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Running-related Injuries & Medical Conditions In The Marine Corps Marathon

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PURPOSE: The aim of this study was to determine the distribution of running-related injuries (RRI) and medical conditions (RRMC) among runners in a popular recreational marathon. **METHODS:** We studied 24,817 runners (11,233 females, 13,584 males) who participated in the 2019 Marine Corps Marathon. The runners were followed for the occurrence of a RRI or RRMC. A RRI or RRMC was defined as any musculoskeletal or medical condition complaint that occurred as a result of participation in the marathon race and required the attention of a medical tent health care provider at an aid station. RRI and RRMC distributions were calculated for body location and injury/condition type. Chi-square analyses and incidence risk ratios (IRR) were used to compare these injury/condition distributions by sex. **RESULTS:** Overall, 236 RRIs were reported with a significantly higher incidence sustained by females (1.1%) than males (0.8%)(IRR=1.46, 95%CI: 1.1-1.9; p=0.002). The most common body locations affected were the foot (0.4%), knee (0.1%), ankle (0.1%) and iliotibial band (0.09%), with females having a significantly greater incidence of foot ([0.5% vs 0.3%] p=0.04) and hip ([0.1% vs 0.02%] p=0.01) RRIs. Blisters (0.3%), tendonitis (0.27%) and muscle strains (0.1%) were the most common RRI types; with a significantly higher occurrence of blisters among females than males ([0.4% vs 0.2%] p=0.02). Similar distributions of fractures were found among females (0.01%) and males (0.02%). Overall, 461 RRMCs were reported with a significantly higher occurrence among males (2.1%) than females (1.5%)(IRR=1.14, 95%CI: 1.1-1.2; p=0.001). The most common RRMCs were muscle cramps (0.9%), dizziness (0.7%), nausea/vomiting (0.2%), and fatigue/weakness (0.09%); with males having a significantly greater incidence of muscle cramps ([1.1% vs 0.6%] p=0.0003) and heat stroke/exhaustion ([0.07% vs 0.02%] p=0.05). Asthmatic/breathing problems were more common among females than males ([0.1% vs 0.02%] p=0.005). **CONCLUSIONS:** Our findings suggest that the occurrence of RRIs and RRMCs in the marathon were low. Participants were most likely to incur a foot RRI (especially females) or experience muscle cramps (particularly males). While the occurrence of heat-related RRMC was very low, they were more common among male runners.

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The Relationship Between Competition Level And Dynamic Balance In Male And Female Soccer Players

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PURPOSE: To investigate the relationship between competition level and sex differences with dynamic balance in soccer players. **METHODS**: Over a 15 year period, preseason screenings were performed including limb length, activity scale, sport and the Y-Balance Test Lower Quarter (YBT-LQ). The maximum distance for the anterior (ANT), posteromedial (PM), and posterolateral (PL) reaches were normalized to limb length. Reach asymmetry and composite score were calculated. Unadjusted and adjusted multivariable quantile regressions, with coefficients and 95% confidence intervals (95% CI), were performed to investigate the relationship between competition and dynamic balance. Sensitivity analyses were performed for left and right limbs. Mann Whitney U tests and Cohen's D effect size indices (ES) with 95% CI's were performed to examine male and female YBT-LQ reach asymmetry differences. **RESULTS**: 5,018 participants (Age: 16.6 [3.6] years; Males: 2,484, Females: 2,533; ANT: 64.3 [8.14], PM: 96.6 [11.5], PL: 97.9 [11.6], Composite: 98.0 [9.2]) were included. There was a negative adjusted relationship between ANT and female (-0.27 [-0.55, -0.13]). There was a positive adjusted relationship between age and PL (0.43, [0.19, 0.67]), PM [0.49, (0.22, 0.76]), and composite (0.39, [0.32, 0.47]). There was a negative adjusted relationship for ANT (-0.27, [-0.55, -0.13]) in females and a positive adjusted relationship for PL (0.49 [0.22, 1.04]) and PM (0.93 [0.45, 1.38]). A positive relationship for age and composite score for females (0.36 [0.28, 0.57]), but not males (0.09 [-0.10, 0.37]). There were significant differences in PL and PM, however, the effect sizes were small ([p=<0.05], ES: 0.08-0.12). **CONCLUSIONS**: As soccer players get older their dynamic balance improves for PM, PL, and composite scores on the YBT-LQ; however, ANT does not. Interestingly, females' ANT decreased with age, but males did not change. Females composite score increased until age 14 and then precipitously dropped between ages of 15-17. Sex may affect dynamic balance, especially in ANT and composite scores. This may indicate a relationship between dynamic balance and onset of puberty which needs to be further studied.

