

**Methods:**

Longitudinal data from adult twins were drawn from the AUstralian Twin BACK study. The primary outcome was the total self-reported frequency (counts) of overall utilisation of care for LBP, over one year. Secondary outcomes were the utilisation of health services, and the utilisation self-management behaviours, for LBP (assessed as total frequency over one year). Explanatory variables were device-based measures of sedentary behaviour and moderate-to-vigorous intensity physical activity, and self-reported measures of physical workload (Physical Workload Index), and work, transport, household, and leisure domain physical activity (International Physical Activity Questionnaire), at baseline. Explanatory variables were categorised into tertiles, then dichotomised as low or medium-to-high volumes. Low volumes were considered the reference comparison.

**Results:**

Data from 340 individuals were included. Medium-to-high baseline volumes of sedentary behaviour were significantly associated with greater counts of overall care utilisation (incident rate ratio [IRR] 1.60, 95% confidence interval [CI] 1.04-2.44) and utilisation of self-management behaviours (IRR 1.60, 95% CI 1.02-2.50) for LBP, over one year. Medium-to-high baseline volumes of household domain physical activity were significantly associated with greater counts of utilising self-management strategies for LBP over one year (IRR 1.62, 95% CI 1.04-2.53). No other explanatory variables were associated with the utilisation of health services for LBP.

**Discussion:**

People who engage in higher baseline volumes of sedentary behaviour or physical activity in the household setting utilise 1.6 times more care for LBP over one year.

**Impact/Application to the field:**

Patients and clinicians should collaborate to screen and develop strategies to modifying engagement in sedentary behaviour or domestic labour, as higher volumes of these behaviours may lead to poorer and potentially most costly recovery from LBP.

**Declaration:**

My co-authors and I acknowledge that we have no conflict of interest of relevance to the submission of this abstract.

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**O2023SMA-218****Effect of run duration on the reliability of local dynamic stability in healthy young athletes**

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**Introduction:** Anterior cruciate ligament (ACL) injury and subsequently ACL reconstruction (ACLR) are common among athletes. However, approximately one in four young athletes suffer re-injury following rehabilitation and return-to-sport (RTS), indicating that the current methods used to assess RTS readiness might be insufficient. Therefore, there is a need for alternative assessments to monitor rehabilitation status. Local dynamic stability (LDS) of walking is an assessment that has been used to differentiate between healthy and injured populations, highlighting its potential as an indicator of healthy gait. However, there is insufficient research regarding the minimum duration required to produce reliable LDS measurements for young athletes during running. Therefore, this study investigated the effect of run duration on the reliability of LDS in young athletes during treadmill running.

**Methods:**

Fifteen healthy young athletes completed two sessions (average 7 days apart) of treadmill running for 5.5 minutes at a self-selected preferred speed. Knee flexion-extension angle was captured using three-dimensional motion capture. Run durations of 1, 2, 3, 4, and 5-minutes were extracted, and LDS estimated by calculating the largest Lyapunov exponent ( $\lambda$ ) across each duration. Differences in mean  $\lambda$  for each session were evaluated using paired t-tests. Inter-session reliability was assessed using intraclass correlation coefficients ICC(2,1) and standard error of measurement (SEM). Minimal detectable difference (MDD) was also calculated (expressed as percentage of the mean).

**Results:**

There was no significant difference in mean  $\lambda$  between sessions for all run durations ( $p > 0.05$ ) and all durations demonstrated excellent relative reliability (ICC  $> 0.75$ ). Across all run durations, the 4-minute duration showed the greatest ICC (0.95), the lowest SEM (0.13), and the lowest MDD (0.37 or 20%).

**Discussion:**

Whilst excellent ICC values were calculated for all run durations, SEM and MDD reduced incrementally from 2-minute run durations; the lowest SEM and MDD values were observed for 4-minute run durations before increasing for 5-minute run durations, indicating that 4-minute run durations are optimal for calculating reliable and sensitive LDS measures. Current ICC and  $\lambda$  results are consistent with previous research assessing the reliability of trunk LDS during gait in young athletes for a 2-minute running protocol. However, SEM and MDD were not reported, which is crucial when understanding a measure reliability and sensitivity. Current results indicated that 2-minute run durations are less desirable than 4-minutes due to the SEM and MDD being almost double in the former. Therefore, a 4-minute run duration was optimal for calculating reliable LDS measures, based on ICC, SEM, and MDD.

**Impact/Application to the field:**

Results of this study have practical implications for clinicians and researchers evaluating LDS in young athletes during running. An optimal run duration of 4-minutes provides reliable and sensitive LDS measures, which could be used to monitor an athlete's rehabilitation status and RTS readiness. Further, results of this study highlight that ICC, SEM, and MDD must be considered when determining optimal run durations to calculate LDS measures, used to assess real-world change in athlete rehabilitation status. Future research, to assess the role of LDS in monitoring rehabilitation status and RTS readiness, following ACLR in young athletes, is warranted.

**Declaration:**

My co-authors and I acknowledge that we have no conflict of interest of relevance to the submission of this abstract.

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**O2023SMA-171****Unilateral tests of explosive hip extension and horizontal force production: reliability and associations with sprinting performance**

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**Introduction**

The hamstring muscles are a major contributor to explosive hip extension and horizontal force production during the acceleration

phase of sprinting. Previously hamstring-injured athletes often return to sport with impaired horizontal force production when sprinting, which can negatively impact their sport performance. Low horizontal force production during sprinting has also been associated with future risk of hamstring injury in team-sport athletes.

Horizontal force production is commonly measured during sprinting. However, potential between-leg deficits in horizontal force may not be considered during testing due to the bilateral nature of sprinting. Therefore, this study aimed to establish the reliability of unilateral tests assessing explosive hip extension and horizontal force production, and their association with sprinting performance.

