RESULTS: There was a significant condition*time effect for leg extension (p=0.017). Both HV and HL significantly increased leg extension from PRE to POST (p<0.001) and PRE to POSTPR (p<0.001). However, HL was significantly greater than HV at both POST (mean difference 5 ± 6 kg, *p*=0.007) and POSTPR (5 ± 6 kg, *p*=0.009). There was a main effect of time for Est. 1RM leg press (p<0.001), with Est. 1RM being higher in both conditions from PRE to POST (*p*<0.001) and PRE to POSTPR (*p*<0.001). Similar trends were evident for mean knee extensor torque at 60 deg/sec (*p*=0.041) with mean knee extensor torque at 60 deg/sec being higher from PRE to POSTPR (*p*=0.029) and from POST to POSTPR (*p*=0.43). There were no significant interactions or main effects for isokinetic knee extension peak torque at 60 and 120 deg/sec or mean torque at 120 deg/sec.
CONCLUSION: Our data suggest the effects of different unilateral loading schemes may be expressed to a greater extent in single joint movements. Additionally, isokinetic dynamometry may not be a valid method to detect strength changes to resistance training in a previously-trained population.

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Men And Women Express Similar Power Profiles In Pull Motions But Not Push

Jacob M. Cunha, Alexia E. Amo, Cynthia Villalobos, J. Mark VanNess, Courtney D. Jensen. *University of the Pacific, Stockton, CA.*

(No relationships reported)

Pushing and pulling occurs in athletic and nonathletic settings. Weaknesses in either movement could compromise sport performance or daily functioning. Determination of optimal load may aid in sport performance and reduce the risk of injury.
PURPOSE: To determine power output differences between men and women using colinear resistance.
METHODS: We enrolled 32 recreationally active men (n=14) and women (n=18), ages 18-25, to evaluate power profiles in horizontal and vertical push and pull exercises using Proteus (Proteus Motion, USA), which applies continuous, three-dimensional, concentric resistance. Subsequent data collection involved 2 repetitions with the dominant arm at 7lb, 14lb, 21lb, and 28lb in each exercise (32 total repetitions). Proteus software computed power output in watts for each set performed. Analysis of variance (ANOVA) with repeated measures tested the differences in power output at each load.
RESULTS: In both horizontal and vertical pull motions, there was a significant difference by load (p<0.001) and an interaction effect by sex (p<0.001). The expression of power was most similar between men and women at the lowest resistance horizontally (p=0.020) and vertically (p=0.038); both deviated more as weight increased. No plateaus were demonstrated in either motion; higher loads were required for both sexes to achieve peak power. In horizontal and vertical push motions, there was a significant difference by load (p<0.001) and an interaction effect with sex (p<0.001). Men and women were closest in power at 7lb horizontally (p=0.017) and vertically (p=0.004). Women experienced a plateau at 21lb; further change was insignificant both horizontally (p=0.147) and vertically (p=0.519). Men did not exhibit a plateau; power continued to increase from 21lb to 28lb (p<0.001).
CONCLUSIONS: In our population, the power produced between sexes was similar in press motions, but differed in pulls. By assigning sex-specific training loads, athletes can optimize performance.

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Neuromodulation Does Not Enhance Neural Adaptations To Strength Training In Previously Trained Individuals

Carlos A. Estrada[1], Masoud Moghaddam[2], Micheal J. Luera[2], Tyler W.D. Muddle[2], Cameron S. Mackey[2], Cody L. Diehl[2], Jason M. DeFreitas[2], Bert H. Jacobson[2]. [1]*Aurora University, Aurora, IL.* [2]*Oklahoma State University, Stillwater, OK.*

(No relationships reported)

