

good interrater and intrarater reliability (Kappa 0.24–0.69 and 0.57–0.63). The Acromial angle classification had moderate to good interrater and intrarater reliability (Kappa 0.53–0.60 and 0.59–0.72). The novel Acromial curve classification showed moderate to good interrater and intrarater reliability (ICC 0.66–0.71 and 0.75–0.78, respectively).

**Conclusion** The Acromial curve classification was the only classification method with an ICC value > 0.7. The popular Bigliani method had the worst reliability. The Acromial curve classification produces numerical data, as opposed to the other three classification methods. This could potentially be utilized in future research to establishing cut-off values for treatment stratification.

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### QUADRICEPS OR HIP EXERCISES FOR PATELLOFEMORAL PAIN? A RANDOMIZED CONTROLLED EQUIVALENCE TRIAL

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**Introduction** Exercise therapy comprising exercises for the hip and the knee is recommended for improving pain and function in patients with patellofemoral pain (PFP). However, there is uncertainty about which type of exercises that are most effective. We aimed to assess effectiveness equivalence between two commonly prescribed exercise programs targeting either the quadriceps or the hip muscles in patients with PFP.

**Materials and Methods** This randomised controlled equivalence trial included 200 participants with a clinical diagnosis of PFP. Participants were randomly assigned to either a 12-week quadriceps-focused (QE) or a hip-focused (HE) exercise program. The primary outcome was the change in Anterior Knee Pain Scale (AKPS) (0–100) from baseline to 12-week follow-up. Prespecified equivalence margins of  $\pm 8$  points on the AKPS were chosen to demonstrate comparable efficacy. Key secondary outcomes were the Knee Injury and Osteoarthritis Outcome Score questionnaire (KOOS) pain, physical function, and knee-related quality of life subscales.

**Results** The least squares mean changes in AKPS (primary outcome) were 7.5 for QE and 7.2 for HE (difference 0.3 points, 95% CI –1.9 to 2.4; test for equivalence  $p < 0.0001$ ). None of the group differences in key secondary outcomes exceeded predefined equivalence margins.

**Conclusion** 12-week focused quadriceps and hip focused exercise protocols were equivalent in changes in symptoms and function for patients with PFP.

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### IS MY ACLR STRONG ENOUGH? GRAFT TYPE, ACTIVITY LEVEL INFLUENCE KNEE STRENGTH IN 392 ATHLETES ACROSS FIVE TIME POINTS

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**Introduction** An essential priority in rehabilitation after anterior cruciate ligament reconstruction (ACLR) is the restoration of knee muscle strength. We aimed to describe quadriceps and hamstrings strength after ACLR of an uncomplicated rehabilitation course, categorized into level of activity and graft type (patellar-tendon – BPTBG, hamstring – HSG).

**Methods** Isokinetic concentric strength (body weight – BW-adjusted) was measured in 392 athletes ( $26.2 \pm 6.7$ y) at five time-points (3, 4.5, 6, 7.5, and 9m) following ACLR. Data was analyzed using mixed-effects models and participant specific random effects. Fixed effects included graft type, athlete categorization, and assessment time. We applied Tukey adjustment for multiple comparisons.

**Results** Professional athletes (HSG) displayed greater quadriceps strength than recreational (BPTBG) at all time-points (except 7.5m). No other significant differences were noted.

Professional and recreational athletes' quadriceps strength significantly increased through time (irrespective of graft type). Professionals (HSG) reached >2.5 BW quadriceps strength at 6-months, and recreational >2.3 BW at 7.5-months.

Professional athletes showed significantly greater hamstring strength through time (irrespective of graft type). Both athletic categories reached maximum hamstring strength at 6-months post operatively (>1.7 BPTB and >1.5 HS, BW).

Recreational athletes (BPTBG) displayed a significant increase in hamstring strength (1.4 BW, 4.5m), while for recreational athletes (HSG) strength was consistently improving up to 7.5m.

**Conclusions** Knee strength increases during rehabilitation but at the initial phase of ACLR rehabilitation is influenced by the graft type, while at the end of rehabilitation it is affected by the activity level. The maximum achieved strength is affected mostly by activity level.

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### SEX-DEPENDENT DIFFERENCES ON KNEE FRONTAL MOMENT IN PRE-ADOLESCENT AND ADOLESCENT AGES DURING A CUTTING MANEUVER TASK

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**Introduction** Although the rate of anterior cruciate ligament (ACL) injury is low among children, it increases during adolescence, especially in girls. The injury typically occurs immediately after foot-ground contact during sports activities such as a cutting maneuver (CM). The knee frontal plane moment (KFM) has been implicated as a biomechanical risk factor, but it has not been extensively studied within the injury timeframe. The present study aimed to prospectively investigate sex-dependent changes in the KFM from pre-adolescence to adolescence during the first 70 ms of a CM task.

