**The influence of handgrip on maximal power output during sprint cycling**

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# Abstract

**Keywords:**

# Introduction

Previous research shows that the upper-body muscles contribute significantly to maximal power output during sprint cycling by acting on the handlebar. Researchers have speculated that the mechanism underlying this contribution relates to the prevention of upward acceleration of the rider’s center of mass during the downstroke, which allows leg extension power to generate greater levels of crank power.

Here, we investigated the contribution of the upper body to maximal power output and rider center of mass movement during sprint cycling by having riders sprint in both a seated and non-seated posture while either gripping or not gripping the handlebar. In the “no-grip” conditions, we asked riders to rest their closed fists on top of where they would usually grip the handlebar. Our first hypothesis was that gripping the handlebar would increase maximal power output and that this effect would be larger in a non-seated posture. Our second hypothesis was that gripping the handlebar would decrease the upward acceleration of the rider’s center of mass during the downstroke and that this effect would be larger in the seated posture. Additionally, we explored differences in bicycle-rider interaction forces, center of mass displacement and velocity, net joint power, and muscle activity.

# Material and methods

## Statistical analysis

We used two-way repeated-measure analyses of variance (ANOVAs) to test for main and interaction effects (posture x handgrip) on maximal power output and vertical center of mass acceleration. Due to available time and resources, we collected data on 11 participants. A *post-hoc* power analysis using G\*Power v3.1 (Faul et al., 2013) determined that our sample size of 11 could detect effect sizes >1.09 at our desired power (90%) and alpha level (0.05). The smallest detectable effect size was 0.67. For multiple comparisons, we corrected p-values using the Dunn-Sidak method and tested whether the distribution of each variable violated the assumption of normality using a Jarque-Bera test. For each comparison, we provide the t-statistic (t), corrected p-value (p), 95% confidence intervals (CI95% [Low to High]), and Hedge’s gav corrected effect size (ES). Descriptive data are reported as the group mean ± one standard deviation.

# Results

## Maximal power output

## Center of mass motion and energetics

## Bicycle-rider interaction forces, net joint power, and muscle activity

# Discussion

# Declarations

## Funding

R.D.W. and C.R-M. received Ph.D. funding and

## Conflict of interest statement

No conflicts of interest to disclose.

## Availability of data and material

Data can be found at [INSERT URL].

## Code availability

Code can be found at [INSERT URL].

## Authors’ contributions

R.D.W, C.R-M, A.G.C, G.A.L

# References

# Figures and captions

**Figure 1.** Caption.