

Patients (or Participants) Twelve hundred and five athletes (86 teams) and 799 female athletes (78 teams), aged between 18 and 35, participated to this study.

Interventions (or Assessment of Risk Factors) Survey data of athletes were collected twice during the season 2014–2015 (male athletes) and season 2015–2016 (female athletes).

Main Outcome Measurements Using an online survey (www.letselpreventie.be), information concerning type, duration and frequency of implemented exercises or barriers to neuromuscular training during the preseason and season were gathered.

Results During the preseason, only 12% of the athletes indicated to perform balance exercises (jump-landing) and plyometric exercises with a frequency of two sessions per week and a duration of at least 10 minutes per exercise. During the season, this percentage was reduced to 4%. Fifty-five to 77% (preseason) and 65 to 82% (season) of the athletes respectively indicate not to perform any neuromuscular training at all. Most important barriers to neuromuscular training were: 'I don't need it', 'I have no time', 'stretching and warming-up are sufficient' and 'I don't know which exercises to perform'.

Conclusions Most non-elite soccer teams do not implement neuromuscular training for preventing ACL injuries. These results highlight the need for educating coaches and athletes to implement neuromuscular training during practice.

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IMPLEMENTING A SCHOOL PREVENTION PROGRAM TO REDUCE INJURIES THROUGH NEUROMUSCULAR TRAINING (iSPRINT): A CLUSTER-RANDOMIZED CONTROLLED TRIAL

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Background The effectiveness of neuromuscular training (NMT) programs in preventing injuries in youth sport is well documented, however there is little evidence on NMT programs delivered in school physical education (PE).

Objective To assess the effectiveness of iSPRINT, a NMT warm-up implemented in PE classes in reducing injuries and improving performance.

Design Cluster-randomized controlled trial.

Setting Junior high schools in Calgary, Canada.

Patients (or Participants) 1,067 students (12 schools; ages 11–16; 53.7% female).

Interventions (or Assessment of Risk Factors) Following a workshop, teachers delivered a 12-week NMT (6 schools) or

standard-of-practice (6 schools) warm-up at the beginning of PE classes.

Main Outcome Measurements Validated injury surveillance included sport/recreational injuries resulting in time loss from activity or medical attention. Predicted-VO₂max, vertical jump, and single-leg eyes-closed dynamic balance on foam pad were measured at baseline and 12-weeks. Multiple multilevel regression analyses (adjusting for previous injury and random effect by school and class) estimated injury incidence rate ratios (IRR) (Poisson regression considering interaction with sex) and mean changes in performance (linear regression).

Results iSPRINT was protective against all injuries (IRR=0.543, 95%CI; 0.295–0.998), lower extremity injuries (IRR=0.357, 95%CI; 0.159–0.799) and medically-treated injuries (IRR=0.289, 95%CI; 0.135–0.619) in girls but not boys (IRR=0.866, 95%CI; 0.425–1.766, 1.055, 95%CI; 0.404–2.753, and 0.639, 95%CI; 0.266–1.532; respectively). Mean baseline balance times (seconds) were similar between iSPRINT (7.4, SD+/-2.6) and control participants (6.9, SD +/-2.2). At 12-weeks mean balance time was greater in iSPRINT group (9.1 SD+/-2.6) than control (7.9, SD+/-6.5). The difference in mean change over 12-weeks favoured the iSPRINT group (1.2 seconds, 95%CI; 0.2–2.1). No between group differences were observed for changes in predicted-VO₂max or vertical jump.

Conclusions An NMT program is effective in reducing injuries in girls and improving dynamic balance in all youth. This research informs the current standard-of-practice warm-up in youth PE. Future research should consider exercise fidelity differences between girls and boys.

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KINEMATIC AND NEUROMUSCULAR PREDICTORS OF FAILED LANDINGS DURING UNANTICIPATED DROP-JUMPS: IMPLICATIONS FOR INJURY PREVENTION

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Background Despite the link between jump landings and ACL injury risk, limited research has investigated the biomechanical and neuromuscular differences between successful and failed landings. Identifying the factors that lead to failed landings may provide specific targets for injury prevention programs.

Objective Identify which neuromuscular and biomechanical variables predict success or failure during unanticipated drop-jump landings.

Design Cross-sectional study.

Setting Controlled laboratory setting.

Patients (or Participants) Thirty-two healthy male (n=16; 15.9 ±1.87 yrs.) and female (15.7±1.7 yrs.) Ottawa area competitive athletes with no history of major musculoskeletal injury affecting functional performance.

Interventions (or Assessment of Risk Factors) Participants completed single-leg drop-jump landings from a platform aligned to their tibial plateau. The landing leg was randomly signalled during flight via a projector in front of the participant. The landings were then categorized as 'successful' or 'failed' (defined as any loss of balance forcing the participant to adjust their base of support during landing).

