21  | 16.36   | 18.19   | 0.61      |
| Height (cm)         | 189.85 | 173.00  | 203.00  | 7.03      |
| Mass (Kg)           | 71.68  | 57.90   | 82.25   | 6.71      |
| BMI (Kg/m$^2$)      | 19.90  | 15.80   | 23.27   | 1.64      |
| Body fat (%)        | 12.36  | 7.62    | 16.26   | 2.57      |
3.1. Reliability Analyses

Table 2 illustrates the performance data reliability outcomes for the R-CoD test. In brief, ICC measures of 0.87 to 0.96 and CV values ranging from 4.8 to 7.9% showed appropriate to the high reliability of the evidenced performances (Table 2).

Table 2. Reliability analysis for the measured performances.

| Variables          | ICC$_{3,1}$ (95% CI) | SEM  | CV (%) |
|--------------------|-----------------------|------|--------|
| Total time (s)     | 0.96 (0.89–0.99)      | 2.44 | 7.09   |
| Peak time (s)      | 0.95 (0.77–0.99)      | 2.80 | 6.10   |
| Fatigue index (%)  | 0.87 (0.64–0.98)      | 2.86 | 4.82   |

ICC—intraclass correlation, SEM—standard error of the measurement; CV—coefficient of the variation.

3.2. Analysis of Variance of the Outcome Measure and Post-Hoc Analyses

The TT performances obtained across the three conditions differed significantly (F-test = 6.96, $p < 0.01$; $\eta^2 = 0.26$, large ES) (Figure 2). Significant post hoc differences, calculated by the Scheffe test, were found between CON and VE ($p < 0.05$) and also when CON was compared with PM ($p < 0.01$). In both cases, CON performance was less successful than the remaining two performances.

Figure 2. Descriptive statistics for total time (TT) in three conditions (Control, PM—listening of the preferred music, VE—verbal encouragement), and post-hoc differences between conditions (** denotes significance of $p < 0.01$, * denotes the significance of $p < 0.05$).

Descriptive statistics across three conditions for PT and ANOVA post-hoc differences are presented in Figure 3. Once again, the performance achieved during the control condition was less successful than performances achieved over PM and VE (F-test = 4.15, $p < 0.05$; $\eta^2 = 0.18$, medium ES).
Descriptive statistics across three conditions for peak time (PT) and ANOVA post-hoc differences are presented in Figure 3. Once again, the performance achieved during the control condition was less successful than performances achieved over Pm and VE (F-test = 4.15, $p < 0.05$; $\eta^2 = 0.18$, medium ES).

Figure 3. Descriptive statistics for peak time (PT) in three conditions (Control, PM—listening of the preferred music, VE—verbal encouragement), and post-hoc differences between conditions (* denotes the significance of $p < 0.05$).

The FI did not differ significantly across three conditions (F-test = 0.16, $p > 0.05$; $\eta^2 = 0.01$) (Figure 4).

Figure 4. Descriptive statistics for fatigue index (FI) in three conditions (Control, PM—listening of the preferred music, VE—verbal encouragement).

3.3. Correlations between Study Variables Obtained under Different Protocols

Table 3 presents the results of the correlation analysis where different performance variables were correlated across R-CoD-CON, R-CoD-VE, and R-CoD-PM. Anthropometrics were sporadically associated with performance variables (outcomes), outlining the relative independence of the studied outcomes of the participants’ anthropometric characteristics. Furthermore, the PT for R-CoD-CON was poorly related to other performances and variables (outcomes). Additionally, the relative independence of the FI across the different conditions and its low correlation with other outcomes are important to note,
especially if we consider that performances did not differ in this outcome (see the previous section for details).

