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### Female Collegiate Athletes And CrossFit Exercisers Exhibit Muscular Differences During Body Composition Testing

Marie R. Jensen, Jazmin Trevino, Nathaniel J. Holmgren, Addisen Azevedo, J. Mark Van Ness, Courtney D. Jensen. *University of The Pacific, Stockton, CA.*

CrossFit facilities and Division 1 athletics programs are settings of intense and often competitive physical training. However, the participants' nutritional behaviors and characteristics of exercise programming may differ, which can influence accretion of lean mass.

**PURPOSE:** To compare muscular parameters of body composition testing in female Division 1 collegiate athletes (DCA) and CrossFit exercisers (CFE).

**METHODS:** We scanned 244 female exercisers (32 DCA and 212 CFE) on the InBody 770 body composition analyzer. From this pool of subjects, we used coarsened exact matching (CEM) to create new subsamples matched for age and bodyweight. The comparison groups generated by CEM consisted of 22 DCA and 22 CFE. There were 7 different court, field, and aquatic sports represented in the DCA group. We used two-tailed independent-samples t-tests to compare the matched samples in InBody calculations of lean body mass, dry lean mass, skeletal muscle mass, lean leg mass (single leg average), lean arm mass (single arm average), lean trunk mass, and skeletal muscle index; 95% confidence intervals of the between-group differences are reported.

**RESULTS:** Lean body mass was  $119.7 \pm 16.4$  lb for DCA and  $108.1 \pm 13.5$  lb for CFE ( $p = 0.013$ ; 95% CI: 2.5, 20.8). Dry lean mass was  $32.4 \pm 4.5$  lb for DCA and  $29.0 \pm 3.7$  lb for CFE ( $p = 0.009$ ; 95% CI: 0.9, 5.9). Skeletal muscle mass was  $67.1 \pm 9.5$  lb for DCA and  $60.3 \pm 8.0$  lb for CFE ( $p = 0.014$ ; 95% CI: 1.5, 12.1). Lean leg mass was  $18.1 \pm 3.1$  lb for DCA and  $15.7 \pm 2.3$  lb for CFE ( $p = 0.006$ ; 95% CI: 0.7, 4.1). Lean arm mass was  $6.4 \pm 1.1$  lb for DCA and  $5.9 \pm 0.9$  lb for CFE ( $p = 0.104$ ; 95% CI: -0.1, 1.1). Lean trunk mass was  $52.7 \pm 6.9$  lb for DCA and  $49.2 \pm 5.5$  lb for CFE ( $p = 0.069$ ; 95% CI: -0.3, 7.3). Skeletal muscle index was  $7.4 \pm 0.5$  for DCA and  $7.3 \pm 0.6$  for CFE ( $p = 0.409$ ; 95% CI: -0.2, 0.5). All comparisons met Levene's test for equality of variance ( $p > 0.400$ ).

**CONCLUSIONS:** Despite subject matching, female DCA showed greater muscle mass overall than CFE. The most significant difference was observed in the legs, which may contribute to variance in athletic performance. Future studies should examine variables such as nutrition and training volume to determine which factors may contribute to these differences.

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### The Secular Trend On Fitness Parameter In Chinese Male College Students From 2013 To 2021

Chunbo Qin<sup>1</sup>, Xi Jin<sup>2</sup>, Zhonghui Wang<sup>3</sup>, Yang Wen<sup>1</sup>. <sup>1</sup>Shenzhen University, Shenzhen, China. <sup>2</sup>University of University, University, MS. <sup>3</sup>Louisiana State University in Shreveport, Shreveport, LA.

Trends of Physical Fitness (PF) can predict group physical activity and develop measurement interventions to promote health.

**PURPOSE:** The purpose of this cross-sectional study was to explore the trends of fitness parameters in male college students from 2013 to 2021 in southern China.

**METHODS:** Totally, 25716 Chinese male college students aged from 15 to 26 years old were recruited from Shenzhen University in China. The subjects participated in PF tests from 2013 to 2021 at their first year of college. Physical characteristics and PF tests included body weight (BW), body height (BH), body mass index (BMI), vital capacity (VC), 50-meter running (50m), stand long jumping (SLJ), sitting body flexion (SBF), 1000-meter running (1000m), and pull-up (PU). All students were tested by facilities TSN200 (produced by Physical Fitness Science and Technology Company). Orthogonal regression were applied to analyze the trends on all variables by Stata 15.0.

**RESULTS:** In these nine-year analysis, the trends of all variables are positive. In details, the trends of BW, BMI, VC, and SBF are quartic ( $p=0.000$ ). The trends of BH and 50m are quintic ( $p=0.000$ ). The trends of SLJ and PU are cubic ( $p=0.000$ ). The trend of 1000m is quadratic ( $p=0.000$ ).

**CONCLUSION:** College physical education programs can be targeted and directed according to trends in all variables. Other variables, such as  $VO_{2max}$ , can be considered adding for further study.

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### Reliability Of Acceleration Measures Using A Linear Position Transducer During Segments Of The Bench Press

Ryan W. Gant<sup>1</sup>, Jennifer Rivera<sup>1</sup>, Emily Tagesen<sup>1</sup>, Anthony Pinzone<sup>1</sup>, Edward Pelka<sup>1</sup>, Modesto Lebron<sup>2</sup>, Adam Jajtner<sup>1</sup>. <sup>1</sup>Kent State University, Kent, OH. <sup>2</sup>University of Central Florida, Orlando, FL. (Sponsor: Ellen L Glickman, FACSM)

**PURPOSE:** To determine the inter-set and inter-session reliability of acceleration measurements in concentric segments of the barbell bench press (BP).

**METHODS:** 17 participants ( $24 \pm 4$  years;  $1.71 \pm 0.07$  m;  $80.8 \pm 11.2$  kg) with six months of prior resistance training experience completed three trials at least 48 hours apart. During visit one participants completed an informed consent and one-repetition maximum assessment (1RM) for the BP. During visits two and three, participants performed two sets of three BP repetitions at 30-, 50-, 60-, and 70% 1RM. The linear position transducer (LPT) was attached to the medial aspect of the barbell sleeve with the retractable belt perpendicular to the floor. Barbell position, collected by LPT, was sampled at a rate of 100Hz with velocity calculated as the change in displacement over time and filtered on a rolling 0.10s average with a custom spreadsheet. Repetition onset was defined as filtered velocity of  $0.05m \cdot s^{-1}$  with a prerequisite displacement of 10cm. Repetition segments were determined by dividing total displacement into three equal portions: bottom (BOT), middle (MID), and top (TOP). Acceleration was defined as the change in velocity over time and represented as both the mean acceleration averaged over three repetitions (AR) and as the repetition with the highest mean velocity (BR). AR and BR were compared from set one to set two and from session two to session three. Intraclass Correlation Coefficients (ICC) and paired samples t-tests were used to assess reliability in filtered data for the LPT. AR reflected greater reliability than BR and are displayed below.

**RESULTS:** Inter-set comparisons demonstrated excellent ICCs ( $ICC_{2k} > 0.90$ ) in 6 of 12 segments and good ICCs ( $ICC_{2k} = 0.75 - 0.90$ ) in 5 of 12 segments. Inter-session comparisons demonstrated good ICCs at 30% and 50% with the exception of MID 50% ( $ICC_{2k} = 0.297$ ). Higher intensities (60 and 70% 1RM) had poor ICCs in BOT ( $ICC_{2k} = -0.141 - 0.095$ ), and moderate ICCs at MID and TOP ( $ICC_{2k} = 0.541 - 0.729$ ). No significant differences were observed between sets or sessions at any intensity or segment.