

**Kinetics And Kinematics Of Isoinertial Ballistic  
Contractions In Older Adults [abstract only]**

MC DERMOTT, Emmet J., BALSHAW, Thomas G., BROOKE-WAVELL, Katherine, MADEN-WILKINSON, Tom <<http://orcid.org/0000-0002-6191-045X>> and FOLLAND, Jonathan P.

Available from Sheffield Hallam University Research Archive (SHURA) at:  
<http://shura.shu.ac.uk/27968/>

---

This document is the author deposited version. You are advised to consult the publisher's version if you wish to cite from it.

**Published version**

MC DERMOTT, Emmet J., BALSHAW, Thomas G., BROOKE-WAVELL, Katherine, MADEN-WILKINSON, Tom and FOLLAND, Jonathan P. (2020). Kinetics And Kinematics Of Isoinertial Ballistic Contractions In Older Adults [abstract only]. *Medicine & Science in Sports & Exercise*, 52 (7S), p. 946.

---

**Copyright and re-use policy**

See <http://shura.shu.ac.uk/information.html>

## Kinetics And Kinematics Of Isoinertial Ballistic Contractions In Older Adults

McDermott, Emmet J.<sup>1</sup>; Balshaw, Thomas G.<sup>1</sup>; Brooke-Wavell, Katherine<sup>1</sup>; Maden-Wilkinson, Thomas M.<sup>2</sup>; Folland, Jonathan P. FACSM<sup>1</sup>

<sup>1</sup> Loughborough University, Loughborough, United Kingdom.

<sup>2</sup>Sheffield Hallam University, Sheffield, United Kingdom.

Medicine & Science in Sports & Exercise: [July 2020 - Volume 52 - Issue 7S - p 946](#)

Regular resistance training (RT) is recommended for older adults to help offset age-induced declines in neuromuscular performance (e.g. power, force and velocity). However, there is limited research comparing the kinetics (force) and kinematics (velocity and power) of different types of RT contractions, and specifically concentric only (CON-ONLY) and eccentric-concentric (ECC-CON) contractions aiming to throw the load as far as possible.

**PURPOSE:** To compare the kinetics and kinematics of ballistic contractions performed as CON-ONLY (explosive concentric contraction performed from rest) vs ECC-CON (a prior controlled eccentric lowering of the load followed by an explosive concentric contraction) in an older adult population.

**METHODS:** Twelve healthy active older adult males (age: 66±5 yrs; height: 1.81±0.1 m; body mass: 78.5±11.0 kg; activity: 2175±1450 MET·min·week) completed 3 sessions (1 familiarisation and 2 measurement) using an instrumented isoinertial (30°) leg press dynamometer that facilitated recording of force and displacement that were used to derive velocity and power. Participants performed a series of attempts using both types of contraction (CON-ONLY and ECC-CON: counterbalanced) with a range of loads in ascending order during each measurement session (day 1: 20, 35 and 50; day 2: 50, 65 and 80%1RM).

**RESULTS:** No main effect for contraction ( $p>0.05$ ) was found for peak power or peak velocity across loads. A main contraction effect was found for peak force ( $p=0.012$ ), with post hoc analysis revealing no difference ( $p>0.05$ ) between contractions at any load. A main effect for contraction type was found for mean power ( $p=0.016$ ) and mean velocity ( $p<0.01$ ), with post hoc analysis revealing that mean power was higher for ECC-CON at 65% (310 vs. 430W, +23.0%,  $p<0.01$ ) and 80%1RM (229 vs. 337W, 47.3%,  $p<0.01$ ). Mean velocity was higher in ECC-CON across all loads (+13.7 - 49.5%; all  $p<0.01$ ).

**CONCLUSIONS:** CON-ONLY and ECC-CON ballistic contractions produced similar peak neuromuscular performance in an older adult population. However, ECC-CON contractions involved greater mean power and mean velocity. In conclusion, it may be beneficial for older adults to perform ECC-CON contractions as they provide equivocal peak neuromuscular performance as CON-ONLY, but superior mean neuromuscular performance.