

Background In recent years there has been an increase in focus on the potential role neck muscle strength and strengthening may play in helping to mitigate the risk of sports related concussion (SRC). However, to date there has not been any systematic reviews or analysis to help quantify this role and provide guidance.

Objective To systematically review the literature surrounding the neck strength and strengthening in reducing the risk of SRC.

Design Systematic review and meta-analysis.

Data sources SportsDISCUS, Ovid Medline, Web of Science, CINAHL and EMBASE

Patients (or Participants) Athletic population regardless of age or sex.

Study selection The above databases were searched using a combination of keywords and medical subject headings to identify studies that examined the association between SRC and neck strength and or neck strengthening programs.

Results The initial search produced 593 studies, of which 6 were included for review and meta-analysis. Intervention programs that included neck strengthening were shown to be effective at decreasing the incidence of SRC RR 0.54 (95% CI 0.50–0.95)

Conclusions Neck strengthening intervention programs can reduce the incidence of SRC in an athletic population. Athletes who participate in high-risk sports or are from high-risk populations (i.e. adolescents and females) should incorporate neck strengthening into their respective training programs.

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332 **LEG COMPARTMENT PRESSURES IN COLLEGIATE RUNNERS: A COMPARISON OF SYMPTOMATIC AND ASYMPTOMATIC ATHLETES**

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Background Chronic exertional compartment syndrome (CECS) is an uncommon cause of leg pain in running athletes. Post-exercise compartment pressure measurements are an invasive test that many clinicians rely upon for making the diagnosis of CECS.

Objective The authors sought to determine if intracompartmental pressures in the anterior leg compartments of asymptomatic collegiate distance runners meet established criteria for diagnosis of exertional compartment syndrome and to

compare these measurements with those of symptomatic athletes.

Design Thirty collegiate running athletes underwent 1-minute post-exercise compartment pressure measurements of bilateral anterior leg compartments. Each was asked to run for 15 minutes at a moderately intense pace and then underwent measurements performed at 1 minute post-exertion with a slit catheter manometer. Fifteen male and 15 female collegiate running athletes age 18–23 years (average 20.8 years) underwent post-exercise compartment pressure testing of the legs. The pressure measurements were then compared with those of 30 symptomatic age- and activity-matched control athletes.

Setting Collegiate (University) Athletics.

Patients (or Participants) Collegiate Track and Field and Soccer (Football) Athletes.

Interventions (or Assessment of Risk Factors) Post-exercise leg compartment pressure testing with slit catheter pressure measurements.

Main Outcome Measurements Bilateral leg anterior muscular compartment pressures immediately following provocative exercise.

Results Measurements of leg compartment pressures performed at 1-minute post-exercise were indicative of exertional compartment syndrome in more than one-third of asymptomatic running athletes tested (11/30, 36.7%). Six male and 5 female runners demonstrated 1-minute post-exercise compartment pressure measurements > 30 mmHg in at least one leg. Of these 11 athletes, 4 demonstrated positive measurements bilaterally (2 men, 2 women). Intracompartmental pressure measurements ranged from 16 mmHg to 88 mmHg. The range of pressure measurements were nearly identical in the symptomatic runners.

Conclusions Elevated intracompartmental pressures were prevalent in collegiate runners despite a lack of symptoms. Post-exercise compartment pressure measurements should be viewed as only an indicator of exertional compartment syndrome and should not be relied upon as a confirmatory test.

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334 **TRAINING FACTORS AND ACUTE ILLNESS IN MARATHON RUNNING EVENT PARTICIPANTS**

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Background Acute illness during training for an endurance running event reduces the likelihood of completing the event. A greater understanding of the risk factors for acute illness during training may inform prevention strategies and advice.

Objective To describe training factors and acute medical conditions amongst participants in mass-participation community-based marathon events.

Design Observational questionnaire-based study.

Setting Two large UK city mass-participation marathon events.

Patients (or Participants) Entry to both events was open to novice runners, with no qualifying time for general entry. All registered participants were invited to complete an online

questionnaire in the week preceding the event. 11809 runners completed the survey.

Interventions (or Assessment of Risk Factors) Demographics including age, gender, experience and training history.