Table 3. Pearson’s correlations between study variables.

| Variable | CON_TT | CON_PT | CON_FI | VE_TT | VE_PT | VE_FI | PM_TT | PM_PT | PM_FI |
|----------|--------|--------|--------|-------|-------|-------|-------|-------|-------|
| Height   | 0.07   | 0.05   | 0.03   | -0.17 | -0.21 | 0.22  | -0.23 | -0.22 | 0.02  |
| Mass     | 0.43   | 0.33   | 0.13   | 0.28  | 0.24  | -0.09 | -0.03 | 0.14  | -0.40 |
| BMI      | 0.42   | 0.30   | 0.15   | 0.45   | 0.44  | -0.29 | 0.15  | 0.34  | -0.47 |
| Body fat | 0.13   | 0.07   | 0.09   | 0.49   | 0.40  | -0.10 | 0.19  | 0.16  | 0.02  |
| CON_TT   | -      | -      | -      |       |       |       |       |       |       |
| CON_PT   | 0.92   | ***    | -      | -      |       |       |       |       |       |
| CON_FI   | -0.07  |       | -0.47  | *      | -      |       |       |       |       |
| VE_TT    | 0.80   | ***    | 0.63   | **     | 0.19  |       |       |       |       |
| VE_PT    | 0.83   | ***    | 0.72   | ***    | 0.04  | 0.94  | ***   | -      |       |
| VE_FI    | -0.61  | **     | -0.63  | **     | 0.22  | -0.53 | *      | -0.79 | ***   |
| PM_TT    | 0.73   | ***    | 0.67   | **     | -0.08 | 0.65  | *      | 0.75  | ***   | -0.69 | ***   |
| PM_PT    | 0.71   | ***    | 0.65   | **     | -0.06 | 0.66  | **     | 0.80  | ***   | -0.80 | *      | 0.91 | ***   |
| PM_FI    | -0.10  |       | -0.08  |       | -0.01 | -0.13 |       | -0.25 | 0.39  | 0.04  |       | -0.39 | -    |

CON—control condition, VE—verbal encouragement, PM—preferred music, TT—total time, PT—peak time, FI—fatigue index (** p < 0.01, * p < 0.05).

Finally, the correlations of the variables of differences (the differences calculated between performance in the control condition with performances in the VE and PM conditions) were negligible. Variables of differences shared <3% of the common variance (Pearson correlation = 0.09, 0.06, and 0.06; p > 0.05 for TT_diff, PT_diff, and FI_diff, respectively), altogether indicating the independence of the changes in the studied performance variables that occurred as a result of the PM and VE protocols.

4. Discussion
This study investigated the acute effects of three repeated maximal CoD speed protocols using verbal encouragement (R-CoD-VE) or preferred music (R-CoD-PM) in comparison to a control protocol (R-CoD-CON) on subsequent R-CoD performance (TT, PT, and FI) in young male elite basketball players. The study has several important findings. First, the results showed beneficial effects of VE and PM on measured R-CoD in the studied players, and consequently, our first study hypothesis may be accepted. Second, no differential effects of VE and PM were evidenced, so our second study hypothesis can be rejected. Third, the studied performances and changes in studied performances were poorly intercorrelated.

4.1. Effects of Verbal Encouragement and Listening to Preferred Music
Based on the relevant literature [9,19,20,24] and with regards to our research hypothesis, the main finding was that the players’ performances improved under the PM and VE. Therefore, it is likely that the youth elite basketball players responded positively to listening to preferred music and receiving verbal encouragement, which, consequently, similarly improved their repeated CoD performance more than performing the same task did. To our knowledge, this is the first study to compare the influence of highly motivating music vs. verbal encouragement and the absence of both conditions on repeated maximal CoD performance in elite young basketball players.

The present results indicate a positive acute effect of listening to PM and receiving VE compared to the control condition on the repeated CoD performance of youth elite basketball players. Based on the many benefits of music in sports performance [9,24], we could argue that the tempo of the music and the coupled motor patterns would result in increased efficiency/decreased needs of neural drive [9,24]. Notwithstanding, the R-CoD is a graded test, increasing in high-intensity velocity in our study. Therefore, although the synchronization between the music and the motor tasks underpins this higher performance
for a similar physiological exertion, allowing the activity to be more efficient [31], both listening to the preferred music and receiving verbal encouragement during the R-CoD task in our study more likely reduced the physiological feedback signals related to this physical exertion, being the consequence of the limited channel capacity of our afferents [19,20,24]. This might distract from fatigue afterward more than the use of control conditions would. Moreover, despite the fact that during high-intensity activity, in all stages of the test, attention might be narrowed and the distracting capacity could be insufficient to cope with high fatigue [9,19,20,32], we can deduce that the participants are elite athletes who had already experienced music- and verbal-encouragement-related motivation and success.

