

# COMPARISONS OF PHYSICAL FITNESS MARKERS BETWEEN FIREFIGHTER RECRUITS WHO COMPLETE VS. DROP-OUT OF A TRAINING ACADEMY



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## Introduction & Purpose

- Aspiring firefighters (FFs) must attend recruit training academy.
- Admission requirements vary by state, with some requiring that recruits successfully complete the candidate physical ability test (CPAT).
- Additional physical fitness measures (e.g., anaerobic power or muscular strength) are not routinely evaluated before or during training academy.

The goals of this research were two-fold:

- Comprehensively characterize the physical fitness of FF recruits at the start of training academy.
- Compare physical fitness indices between recruits who successfully completed the academy vs. those who dropped out.

## Methods

- 30 male recruits visited the Tactical Performance Laboratory (TPL) once to complete a series of physical fitness measures:
  - Body composition (via bioelectrical impedance analysis [BIA])
  - Posterior kinetic chain strength (via isometric mid-thigh pull)
  - Anaerobic power and capacity (via Wingate anaerobic test)
- Independent sample *t*-tests evaluated differences in physical fitness measures between recruits that completed training vs. dropouts.
- Cohen's *d* effect size (ES) was calculated for comparisons.
- Alpha level set to 0.05

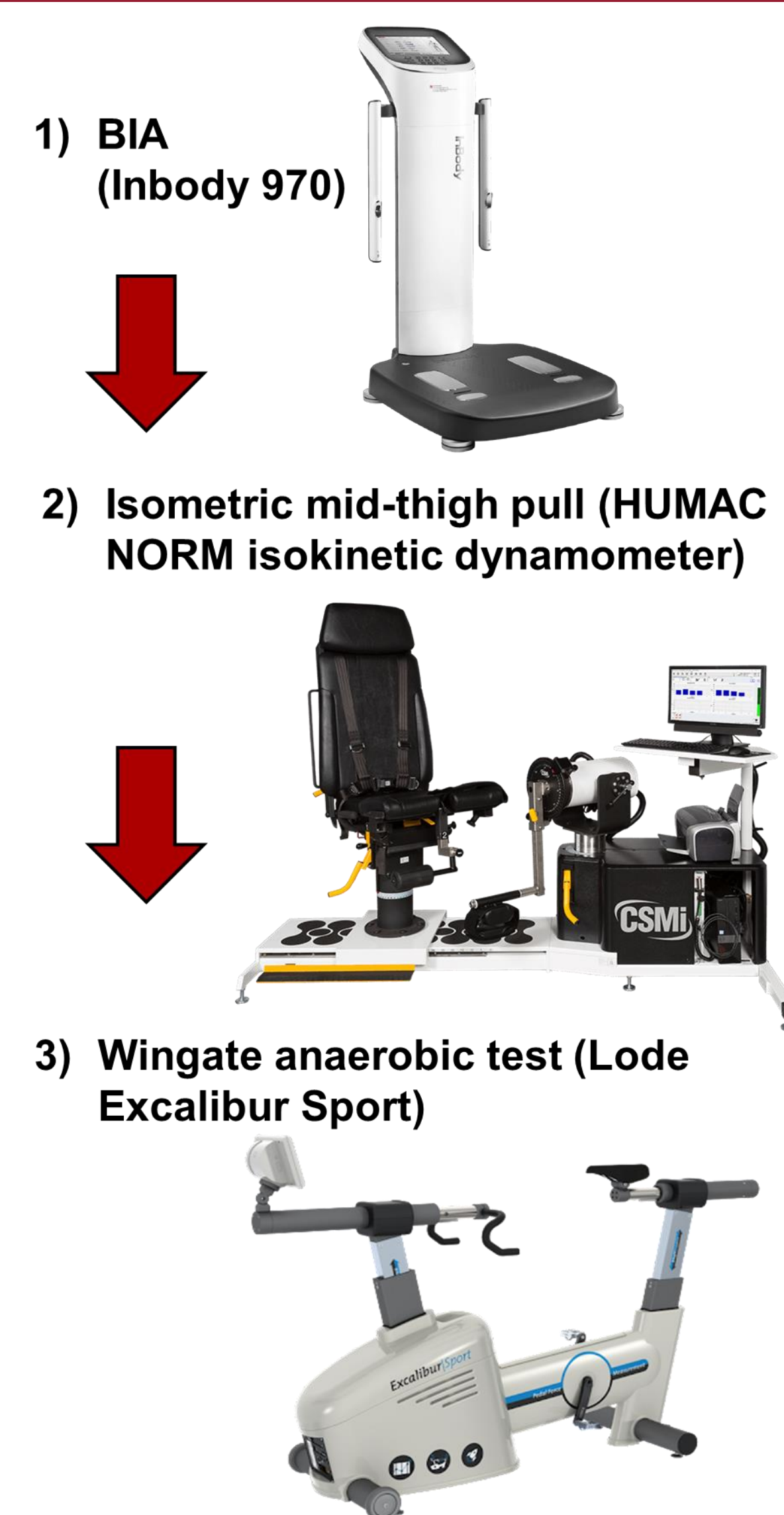


Figure 1: Graphical representation of the methods employed in this study.

- 11 recruits (37%) dropped out over the course of the training.
- We observed no significant differences between recruits that completed training vs. those that dropped out in most of the physical fitness indices we measured (Table 1 and Figures 2 – 7).
- Relative peak power was significantly different between the “Completed Training” and “Dropped Out” recruit groups: MD = 1.07 ± 0.48, *p* = 0.04, ES = 0.95 (Figure 6).

Table 1. Recruit characteristics (Mean ± SD).

	Full Roster (N=30)	Completed (N=19)	Dropped out (N=11)
Age	20.7 ± 3.82	21 ± 4.1	20.1 ± 3.3
Height (cm)	178.8 ± 7.34	178.1 ± 6	180.2 ± 9.4
Weight (kg)	86.3 ± 12.5	85.2 ± 12.7	88.2 ± 12.5
BMI	26.9 ± 3.5	26.7 ± 3.4	27.2 ± 3.9
SKMM (kg)	40.3 ± 5.4	40.1 ± 5.7	40.7 ± 5.1
BF%	18.0 ± 5.5	17.5 ± 5.1	18.7 ± 6.2