#### Methods

Twenty recreationally active men ( $26 \pm 5$  years,  $181 \pm 8$  cm,  $81 \pm 7$  kg) participated in one familiarisation and two data collection sessions. Each session was separated by seven days and comprised a standardised warm-up, sprinting test and four unilateral tests assessing explosive hip extension and horizontal force production: scooter, isometric hip extension, hamstring switch, and single leg hop for distance. Reliability was established by calculating typical error (TE), coefficient of variation (TE%), interclass correlation coefficient (ICC) and minimal detectable change (MDC). Pearson's correlation coefficients were calculated between the unilateral tests and sprinting peak velocity, with  $p < 0.05$  indicating statistical significance. Statistically significant correlations were investigated further through linear mixed models.

#### Results

Test re-test reliability was good to excellent for the scooter ( $TE\% = 1.7\text{--}4.6$ ;  $ICC = 0.88\text{--}0.94$ ), moderate for the isometric hip extension ( $TE\% = 5.6\text{--}6.0$ ;  $ICC = 0.65\text{--}0.69$ ) and good for the hamstring switch ( $TE\% = 3.4\text{--}4.7$ ;  $ICC = 0.78$  to  $0.87$ ) and single hop for distance ( $TE\% = 4.7\text{--}5.7$ ;  $ICC = 0.78\text{--}0.86$ ). Sprinting peak velocity was significantly associated with scooter peak horizontal force (left  $R^2 = 0.35$  and right  $R^2 = 0.38$ ), scooter peak velocity (left  $R^2 = 0.26$  and right  $R^2 = 0.31$ ) and single leg hop distance (left  $R^2 = 0.33$  and right  $R^2 = 0.42$ ).

#### Discussion

All unilateral tests of explosive hip extension and horizontal force production had acceptable reliability. Sprinting peak velocity was significantly associated with scooter peak horizontal force, scooter peak velocity and single leg hop distance. Isometric hip extension and hamstring switch were found to be reliable measures but were not associated with sprinting performance.

Significant associations between sprinting peak velocity and single leg hop distance have been reported previously, likely due to both tasks involving explosive contributions from the hip, knee and ankle joints to produce horizontal force. The scooter test involves repetitive explosive lower limb joint actions that are similar to sprinting with the additional benefit of providing objective measures of horizontal force production.

#### Impact and applications to the field

Practitioners can implement the scooter and/or single leg hop for distance to test unilateral explosive hip extension and horizontal force production, which have relevance to an athlete's sprinting ability. The isometric hip extension and hamstring switch may be used by practitioners as more isolated tests of hamstring function; however, these tests should not be used as surrogate measures of sprinting velocity.

#### Declaration:

My co-authors and I acknowledge that we have no conflict of interest of relevance to the submission of this abstract.

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#### O2023SMA-199

### The Impact of Dietary Factors on the Sleep of Athletically Trained Populations: A Systematic Review

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**Introduction:** Many athletically trained populations report poor sleep, especially during intensive training and competition periods. Recently, diet has been shown to significantly affect sleep in general populations, however, little is known about the impact diet has on the sleep of athletically trained populations. With sleep critical for optimal recovery and sports performance, this systematic review aimed to evaluate the evidence investigating the effect of dietary factors on the sleep of athletically trained populations.

#### Methods:

Four electronic databases (CINAHL Complete, Embase, MEDLINE Complete, and SPORTDiscus with Full Text) were searched from inception to May 2022. Primary research articles were included if they contained a dietary factor(s) as the independent variable, an outcome measure of sleep or sleepiness, and participants were aged  $\geq 18$  years and could be identified as athletically trained (i.e., described as "trained" or completing structured exercise  $\geq 3$  times per week, for  $\geq 5$  hours per week).

#### Results:

Thirty-three studies were included within the systematic review. Sleep or sleepiness was measured objectively using actigraphy ( $n = 13$ ) or polysomnography ( $n = 3$ ) in 48% of studies ( $n = 16$ ). Caffeine supplementation ( $\sim 2\text{--}6$  mg/kg) negatively affected sleep through reductions in total sleep time ( $-1.2\text{--}2.6$  hr) and sleep efficiency ( $-5.8\text{--}15.4\%$ ), and increases in sleep latency ( $+7.8\text{--}40.9$  min). Total daily carbohydrate intake was not significantly associated with sleep, however, the evening intake of high glycaemic index (GI) carbohydrates was associated with increases in objective sleep efficiency and reduced sleep latency. Protein sources high in tryptophan content consumed in the evening, including  $\alpha$ -lactalbumin, reduced sleep onset latency and increased N-REM stage 2 sleep, whilst increased total daily protein intake containing a mixture of amino acids decreased sleep efficiency and increased wake after sleep onset. Dietary supplementation of probiotics, beetroot juice, cherry juice, and cannabidiol all improved at least one aspect of subjective sleep, although limited research was presented.

#### Discussion:

This review supports the assertion that diet can affect the sleep of athletically trained populations. Through increased energy expenditure, protein turnover, and recovery demands, trained populations require greater amounts of carbohydrates and protein compared to general populations. The timing and composition of these macronutrients appear influential for sleep, with the evening intake of high GI carbohydrates and protein sources rich in tryptophan potentially improving sleep through promoting tryptophan availability – the dietary precursor to melatonin. Promoting the evening intake of these foods may further aid recovery and training adaptations through satisfying increased macronutrient requirements, whilst also optimising sleep.

#### Impact/Application to the field:

To optimise the sleep of trained populations, individuals should be screened for caffeine use up to seven hours prior to sleep. Additionally, for trained individuals experiencing long sleep onset latencies (e.g., night before competition), consumption of protein