(OR=3.03, p<0.01), time spent in low-speed (OR=2.09, p=0.03), and medium speed zones (OR=2.05, p=0.04) compared to the low load group.
CONCLUSION: Several load measures used in this novel study indicate greater odds of male ice hockey players reporting complaints when experiencing high levels of load.
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644

Using Electronic Handgrip Dynamometry To Determine Human Performance In Master'S Aged Cyclists And Triathletes

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Endurance training throughout adulthood is an important part of preventing physical declines. The master's athlete typically manages work, family, and social life on top of their personal training. Electronic handgrip dynamometry is a simple non-fatiguing proxy to assess overall muscle strength and function.
PURPOSE: This study sought to examine the correlations of maximal handgrip strength (HGS), rate of HGS force development, and HGS fatigability on lean body mass, peak power, functional threshold power, and aerobic capacity in master's aged cyclists and triathletes.
METHODS: A cross-sectional design was utilized and the analytic sample included n=31 master's aged cyclists and triathletes (age: 49.1±10.4 years). Achievement motivation was self-reported with a Situational Motivation Scale Questionnaire. A stationary bicycle trainer and metabolic cart was used to evaluate peak power and aerobic capacity with standardized protocols. Whole body bioelectrical impedance measured lean body mass. An electronic handgrip dynamometer examined maximal HGS, rate of HGS force development, and HGS fatigability.
RESULTS: Maximal HGS (34.2±10.6 kg) was moderately correlated with peak power (5.7±2.2 w/kg) (r=0.46; p<0.01), lean body mass (63.2±13.4 kg) was moderately correlated with peak power (r=0.48; p<0.01) and negligibly correlated with aerobic capacity (43.6±9.1 ml/kg/min) (r=0.37; p=0.04). Rate of HGS force development (73.9±39.7 kg/s) was also moderately correlated with peak power (r=0.36; p=0.04). Maximal HGS was moderately correlated with rate of HGS force development (r=0.63; p<0.01). Moreover, after ranking the measures, maximal HGS was moderately correlated with peak power (r=0.40; p=0.02) and lean body mass was moderately correlated with peak power (r=0.50; p<0.01).
CONCLUSIONS: This study suggests that maximal HGS and rate of HGS force development share a signal with peak power in master's aged cyclists and triathletes. Further, increased lean body mass is related to greater peak power. Maximal HGS and rate of HGS force development show promise for being utilized in a single protocol as a correlate for peak power when exhaustive testing is not possible, and maintaining lean mass is also advised for human performance in older endurance athletes.

645

Sex Differences In Proportional Numbers Of Top Performances Within Elite Youth Track And Field Athletes

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There is a small but consistent sex difference (~5%) in track running performance in that boys outperform girls prior to puberty in elite youth track and field athletes. Whether the proportional number of males and females differ among top elite youth performances remains unknown.
PURPOSE: To determine among elite youth track athletes 1) the proportional number of males vs. females and 2) at what age (between 5 and 18 years) females are no longer represented, within the overall top running performances.
METHODS: Top age group running performance records of elite USA male and female track and field athletes (5-18 years) over a ten-year period (2009-2019) were collected from an online database (athletic.net). The top 10 and top 100 performances were recorded for four running events: 100m, 200m, 400m, and 800m. Data are reported in mean ± standard deviation.
RESULTS: Between 5-6 years, the proportion of males (M) was greater than females (F) in the top 10 (M = 6.3 ± 1.4, range: 4-8 (# of males that placed in the top 10); F = 3.8 ± 1.4, range: 2-6 (# of females that placed in the top 10); $\chi^2 = 10$, $p = 0.002$) and top 100 (M = 59.4 ± 13.0, range: 30-74; F = 36.0 ± 5.4, range: 26-44; $\chi^2 = 92$, $p < 0.001$), across all four events. Between 7-12 years, there was a greater proportion of males than females in the top 10 (M = 8.9 ± 0.9, range: 7-10; F = 1.1 ± 0.9, range: 0-3; $\chi^2 = 295$, $p < 0.001$) and top 100 (M = 80.7 ± 5.5, range: 69-88; F = 19.3 ± 5.5, range: 12-31; $\chi^2 = 1811$, $p < 0.001$), across all four events. Additionally, between 13-18 years, there was a greater proportion of males than females in the top 10 (M = 10.0 ± 0.0, range: 10; F = 0.0 ± 0.0, range: 0) and top 100 (M = 99.5 ± 1.1, range: 96-100; F = 0.46 ± 1.10, range: 0-4; $\chi^2 = 4712$, $p < 0.001$), across all four events. Females were no longer represented within the top 10 overall performances starting at 13 years in the 100m and 200m, 12 years in the 400m, and after 10 years in the 800m. Females were no longer represented within the top 100 overall performances starting at 14 years in all four events.
CONCLUSION: Prior to puberty in elite youth track and field athletes, there is a greater proportion of males within the top 10 and top 100 overall running performances. Between ages 5-6 years, the sex difference in the proportion of top running performances is small, but present, and increased between ages 7-12 years, with no females represented after 13 years.