BMI: Body Mass Index; SKMM: Skeletal Muscle Mass; BF%: Body Fat Percentage

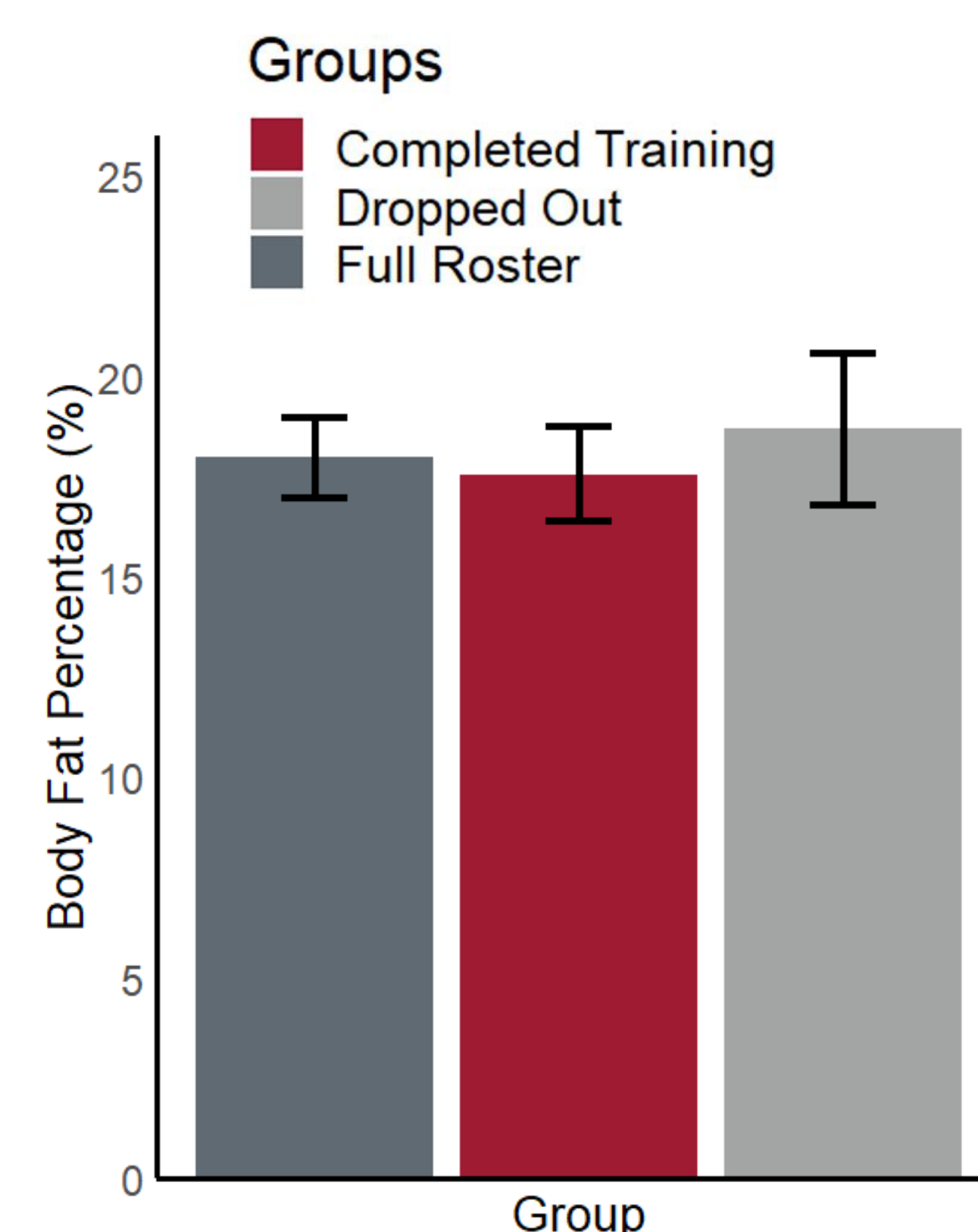


Figure 2: Body fat percentages between groups.

