BOOK OF ABSTRACTS **Open Access**

Do athletes know which feedback helps them most?

Dobiasch, M.[1]✉, Heindl, J.[1], Stöckl, M.[1] and Baca A. [1]

[1] University of Vienna

✉ **Contact email:** martin.dobiasch@univie.ac.at

Purpose:

The assessment of one's fitness level is an essential part of any rigorous coaching regime. Testing in the lab is usually done with equipment such as a cycle ergometer or a treadmill, where a fixed intensity (speed or resistance) can be selected by the tester. When testing in the field, however, athletes are required to adhere to selected intensities as best as possible in order to have reliable and accurately performed tests. Modern technology offers various tools to athletes and their coaches for performing field tests. Some of these tools include features which aim at aiding athletes to improve their accuracy during these tests. However, it seems that there is no perfect solution which helps all athletes best, and thus athletes and their coaches are required to select a feedback based on their preferences. The aim of this study was to determine whether athletes prefer the feedback with which they achieve the best accuracy during a test.

Methods:

12 recreational athletes (mean $\pm$ SD; age: 25.24 ± 2.53 years, BMI: $23.31 \pm 2.08\ kg\ m^{-2}$) participated in a pilot study. This study consisted of a running test and a cycling test. The study was approved by the ethics committee of the University of Vienna. The running test is based on the "Conconi-test" where athletes have to increase their speed by $0.5\ km\ h^{-1}$ every $200\ m$. Athletes are stopped automatically upon reaching 90% of their self-reported maximal heart rate. The cycling test is a modified version of the Lamberts Submaximal Cycling Test (Lamberts et. al, 2009), which adds another stage to the test in which athletes are asked to cycle for three minutes at the average power of their third stage of the test (Dobiasch et al., 2018). The participants completed the trials in a randomised order.

During the running test three different feedback variants were examined. Participants were equipped with a smartphone on which a custom app was installed. This app provided the participants with feedback regarding their target speed. The first feedback variant uses two different vibration patterns. When an athlete is too slow, the phone will vibrate three times for $200ms$ with a $150ms$ break between the vibrations. When an athlete is too fast, the phone will vibrate three times for $1000ms$ with a $250ms$ break in between. The second feedback uses the text-to-speech software of the phone to tell the athletes when they are "too slow" or "too fast". The third variant vibrates and speaks to the athlete at the same time, thus combining both feedbacks. Due to technical problems a fourth variant resembling a classic beep-test was excluded from this analysis.

In the cycling test two novel design variants were compared to a classical display where information is shown using only numbers. The first novel design shows the deviation from the target as a vertical bar. As a second novel design participants were shown a tachometer on which the respective target value and allowed deviation is marked.

Preferences of the athletes were recorded using a questionnaire after all the trials of the running or cycling tests were completed. For the running test the participants were asked to rank the three variants in their preferred order. After the cycling test, participants were asked to provide a ranking for the heart rate-based and the power-based task. This was done independently from each other.

For the running tests the accuracy was calculated as the relative amount of time the participant ran within the boundaries of $\pm 0.3\ km\ h^{-1}$ from the target speed. Feedback was only given to the participants when they were running with a speed outside the required boundaries. Similarly, the accuracy for the heart rate was calculated as the relative amount of time cycled within the required boundaries of the target heart rate. The boundaries of two heart beats for the first stage and one heart beat for the second as well as the third stage were explained to the participants during the familiarisation with the study. For each stage the first minute was excluded from the analysis in order to account for the delayed onset of the heart rate. The accuracy of the power was calculated as the relative amount of time spent within ± 10 watts of the target power in minutes two and three of the power stage. These computed accuracies were then used to rank the feedbacks for the running speed as well as the heart rate and power test. We used Kendall's test to test for a correlation between ranking of the athlete's preferences and the ranking of their accuracies.

Results:

Based on the data from the study, preferred feedback is independent from the accuracy in the running test ($r_\tau = .08; p = .6$). Similarly, no linear relation could be identified for the heart rate and power feedback in the cycling test ($r_\tau = .16; p = .3$) and ($r_\tau = .17; p = .25$), respectively.

Conclusion:

One limitation of this study is the rather small sample size, which also affects the significance of the correlation tests. Another limitation of this study is that for the cycling test differences in accuracy are non-significant (Dobiasch 2018). Consequently, more research is needed in order to determine whether athletes can predict their accuracy. The results indicate that athletes might not always prefer the feedback which is best for them. As a result of this it might be necessary for athletes and their coaches to select a feedback based on accuracy rather than preference.

References:

1. Dobiasch, M., Stöckl, M., & Baca, A. (2018). Guiding athletes through heartrate and power based tasks. *Journal of Science and Cycling*, 7(2), 22-23.
2. Lamberts, R. P., Swart, J., Noakes, T. D., & Lambert, M. I. (2009). A novel submaximal cycle test to monitor fatigue and predict cycling performance. *British Journal of Sports Medicine*, *45*(10), 797–804.