The benefits of auditory-motor synchronization in complex tasks (i.e., CoD) are evident because the motor patterns are highly specialized and need equally specific preferred music and verbal instruction. In addition, CoD speed includes many external stimuli to consider so that the distracting effect may be more evident during this task [33]. In this context, participants feeling engaged would be confident with increasing their performance in this challenging situation when assigned verbal encouragement and instructions. This is another benefit of music and verbal encouragement in sports [24,34] and represents a psychological effect related to the motivational qualities of music for enhancing subsequent repeated maximal CoD performance [25].

The lack of influence of VE and MP on the FI may seem surprising at first sight. Still, this finding is easily explainable if we consider the FI’s physiological background as a performance indicator. Mainly, the FI is used as an indicator of fatigue during anaerobic activities [35]. In all cases when this parameter is used, the FI is actually quantification of the decline in power (anaerobic achievement) over the anaerobic lactate test performance [16,36]. Physiologically, the FI is mostly influenced by one’s tolerance to lactate accumulation, meaning that the higher is metabolic tolerance to accumulation of the lactates during the anaerobic activity (test), the better will be the FI. The VE and MP might be considered as ergogenic aids in R-CoD performance because of the positive influence on arousal and motivation, as previously discussed. However, it is not reasonable to expect that VE and MP will acutely positively influence the lactated tolerance of studied athletes, consequently resulting in improved FI [36].

4.2. Lack of Association between Changes in Performances

Originally, we hypothesized that MP would induce more positive effects than VE. However, both VE and MP induce positive changes in performances but with no differential effects. In explaining such findings, the (lack of) associations between variables of differences are particularly important. In short, correlations between variables of differences (changes in the studied performances) were negligible.

The lack of association between variables of differences implies that changes (e.g., improvements) in CoD performance that occurred as a result of VE and those which occurred as a result of PM were not associated. In other words, some players improved their performance to a greater extent as a result of PM. In contrast, for others, the VE was more beneficial, highlighting the importance of applying the principle of individuality in the conditioning of youth basketball players. This principle of individuality states that each person (athlete) will respond differently to the same training stimulus [37]. Therefore, each training routine should be tailored individually to meet each athlete’s specific and unique needs. Indeed, studies regularly confirmed the individualization of the training load as one of the crucial prerequisites for achieving proper training and successful management of injury risk [37–39].

Although this principle of individuality is regularly applied in sports training when it comes to intensity and/or volume (i.e., training intensity and volume are individualized according to the athlete’s ability and specific needs), the applicability and potential usefulness of this principle are rarely examined from the perspective of “appropriateness of training method.” Our finding on the independence of changes that occurred as a result of VE and PM actually implies that “individualization of the training” is not only a concept
that should be respected in terms of “training load” (i.e., intensity or volume) but also a paradigm which should be valued in the process of selecting the training method (i.e., VE or PM). Although we could not find an empirical study that examined this issue in competitive athletes, the importance of an individualized approach in the application of self-preferred exercise modality has been confirmed in recent studies where recreational athletes were observed [40,41].

4.3. Limitations and Strengths

There are several study limitations. First, the sample of athletes involved comprised youth basketball players. Therefore, the results obtained can only be generalized to similar samples of participants. Furthermore, a larger sample size (>40 or 50 subjects) would have been needed to further understand the impact of PM and VE on the R-CoD test. However, it is not easy to obtain that number of such well-trained young players and recruit them in a short-term randomized experimental design. Another possible limitation is the type of VE and the standardization of the VE protocol. Although we tried to standardize this procedure, there is no doubt that certain differences in the VE could appear between participants. Finally, this study observed performance variables and did not measure psychophysiological response variables (i.e., blood lactate, heart rate, rating of perceived exertion), which will certainly allow us to discuss the obtained results more profoundly.

On the other hand, this is one of the rare investigations where VE and PM are simultaneously examined and compared, considering their effectiveness. Additionally, the quality of the observed participants (well-trained youth basketball players) and the sport-specific nature of the observed performance are important strengths of the investigation. Therefore, although not being the final word on the topic, we believe that the results of this study will improve the knowledge in this field and initiate further research.