Main Outcome Measurements Sex, limb dominance, joint angles and excursions, and muscle excitation amplitudes during the flight phase of the drop-jumps were extracted. These variables were normalized, reduced and submitted to a logistic regression.

Results Twenty-nine variables were reduced to a seven variable logistic regression model that included trunk and pelvis lateral tilt, pelvis internal rotation, hip abduction, trunk and pelvis joint excursion, and biceps femoris muscle excitation. Using these variable the model correctly classified 74% of the landings. The same variables are present for both males and females.

Conclusions Regardless of sex, an athlete who presents the identified movement and control patterns during the flight phase risks a failed landing, potentially increasing the risk of injury. Typical prophylactic interventions focus on landing characteristics. This research indicates for the first time that modifying what occurs prior to landing is critical and must be addressed through training.

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THE PREVENTIVE EFFECT OF TARGETED ADDUCTOR TRAINING ON GROIN PAIN FROM FOOTBALL PLAYERS

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Background Groin pain is a widespread problem in football. Not only in the professional leagues, even the amateur and the youth sector have to handle it. Consistently, there are training and game absenteeism due to existing pain in this area.

Objective The aim was to describe the preventive effect of a separate training of the hip joint adductors on groin pain in order to reduce their prevalence.

Design Randomized prospective intervention study.

Setting Twelve amateur football teams were grouped and supervised during a period of six months (2 preparation, 4 first half of the season).

Patients (or Participants) Twelve amateur football teams participated (6 teams, 121 players, aged 25±8 yrs, in the intervention group, 6 teams, 115 players, aged 26±5 yrs, in the control group)

Interventions (or Assessment of Risk Factors) The intervention group worked on three targeted exercises to strengthen the adductors, performed said exercise three times a week during their preiod and once a week during their season (3x15 reps, 30'). The content included stabilization exercises with their own body weight and a 'Doiserband' as an additive.

Main Outcome Measurements The prevalence of groin pain was recorded weekly over a period of 16 weeks during the competition phase per VAS and a short questionnaire. The weekly activity of each player was also recorded.

Results The average prevalence of groin pain was 12.5% (95% CI. 11,3% to 13,7%) in the intervention group and 20.3% (95% CI. 29,0% bis 21,6%) in the control group. This result is a 41% lower risk for the occurrence of groin pain, if separate exercises for strengthening would be performed additionally.

Conclusions It becomes apparent that a strengthening training of the adductors can reduces the prevalence of groin pain in the observed sample. Therefore, a targeted and regular training program is recommended to strengthen the adductors, and to preventively reduce the risk of training and competition failures.

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SUPERVISED IMPLEMENTATION OF A NEUROMUSCULAR TRAINING WARM-UP PROGRAMME TO IMPROVE ADHERENCE AND REDUCE INJURIES IN YOUTH BASKETBALL: A CLUSTER RANDOMISED TRIAL

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Background The efficacy of neuromuscular training (NMT) programmes has been extensively documented; however, little is known about the best strategies to translate them into practice.

Objective To compare the effects of a supervised vs. unsupervised implementation of an NMT warm-up programme on team adherence and injury risk in youth basketball players.

Design A pragmatic cluster randomised controlled trial.

Setting High school basketball teams in Alberta, Canada.

Participants 31 teams (18 female teams) comprising 307 players (age range: 14–18 years).

Interventions A structured pre-season coach workshop with (intervention) or without (control) weekly research staff supervision of a 10-minute NMT warm-up programme, comprising 13 exercises was administered. Teams were asked to perform the NMT warm-up programme before every practice and game through the 2017/2018 basketball season.

Main Outcome Measurements Team adherence, evaluated as cumulative utilisation (proportion of total NMT sessions possible), utilisation fidelity (average number of exercises completed per NMT session) and utilisation frequency (average number of NMT sessions completed per week), was tracked daily by team designates. All-complaint injuries were collected weekly. Wilcoxon sign rank tests or Poisson regressions were used for the analyses, with Bonferroni corrections.

Results No significant differences were found in the median (range) cumulative utilisation [80% (32%–100%) vs. 75% (16%–100%)], utilisation fidelity [12.1 (5.5–13.0) vs. 11.4 (5.1–13.0)] and utilisation frequency [2.2 (0.9–4.1) vs. 2.2 (0.5–4.7)] between intervention and control groups, respectively (all $p > 0.017$). Injury incidence rates, adjusted for cluster by team, sex and age did not differ by groups for all injuries [incidence rate ratios (IRR) = 1.21 (97.5%CI: 0.73–1.99)] and lower extremity injuries [IRR = 1.10 (97.5%CI: 0.73–1.66)].

Conclusions No additional benefits were found in adherence or injury risk reduction following a supervised implementation