runners), implying a decreased efficacy in jumpers and increased in runners.

Conclusions Throughout season neuromuscular adaptations occurred accordingly with sports gestures and this might explain the different results found between groups. Fatigue can be an important factor to explain the decrease of performance of runners. Sports with consecutive jumps maybe are related with the reduction of asymmetry, what does not happen between runners.

303 INJURY BURDEN AND CHARACTERISTICS IN AESTHETIC SPORTS AMONG HIGH SCHOOL ADOLESCENTS

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Background Aesthetic sports require athletes to showcase extreme flexibility, aerial maneuvers and perform hard surface landings that may increase injury risk. However, very few studies have examined injury risk in this population.

Objectives To identify aesthetic sport injury prevalence among high school students and to describe the type, location and severity of injury in adolescents who practice aesthetic sports.

Design Cross-sectional study.

Setting High schools in Calgary area, Canada.

Participants Adolescent students (n=2029; 958 male, 1048 female, 23 identified 'other'; ages 14–19 year) from 24 high schools.

Assessment of Risk Factors Self-reported participation in aesthetic sport (i.e., gymnastics, dance, figure skating) in previous one-year (based on top three sports for participation).

Main Outcome Measurements Self-reported injury (time loss/medical attention), type, anatomical location, and severity. Proportions [95% confidence intervals (CI)] were adjusted for cluster by school.

Results Among the 2029 students who completed the question about sport participation, 15% (302/2029) participated in aesthetic sports (282 female, 20 males; dance (247/302; 82%), gymnastics (50/302; 16%), figure skating (22/302; 7%). In the previous one-year, 74 females (26.2%; 95% CI, 20.8–32.6) and 2 males (10.0%; 95% CI, 2.6–31.2) listed aesthetic sport injury as the most severe. Ankle (26.3%; 95% CI, 17.5–37.6), knee (25.0%; 95% CI, 16.4–36.2), and back (9.2%; 95% CI 4.4–18.4) were the most common injury sites. Ligament sprains (22.7%; 95% CI 14.4–33.7), muscle strains (14.7%; 95%CI 8.2–24.9), and fractured bones (12.0%; 95% CI 6.3–21.8) were most common injury types. Medical attention injury rate was 20.5/100 athletes/year and time-loss >7 days injury rate was 11.9/100 athletes/year.

Conclusions Aesthetic sport participation and injury rates among high school students are high. The most serious injuries reported were lower extremity injuries with a greater proportion of females reporting aesthetic sport injuries than males. Future research should focus on mitigation of lower extremity injuries among these high-risk aesthetic athletes.

304 PREVALENCE AND BURDEN OF HEALTH PROBLEMS IN COMPETITIVE ADOLESCENT DISTANCE RUNNERS: A 6-MONTH PROSPECTIVE COHORT STUDY

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Background Little is known about the overall health of adolescent distance runners.

Objective To describe all health problems (injuries and illnesses) in relation to type, location, incidence, prevalence, time loss, severity, and burden, in competitive adolescent distance runners in England.

Design Prospective observational study monitoring all health problems for 24-weeks between May and October (2019).

Setting Competitive adolescent distance runners (i.e., 800 m to 10,000 m, including steeplechase) in England.

Patients (Or Participants) Distance runners (13–18 y) were invited to participate if they had achieved a top-50 performance in their age-group (U20, U17 and U15) during 2018. A total of 644 athletes were invited to take part, with 136 athletes (73 females) having enrolled and completed the study (lost to follow-up: n = 7).

Main Outcome Measurements The prevalence and burden of health problems was recorded using the Oslo Sports Trauma Research Center Questionnaire on Health Problems (OSTRC-H). The OSTRC-H was completed online, via Qualtrics, on a weekly basis.

Results A total of 363 health problems were registered during this study, including 213 injuries and 150 illnesses. At any time, 24% [95% Confidence Intervals (CI): 21–26%] of athletes reported a health problem, with 11% [95% CI: 9–12%] having experienced a health problem that had substantial negative impact on training and performance. Female athletes reported noticeably more illnesses, compared to male athletes, including higher prevalence, incidence, time loss, and severity. The most burdensome health problems, irrespective of sex, included lower leg, knee, and foot/toes injuries, alongside upper respiratory illnesses. The mean weekly prevalence of time loss was relatively low, regardless of health problem type or sex.

Conclusions Competitive adolescent distance runners are likely to be training and competing whilst concurrently experiencing health problems. These findings will support the development of injury and illness prevention measures.

305 DOES THE FIFA 11+ SHOULDER INJURY PREVENTION PROGRAM REDUCE THE INCIDENCE OF UPPER EXTREMITY INJURIES AMONG SOCCER GOALKEEPERS? A RANDOMISED CONTROLLED TRIAL

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Background Goalkeepers appear to be the players who are at most risk of sustaining a shoulder injury. Many researchers have reported that goalkeepers are more likely, than outfield players, to injure their upper limb. The FIFA 11+S is

structured according to the FIFA 11+ program which is already being successfully used to prevent injuries.

