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INDIVIDUALISED TRAINING ENHANCES INITIAL ACCELERATION PERFORMANCE IN ELITE SPRINTERS: A NOVEL FRAMEWORK TO SUPPORT EXERCISE SELECTION

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INTRODUCTION:

The 100 m sprint is broadly distinguished into the initial and pick-up acceleration, maximum speed and negative acceleration phases [3] with athlete's performance resulting from the interaction of the subsequent sections. The acceleration phase is considered to be a key component of the race [2]. It is well established that acceleration performance is primarily determined by the athlete's ability to generate a high ratio of forces (RF), which is highly dependent on technical components [4]. Although these characteristics seem well understood, there are currently no procedures that allow practitioners to tailor individual exercise selection to precisely target and optimize the underlying kinematic parameters.

METHODS:

Spatiotemporal variables and shin-roll kinematic behaviour [1] were obtained from 15 male (100 m-PR: 10.11-11.36 s) and 13 females (100 m-PR: 11.19-12.49 s) national to elite level sprinters. As a measure of initial acceleration performance V/T ratio (instantaneous velocity at 10 m divided by 10 m time) was calculated. In addition, biomotor capacity was assessed using countermovement and drop jumps. These metrics have been merged into individual profiles to provide insight into athlete's strengths and weaknesses. Based on this, each athlete was assigned six profile-specific drills to refine sprint mechanics and assist in feeling acceleration-specific muscle activation. The individualised interventions were allocated to fifteen athletes (INT) and incorporated into the warm-up routine over a 4-week period (2x/w). The remainder of the participants (n=13) were included as a control group (CON) and maintained their group-based training regimen. Statistical inference for intervention response was conducted using stratified 2000 bootstrap resamples (and 95% bias-corrected and accelerated confidence intervals). The effect of group (INT vs CON) on V/T ratio was estimated using a linear regression model.

RESULTS:

Initial acceleration performance of participants who received a technical intervention improved significantly from pre- to post-intervention (mean change=.081, 95% CI [.031, .139], $p=.003$) and differed significantly from the observed change of CON group (mean change = -.093, 95% CI [-.173, -.03], $p=.012$). Increases in performance of the INT group were accompanied by changes in whole-body kinematic strategies, that were significantly greater than those of the CON group ($p<.001$), whereas no change in biomotor capacity was observed for both groups.

CONCLUSION:

Individualized, technique-based exercises significantly improved initial acceleration performance, in contrast to the lack of meaningful change in controls who underwent a group-based sprint training protocol. This study provides an evidence-based approach for practitioners to holistically assess how aspects of technique relate to acceleration performance and support exercise selection.

REFERENCES:

- [1] Alt et al., 2022
- [2] Jones et al., 2009
- [3] Mero et al., 1992
- [4] Morin et al., 2011

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