



### Introduction

- Critical power (CP) represents the maximal work rate in which a metabolic state steady state can be achieved.
- The three-minute all-out test (3MT) has been shown to be a valid and reliable single visit assessment of CP. Currently, it is recommended that the 3MT be completed on a separate day from other assessments such as incremental cycling test (ICT)
- *The purpose of this investigation was to determine if completing an ICT and 3MT on the same day separated by 30 minutes of rest would provide a valid assessment of CP.*
- It was hypothesized that completing an ICT and 3MT on the same day separated by 30 minutes of results would provide a valid assessment of CP.

### Methods

- Participants completed two testing sessions separated by at least 48 hours but no more than 10 days. Visit 1, participants completed an individualized increment cycling test (ICT) to exhaustion, followed by a square wave bout verification protocol.
- Participants rested for 30 minutes before beginning the 3MT. CP was calculated as the average power over the final 30 seconds of the test, and W prime (W') was calculated as the work performed above CP during the initial 150 seconds of the test.
- Participants completed the same procedures for the 3MT on Visit 2.

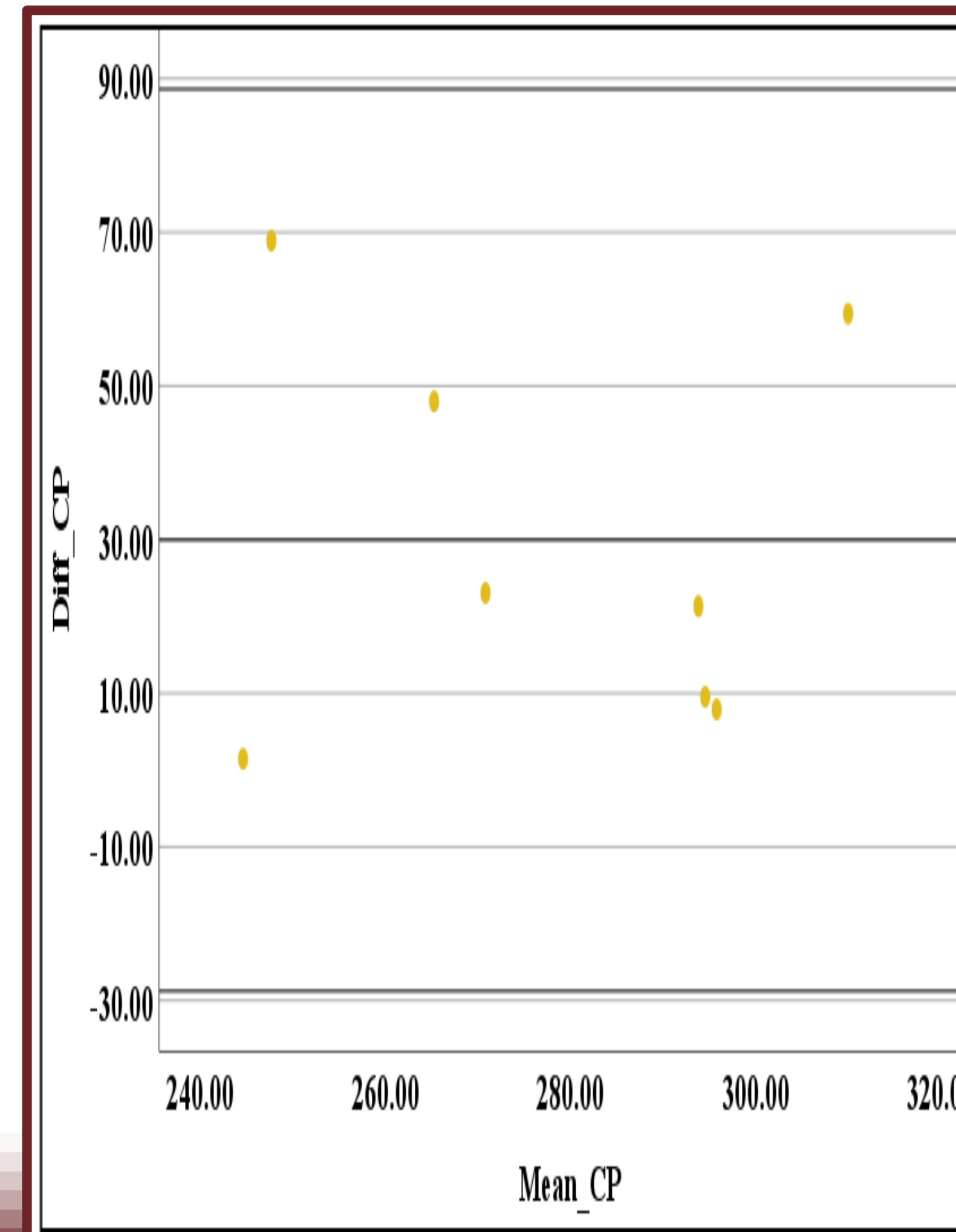
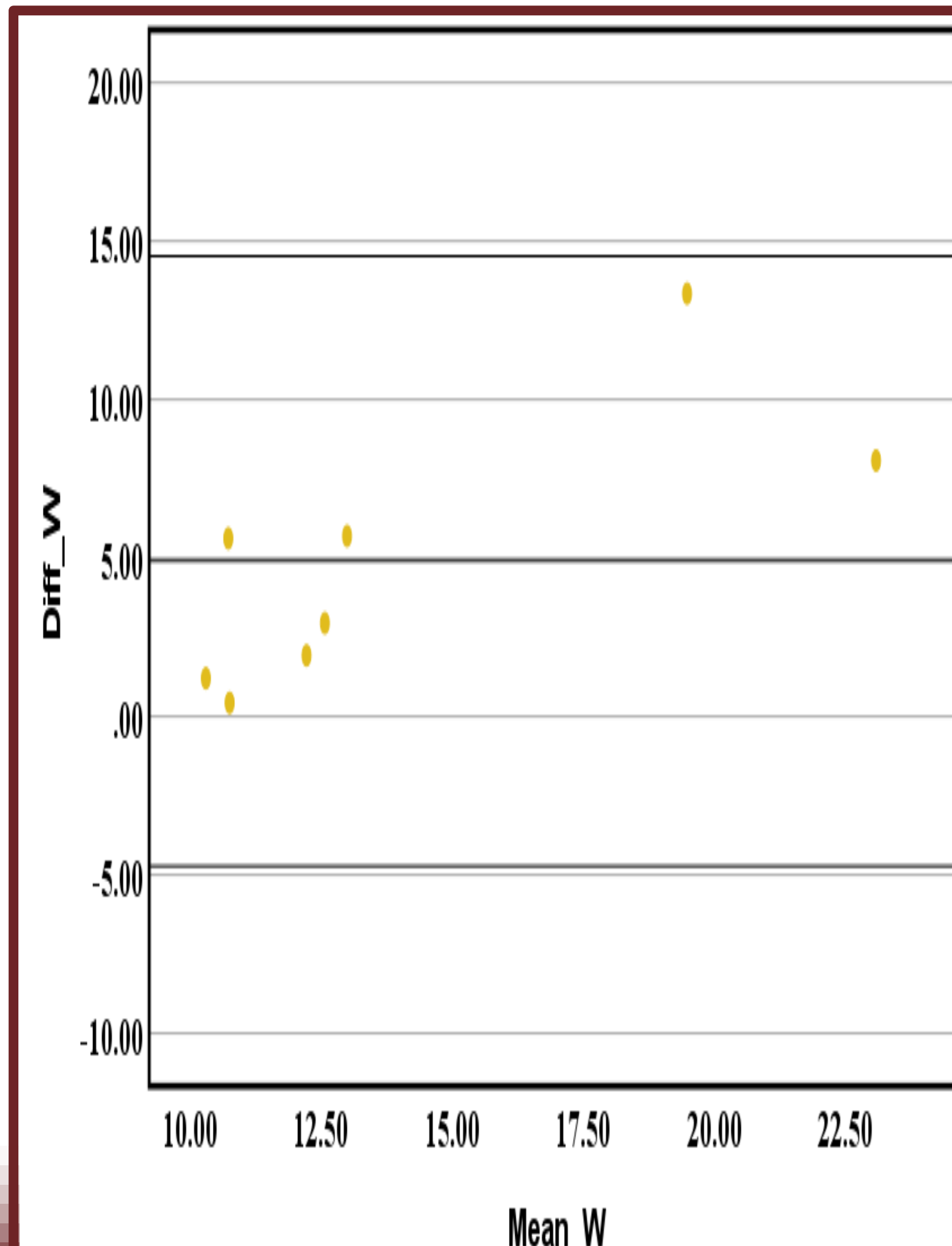
### References

