

in blood lactate concentration and lifting velocity during and after the application of the two protocols for strength gain and muscle hypertrophy. However, blood lactate concentration was significantly higher in men than in women.

## B-64 Free Communication/Poster - Running

Wednesday, May 27, 2020, 1:30 PM - 4:00 PM  
Room: CC-Exhibit Hall

### 895 Board #21 May 27 1:30 PM - 3:00 PM Distance Runners' Perceptions Of A Strength Training Intervention

Danielle Trowell<sup>1</sup>, Aaron Fox<sup>1</sup>, Natalie Saunders<sup>1</sup>, Bill Vicenzino<sup>2</sup>, Jason Bonacci<sup>1</sup>. <sup>1</sup>Deakin University, Melbourne, Australia. <sup>2</sup>University of Queensland, Brisbane, Australia. Email: danielle.trowell@ausport.gov.au  
(No relevant relationships reported)

**PURPOSE:** This study is one part of a Randomised Controlled Trial investigating the effect of strength training on distance runners' mechanics and performance. The aim of this study was to examine runners' perceptions of the strength training intervention. **METHODS:** Thirty distance runners (18 male, 12 female) were recruited for this study. In addition to their normal running training, the experimental group undertook strength training two days per week for 10 weeks. Total training time was matched, with the control group performing additional low-intensity running and body-weight exercises. Running performance and biomechanics during submaximal running (3.8 m/s) and maximal sprinting were assessed immediately before and after the intervention period. At the completion of the 10 week intervention period, the strength training group were also surveyed on their perceptions of the strength training intervention using an online questionnaire in Qualtrics.

**RESULTS:** Twenty-eight participants completed follow-up testing. Strength training significantly improved two kilometre running performance ( $F(1,26) = 10.497, p = .003$ , partial  $\eta^2 = .288$ ) more than running training alone. The mean (95% CI) difference between groups was 11.31 (3.73 to 18.98) seconds. However, strength training did not change maximal aerobic capacity, running economy (3.3 m/s) or lower-limb joint kinematics or kinetics during running. Survey responses showed 64% ( $n = 9$  of 14) of the experimental group believed the strength training program improved their running performance and 79% ( $n = 11$ ) reported they would continue using strength training. Half ( $n = 7$ ) of the experimental group believed strength training had a considerable effect on their running technique.

**CONCLUSIONS:** Strength training appears to improve runners' physical and task-specific self-efficacy, and increased confidence may facilitate faster running performance. This study also demonstrated a discrepancy between measured and perceived effects of strength training on running technique.

### 896 Board #22 May 27 1:30 PM - 3:00 PM Setting A New World Record: The Demands Of Running 833km On Treadmill In 7 Days

Nicolas John Alexander Berger<sup>1</sup>, Russ Best<sup>2</sup>, Daniel Cooley<sup>1</sup>, Michael Graham<sup>1</sup>, Claire Harrison<sup>3</sup>, Matthew Wright<sup>1</sup>. <sup>1</sup>Teesside University, Middlesbrough, United Kingdom. <sup>2</sup>WINTEC, Hamilton, New Zealand. <sup>3</sup>The Newcastle Upon Tyne Hospitals NHS Foundation Trust, Newcastle, United Kingdom. Email: n.berger@tees.ac.uk  
(No relevant relationships reported)

Ultra-running (UR) comprises running events longer than a marathon (>42.2km). Due to the prolonged duration of UR, decrements in most or all physiological parameters are to be expected, and include a decrease in body mass and dehydration, loss of skeletal muscle mass and increased total body water. **Purpose:** to present data on a female multiple world record holding ultra-runner, examining haematological and physiological perturbations, as well as nutritional strategies throughout a successful treadmill world record attempt for total distance completed in seven days on a treadmill (833.05km). **Methods:** Sharon Gayter (SG) 47 years, 162.5cm, 49kg,  $\dot{V}O_{2max}$  48 ml/kg/min<sup>-1</sup> ran continuously for 7 days on a treadmill located at Teesside University, UK. 3-hours of running were followed by 30-minute breaks, and night-time rest from 1am-5am. Heart rate (HR), oxygen uptake ( $\dot{V}O_2$ ), weight (kg), blood lactate (La; mmol.L<sup>-1</sup>), haemoglobin (Hb; g.DL<sup>-1</sup>), haematocrit (hct; %), glucose (G; g.L<sup>-1</sup>), and nutrition were recorded. **Results:** SG ran at approx. 7km/h for 17.5 hours/day, covering an average of 120km. Mean  $\dot{V}O_2$  1.2 ± 0.1 L.min<sup>-1</sup>/ 24.7 ± 3.2 mL.kg.min<sup>-1</sup>, RER 0.80 ± 0.03, HR 125 ± 5 b.min<sup>-1</sup>. Weight increased from 48.6 to 49.5kg. Hb decreased from 13.7 to 11 g.DL<sup>-1</sup>, and hct decreased from 40% to 33%. Average G was 6.3 ± 1.6 g.L<sup>-1</sup>, (range 2.65-9.14 g.L<sup>-1</sup>), and average blood lactate was 1.0 ± 0.5 mmol.L<sup>-1</sup>, (range 0.4-3.3 mmol.L<sup>-1</sup>). Energy expenditure (EE) for each 24-hour period was 6878 kcal, and energy intake (EI) was 2701 kcal. Hourly EE was 382 kcal, with 66.6% and