Introducing resistance training to an initially untrained population induces rapid, early strength increases due to neural adaptations and are thereafter increased due to morphological adaptations within the musculotendinous unit. However, transcranial direct current stimulation (tDCS) is a method of neuromodulation that has been speculated to elicit further neural adaptations in already trained individuals, though the efficacy of tDCS to do so remains unsubstantiated.
PURPOSE: To examine the effect of tDCS on performance following a short-term resistance-training protocol.
METHODS: Forty-three trained males and females (Age = 20.7 ± 1.4yrs) participated in this investigation and reported on 12 separate occasions for pre- and post-testing and lower-body resistance training. During the initial visit, participants performed submaximal lower-body strength (predicted-1RM) and power testing (countermovement jump height [CMJ], peak power [PP], and peak velocity [PV]), and were familiarized with isometric strength testing procedures (knee extensor maximal voluntary isometric contractions). Participants reported 48-72hrs later for isometric testing to evaluate knee extensor peak torque (PT) and peak rate of torque development (pRTD), and were randomly assigned to either a control (CON), stimulation (tDCS), or sham (S-tDCS) condition thereafter. Each condition engaged in an identical training protocol 2x/wk for four weeks. Individuals in the tDCS and S-tDCS condition received stimulation to the primary motor cortex for 21 minutes prior to training. Post-testing occurred within the 3-7 day period following the final training session. Six separate 2x3 (Time x Condition) repeated-measures ANOVAs were conducted to assess between-condition differences in pre- to post-training measures of strength and power.
RESULTS: No significant Time x Condition interaction effects were observed within any of the dependent variables (DV). However, a main effect of Time was observed in measures of CMJ, PP, PV, PT, and predicted 1RM strength ($p < 0.05$). When collapsed across condition, significant improvements ($p = 0.000 – 0.048$) were observed in these DVs.
CONCLUSION: These results suggest that tDCS did not elicit superior improvements in lower-body strength and power compared to CON and S-tDCS conditions.

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Agreement Between Kinovea And The Open Barbell System For Barbell Velocity And Range Of Motion

Christian Macarilla, Joseph P. Carzoli, Colby A. Sousa, Eric R. Helms, Michael C. Zourdos. *Florida Atlantic University, Boca Raton, FL.* (Sponsor: Michael Whitehurst, FACSM)

Email: cmacarilla2018@fau.edu

(No relationships reported)

PURPOSE: The aim of this study was to examine the degree to which Kinovea video analysis software and a linear position transducer, the Open Barbell System (OBS), agree for measurements of average (ACV) and peak concentric velocity (PCV), as well as concentric range of motion (ROM) during the free-weight back squat and bench press exercises.
METHODS: Sixteen males (age: 23.6±2.8yrs, body mass: 82.0±12.2kg, height: 171.8±7.5cm, training age: 7.0±3.6yrs) performed a bench press and squat one-repetition maximum (1RM) in the first session. Then, in 3 different sessions subjects performed 3 (sets) X 1 (repetition) at 60% and 80% of 1RM. On each repetition, ACV, PCV, and ROM were assessed via both Kinovea and OBS. A smartphone was used to obtain videos from the lateral aspect that were later uploaded for analysis via Kinovea software, while the OBS was attached to the barbell via a cord and all outcomes were displayed on the unit in real time. Paired t-tests, intraclass correlation coefficients (ICCs), Bland-Altman plots, and folded empirical cumulative distribution plots (mountain plots) were used to analyze results.
RESULTS: Due to recording errors 348 out of a possible 352 repetitions were recorded. Paired t-tests revealed significant differences between measurement systems in all outcome variables for both the squat and bench press (p<0.01). ICCs for the squat were: 0.929 (ACV), 0.913 (PCV), and 0.188 (ROM). ICCs for the bench press were: 0.930 (ACV), 0.929 (PCV), and 0.683 (ROM). Large limits of agreement were observed in all Bland-Altman plots and visual inspection of the mountain plots revealed deviation from the zero-difference line and long tails in all plots denoting a lack of agreement between devices.
CONCLUSION: In summary, the Kinovea software and OBS do not agree for measurement of ACV, PCV, and ROM during the squat and bench press. The OBS is a validated device versus a motion capture system, therefore we do not recommend Kinovea for these outcomes.