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 2. Poole, D. C., Burnley, M., Vanhatalo, A., Rossiter, H. B., & Jones, A. M. (2016). Critical power: An Important Fatigue Threshold in Exercise Physiology. *Medicine & Science in Sports & Exercise*, 48(11), 2320–2334. <https://doi.org/10.1249/mss.0000000000000939>  
 3. Vanhatalo, A., Doust, J. H., & Burnley, M. (2007). Determination of critical power using a 3-min all-out cycling test. *Medicine & Science in Sports & Exercise*, 39(3), 548–555. <https://doi.org/10.1249/mss.0b013e31802dd3e6>

Table 1. Individual Demographic Data

Participant	VO <sub>2</sub> max (mL·kg <sup>-1</sup> ·min <sup>-1</sup> )	CP (Same)	CP (Separate)	W' (Same)	W' (Separate)
1	66.30	283.16	304.50	13.19	11.26
2	55.50	299.77	291.85	9.70	10.91
3	64.60	299.34	289.81	7.92	13.55
4	45.30	282.14	213.22	12.81	26.16
5	55.00	241.27	289.27	15.85	10.15
6	59.60	282.36	259.29	11.10	14.05
7	55.20	280.31	339.72	27.13	19.05
8	53.50	245.36	243.89	10.54	10.98

Abbreviation: W = watts; CP= Critical power; Vo2Max=Maximal rate of oxygen consumption



### Statistical Analysis

- Statistical differences in CP and W' between Visit 1 (same) and Visit 2 (separate) were determined with paired-samples t tests. The agreement between CP and W' values were assessed using mean difference, 95% confidence intervals (95%CI) of mean difference, and limits of agreement (LOA).
- Pearson's correlation was used to assess the strength of the relationship between CP and W' values assessed on Visit 1 and Visit 2.
- If significant correlations were present, linear regression was used to calculate values for the standard error of the estimate (SEE).

### Results

- The Mean age (yrs), height (cm), and Body mass (kgs) were (27 ± 5.55), (171.38 ± 6.55), (71.35 ± 11.71) respectively.
- No statistical differences were detected in CP and W'
- A mean difference of 2.23 ± 40.9 and 1.0 ± 6.7 kJ were observed for CP and W', respectively.
- No statistically significant associations were detected between CP<sub>same</sub> and CP<sub>separate</sub> or W'<sub>same</sub> and W'<sub>separate</sub>
- LOA for CP and W' were -77.8 to 82.3 W and and -12.1 ± 14.1 kJ

### Conclusions

- Though no significant differences were detected between measuring CP and W' on the same day as an ICT and measuring on a separate day, the lack of significant correlation and large LOA prevent recommending conducting an ICT and 3MT on the same day ,
- It is speculated that due to the varying levels of VO2 max levels the 3-minute test might not be long enough to deplete individuals with very high levels of VO2max.

### Practical application

- The current recommendations of separate days for conducting an ICT and the 3MT should be followed by coaches and athletes.