33.4% of the energy coming from fat and carbohydrate oxidation, respectively. 7-day EI was 26,989 kcal and EE was 48,147 kcal, resulting in a total energy deficit (ED) of 21,158kcal. **Conclusion:** The previous record of 753.24km was extended by 79km to a new world record of 833.05km. SG exhibits an enhanced fat metabolism through which she covered the large daily ED. The increase in body weight could be the result of protein catabolism. The corresponding development of hypoproteinaemic oedema, and increased plasma volume, likely lead to the reduced Hb and hct. Her success can be attributed to a combination of physiological and psychological factors, as she remained upbeat throughout the event and stated that she felt that the attempt was easy but became a bit 'tedious' towards the end.

### 897 Board #23 May 27 1:30 PM - 3:00 PM Prevalence Of Low Bmd Of High-level Kenyan Male And Female Distance Runners Compared To Kenyan Controls

Lauri Önnik<sup>1</sup>, Diresibachew W. Haile<sup>2</sup>, Anthony C. Hackney<sup>3</sup>, Robert Ojiambo<sup>2</sup>, Silva Suvi<sup>1</sup>, Amy R. Lane<sup>2</sup>, Martin Mooses<sup>1</sup>. <sup>1</sup>University of Tartu, Tartu, Estonia. <sup>2</sup>Moi University, Eldoret, Kenya. <sup>3</sup>University of North Carolina, Chapel Hill, NC. Email: lauri.onnik@ut.ee  
(No relevant relationships reported)

Kenyan male and female runners have dominated international running events for decades, however the information about their bone health to date is lacking. High training volumes and low energy availability concurrently could potentially impact greatly on bone health. Previous reports lack comparison with the proper control group.

#### PURPOSE

To determine the bone health indices of Kenyan high-level male and female distance runners.

#### METHODS

Participants were 26 female (28.7±6.3 yr; 51.8±5.0 kg; 1.63±0.07 m; 19.5±2.0 kg.m<sup>-2</sup>; IAAF performance score: 1029±132 pt) and 30 male (28.1±3.8 yr; 57.7±6.1 kg; 1.73±0.05 m; 19.6±1.8 kg.m<sup>-2</sup>; IAAF performance score: 1087±66 pt) high level Kenyan distance runners. Control group consisted of 29 female (25.0±5.7 yr; 63.4±9.1 kg; 1.65±0.06 m; 23.3±3.2 kg.m<sup>-2</sup>) and 29 male (24.1±3.8 yr; 62.5±10.1 kg; 1.7±0.08 m; 21.8±5 kg.m<sup>-2</sup>) university students of similar age. DEXA was used to measure BMD at the lumbar spine (LS-BMD), right femur (RF-BMD) and total body (TB-BMD). Low BMD was defined as Z-score between -1.0 and -2.0 and osteoporosis < -2.0.

#### RESULTS

There were no differences in LS-BMD Z-score, RF-BMD Z-score and TB-BMD Z-score between female-male athletes and their respective controls. LS-BMD Z-score, RF-BMD Z-score and TB-BMD Z-score frequency count in the range of -1 to -2 and below -2 is shown in table 1.

Table 1. Number of participants with Z-scores in the range of -1 to -2 and below -2.

|                   | F Athletes (n=26) | M Athletes (n=30) | F control (n=29) | M control (n=29) |
|-------------------|-------------------|-------------------|------------------|------------------|
| LS-BMD Z -1 to -2 | 7                 | 5*                | 6                | 7                |
| LS-BMD Z < -2     | 3                 | 1*                | 2                | 2                |
| RF-BMD Z -1 to -2 | 5                 | 2*                | 3                | 3                |
| RF-BMD Z < -2     | 2                 | 0*                | 3                | 2                |
| TB-BMD Z -1 to -2 | 3                 | 1                 | 3                | 3                |
| TB-BMD Z < -2     | 0                 | 0                 | 1                | 0                |

\* - sample size for these values was 20; M = male, F = female

#### CONCLUSION

There was high prevalence of low BMD (Z-score < -1) in high level male and female Kenyan distance runners and somewhat unexpectedly for control groups too; but, no statistical differences in bone health indices between female-male athletes and corresponding control groups. These findings warrant additional investigation be conducted into the energy balance, eating disorders, disordered eating and hormonal markers to further explain causality, both among Kenyan athletes and controls.

### 898 Board #24 May 27 1:30 PM - 3:00 PM May The Force Be With You: Acceleration-based Estimates Of Vertical Ground Reaction Forces During Running

Dovin Kiernan, David Hawkins. University of California, Davis, Davis, CA.  
(No relevant relationships reported)

Running-related injury (RRI) may be caused by combinations of load magnitudes and numbers exceeding musculoskeletal structure capacity. Few methods exist, however,