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# The effect of running nine marathons in nine days on proprioception and balance

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## Abstract

**Background** Multi-day running events are becoming increasingly popular with nonprofessional athletes. However, it is unknown how and when this type of event affects injury risk factors such as proprioception and balance.

**Objective** To evaluate the effect of running one, five consecutive and nine consecutive marathons on joint position sense (JPS) and dynamic balance.

**Design** Cross-sectional, observational study.

**Setting** Sports-injury clinic.

**Participants** 21 athletes completing the event (age  $44.8 \pm 8.09$  yrs, mass  $74.4 \pm 13.14$  kg, years running  $10.4 \pm 7.39$  yrs, average weekly mileage  $44.8 \pm 12.09$  miles) entered the study. Ten athletes completed the JPS testing and five athletes completed the dynamic balance testing.

**Assessment of Risk Factors** Risk factors were assessed the day before the event (day zero) and then following completion of one (day one), five (day five) and nine (day nine) consecutive marathons. The independent variable was time.

**Main Outcome Measurements** JPS error into flexion and extension, star-excursion balance test (SEBT) and number of injuries per runner.

**Results** Friedman's ANOVAs indicated no effects of time on JPS into extension ( $p=0.94$ ), dominant-leg anterior ( $p=0.52$ ) or posterior-lateral ( $p=0.65$ ) SEBT reach. JPS flexion error significantly decreased by  $1.3^\circ$  from day one to five ( $p=0.032$ ). Non-dominant leg anterior, posterior-medial and posterior-lateral SEBT reaches significantly decreased from day zero to nine by 0.09% ( $p=0.043$ ), 0.13% ( $p=0.043$ ) and 0.17% ( $p=0.043$ ) of leg length respectively. Dominant leg posterior-medial SEBT reach also significantly decreased by 0.12% of leg length ( $p=0.043$ ) from day zero to nine. There were 4.2 injuries per runner.

**Conclusions** The results suggest multi-day running events can cause over four lower limb injuries per runner and reduce dynamic balance ability. Nonprofessional athletes completing these events should be aware of this high injury occurrence and prepare appropriately. Injury prevention programmes incorporating dynamic balance may be recommended. However future studies with additional risk factors and larger sample sizes are needed to substantiate these findings.