5. Conclusions

Our study confirmed the positive acute ergogenic effects of VE and PM on R-CoD in young basketball players. Therefore, strength and conditioning coaches working with young basketball players must consider the effectiveness of these training methods in improving the respective capacities and apply these methods in the conditioning of young basketball players.

VE and PM did not induce differential effects on the studied performances. Hence, we cannot currently speculate which of these two methods is more effective with regard to effects on R-CoD. However, it is important to note that the changes that occurred due to VE and PM were not intercorrelated. This implies that some players improved their R-CoD performance to a greater extent due to VE, while others better improved their performance with the PM condition.

Consequently, in future studies, individual responsiveness to VE and PM should be evaluated. Such experiments will eventually reveal the background of the VE- and PM-related effects on the studied performances (and individual athletes) and assure proper individualization of the training in youth basketball, at least when it comes to the conditioning of R-CoD. As R-CoD in basketball is directly related to competitive success, these findings should be translated into regular basketball training to benefit competitive success.

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References
1. Scanlan, A.T.; Stojanović, E.; Milanović, Z.; Teramoto, M.; Jelić, M.; Dalbo, V.J. Aerobic Capacity According to Playing Role and Position in Elite Female Basketball Players Using Laboratory and Field Tests. *Int. J. Sports Physiol. Perform.* 2021, 16, 435–438. [CrossRef] [PubMed]

2. Vijayakumar, M.; Vashi, P.; Ghare, S.D. Reliability of a New Multicomponent Agility Test for Assessing Agility in Basketball Players: The Basketball Multicomponent Agility Test (BMAT). *Int. J. Adv. Res. Ideas Innov. Technol.* 2017, 3, 151–155.

3. Kusnakin, N.W.; Kusnakin, N.W.; Hartati, H. Physical and physiological profile of junior high students in Indonesia. *J. Sport Sci.* 2017, 10, 96–99.

4. Scanlan, A.T.; Wen, N.; Tucker, P.S.; Borges, N.R.; Dalbo, V.J. Training mode’s influences on the relationships between training-load models during basketball conditioning. *Int. J. Sports Physiol. Perform.* 2014, 9, 851–856. [CrossRef]

5. Ujakov, F.; Šarabon, N. Change of Direction Performance Is Influenced by Asymmetries in Jumping Ability and Hip and Trunk Strength in Elite Basketball Players. *Appl. Sci.* 2020, 10, 6984. [CrossRef]

6. Porter, J.M.; Nolan, R.P.; Ostrowski, E.J.; Wulf, G. Directing attention externally enhances agility performance: A qualitative and quantitative analysis of the efficacy of using verbal instructions to focus attention. *Front. Psychol.* 2010, 1, 216. [CrossRef]

7. Al-Abood, S.A.; Bennett, S.J.; Hernandez, F.M.; Ashford, D.; Davids, K. Effect of verbal instructions and image size on visual search strategies in basketball free throw shooting. *J. Sports Sci.* 2002, 20, 271–278. [CrossRef] [PubMed]

8. Halperin, I.; Aboodarda, S.J.; Basset, F.A.; Byrne, J.M.; Behm, D.G. Pacing strategies during repeated maximal voluntary contractions. *Eur. J. Appl. Physiol.* 2014, 114, 1413–1420. [CrossRef]

9. Blasco-Lafarga, C.; Ricart, B.; Cordellat, A.; Roldán, A.; Navarro-Roncal, C.; Monteagudo, P. High versus low motivating music on intermittent fitness and agility in young well-trained basketball players. *Int. J. Sport Exerc. Psychol.* 2021, 1–17. [CrossRef]

10. Jebabli, N.; Granacher, U.; Selmi, M.A.; Al-Haddabi, B.; Behm, D.G.; Chaouachi, A.; Sassi, R.H. Listening to Preferred Music Improved Running Performance without Changing the Pacing Pattern during a 6 Minute Run Test with Young Male Adults. *Sports* 2020, 8, 61. [CrossRef]

11. Madigian, D.J.; Curran, T.; Stoeber, J.; Hill, A.P.; Smith, M.M.; Passfield, L. Development of Perfectionism in Junior Athletes: A Three-Sample Study of Coach and Parental Pressure. *J. Sport Exerc. Psychol.* 2019, 41, 167–175. [CrossRef]

