Results Participants landed with more trunk flexion (success: $21.8^\circ \pm 13.2^\circ$; failed: $30.3 \pm 17.2^\circ$) ($p < 0.05$), more anterior pelvic tilt (success: $4.2^\circ \pm 5.4^\circ$; failed: $7.7^\circ \pm 5.1^\circ$), and less lateral pelvic tilt towards the landing leg (success: $4.7 \pm 3.0^\circ$; failed: $2.7 \pm 3.7^\circ$) during failed landings ($p < 0.05$). Higher rectus femoris, biceps femoris and gluteus medius excitation amplitudes were also observed during the failed landings ($p < 0.05$). MACD analysis identified that differences between failed and successful landings were initiated during the preparatory phase of the drop-jump.

Conclusions While biomechanical variables were significantly different during the landing phase, our novel MACD analysis identified that these differences initiated during the flight phase. Our findings also highlight that proximal joints play a critical role for landing successfully. Preventive training must therefore include how athletes prepare for a landing with a strong emphasis on upper body and proximal joint control.

342 DOES HIP STRENGTH PREDICT DYNAMIC VALGUS IN FEMALE RECREATIONAL RUNNERS?

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Background Dynamic valgus has been the focus of many studies to identify its association to an increased risk of running-related injuries. Many therapists suggest gluteus strengthening to address this movement dysfunction. However, it is not known which hip strength associated with this movement dysfunction.

Objective To test the correlation between hip strength and dynamic valgus in female runners.

Design Cross-sectional study.

Setting Biomechanics laboratory.

Participants Twenty-nine healthy recreational female runners.

Interventions Participants ran on a treadmill at 2.92 m/s. Kinematic data were collected using an 8 high-speed cameras motion analysis system (Vicon, Oxford, UK) with a sample rate of 250 Hz. Maximal isometric hip strength was tested using a hand-held dynamometer.

Main Outcome Measurements Predictor variables were peak isometric strength of hip extensors, abductors and external rotators. Interest variables were contralateral pelvic drop, hip adduction and internal rotation (peak angles and joint excursion) during stance phase of running. Association between predictors and interest variables were tested using Pearson Correlation Coefficient ($\alpha = 0.05$).

Results There was no significant correlation between hip strength and contralateral pelvic drop (r ranging from -0.09 to 0.32, $p > 0.05$), hip adduction (r ranging from -0.23 to 0.11, $p > 0.05$), and hip internal rotation (r ranging from -0.33 to 0.01, $p > 0.05$).

Conclusions Although previous studies showed dynamic valgus was associated to hip weakness during single-leg squat and jump-landing tasks, the results of our study suggested that caution should be taken when linking hip disorders in female runners during running to posterolateral hip strength. These

findings could be related to the linear nature of the statistical methods used to predict the biomechanical dysfunctions. It might be necessary to apply more robust techniques, as Artificial Neural Networks and Random Forests, to understand how physical variables interact to predict dynamic valgus in runners.

343 SHORT TRACK VS HOCKEY HELMETS: INVESTIGATING IMPACT ATTENUATION PROPERTIES OF HELMETS IN TWO SKATING SPORTS

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Background Certification standards governing short track (ST) helmets only require high velocity impacts be tested. Rotational acceleration and low velocity impacts are mechanisms of injury which are known to cause concussion. Conversely, ice hockey (IH) helmet certification require low velocity impacts in addition to high velocity impacts, and have been designed to mitigate both impact velocities.

Objective To compare the impact attenuation characteristics between ST and IH helmets, in both high and low velocity impacts.

Design Two-group experimental design.

Setting Impacts were performed in laboratory under controlled conditions. Helmets were impacted at two impact velocities (high and low; 4.5m/s and 2.4m/s respectively) and four impact locations (rear, rear boss, side and front boss). This was performed using a linear impactor device and the Hybrid III surrogate headform and neck.

Patients (or Participants) 5 different helmet models; 3 ST models and 2 IH models.

Interventions (or Assessment of Risk Factors) Assessment of ST and IH helmet impact attenuation under various conditions.

Main Outcome Measurements Peak linear and rotational acceleration; Head Injury Criterion (HIC) and Brain Injury Criterion (BrIC).

Results Between-groups ANOVA for linear [Low $F(1,27) = 10.7$, $p < 0.05$, $\eta^2 = 0.284$; High = $F(1,24) = 5.8$, $p < 0.05$, $\eta^2 = 0.195$] and rotational [Low $F(1,27) = 15.8$, $p < 0.05$, $\eta^2 = 0.370$; High = $F(1,24) = 8.1$, $p < 0.05$, $\eta^2 = 0.251$] accelerations yielded statistically significant differences with large effect sizes for all impact locations in both impact velocities. One-way between-helmet ANOVAs and post-hoc Bonferroni revealed impact attenuation performance hierarchy: IH 2 > IH 1 > ST 3 > ST 1 > ST 2. Between-groups ANOVA revealed statistical differences for HIC [Low $F(1,27) = 14.1$, $p < 0.05$, $\eta^2 = 0.344$; High = $F(1,24) = 7.6$, $p < 0.05$, $\eta^2 = 0.241$]. BrIC results were mixed.

Conclusions Results suggest that these IH helmets are better at attenuating both impact velocities than this group of ST helmets. Interestingly, the largest effect sizes were observed in the low-velocity impacts.

344 DO MOUTHGUARDS PREVENT ORO-FACIAL TRAUMA IN SPORT: A SYSTEMATIC REVIEW

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