

1-1-2021

Reply to “Programming may matter most.” Response to “Metabolic effects of two high-intensity circuit training protocols: Does sequence matter?”

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Recommended Citation

Nuñez, Tony P.; Amorim, Fabiano T.; Beltz, Nicholas M.; Mermier, Christine M.; Moriarty, Terence A.; Nava, Roberto C.; VanDusseldorp, Trisha A.; and Kravitz, Len, "Reply to “Programming may matter most.” Response to “Metabolic effects of two high-intensity circuit training protocols: Does sequence matter?” (2021). *Faculty Publications*. 211.
<https://scholarworks.uni.edu/facpub/211>

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Contents lists available at ScienceDirect

Journal of Exercise Science & Fitness

journal homepage: www.elsevier.com/locate/jesf

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We appreciate the interest that our study elicited and the comments from a reader. We commend the reader of our paper for critically evaluating the protocol and results of the study. Here, we would like to respond to the statement made in the letter. Indeed, the rest intervals were longer and time at VO_{2max} was lower in our study than recommended by Buchheit and Larsen.¹ However, because the reader is interested in the practical implications of our study, we ask that they consider the following:

- 1) Exercise prescriptions are recommendation given by professionals; however, there is no standards that mandate absolute requirements for loads, sets rest periods, etc. There is no empirical evidence to suggest that our protocol, specifically the recovery period during the high intensity interval training (HIIT) protocol, is “too short” or “too easy”. Previous research has defined and assessed HIIT as high-intensity bouts (80–100% HR_{max}) with active recovery (50–70% HR_{max}).^{2,3} Unpublished data from our study demonstrate that participants’ heart rates were rarely below 60% HR_{max} during active rest (90-s walking). Nonetheless, the purpose of the study was to compare the sequence of HIIT and circuit weight training (CWT), not the efficacy of the HIIT protocol independently. According to immediate post-exercise blood lactate concentrations for both protocols (mean 9.6 ± 3.7 mmol L^{-1}), the combination of HIIT and CWT required high-intensity effort to complete. Furthermore, pilot data from our lab showed that greater intensities for HIIT and CWT would cause participants to reach volitional fatigue prior to completing the exercise protocol.
- 2) Because the reader is interested in critically evaluating scientific methodology, they may find it useful to consider the methodology used to develop the recommendations they have referred in their letter. The recommendations from Buchheit and Larsen¹ are based on simple bivariate correlations and comparisons between various methodological approaches to HIIT training. While this approach is useful, it is not a substitute for a proper meta-analysis of the magnitude (effect size) of HIIT-induced training outcomes relative to methodological differences between studies. The recommendations from Buchheit and Larsen¹ are a helpful guide for practitioners, and not to be considered that standard for optimal training protocol adaptations. In other words, we respectfully suggest that the reader’s assessment that our protocol is too easy is not relevant, as there is no established threshold that must be surpassed to achieve training adaptations.
- 3) The recommendations referred to by the reader are based on the assumption that HIIT training is to be performed alone, or at

least during a separate session to other training sessions performed on the same day. Instead, our study coupled HIIT with CWT. Exercise professionals must take into account that a modification in one training variable must be accompanied by proportional changes to the other variables. With that said, we reduced the duration of HIIT and increased the rest period so that the participants could perform each exercise properly without reaching total exhaustion. Our extensive pilot investigation of this training approach proved to be a worthy practical strategy.

- 4) Lastly, and to the aforementioned point, there will never be a single experimental protocol that an exercise professional should exclusively rely on for exercise prescription. The factors involved in individualized exercise prescription, particularly for trained individuals, are to be evaluated by the exercise professional in order to design an ‘optimal’ training program. These considerations are beyond the scope of the present work.

Thank you again for your stimulating comments. We appreciate your interest in this novel training approach and hope more research is completed in this area.

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<https://doi.org/10.1016/j.jesf.2020.10.001>

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Available online 21 October 2020