



Effects of verbal encouragement on performance of the multistage 20 m shuttle run

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ABSTRACT. Exertion tests for predicting maximal oxygen uptake (VO_2) intend to estimate the person maximum performance. Some articles mention the verbal encouragement in their protocol to reach it, while others do not. The objective of the present study is to observe the influence of verbal encouragement every 60 s used by a coach on maximal oxygen uptake, distances covered and final heart rate of adolescents. 12 young male volunteers (aged 16.7 ± 0.45 years) were subjected to a multistage 20 m shuttle run test twice, with a week interval between each test. Half of the sample was given incentives during the first test, and the other half, only in the second test. Significant differences in maximal oxygen uptake ($\Delta\% = 5.14\%$, $p = 0.009$), distances covered ($\Delta\% = 9.23\%$, $p = 0.03$) and final heart rate ($\Delta\% = 3.21\%$, $p = 0.03$) were observed between the two groups, with and without verbal encouragement. The verbal encouragement improved the performance in the test for the three parameters analyzed.

Keywords: exertion test, oxygen uptake, motivation.

Efeitos do incentivo verbal no desempenho do teste de multiestágios de 20 m

RESUMO. Testes de esforço, como os de aferição do consumo máximo de oxigênio (VO_2), pretendem medir o desempenho máximo do indivíduo. Muitos artigos mencionam no seu protocolo o incentivo para este fim, enquanto outros não. O objetivo deste estudo é observar a influência do incentivo verbal do treinador a cada 60 s sobre o consumo máximo de oxigênio, a distância percorrida e a frequência cardíaca final obtidos por adolescentes no teste de multiestágios de 20 m. Doze jovens voluntários ($16,7 \pm 0,45$ anos) foram submetidos ao teste de multiestágios de 20 m duas vezes com um espaço de uma semana entre os testes. Metade dos sujeitos foi incentivada na primeira semana, enquanto os outros foram incentivados na segunda semana. Foram observadas diferenças significativas no consumo máximo de oxigênio ($\Delta\% = 5,14\%$, $p = 0,009$), distância percorrida ($\Delta\% = 9,23\%$, $p = 0,03$) e frequência cardíaca final ($\Delta\% = 3,21\%$, $p = 0,03$) entre os desempenhos com incentivo e sem incentivo. O incentivo verbal melhorou o desempenho no teste nos três parâmetros observados.

Palavras-chave: teste de esforço, consumo de oxigênio, motivação.

Introduction

Performance in physical and sport activities is object of study of science, and determined by factors such as the physical constitution, physical condition, technical condition, environmental influences, cognitive ability and mental capacity (FRANCO, 2000).

Good psychic ability related to performance will be generated through positive mental state, produced by the critical factors: motivation, personality, aspiration, emotion and anxiety control (BROWNE et al., 2009).

Recent researches on sports and motivation highlight the importance of feedback from the coach on the quality of teaching-learning (SÁNCHEZ; VICIANA, 2002; KOKA; HEIN, 2005; VALDIVIA, 2011). Thus a proper feedback fosters learning and encourages the efforts of practitioners (PIÉRON, 1992) and also the role of the sports coach (GRANT et al., 1990; UREÑA et al., 2009). Actually the aspect that relates most to the feedback from the coach is the motivation of practitioners, based on the assumptions of the Self-Determination Theory (DECI; RYAN, 2000). According to this perspective, the source of motivation may be more internal or

external to the practitioner (more or less self-determined), insofar as the person gets involved or not in the performance of activities to achieve certain goals, that is, the voluntary ability to complete actions by their own.

The Self-Determination Theory states that people are dynamically predisposed to evolve and develop, but continuous stimuli of the social environment are needed to make it happen positively. Thus, the social environment can stimulate or can thwart the natural tendencies of active engagement and psychological growth. The environment will influence the motivation so the increase in perceived competence, autonomy and social relationship will create a state of intrinsic motivation, whereas negative change in these three aspects will be associated with lower intrinsic motivation, extrinsic motivation or demotivation. Under this theory, external factors (such as verbal encouragement) influence intrinsic motivation, whether positively or negatively. The authors argue that social contexts, leading to feelings of competence during action, can develop intrinsic motivation. Thus, the positive challenges and feedback to promote the efficacy (such as verbal encouragement) as well as freedom help to achieve intrinsic motivation (DECI; RYAN, 2000).