**Methods** A total of 293 handball and soccer players, aged 9–12 years, were recruited to perform a CM, where kinematic and kinetic data were obtained using marker-based motion capture and force plates. Those who continued sports participation (n=105) returned five years later to repeat the test procedure. A mixed-model analysis of variance (ANOVA) for repeated measures was used for statistical analysis of the KFM during the first 70 ms after foot-ground contact.

**Results** Overall, boys had significantly higher valgus KFM values than girls across both data collections ( $P=0.001$ ). Also, a significant interaction between sex and age was observed, where girls and boys demonstrated respectively an increase and decrease in the valgus KFM values from pre-adolescence to adolescence age (13.8% increase vs. 10.6% decrease:  $P=0.001$ ).

**Conclusion** The remarkable increase of KFM in adolescent athlete girls may, in part, play a role in their risk of ACL injury, although future studies need to assess the relationship between this increase and rate of ACL injuries.

## 20 PATIENTS' LIVED EXPERIENCES OF KNEE INJURY TREATMENT USING INTEGRATED PSYCHOLOGICAL TRAINING OR CARE-AS-USUAL: A PHENOMENOLOGICAL INTERVIEW STUDY

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**Introduction** Despite recent literature recommending increased focus on psychological aspects of rehabilitation, injured athletes often do not return to sport despite having reached physical readiness. The aim of this study was to explore the lived experiences of patients undergoing treatment for knee injury according to either the novel Motor Imagery to Facilitate Sensorimotor Re-learning (MOTIFS) training model, which integrates psychological training into physical rehabilitation, or care-as-usual.

**Materials and Methods** This phenomenological interview study identified major and subordinate themes encompassing the lived experiences of rehabilitation of 5 patients undergoing MOTIFS training and 7 receiving care-as-usual.

**Results** Results indicated that patients in the MOTIFS group perceived increased focus on individualized and activity-relevant meaning during rehabilitation training. This included concrete strategies to influence psychological outcomes, and identifying an explicit biopsychosocial interaction in which confidence, motivation, and enjoyment encouraged both physical and psychological readiness to return to sport.

Patients in the care-as-usual group perceived focus on physical aspects of training. The complexity of the biopsychosocial interaction was not articulated, though the lack of structured psychological training strategies was perceived to have a negative influence on feeling psychologically ready to return to sport.

**Conclusion** Those in the MOTIFS group described this novel training model as focusing on understanding and providing strategies for coping with psychological factors in rehabilitation and subsequent return to sport. The care-as-usual group perceived a need for more focus on improving psychological well-being. Future research should focus on methods of improving both physical and psychological readiness to return to sport.

## 25 STRENGTH, FUNCTION AND OVERALL HEALTH BEFORE AND AFTER SURGICAL OR CONSERVATIVE TREATMENT OF PROXIMAL HAMSTRING AVULSION

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**Introduction** Proximal Hamstring Avulsion (PHA) is a rare injury and happens with hyperextended knee and hyperflexed hip.

**Materials and Methods** The aim of the study was to investigate the effect of surgical and conservative treatment of PHA.

Patients with MRI-verified PHA were included and had either surgery or training. At baseline, at 6 and 12 months follow-up, all patients answered Perth Hamstring Assessment Tool (PHAT), Hip Sports Activity Scale (HSAS), overall-health Visual Analog scale and had their knee flexion strength measured at 30 degrees using handheld dynamometer.

**Results** 13 patients had surgery (mean age  $51\pm 15$ , 46% females, 15 days after injury) and 13 patients had training (mean age  $50\pm 17$ , 46% females, 64 days after injury). In the surgical group, the median PHAT score increased from 41 to 70 to 82 ( $p<0.001$ ), their overall health: 50 to 80 to 80 ( $p=0.025$ ) and their HSAS: 0 to 3 to 3 ( $p<0.01$ ). In the training group, the PHAT score increased from 51 to 68 to 77 ( $p<0.001$ ). Overall health improved from 69 to 75 to 80 ( $p=0.025$ ), while HSAS went from 0 to 1 to 1 ( $p<0.01$ ). Median knee strength improved in the surgical group from 0.22 to 0.67 to 1.07 Nm/kg ( $<0.001$ ) and in the training group from 0.24 to 0.44 to 0.48 Nm/kg ( $p<0.001$ ).

**Conclusion** At 12 months follow-up, both groups improved PHAT and overall health. However, the surgical group improved more in knee flexion strength and were able to participate in sports at a higher level than the training group.

## 26 COMBINED HORMONAL CONTRACEPTIVE USE IS NOT PROTECTIVE AGAINST MUSCULOSKELETAL CONDITIONS OR INJURIES: A SYSTEMATIC REVIEW WITH DATA FROM 5-MILLION WOMEN

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**Introduction** Half of young women start combined hormonal contraceptive (CHC) use for non-contraceptive reasons including 'controlling' their menstrual cycle to prevent injuries. These decisions should be evidence-based. This study assessed the association between CHC use and musculoskeletal tissue pathophysiology, injuries, or conditions.