646

Training Load And Cardiovascular Stress Differ In Practice And Competition Settings In Female Collegiate Basketball

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Collegiate basketball involves rigorous practice and competition schedules. Heart rate and GPS tracking devices permit comparison of the two performance settings.
PURPOSE: To assess exercise load and cardiovascular stress among female collegiate basketball players during practices and competitions.
METHODS: We monitored 14 female Division-1 basketball players from September 16, 2020, through March 5, 2021. During this period, each player wore a Polar Team Pro device for all practices (n=80) and games (n=16). We exported total distance traveled, maximum heart rate (HR), maximum speed, and the Polar calculations for training load and cardio load. We used paired-samples t-tests to measure differences between each player's average practice and game performances. Linear regressions across all observations analyzed the effect of game number, practice number, and duration of rest prior to performance on training load.
RESULTS: In practice settings, players ran a total distance of 2.7 ± 1.4 miles, achieved a maximum speed of 14.1 ± 3.6 mph, had a maximum HR of 202.0 ± 18.9 bpm, a training load score of 135.3 ± 77.0, and a cardio load score of 169.6 ± 80.6. In games, players ran 55.4% farther (4.2 ± 1.5 miles; $p < 0.001$), 9.0% faster (15.3 ± 1.4 mph; p = 0.001), had a 1.0% higher maximum HR (204.0 ± 20.5 bpm; p = 0.461), a 19.6% higher training load (161.7 ± 99.0; p = 0.101), and a 30.1% higher cardio load (220.6 ± 92.7; p = 0.009). Rest prior to performance was 10.1% longer before games (p = 0.068). Simple linear regression estimating the effect of performance setting on training load found games to be 26.4 points (19.5%) higher than practices ($p < 0.001$; 95% CI: 12.851, 39.895). However, when including day of the season and number of rest days prior to performance, each successive day of the season predicted a 0.2-point increase in training load ($p < 0.001$; 95% CI: 0.123, 0.334), each additional rest day predicted a 3.1-point increase (p = 0.002; 95% CI: 1.163, 4.966), and whether it was a game or practice was no longer significant (p = 0.523).
CONCLUSIONS: During games, players ran farther, achieved faster speeds, and had higher cardio loads than they did during practices. Although games had greater workloads, the difference was statistically accounted for by additional rest prior to games and improvements in workload capacity as the season progressed.