Sports studies show that the perceived motivational climate influences the ability and effectiveness of athletes (GOMES et al., 2012). The motivational climate is defined as the set of implicit signals, and/or explicit, perceived in the environment, which establishes the keys to success or failure. An environment with prevailing self-improvement, effort and learning creates better motivation (AMES, 1995).

It is also assumed that the incentive act in the central nervous system as factor for prolonging the exercise, inhibiting fatigue (RUBE; SECHER, 1981; McNAIR et al., 1996; SZMEDRA; BACHARACH, 1998; ANDREACCI et al., 2002).

Tests for predicting maximal oxygen uptake (VO_2) usually take participants to exhaustion. Some articles mention the encouragement as a routine procedure but do not explain why to use it and others do not even mention this procedure. (LEGER et al., 1988; STRICKLAND et al., 2003; BIM; NARDO JR., 2005; MOGGRIDGE et al., 2010; HEROUX et al., 2013; GARCÍA; SECCHI, 2014). Campenella et al. (2000) found no effect of verbal encouragement on strength efforts, while Moffatt et al. (1994) observed that competitive runners were not influenced by verbal encouragement in terms of $\text{VO}_{2\text{max}}$, respiratory exchange ratio and maximal lactate values.

Therefore, the aim of this study is to observe the influence of verbal encouragement every 60 s by the coach on the maximal oxygen consumption, distance covered and final heart rate in adolescents in the multistage 20 m shuttle run test

Material and methods

Study design

This was a crossover study (each subject serves as his own control) with one week of wash-out (SENN, 2002).

Participants

The sample consisted of 12 male students (16.7 ± 0.45 years, 62.8 ± 10.2 kg and 1.74 ± 0.06 m) enrolled in the State High School Infante Dom Henrique, located in Rio de Janeiro, volunteers among the 20 best scores in a physical fitness test battery (GAYA; SILVA, 2007) previously performed. The remaining eight students declined to participate.

The participation of each student was previously informed and granted by signing an informed consent form by the guardians, in compliance with guidelines and regulatory standards for research involving human subjects in accordance with Resolution 466/2012 of the National Health Council.

This study was submitted to the Ethics Committee on Research involving human subjects of the University of Castelo Branco, with the number 0083/2008.

Intervention procedures

All procedures followed the guidelines proposed by the International Society for the Advancement of Kinanthropometry (ISAK, 2001).

For measurement of body weight and height, we used a mechanical scale with a capacity of 150 kg and accurate to 100 g, and a Filizola® stadiometer.

The multistage 20 m shuttle run test is a progressive exertion test covering a distance of 20 m, round trip, at a rate determined by playing a standard Mp3 file until the individual can no longer keep pace. The formula to estimate the maximum oxygen consumption in adults is $\text{VO}_{2\text{max}} = 31.025 + 3.238 X - 3.248 A + 0.1536AX$, in which X = speed at the last stage in km h^{-1} , A = Age in years (LEGER et al., 1988).

Each student performed the multistage 20 m shuttle run test, individually, twice, with a week interval between each test. Half of the sample was encouraged during the first test and the other half received encouragement in the second week.

The types of incentives used were: 'Very well', 'Let's go kid', 'Way to go', 'You can do it', 'Cheer up', 'You're almost there', every 60 s, throughout the process, uninterruptedly to all participants (McNAIR et al., 1996; ANDREACCI et al., 2002; WISE et al., 2004; MOGGRIDGE et al., 2010).

The participants were not previously informed about the study objectives. The heart rate was monitored through a Polar RS 800 frequency meter (Finland). The tests were performed in the morning shift, indoors and under similar conditions of temperature.

Data analysis

Descriptive statistics with mean, standard deviation, test power and percentage delta ($\Delta\%$) was used. The normality of the sample was checked by the Shapiro-Wilk test and homogeneity of variance by Levene's test. For the analysis of variables within groups, the paired Student t test was applied. The level of $p < 0.05$ was adopted for statistical significance. Results were evaluated using Bioestat 5.3 (Brazil).

Results

Significant differences were found ($\Delta\% = 5.14\%$, $p = 0.009$) in $VO_{2\max}$ measured between the groups with and without encouragement or incentive. Table 1 and Figure 1.

Table 1. Maximal Oxygen Uptake with and without Verbal Encouragement.

	N	$VO_{2\max}$ (ml kg^{-1} min $^{-1}$)	SD
With VE	12	47.3*	3.20
Without VE	12	44.9	3.53

* $p = 0.009$, VE = Verbal encouragement, SD = Standard Deviation.