12. Eccles, J.S.; Wigfield, A. Motivational beliefs, values, and goals. *Annu. Rev. Psychol.* 2002, 53, 109–132. [CrossRef]

13. Chao-Fernández, R.; Gisbert-Caudeli, V.; Vázquez-Sánchez, R. Emotional training and modification of disruptive behaviors through computer-game-based music therapy in secondary education. *Appl. Sci.* 2020, 10, 1796. [CrossRef]

14. Debberma, H.; Arun, B.; Nagarajan, M. Comparison of music therapy with agility training on agility performance in collegiate male badminton players. *Int. J. Phys. Educ. Health Sci.* 2013, 2, 55–61.

15. Anshel, M.H.; Marisi, D. Effect of music and rhythm on physical performance. *Res. Q.* 1978, 49, 109–113. [CrossRef]

16. Ballmann, C.G.; Maynard, D.J.; Lafoon, Z.N.; Marshall, M.R.; Williams, T.D.; Rogers, R.R. Effects of Listening to Preferred versus Non-Preferred Music on Repeated Wingate Anaerobic Test Performance. *Sports* 2019, 7, 185. [CrossRef]

17. Mahamud, J.; Tuero, C.; Márquez, S. Características psicológicas relacionadas con el rendimiento: Comparación entre los requerimientos de los entrenadores y la percepción de los deportistas. *Rev. Psicol. Deporte* 2005, 14, 237–251.

18. Weinberg, R.S.; Gould, D. *Foundations of Sport and Exercise Psychology;* Human Kinetics: Champaign, IL, USA, 2014.

19. Lauber, B.; Keller, M. Improving motor performance: Selected aspects of augmented feedback in exercise and health. * Eur. J. Sport Sci.* 2014, 14, 36–43. [CrossRef]

20. Jaffri, A.H.; Saliba, S. Does verbal encouragement change dynamic balance? The effect of verbal encouragement on Star Excursion Balance Test performance in chronic ankle Instability. *Braz. J. Phys. Ther.* 2021, 14, 1413–3555. [CrossRef]

21. Delextrat, A.; Martínez, A. Small-sided game training improves aerobic capacity and technical skills in basketball players. *Int. J. Sports Med.* 2014, 35, 385–391. [CrossRef] [PubMed]

22. Hernández, S.; Ramírez-Campillo, R.; Álvarez, C.; Sánchez-Sánchez, J.; Moran, J.; Pereira, L.A.; Loturco, I. Effects of Plyometric Training on Neuromuscular Performance in Youth Basketball Players: A Pilot Study on the Influence of Drill Randomization. *J. Sports Sci. Med.* 2018, 17, 372–378.

23. Loizou, G.; Karageorghis, C.I. Effects of psychological priming, video, and music on anaerobic exercise performance. *Scand. J. Med. Sci. Sports* 2015, 25, 909–920. [CrossRef] [PubMed]
24. Terry, P.C.; Karageorghis, C.I.; Curran, M.L.; Martin, O.V.; Parsons-Smith, R.L. Effects of music in exercise and sport: A meta-analytic review. *Psychol. Bull.* 2020, 146, 91. [CrossRef] [PubMed]

25. Stork, M.J.; Karageorghis, C.I.; Ginis, K.A.M. Let’s Go: Psychological, psychophysical, and physiological effects of music during sprint interval exercise. *Psychol. Sport Exerc.* 2019, 45, 101547. [CrossRef]

26. Clark, C.N.; Golden, H.L.; McCallion, O.; Nicholas, J.M.; Cohen, M.H.; Slattery, C.F.; Paterson, R.W.; Fletcher, P.D.; Mummery, C.J.; Rohrer, J.D.; et al. Music models aberrant rule decoding and reward valuation in dementia. *Soc. Cogn. Affect. Neurosci.* 2018, 13, 192–202. [CrossRef] [PubMed]

27. Deurenberg, P.; Pieters, J.J.; Hautvast, J.G. The assessment of the body fat percentage by skinfold thickness measurements in childhood and young adolescence. *Br. J. Nutr.* 1990, 63, 293–303. [CrossRef]

28. Haj-Sassi, R.; Dardouri, W.; Gharbi, Z.; Chaouachi, A.; Mansour, H.; Rabbi, A.; Mahfoudhi, M.E. Reliability and validity of a new repeated agility test as a measure of anaerobic and explosive power. *J. Strength. Cond. Res.* 2011, 25, 472–480. [CrossRef]

29. Terry, P.C.; Karageorghis, C.I. Music in sport and exercise. In *The New Sport and Exercise Psychology Companion*; Fitness Information Technology: Morgantown, WV, USA, 2011; pp. 359–380.