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Investigating Gender Differences On The Clinical Profiles Screen In Adolescents With Sport-related Concussion

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PURPOSE: To examine gender differences on the Clinical Profiles Screen (CP) and to compare the relationship between the CP screen and the Post-Concussion Symptom Scale (PCSS) among male and female concussed adolescents. This paper will also explore gender relationships between shared subscales of the CP Screen and PCSS to include Affective, Cognitive Fatigue, and Sleep. **METHODS**: Concussed athletes (N=276; 15.02 ± 1.43 yrs; 55% female) completed the CP Screen and PCSS within 30 days of concussion. Gender differences for the CP scores were examined with a series of non-parametric Mann-Whitney U tests. Pearson Product Moment correlations were used to document the relationship between CP Screen and the PCSS in males and females separately. **RESULTS**: Females exhibited more symptoms ($U = 27233$, $z = -3.33$, $p = .001$) and greater symptom severity compared to males ($U = 7049$, $z = -3.60$, $p < 0.001$) on the CP Screen. Females also scored higher than males on the anxiety/mood ($U = 7059$, $z = -3.62$, $p < .001$), cognitive/fatigue ($U = 7160.50$, $z = -3.46$, $p = .001$), and ocular ($U = 6740.50$, $z = -4.08$, $p < .001$) CP Screen sub-scores compared to males. The Affective factor on the CP Screen and the Anxiety/mood factor of the PCSS were significantly correlated in both males ($r = 0.63$, $p < 0.01$) and females ($r = 0.72$, $p < 0.01$). In addition, the CP Screen Cognitive Fatigue and PCSS Cognitive-migraine-fatigue subscales were significantly correlated in both males ($r = 0.53$, $p < 0.01$) and females ($r = 0.71$, $p < 0.01$). Sleep factors for both the CP Screen and the PCSS were also significantly correlated for males ($r = 0.67$, $p < 0.01$) and females ($r = 0.62$, $p < 0.01$). **CONCLUSIONS**: Gender differences on the CP Screen are consistent with those previously noted on the PCSS. These findings further support the clinical utility of the CP Screen and highlight the varying clinical presentations of concussion in females compared to males.

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Fall Risk Analysis: Implications For Exercise Prescription Among Older Adults

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Americans over the age of 65 are at a higher risk of falls. After falling, they commonly experience decreases in functionality, independence, and quality of life. In ACSM's Guidelines of Exercise Testing and Prescription, older adults are recommended to participate in aerobic exercise 5 days a week, supplemented with 2 days of flexibility and resistance training. We propose additional considerations may be required for adults who have previously experienced a fall. **PURPOSE:** To evaluate the effect of past falls on likelihood and incidence of future falls among older adults. **METHODS:** We evaluated 615 patients consecutively admitted in a single year to a Level 1 trauma center for a fall-related injury. All patients were ≥ 65 years of age. We conducted a retrospective analysis to determine the number of previous admissions for fall-related injuries over a 5-year period, and we tracked patients prospectively, recording the number of additional falls experienced for 8 months. We estimated the odds that a patient would experience a future fall using logistic regression and the number of future falls experienced with negative binomial regression. The primary predictor was number of previous falls; we held constant admission month, cognitive decline, and medication use associated with compromised balance.

RESULTS: Patients were 80.0 ± 9.1 years old, 71.9% were female, they had 1.9 ± 1.3 previous fall-related injuries, and they sustained 0.5 ± 0.9 falls during the tracking period. With confounders held constant, each additional previous fall predicted a 3.9-fold increase in the odds of experiencing a future fall ($p < 0.001$; 95% CI of OR: 3.131 to 4.961); the overall model was significant ($p < 0.001$; pseudo $R^2 = 0.460$). Age ($p = 0.351$) and sex ($p = 0.236$) were not significant predictors. Holding the same confounders constant, negative binomial regression found each additional previous fall to predict a 94.9% increase in the number of future falls ($p < 0.001$; 95% CI of IRR: 1.728 to 2.198); age (p=0.283) and sex (p=0.163) were not significant.
CONCLUSIONS: Our findings highlight the importance of screening older adults for a history of falls prior to exercise prescription. For clients and patients who report experiencing a fall, it may be prudent to incorporate safe forms of balance and stability training.

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Clinical Presentation Of Exercise-associated Hyponatremia In Male And Female Ironman-distance Triathletes Over Three Decades

