

Sex Differences in Power Output at Maximal Load during the Barbell Back Squat

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ABSTRACT

When maximal muscular power outputs are examined relatively, sex differences appear to be non-existent. In terms of absolute power, however, significant differences persist between sexes. In both cases, the majority of metrics are obtained at optimal loads for power outputs. However, little is known in regards to differences in power outputs at maximal strength capacity of men and women. **PURPOSE:** The current investigation aimed to identify sex differences of concentric (C) and eccentric (E) power measures at maximal load during the barbell back squat (SQ). **METHODS:** A total of 8 participants (4 men and 4 women) completed one experimental exercise session testing SQ 1-Repetition maximum (1RM) following the National Strength and Conditioning Association 1RM protocol. A Bar Sensei (accelerometer) was attached to the barbell during the 1RM test, and used to collect C and E Average Power (AP), Peak Power (PP), Average Force (AF), Peak Force (PF), Average Speed (AS), Peak Speed (PS), as well as C POP-100, Distance of Movement (DM), and Mass Lifted (ML). **RESULTS:** An independent-sample t test identified statistically different C PF ($p=0.04$), C AF ($p=0.03$), ML ($p=0.03$), E PF ($p=0.03$), E AF ($p=0.03$), E PP ($p=0.03$) and E AP ($p=0.047$) between men (C PF 2054.1 \pm 825.7 N; C AF 1685.4 \pm 630.4 N; ML 367.5 \pm 133 lbs.; E PF 1821.7 \pm 633 N; E AF 1646.3 \pm 597.9 N; E PP 762.4 \pm 248.4 W; and E AP 428.5 \pm 130.4 W) and women (C PF 940.2 \pm 178.3 N; C AF 792.7 \pm 143.1 N; ML 178.8 \pm 33.5 lbs.; E PF 896.5 \pm 138.9 N; E AF 803.5 \pm 146.7 N; E PP 361.15 \pm 137 W; and E AP 230.6 \pm 90.7 W). Contrariwise, no significant differences were indicated for C POP-100 ($p=0.39$), C PS ($p=0.95$), C AS ($p=0.70$), C PP ($p=0.13$), C AP ($p=0.19$), DM ($p=0.46$), E PS ($p=0.66$), and E AS ($p=0.93$) of men (C POP-100 .21 \pm .15 m/s; C PS .80 \pm .15 m/s; C AS .44 \pm .29 m/s; C PP 1471.7 \pm 727.8 W; C AP 824.9 \pm 698.3 W; DM .42 \pm .23 m; E PS .52 \pm .24 m/s; and E AS .29 \pm .11 m/s) and women (C POP-100 .14 \pm .04 m/s; C PS .82 \pm .44 m/s; C AS .36 \pm .23 m/s; C PP 727.8 \pm 446 W; C AP 292.6 \pm 196.7 W; DM .31 \pm .15 m; E PS .45 \pm .15 m/s; and E AS .30 \pm .10 m/s). **CONCLUSION:** These results provide further explanation of sex-differences in power production. The difference in C PF, C AF, ML, E PF, E AF, and E PP complement results of previous sex-differentiating reports. However, men and women produce C POP-100, C PS, C AS, C PP, C AP, DM, E PS, and E AS at equivalent load percentage provides novelty to the current literature. Further research is needed to explain reasoning of male and female power differences and similarities, and to determine sex-specific training implication for improvement in power performance.