Objective To investigate the effectiveness of the FIFA 11+S in reducing the incidence of upper extremity injuries

Design Randomised controlled trial.

Setting Amateur soccer.

Patients (or Participants) Male goalkeepers aged 14 to 35 years were randomly assigned to the experimental group (n = 360) or the control group (n = 366).

Interventions (or Assessment of Risk Factors) Experimental groups performed FIFA 11+S exercises for 20–25 minutes. The control group practiced their usual warm up.

Main Outcome Measurements The incidence of upper extremity injuries, mechanism, type and severity of injury.

Results During one season, 50 injuries (0.62 injuries/1000 exposure hours) were reported in the experimental group and 122 injuries were reported in the control group (1.94 injuries/1000 hours). The FIFA 11+S significantly reduced the total number of upper extremity injuries (RR = 0.42 [0.31–0.56]; $p < 0.00001$; Number Needed to Treat = 5.1), the incidence of contact injury (RR = 0.39 [0.27–0.55]; $p < 0.00001$), the incidence of initial injury (RR = 0.43 [0.31–0.59]; $p < 0.00001$) and the incidence of recurrent injury (RR = 0.32 [0.12–0.86]; $p < 0.05$) more than the usual warm up. Minor injury severity (RR = 0.41 [0.29–0.58]; $p < 0.00001$) and moderate injury severity (RR = 0.44 [0.20–0.94]; $p < 0.05$) were significantly reduced in the experimental group (FIFA 11+S) compared to the control group.

Conclusions This is the first study investigating the effectiveness of the FIFA 11+S in reducing the incidence of upper extremity injuries. This randomised trial provides evidence that implementation of the FIFA 11+S can reduce the incidence of upper extremity injuries among goalkeepers more than usual warm-up.

306

THE FÉDÉRATION INTERNATIONALE DE FOOTBALL ASSOCIATION (FIFA) 11+ REFEREES INJURY PREVENTION PROGRAM: AWARENESS, IMPLEMENTATION AND OPINION OF WORLDWIDE SOCCER REFEREES AND ASSISTANT REFEREES

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Background Soccer referees and assistant referees have a significant risk of injury, particularly to the lower extremity. A growing body of research supports the use of injury prevention programs to prevent such injuries, yet participation rates in these programs by soccer referees and assistant referees remains largely unexplored.

Objective To assess soccer referees and assistant referees' awareness, implementation and opinion of the Fédération Internationale de Football Association (FIFA)11+ referees injury prevention program.

Design A cross-sectional study.

Setting An online survey for all continental football federations.

Patients (or Participants) A total of 727 soccer referees and assistant referees completed the survey.

Interventions (or Assessment of Risk Factors) The questionnaire consisted of questions relating to the awareness level, implementation rate, and opinion of the FIFA 11+ referees injury prevention program. Questions development was guided by several authors whose expertise is in sport medicine and injury prevention.

Main Outcome Measurements The primary outcomes were awareness level, implementation rate, and opinion of the effectiveness of the FIFA 11+ referees injury prevention program in reducing injuries.

Results A total of 234 (32.2%) participants reported awareness of the FIFA 11+ referees injury prevention program and 208 (28.6%) reported implementing the FIFA 11+ referees injury prevention program in their current practice. Participants who implemented the FIFA 11+ referees injury prevention program reported a positive attitude towards the program efficacy, with a score of 7.5 ± 1.3 out of 10.

Conclusions In order to increase the awareness and implementation of the FIFA 11+ referees injury prevention program, the football federations should focus on improving referees and assistant referees education, courses that emphasize injury prevention programs should be mandatory for all soccer referees, soccer assistant referees, and their coaches.

307

THE FÉDÉRATION INTERNATIONALE DE FOOTBALL ASSOCIATION (FIFA) 11+ SHOULDER INJURY PREVENTION PROGRAM: AWARENESS, IMPLEMENTATION AND OPINION OF WORLDWIDE SOCCER GOALKEEPERS AND GOALKEEPERS' COACHES

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Background Soccer goalkeepers are more likely than outfield players to injure their upper extremity. The Fédération Internationale de Football Association (FIFA)11+ Shoulder injury prevention program (FIFA 11+S) was developed to prevent upper extremity injuries.

Objective To assess soccer goalkeepers and goalkeepers' coaches' awareness, implementation, and opinion about the FIFA 11+S injury prevention program.

Design Cross-sectional study.

Setting An online survey for all continental football federations.

Patients (or Participants) A total of 722 goalkeepers and goalkeepers' coaches completed the survey.

Interventions (or Assessment of Risk Factors) The questionnaire consisted of questions covering the awareness, implementation, and goalkeepers and goalkeepers' coaches' opinion of the FIFA 11+S injury prevention program. Questions development was guided by several authors expert in sport medicine and injury prevention programs.

Main Outcome Measurements The primary outcomes were awareness level, implementation rate, and opinion of the