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Exercise-associated hyponatremia (EAH) is an electrolyte imbalance that most commonly occurs during ultra-endurance athletic events and may result in serious complications. Severe cases of EAH are more commonly reported in females but there is a lack of high-quality observational studies comparing the risks by sex.
PURPOSE: To compare the clinical presentation (CP) of EAH between male and female triathletes over the course of three decades of ultra-endurance competitions.
METHODS: Medical records with [Na+] values (n=3,138) from a single Ironman-distance triathlon over the timeframe of 1989-2019 were reviewed for both male (n=2,253) and female (n=885) competitors. Loglinear analyses were run to determine interactions among sex, sodium status, and various CPs (complaints, diagnoses, vitals, lab values, and weight change). Effects were then explored by calculating percentage of triathletes with those CPs as well as odds ratios with 95% confidence intervals, specifically comparing male and female triathletes with EAH, to those without. Lastly, non-binary CPs were compared using Independent samples t-tests.
RESULTS: When comparing triathletes with EAH to those without, males were more likely to present with altered mental status (OR 1.61; 95% CI = 1.22-2.33) and diarrhea (OR 1.45; 95% CI = 1.00-2.11), while females were not; Females were more likely to present with vomiting (OR 1.63; 95% CI = 1.21-2.19), while males were not; And males were less likely to present with abdominal pain (OR 0.70; 95% CI = 0.51-0.94), hypotension (OR 0.52; 95% CI = 0.36-0.76), tachycardia (OR 0.56; 95% CI = 0.38-0.83), and hyperkalemia (OR 0.71; 95% CI = 0.51-0.99), while females were not. Overall, males lost significantly more weight (Mean = -5.8 lbs.; SD = 6.3 lbs.) than females (Mean= -1.1 lbs.; SD = 5.2 lbs.) (t(777) = -11.06, p<0.001). EAH males (OR 5.85; 95% CI = 3.29-10.38) and EAH females (OR 3.32; 95% CI = 1.99-5.55) were more likely to gain weight than non-EAH males and females.
CONCLUSIONS: Altered mental status, diarrhea, vomiting, abdominal pain, hypotension, tachycardia, and hyperkalemia appear to present differently between sexes. Further understanding of how EAH presents in males and females helps both athletes and medical professionals identify it early and prevent life threatening complications.

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Utility Of A Pediatric Computerized Cognitive Tool In Children Aged 5-9 Following Concussion

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PURPOSE: Computerized neurocognitive testing is commonly used as part of a comprehensive evaluation of sport-related concussion (SRC) in adolescents and adults. However, these tools are not designed for use in children. There is a need for a valid, computerized tool to assess cognitive function in pediatric athletes following SRC. The aim is to evaluate a pediatric version of the Immediate Post-concussion Assessment and Cognitive Testing (ImPACT) neurocognitive battery by examining the measure's clinical utility in the evaluation and management of concussion in a pediatric population.
METHODS: A total of 63 children (female-42.2%) aged 5-9 years (7.5±1.0 years) were enrolled within 30 (8.5±5.9) days of concussion upon presentation to a sports medicine concussion specialty clinic. Participants were administered the ImPACT Pediatric at all clinic visits. ImPACT Pediatric is a brief (25 min) computerized neurocognitive test with composite scores for sequential memory, word memory, visual memory, and rapid processing. An omnibus F-test was used to evaluate ImPACT Pediatric performance from initial clinic visit (V1) to medical clearance visit. Paired t-tests were used to compare ImPACT Pediatric composite and subtest scores at V1 and clearance with statistical significance set at p<.05.
RESULTS: On average, participants recovered in 34.1±23.5 days. Participants demonstrated improved performance on all ImPACT Pediatric composite scores from V1 to clearance ($p=.001$, $\eta_p^2 = .152$), with particular improvement in speeded domains (rapid processing: $p=.008$, $d=.29$). At both V1 and clearance, older participants demonstrated faster performance (rapid processing: $p=.021$, $d=.58$) and higher accuracy scores on subtests measuring word learning/memory (word learning correct: $p=.008$, d=.67) and working memory (memory touch sequences correct: $p=.005$, d=.72).
CONCLUSIONS: The findings indicate that ImPACT Pediatric composites and subtests, particularly speeded domains, are able to detect changes in cognitive function from initial to medical clearance visits following concussion. This study suggests that the ImPACT Pediatric tool can be used by sports medicine professionals as one component of a comprehensive assessment to evaluate injury, monitor recovery, and inform return-to-play decisions following SRC.

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Low Pelvic Bone Density In Female Professional Ballet Dancers: Regional Dexa Analysis To Determine Fracture Risk

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We recently observed a high prevalence of low pelvic bone mineral density (BMD) in elite female professional ballet performers (Lambert et al., PMID:32079918).
PURPOSE: Because this population is susceptible to stress and impact-based fractures, we aimed to determine which regions of the pelvis may be at greatest risk compared to general population females (GENPOP) as well as professional female soccer players (SOCCER, a comparison to other elite athletes regularly subjected to high degrees of mechanical loading).
METHODS: Three groups of age-matched females [(GENPOP; n=38, 27±1yrs, 168±3cm, 69±4kg), (BALLET; single company, n=36, 26±3yrs, 165±1cm, 52±2kg), (SOCCER; single MLS® club, n=34, 25±1yrs, 167±2cm, 63±2kg)] consented to have their total body BMD and body composition assessed (DEXA, GE®). For the GENPOP cohort, active healthy females (exercise 3days/wk) were recruited. In addition to soft tissue analysis, a segmental analysis of the pelvis was performed independently by 2 technicians and 1 orthopedic physician to determine site-specific BMD for the iliac fossa, iliac fossa / iliac crest / ilium combined, pubic bone, ischium, and sacrum (ICC > 0.9). A mixed-model ANOVA followed by a Tukey's post-hoc test was used to compare the groups (Type I error was set at α=0.05).

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