30. Karageorghis, C.I.; Terry, P.C.; Lane, A.M.; Bishop, D.T.; Priest, D.-L. The bases expert statement on the use of music in exercise. *Sport Exerc. Sci.* 2011, 28, 18–19. [CrossRef]

31. Nikol, L.; Kuan, G.; Ong, M.; Chang, Y.K.; Terry, P.C. The Heat Is On: Effects of Synchronous Music on Psychophysiological Parameters and Running Performance in Hot and Humid Conditions. *Front. Psychol.* 2018, 9, 1114. [CrossRef] [PubMed]

32. Clark, A.L.; Sorg, S.F.; Holiday, K.; Bigler, E.D.; Bangen, K.J.; Evangelista, N.D.; Bondi, M.W.; Schiehser, D.M.; Delano-Wood, L. Fatigue Is Associated With Global and Regional Thalamic Morphometry in Veterans With a History of Mild Traumatic Brain Injury. *J. Head Trauma Rehabil.* 2018, 33, 382–392. [CrossRef]

33. Dyrlund, A.K.; Wininger, S.R. The effects of music preference and exercise intensity on psychological variables. *J. Music Ther.* 2008, 45, 114–134. [CrossRef]

34. Hutchinson, J.C.; Karageorghis, C.I. Moderating influence of dominant attentional style and exercise intensity on responses to asynchronous music. *J. Sport Exerc. Psychol.* 2013, 35, 625–643. [CrossRef] [PubMed]

35. Harbili, S. The Effect of Different Recovery Duration on Repeated Anaerobic Performance in Elite Cyclists. *J. Hum. Kinet.* 2015, 49, 171–178. [CrossRef] [PubMed]

36. Eliakim, M.; Meckel, Y.; Nemet, D.; Eliakim, A. The effect of music during warm-up on consecutive anaerobic performance in elite adolescent volleyball players. *Int. J. Sports Med.* 2007, 28, 321–325. [CrossRef] [PubMed]

37. Halson, S.L. Monitoring training load to understand fatigue in athletes. *Sports Med.* 2014, 44 (Suppl. S2), S139–S147. [CrossRef] [PubMed]

38. Manzi, V.; Bovenzi, A.; Franco Impellizzeri, M.; Carminati, I.; Castagna, C. Individual training-load and aerobic-fitness variables in premiership soccer players during the precompetitive season. *J. Strength. Cond. Res.* 2013, 27, 631–636. [CrossRef]

39. Boulosa, D.; Casado, A.; Claudino, J.G.; Jiménez-Reyes, P.; Ravé, G.; Castaño-Zambudio, A.; Lima-Alves, A.; de Oliveira, S.A., Jr.; Dupont, G.; Granacher, U.; et al. Do you Play or Do you Train? Insights From Individual Sports for Training Load and Injury Risk Management in Team Sports Based on Individualization. *Front. Physiol.* 2020, 11, 995. [CrossRef]

40. Versic, S.; Idrizovic, K.; Ahmeti, G.B.; Sekulic, D.; Majeric, M. Differential Effects of Resistance- and Endurance-Based Exercise Programs on Muscular Fitness, Body Composition, and Cardiovascular Variables in Young Adult Women: Contextualizing the Efficacy of Self-Selected Exercise Modalities. *Medicina* 2021, 57, 654. [CrossRef]

41. Idrizovic, K.; Ahmeti, G.B.; Sekulic, D.; Zevrnja, A.; Ostojic, L.; Versic, S.; Zenic, N. Indices of Cardiovascular Health, Body Composition and Aerobic Endurance in Young Women; Differential Effects of Two Endurance-Based Training Modalities. *Healthcare* 2021, 9, 449. [CrossRef]