Results The average age of respondents was 40.9y (range 18–83y) and 54.1% were male. 22.3% of respondents developed a new illness in the 4 weeks prior to the event. Upper respiratory tract infection (URTI) was most common (64.3%), followed by GI problems (15.4%) and headache/migraine (14.6%). 28.5% of respondents who had been training for <2 months developed an acute illness, compared with 19.8% of those trained for >6 months ($p=0.0002$). Lower average weekly training distance (22.9% of those training from <20 to 40 miles/week vs. 18.7% training from 40 to >50 miles/week; $p<0.05$) and shorter longest training run (24.4% whose longest run was <20 miles vs. 19.4% whose longest training run was >20 miles; $p<0.05$) were associated with higher incidence of acute illness. 25.0% of novice runners (running <1y) developed an acute illness compared to 20.3% of those who had been running >10y ($p<0.05$).

Conclusions Novice runners who train for <2 months with low average weekly training mileage were more likely to develop an acute illness during marathon training than more experienced runners. Further research is needed to establish the direction and relationship between these factors before guidance can be issued.

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WHAT ARE THE MAIN RISK FACTORS FOR LOWER-EXTREMITY RUNNING-RELATED INJURIES? A RETROSPECTIVE SURVEY-BASED ON 3669 RESPONDENTS

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Background Many studies attempt to identify the risk factors for running-related injuries (RRI), but these are not yet well established.

Objectives To investigate the risk factors of RRI.

Design Retrospective online survey-based study among population of runners injured and non-injured.

Setting Leisure road and trail runners

Patients Participants have to be at least 18 years old and have to practice running at least for 12 months. 3669 runners reported information which were included for statistical analysis.

Assessment of Risk Factors The online survey included 41 questions with five main categories: personal characteristics - daily lifestyle- training and running characteristics - practice of others sports activities and prevention habits.

Main Outcome Measurements Occurrence of running-related injury over the last 12 months.

Results Amongst the 3669 runners, 1852 (50.5%) reported at least one injury over the last 12 months. Overuse injury were largely represented (60.6%). The variables associated with RRI which remained significant in the fully-adjusted model were: previous injury (OR=1.63, IC 95% = 1.42–1.47), competition running (OR = 1.62, IC 95% = 1.26–2.09), more than 2 hours running per week (OR = 1.30, IC 95%= 1.03–1.65), mileage (>20km/week) (OR = 1.25, IC 95%= 1.01–1.55)

and speed training (OR = 1.23, IC 95%= 1.06–1.48). Univariate analysis revealed other variables associated with more RRI: Trail runners (versus road runners, $p<0.001$), men (versus women, $p<0.001$), higher age ($p<0.001$), >2 running session/week ($p<0.001$).

Conclusions Previous injury remains the most relevant RRI risk factor according to the current study and previous data. Many training characteristics seem to be involved but still have to be confirmed in view of conflicting data in literature. Trail runners are more at risk of RRI. Further research would help to understand better RRI and to prevent them.

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EPIDEMIOLOGY OF INJURY AND ILLNESS AMONG TRAIL RUNNERS: A SYSTEMATIC REVIEW

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Background Trail running (TR) is characterised by uneven varying running surfaces, with large elevation gains/losses. Therefore, the injury and illness profiles of TR may differ compared to road running. Limited information is available on injury and illness among trail runners (TRs) to help develop interventions towards injury prevention.

Objective Systematically review data on TR injury and illness.

Design Systematic review.

Setting MEDLINE Ovid, PubMed, Scopus, SportsDiscus, CINAHL, Health Source: Nursing/Academic, Health Source: Consumer Ed. and Cochrane were searched from inception to February 2019. Methodological quality was assessed using an adapted Downs and Black assessment tool.

Patients (or Participants) N/A (systematic review abstract).

Interventions (or Assessment of Risk Factors) Studies were included if they investigated injury and/or illness among TRs participating in training/racing and full-text available in English/French. Studies were excluded on biomarkers of injury/illness in the absence of participants reporting injury/illness, or if no clear evidence was found of investigating TR.

Main Outcome Measurements TR injury (incidence, prevalence, anatomical site, tissue type, specific diagnosis, severity) and illness (incidence, prevalence, symptoms, specific diagnosis, body system, severity).

Results Fourteen studies with 3094 participants were included. Six studies investigated injuries and illnesses, 3 studies investigated only injuries and 5 studies only illnesses. Twelve studies investigated race-related injury and/or illness and 2 studies