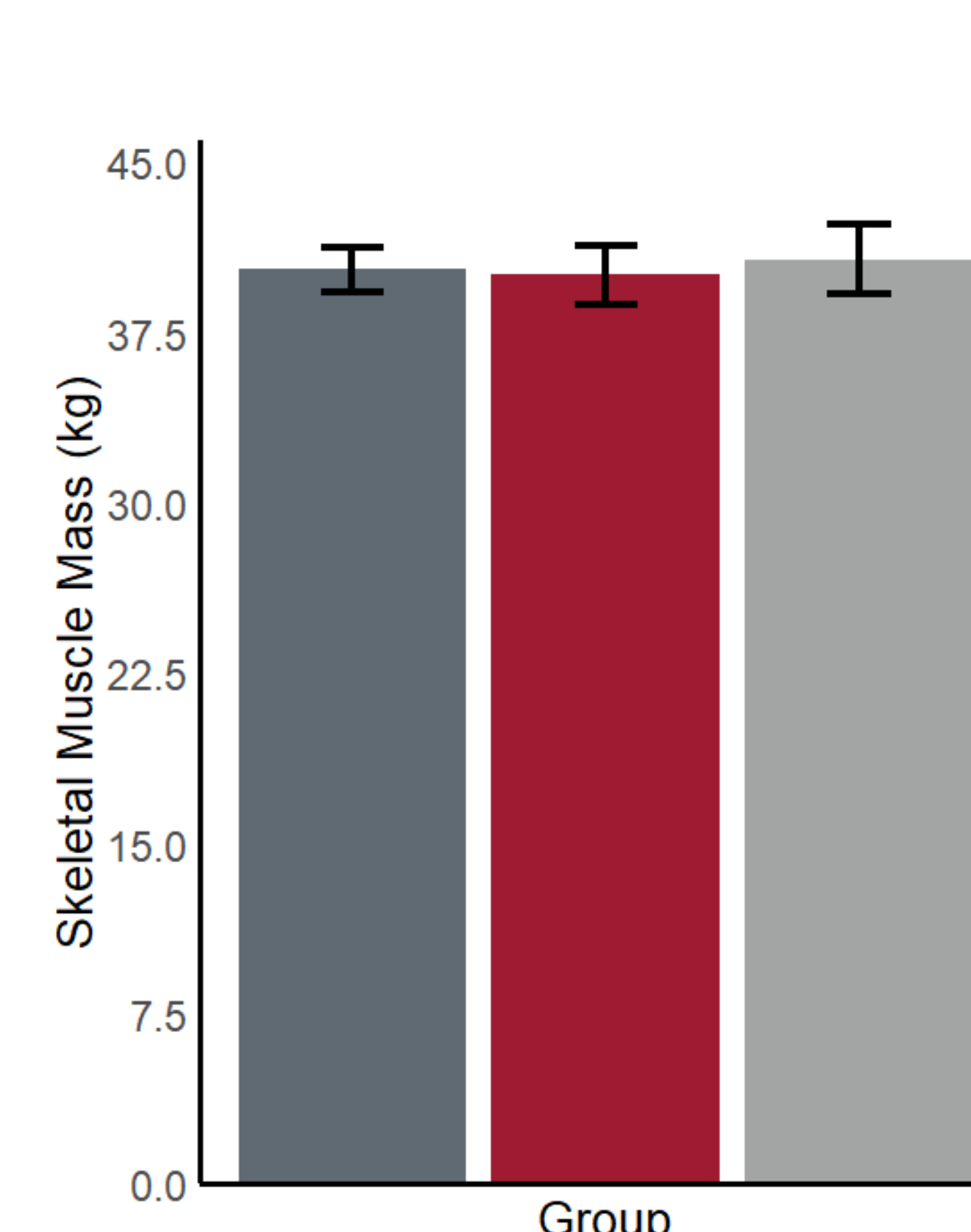
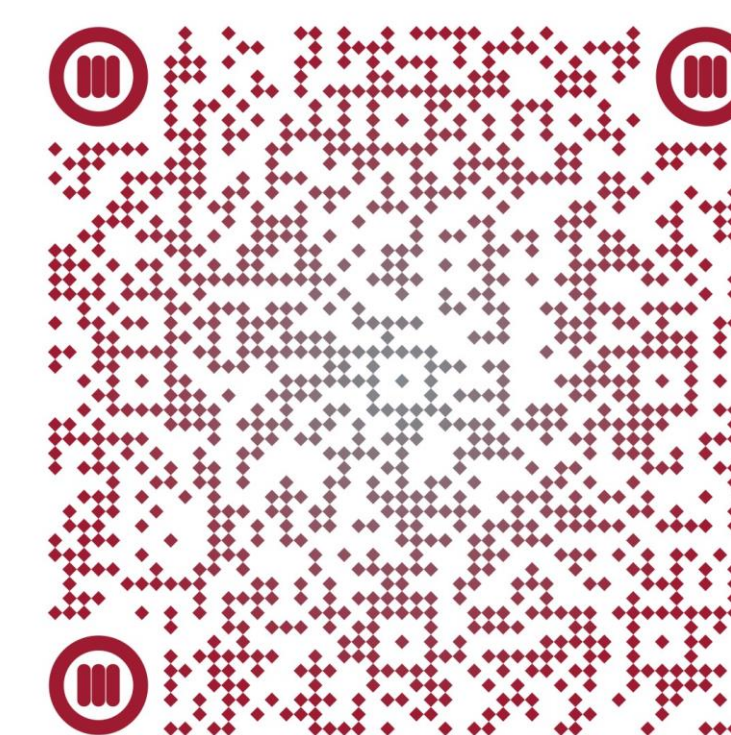


Figure 3: Skeletal muscle mass between groups.