648

The Road To Achieving The World Championship In Age Group For An Olympic Distance Triathlete

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BACKGROUND: Case studies of world-class triathletes are a source of inspiration to generate training strategies in this sport (Cejuela & Sellés-Pérez, 2022). While this information is very valuable, it is not specific to the extensive population of amateur or age group triathletes. Although training intensity distribution (TID) over a short competitive period has recently been described in Olympic distance triathletes from a middle-aged group (Falk Neto et al., 2021), little is known about the TID and physiological characteristics of the most successful triathletes from these groups.
PURPOSE: Describe long period of TID and physiological characteristics of a world champion age group triathlete in Olympic distance.
METHODS: An amateur triathlete (34-yr, 175.7-cm, 70.2-kg, 30.85-mm Σ6 skinfolds, 7-y experience) performed a ~20-month training program until the world championship Dubai 2022. The TID of sessions were divided into 3 blood lactate (BLa) levels zones (Zone 1 [Z1]: <3 mmol/L; Zone 2 [Z2]: 4 to 7 mmol/L; Zone 3 [Z3]: >8 mmol/L), where BLa was monitored periodically. All sessions were performed through interval training [IT] (e.g., reps of 100-m swim [Sw], 2000-m cycle [Cy], and 1000-m run [Ru]) with interval length >1-min (Festa et al., 2023). Additionally, peak oxygen uptake ($\dot{V}O_{2peak}$) was assessed only in running within the training period.
RESULTS: Total training volume during program was ~2322 hours, of which the TID was 71-75% for Z1, 18-21% for Z2, and 5-8% for Z3, both in Sw, Cy, and Ru. Mean weekly frequency was 12 to 14 sessions, accumulating ~27 h/wk; ~11.7, ~284, and ~90 km/wk, for Sw, Cy, and Ru, respectively, with little modification throughout the training program. Z2 was the most measured, in which improvements were found in Sw speed +3.3% (1.20 to 1.24 m/s), Cy power +1.3% (290 to 294 W), and Ru speed +3.4% (4.75 to 4.91 m/s), with trend towards lower BLa values compared previous test. Finally, $\dot{V}O_{2peak}$ increased from 69.10 to 72.01 mL/kg/min (+4.21%) with a decrease in BLa_{peak} (16.1 vs. 13.7 mmol/L) post-test.
CONCLUSIONS: This triathlete was world champion in Olympic distance in 35-39 age group. This case study demonstrates that a successful amateur triathlete has a TID similar to world-class athletes and high physiological performance. Interestingly, latter achieved with IT-based training approach.

649

Comparing Objective And Subjective Measures Of Exercise Stress In Female Collegiate Ice Hockey Players

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Quantifying exercise stress experienced by ice hockey players during training and competition is essential for practitioners in supporting coaches. Exercise stress can be quantified using both subjective and objective methods to derive a training load. However, there remains a paucity of inquiry into the association between indices of subjective and objective training loads in collegiate hockey players.
PURPOSE: To examine the association between a subjective and objective measure of exercise stress in female collegiate ice hockey players.
METHODS: A total of 21 healthy university female ice hockey players with an age (mean ± SD) of 20.4 ± 1.7 y, a height of 166.3 ± 4.7 cm, and a body weight of 66.4 ± 7.3 kg, volunteered to be participants over a two-week period. Each participant wore a chest-strap heart rate monitor during on-ice training and competition. An objective measure of exercise stress was quantified using heart rate dynamics and was calculated using Edwards training load. A subjective measure of exercise stress was quantified using a sessional rating of perceived exertion (sRPE) and was multiplied by time (min) to derive a training load. Indices of exercise stress were recorded from the beginning of the dry-land warm-up and finished upon completion of the off-ice cool-down. The association between sRPE and HR derived training loads were examined using Linear Regression. Significance was declared as a probability of $p < 0.05$. The study was approved by the research ethics review board of the University of Windsor.
RESULTS: Weekly HR-derived training load was (mean ± SD) 300.3 ± 141.5 (AU). Weekly sRPE training load was (mean ± SD) 830.9 ± 466.4 (AU). A significant association between sRPE and HR-derived training loads were observed as displayed though a coefficient of determination of ($R^2 = 0.70$, $p < 0.0001$) and a Pearson correlation coefficient of (r 95% CI = 0.84, 0.80: 0.87).
CONCLUSION: The results from study demonstrate sRPE and HR derived training loads, from on-ice training and competition, are significantly associated during regular season play. Practitioners may wish to choose a singular method that is both feasible and time sensitive to better support coaches and the integrated support staff.