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# Alternative Jump Variables as Surrogate Measures of Weightlifting Performance in National Weightlifters

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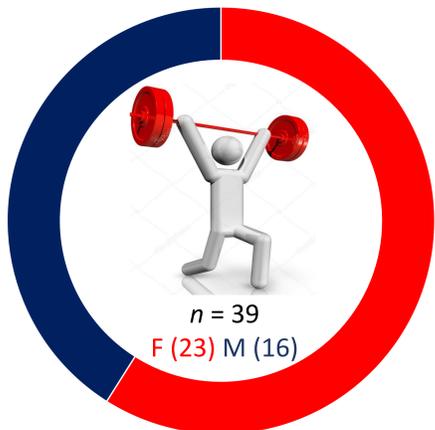
Stuart Martin <sup>2</sup>

Anthony N Turner <sup>1</sup>

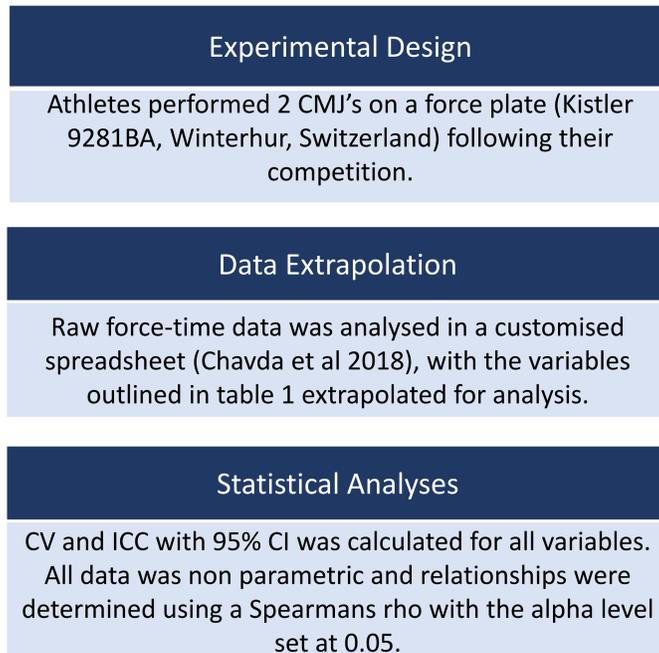
## Introduction

- Surrogate measures of weightlifting performance (WLP) have previously been monitored using loaded and unloaded squat jumps (SJ) (Bazyler et al 2018; Travis et al 2018; Carlock et al 2004) and countermovement jumps (CMJ) (Carlock et al 2004).
- Typically measures of jump height (JH) (Travis et al 2018; Carlock et al 2004) and peak power (PP) (Carlock et al 2004) and their associated scaled counterparts (Travis et al 2018; Carlock et al 2004) have been used to identify relationships between them and WLP.
- While these variables have been shown to have moderate to very strong relationships ( $r = 0.60-0.93$ ) (Carlock et al 2004), further information into the underpinning mechanisms that contribute to such outcome measures has not yet been investigated and may provide insight into variables more sensitive to change, thus aiding the monitoring process.
- Also, given that the sport is divided into female and male categories, differences between variables by gender was also investigated.

## Methods



39 National Level Weightlifters participated in this project during the 2019 English Championships. 2 individuals did not achieve a total and were excluded from the respective analysis



Variable
Snatch (Kg)
Clean & Jerk (Kg)
Total (Kg)
Jump Height (m)
RSI Mod
Peak Force (N)
Relative Peak Force (N/Kg)
Eccentric Impulse (N.s)
Concentric Impulse (N.s)
Concentric Impulse Duration (s)
Peak Power (W)
Relative Peak Power (W/Kg)
Concentric Average Power (W)

## Results

### Reliability

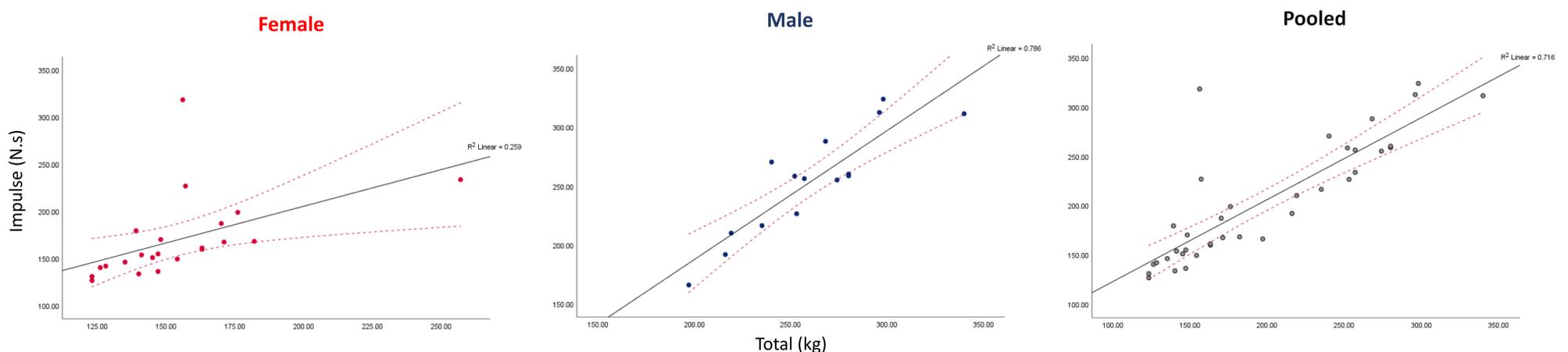
Concentric Impulse (N.s) was the most reliable variable (CV = 1.68%, ICC = 0.994, 95% CI: 0.989-0.997).

### Differences

Significantly more impulse ( $t_{(37)} = -5.938, p = 0.000$ ) was produced during the propulsive phase of the CMJ by males (Mean = 253.77, SD = 43.79) compared to females (Mean = 170.33, SD = 42.72).

### Relationships

Concentric Impulse (N.s) was the highest correlating variable to snatch, C&J and Total achieved for **females** ( $r = 0.73, 0.73, 0.76$ , respectively), **males** ( $r = 0.78, 0.83$  and  $0.85$ , respectively) and **pooled** ( $r = 0.85, 0.85$  and  $0.65$ , respectively).



## Conclusion & Practical Applications

- Concentric impulse from a CMJ has very strong relationships with WLP in both female and male weightlifters ( $r = 0.73-0.85, p < 0.05$ ).
- Concentric impulse may therefore be a good surrogate of WLP, potentially making it useful as a talent identification variable.
- Due to its low CV and high ICC, concentric impulse may also be a useful tool in the monitoring of weightlifting athletes.
- ✓ It is suggested that concentric impulse is used when analysing CMJ's on a force plate within the weightlifting population.
- ✓ Given there is a significant difference in female and male concentric impulse, it is suggested that decisions governed by athletic ability in potentially talented weightlifters should be analysed separately.



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