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## Results

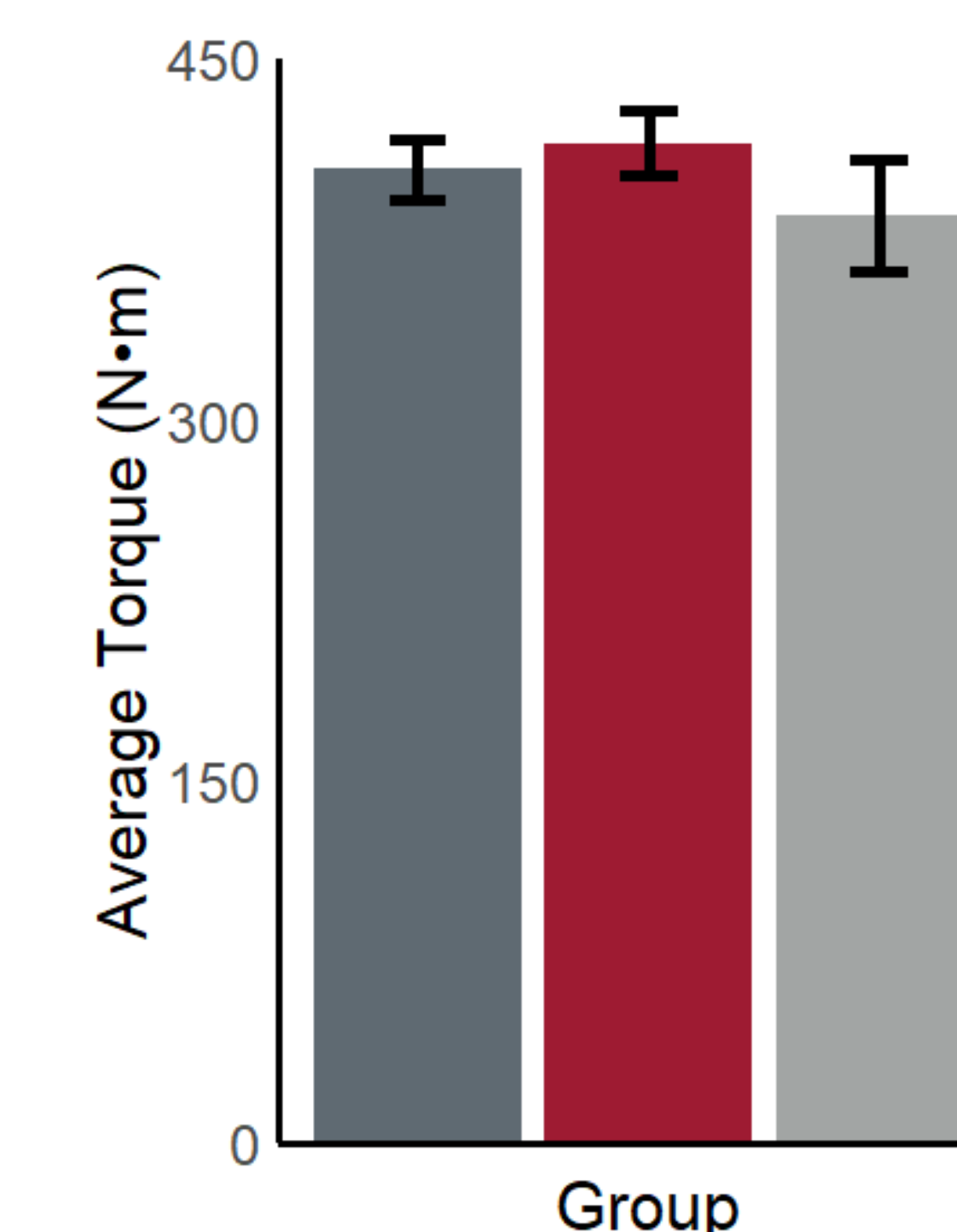


Figure 4: Average torque achieved during isometric mid-thigh pull between the groups.

