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RELATIONSHIPS BETWEEN CHANGES IN PERFORMANCE RELATED-MEASURES FOLLOWING HIGH-INTENSITY INTERVAL TRAINING IN ELITE ATHLETES DERIVED VIA META-REGRESSION ANALYSES

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INTRODUCTION:

Elite athletes use high-intensity interval training (HIT) to enhance competition performance. Meta-analyses have shown that HIT is effective for improving various performance-related measures in various settings (Wiesinger et al. 2023). However, visualization of relationships between HIT-induced change scores in performance-related measures may provide a more nuanced and practical interpretation by revealing trends and patterns that were not apparent in the separate meta-analyses. Here, we have explored these relationships. **METHODS:**

The change scores were the study-estimates for the performance-related measures (sprint speed/power, repeated-sprint ability, time-trial speed/power, peak speed/power, threshold speed/power, VO2max, work economy) for the HIT and control groups in the previous study (Wiesinger et al. 2023). The linear relationships between change scores of pairs of measures were quantified with a meta-analytic mixed model. The fixed effects were the linear-numeric predictor variable and the intercept. The mean value of the dependent variable was estimated with the same mixed model omitting the predictor variable, and the corresponding mean value of the predictor was estimated from the slope (the coefficient of the predictor) and the intercept of the first model. A random effect provided an estimate of heterogeneity as the standard error of the estimate, which represented differences in the effect of HIT between settings that were not explained by the predictor. **RESULTS:**

The scatterplots revealed positive linear relationships between appropriate pairwise combinations of time-trial speed/power, peak speed/power, VO2max, and aerobic/anaerobic threshold. The mean changes in the subset of study estimates in each plot were similar, but the variation in each dependent variable left unexplained by the predictor (the standard error of the estimate) was 2.0 to 2.6%. Mean change in work economy showed a slightly negative relationship with time-trial speed/power and a stronger negative relationship with VO2max. Repeated-sprint ability had a weak positive relationship with sprint speed/power. CONCLUSION:

The wide variation in change in mean time-trial performance between settings for a given change in peak speed/power, VO2max, or threshold speed/power implies that these three test measures would not accurately reflect the effects of HIT on performance in endurance competitions. Therefore, time-trials should be implemented whenever possible to accurately assess the effect of HIT. The three test measures, along with work economy, might nevertheless identify strengths and weaknesses to customize further implementation of HIT or other training interventions of the individual athletes in a given setting. Sprints and repeated-sprinted ability are both important performance-related measures for team-sport athletes, and their poor relationship implies that both should be measured to assess the effect of HIT.

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