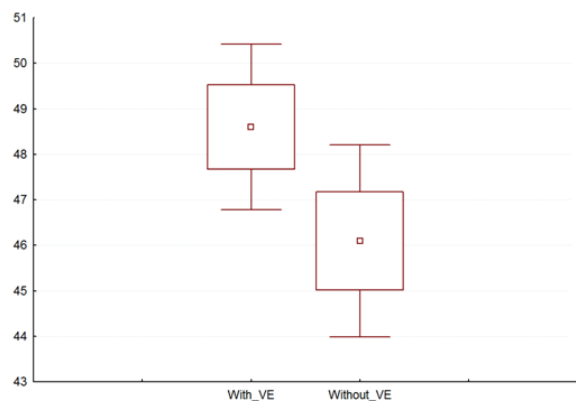


Figure 1. Maximal Oxygen Consumption with and without verbal encouragement.

Also, significant differences were detected ($\Delta\% = 9.23\%$, $p = 0.03$) in distances covered by

participants with and without incentive. Encouraged students covered 146.6 m more, on average. Table 2 and Figure 2.

Table 2. Distances Covered with and without Verbal Encouragement.

	N	Distances (m)	SD
With VE	12	1588.3*	254.9
Without VE	12	1441.7	293.7

* $p = 0.03$, VE = Verbal encouragement, SD = Standard Deviation.

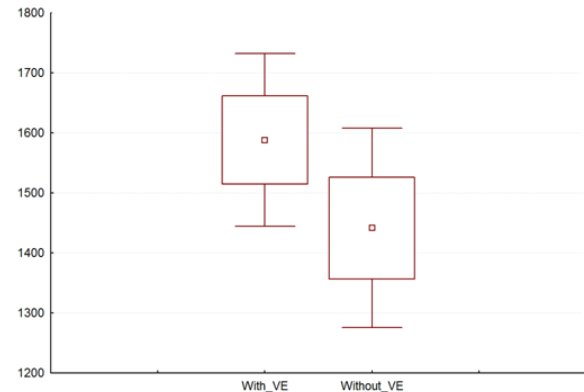


Figure 2. Distances covered with and without verbal encouragement.

Among the 12 participants, ten had their heart rates recorded during the tests. By observing the mean heart rate in the last 30 s of the test, there were significant differences ($\Delta\% = 3.21\%$, $p = 0.03$) between the groups of students (with and without verbal encouragement). Table 3 and Figure 3.

Table 3. Heart Rate with and without Verbal Encouragement.

	N	Heart Rate (bpm)	SD
With VE	10	198.8*	7.7
Without VE	10	192.6	10.2

* $p = 0.03$, VE = Verbal encouragement, SD = Standard Deviation.

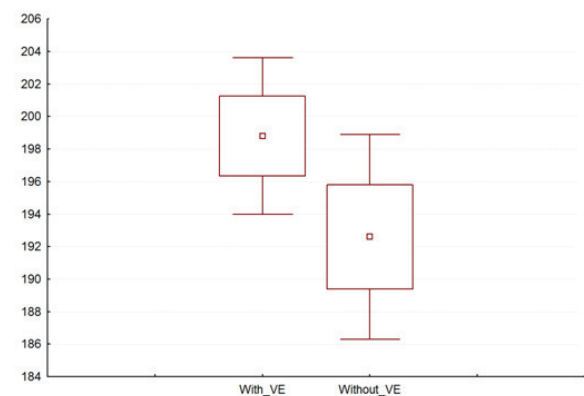


Figure 3. Heart Rate with and without encouragement.

Discussion

The aim of the study was to observe the influence of verbal encouragement on the maximal oxygen uptake, distance traveled and final heart rate in adolescents when performing the multistage 20 m shuttle run test. In the sample analyzed, it was proven the importance of positive feedback, conducted verbally in the efficacy of the test.

Amorose and Horn (2001) demonstrated that coaches who most encouraged, advised and performed positive feedback achieved higher levels of intrinsic motivation, higher levels of perceived competence and commitment to their sports teams, as well as lower levels of tension/pressure. In the same way, Pihu et al. (2008) reported that the positive feedback is directly related to the increase of intrinsic motivation, and this positively influences physical activity. Amorose and Horn (2001) and Fredenburg et al. (2001) showed that positive feedback positively predicted intrinsic motivation for physical education students. Following this reasoning, Moreno-Murcia et al. (2012) evidenced that the overall positive feedback and the perceived overall positive nonverbal feedback contributed to the intrinsic motivation of the students.

