Objective To assess the impact of acute peripheral fatigue on lower extremity functional and neurocognitive tests.

Design Randomized counterbalanced cross-over design.

Setting Primary prevention clinical setting.

Participants Twenty healthy participants (three females and ten males; age=24±3 years; height=177.5±6.6 cm; weight=73.2±11.3 kg) participated in this study.

Interventions Acute peripheral fatigue was induced by a 30 second modified Wingate protocol matched for maximal 30 second power output, while the participants were seated on the bike for 30 seconds during the control task.

Main Outcome Measurements The Y-balance test (YBT), reactive balance test (RBT), single leg hop test (SLH) and counter-movement jump (CMJ) were evaluated pre-post intervention.

Results ANOVA revealed no interaction effect of time and condition for the YBT. The CMJ & SLH were significantly lower post physical fatigue intervention ($p<0.001$), together with the SLH being significantly lower compared to control ($p=0.027$) post fatigue intervention. A significant decrease in RBT accuracy was observed post physical fatigue ($p=0.004$), with participants performing significantly worse when peripherally fatigued compared to control ($p<0.001$). No differences were observed when considering the effect of acute peripheral fatigue on visuomotor reaction time in the RBT.

Conclusions In a fatigued state, accuracy in response to environmental stimuli decreases, while visuomotor reaction time remains unaffected. SLH and CMJ are also negatively affected by acute peripheral fatigue, although the functional test performance is not primarily determined by peripheral intra-muscular energy resources. Clinicians should consider evaluating injury risk in a fatigued state, together with the evaluation of neurocognitive performance tests.

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MODELLING THE RISK OF SOFT TISSUE NON-CONTACT INJURIES FROM MULTIPLE TRAINING MONITORING DATA SOURCES IN A SHORT TRACK SPEED SKATING ELITE TEAM

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Background In short track speed skating, the Canadian national team monitors their athletes throughout the season to adjust training and maximize the amount of time an athlete is at 100%.

Objective This study attempts to create a statistical model to predict the injury risk of an athlete based on training monitoring data with a machine learning approach.

Design Retrospective observational study.

Setting 2018–2019 season.

Patients (or Participants) National women's speed skating team.

Interventions (or Assessment of Risk Factors) We defined injuries as overuse, subjective, non-traumatic or soft tissues. Multiple variables were measured throughout the season and pooled in 5 categories: external and internal load, mental state, heart rate variability and neuromuscular function. We also engineered multiple features from the training load

(moving means and SD) over different time scales, providing time evolution information. The machine learning algorithm try to spot patterns in the variables leading to overuse injury. We tested 5 different algorithms, 4 resampling and used 3 different approaches to deal with Non-available data.

Main Outcome Measurements We started with a broader perspective, hence the large number of algorithms, resampling technique and variables used. The different models on 3 performance metrics were evaluated: Sensitivity, Specificity and F-score.

Results The Naïves Bayes algorithm model with the over/under resampling technique and the fill approach had the best results out of the 75 different possibilities: F-score: 0.77 (harmonic mean of precision and recall), Sensitivity: 0.81 (true positive rate) and Specificity: 0.72 (true negative rate).

Conclusions The common imbalance between the injured and non-injured class in our data set and the amount of non-available data forced us to address these issues in a way that could have led to overfitting. However, this project provides great insight in regard to which variables should be considered when trying to predict injury risk. Also, the framework created throughout this project represent a great starting point for future work.

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IS PROXIMAL STABILITY A RISK FACTOR FOR KNEE INJURIES IN ATHLETIC POPULATIONS? A SYSTEMATIC REVIEW WITH META-ANALYSIS AND BEST-EVIDENCE SYNTHESIS

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Background Proximal stability has been proposed as a contributor to athletic knee injuries. However, it is unclear if this is supported by current evidence.

Objective Examine the association between proximal stability and future athletic knee injuries

Design Systematic review, meta-analysis and best-evidence synthesis.

Setting Amateur to elite athletic settings.

Patients (or Participants) Healthy athletic populations participating in any sport, performing arts, military or physical education teacher education settings with no restriction on sex, age, or level of competition.

Interventions (or Assessment of Risk Factors) Six electronic databases were searched (April 2019) for original research articles. Prospective cohort studies investigating at least one proximal stability variable (lumbopelvic-hip strength, endurance, biomechanics, control, proprioception) for knee injuries in athletic populations were included. Quality of studies was assessed using the Quality in Prognostic Studies (QUIPS) tool. **Main Outcome Measurements** Odds ratio effect measures of association between proximal stability variables and future knee injuries. Data not suitable for meta-analysis were synthesized in a best-evidence synthesis.

Results Twenty-one studies met the inclusion criteria, with a high risk of bias found in six studies. Meta-analysis revealed that stronger hip extension and external rotation strength were associated with 34% (OR 0.66, 95% CI 0.45–0.96,