Non-running physical activity affects prolonged run duration but not gait.

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Summary

Non-running physical activity (PA) may heighten fatigue and compromise effective running training by diminishing the ability to complete runs with an intended distance or intensity. In this study, 16 recreational runners were grouped by all-type PA level; run duration and gait were assessed across two 3-day running protocols. Runners with greater all-type PA ran longer in run 1 but saw run duration decrease across days. Greater all-type PA did not protect against changes in gait.

Introduction

PA from non-running exercise and activities of daily living has historically been neglected when considering training loads and injury mechanisms [1]. Given that non-running PA has the potential to skew the balance between training and recovery, it follows that all-type PA could affect runners' training capacity and thereby promote overtraining [2]. Failure to account for non-running PA when planning training and recovery could contribute to fatigue during training runs, which has been shown to alter gait [3]. If non-running PA contributes to overtraining over time and/or fatigue during prolonged runs, it is plausible that run duration and gait may also be affected. The purpose of this study was therefore to investigate the effect of usual all-type PA on running duration and gait mechanics during two prolonged running protocols.

Methods

Sixteen recreational runners (6F/10M; age: 28.0 ± 6.9 years; run volume: 28.6 ± 21.2 km/week) were divided into low, medium, and high tertiles based on usual all-type moderate-to-vigorous PA (MVPA) minutes measured with a wrist-worn Fitbit prior to initiating the two randomized running protocols: consecutive (3 consecutive days of prolonged runs) and rest (3 days of prolonged runs separated by 24-hours of rest). Each of the 6 runs were performed on an instrumented treadmill at the pace eliciting the first ventilatory threshold (3.3 ± 0.4 m/s) while 3D motion capture was recorded. Runs ended when Borg rate of perceived exertion was ≥17, volitional exhaustion was reached, or run duration exceeded 1 hour. Eversion (EV), tibial internal rotation (TIR), and knee ab/adduction (ABAD) deviations during running were compared with the participant's habitual movement path during functional movements [4]. Within-run changes in gait deviation (Δdev) were calculated between the start (minute 3) and the end of the run. Between-run and between-protocol differences in run duration and Δdev were assessed with separate linear mixed models with pairwise comparisons ($\alpha = 0.05$).

Results and Discussion

For run duration, only the run number:tertile interaction ($p = 0.027$) and tertile main effect ($p = 0.004$) were significant. For both protocols, the high PA tertile ran longer than the low PA tertile for runs 1 and 2 ($p < 0.011$), and longer than the medium PA tertile for run 1 ($p < 0.015$). Run duration did not differ between PA tertiles for run 3 of either protocol ($p > 0.050$). Within protocols, only significant tertile main effects were observed (rest: $p = 0.001$; consecutive: $p = 0.005$) in which the high PA tertile ran longer than the low PA tertile ($p \leq 0.003$).

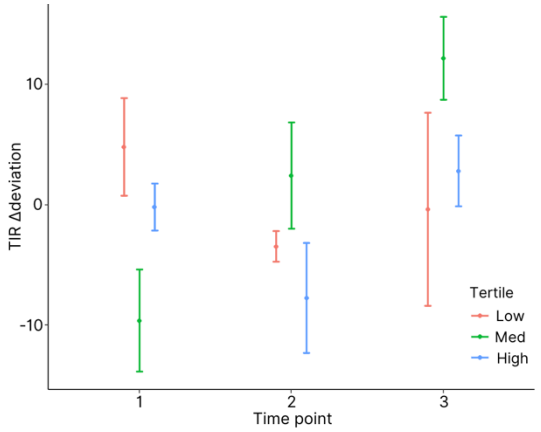

Figure 1: Mean and standard error TIR Δdev by MVPA tertile across the rest protocol.

There were no significant interactions between tertile group, protocol, or run number for EV, TIR, or ABAD Δdev ($p = 0.073–0.986$). The only significant within protocols comparison was a run number:tertile interaction for TIR Δdev during the rest protocol ($p=0.034$; Figure 1), which revealed significantly greater TIR Δdev between run 1 vs. run 3 in the medium PA tertile ($p = 0.002$). Across EV, TIR, and ABAD, inter-participant variability in the direction and magnitude of Δdev likely made it difficult to reveal significant differences.

Conclusions

Runners in the highest MVPA tertile ran longer during run 1 in both protocols but generally decreased run time across days, indicating that they may have initially exerted themselves more than runners in the lower MVPA tertiles. Greater all-type MVPA did not protect against within- or between-run changes in gait deviations.

References

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