Lutz et al. (2003) studied the relationship between positive feedback pre and post-exercise, and observed, with positive feedback, a negative correlation with extrinsic motivation and demotivation, and a positive correlation with intrinsic motivation and self-determined behavior. These results confirm the importance of how the subject is provided with feedback, both within Physical Education and in other physical activity contexts, in order to increase levels of self-determination and intrinsic motivation.

In this sense, some studies exhibit a positive relationship between the feedback on information of positive character and high levels of intrinsic motivation (more self-determined) and the perception of competence on the part of practitioners (AMES, 1995; KOKA; HEIN, 2003). Schmidt and Lee (2014) stated that extrinsic feedback promotes important information to achieve goals, helping the practitioner to overcome personal marks, primarily in long-term and repetitive efforts. The same authors point out that the motivational feedback contributes to the achievement of a longer exercise, with more pleasure and intensity. The present study proposed a test of maximum aerobic resistance, in which the most important environmental variation was the presence or absence of verbal incentives. Eight participants improved and four did not improve their performance,

presumptively, by the particular effect caused by the incentive and/or the interest of each on the task.

Moreover, some authors (RUBE; SECHER, 1981; McNAIR et al., 1996; ANDREACCI et al., 2002) sought to explain how verbal encouragement improves the performance, and suggested that part of the muscle fatigue is developed within the central nervous system, being inhibited the discomfort by motivation.

Szmedra and Bacharach (1998) used music as a motivational strategy and related the improvements found to the fact that music alters the stimulation patterns of the sympathetic division of the autonomic nervous system, keeping the focus away from the exercise. This study employed the verbal encouragement as a dissociative strategy.

Three studies associated oxygen consumption tests with verbal encouragement bringing up the theme in different aspects. Andreacci et al. (2002) compared verbal encouragement every 20, 60 e 180 s during maximal exercise testing, demonstrating that oxygen consumption was strongly affected by verbal encouragement, increasing 13.3% in the 20 s group and 8.6% in the 60 s group. The same authors also found that excessive encouragement might affect negatively, interfering with the running concentration and bothering. Vieira et al. (2005) emphasized that disturbing stimuli of optical, acoustic and tactile origins may also adversely affect the performance.

Moffatt et al. (1994) also found 5% VO_{2max} improvement in maximal treadmill tests with verbal encouragement as well as increases in respiratory exchange ratio (RER), treadmill run time, maximum heart rate and blood lactate concentration for untrained subjects. No VO_{2max} variations were observed for highly trained competitive runners but maximal heart rate increased.

Chitwood et al. (1997) examined the influence of verbal encouragement during assessment of maximal oxygen uptake and concluded that verbal encouragement increased the treadmill time, VO_{2max} (8,7%), and respiratory exchange ratio in Jenkins Activity Survey's type B people (creative), while there were no influences on type A (ward working). This study suggests that individuality is an important factor for extrinsic motivation.

Wise et al. (2004) studied the effects of two different verbal messages (specific and general) on bench press efficacy and concluded that both messages strengthened efficacy. The present study showed that unspecific verbal encouragement ('Very well', 'Let's go kid', 'Way to go', 'You can do it', 'Cheer up', 'You're almost there') every 60 s is sufficient for obtaining better results in oxygen

consumption, overall distances and final heart rate during the multistage 20 m shuttle run test. In the current experiment, the $\text{VO}_{2\text{max}}$ improving rate was 5.14%, similar to Moffatt et al. (1994) with untrained non-athletes and lower than that found by Andreacci et al. (2002) with 60 s stimulus protocol (8.6%) and Chitwood et al. (1997) with psychologically creative profile people (8.7%). Considering the exercise time, all three studies reported increases from 8.1 to 17.9%. The present study also measured the distance covered, and registered 9.23% of improvements. Besides that, Moffatt et al. (1994) registered heart rates 1.2% higher with incentives, while our results were 3.21% higher.

As a limitation of this study, this experiment did not measure any psychological aspect of the participants and our sample was composed only of male adolescents in good physical condition.

Conclusion

The influence of encouragement on increased performance seems to have multifactorial causes. Factors related to motivation, nerve stimulation or inhibition of fatigue are differently influenced, depending on the nature and amount of encouragement and type of individual.

Our findings lead us to believe that verbal encouragement increased maximal oxygen uptake and distance covered on the test, besides providing the highest values of final heart rate in adolescents in the completion of the multistage 20 m shuttle run test.

Future studies can estimate the influence of incentive under various conditions on physical performance in children, women and elderly.

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