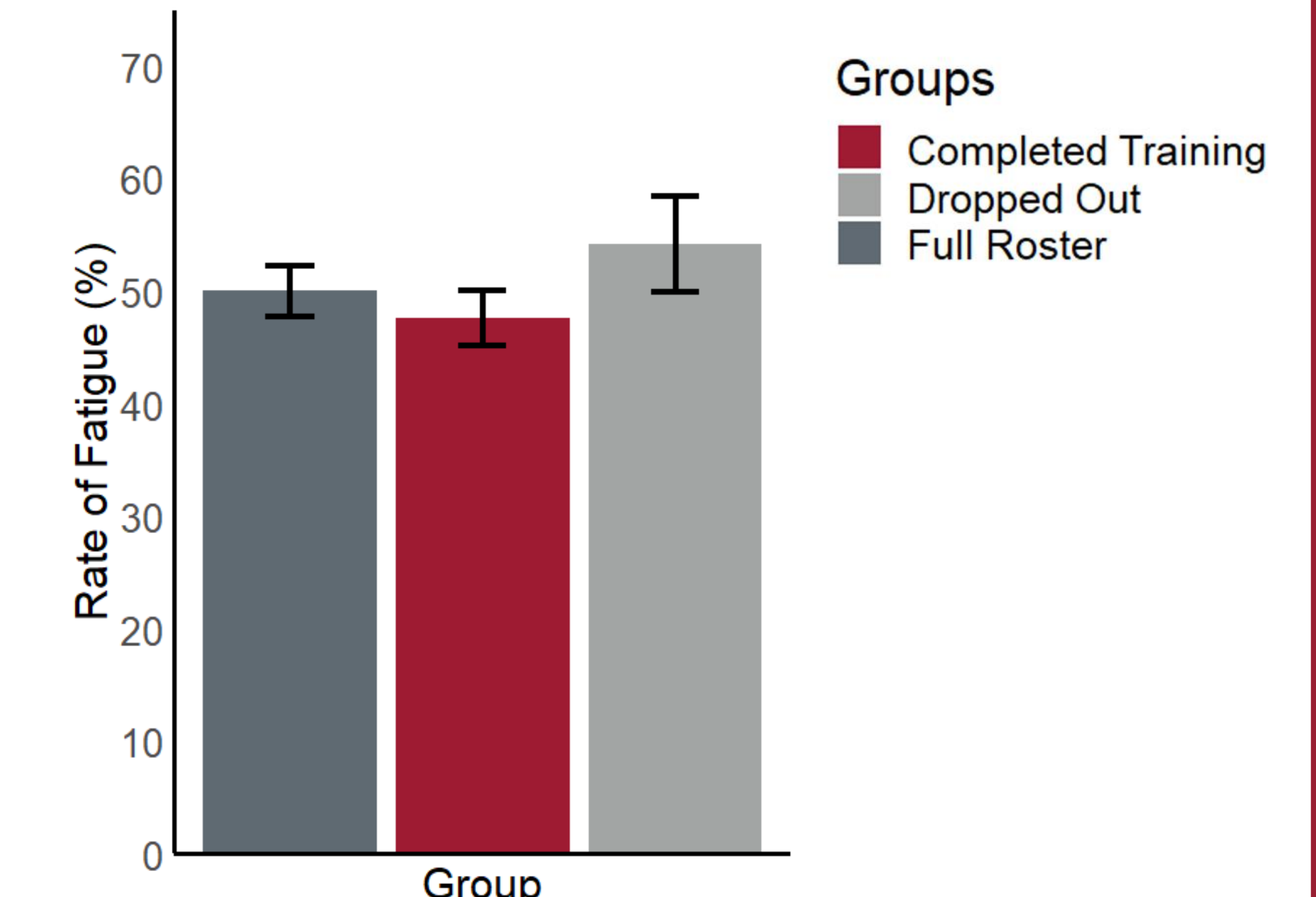


Figure 5: Rate of fatigue during the Wingate anaerobic test between groups.

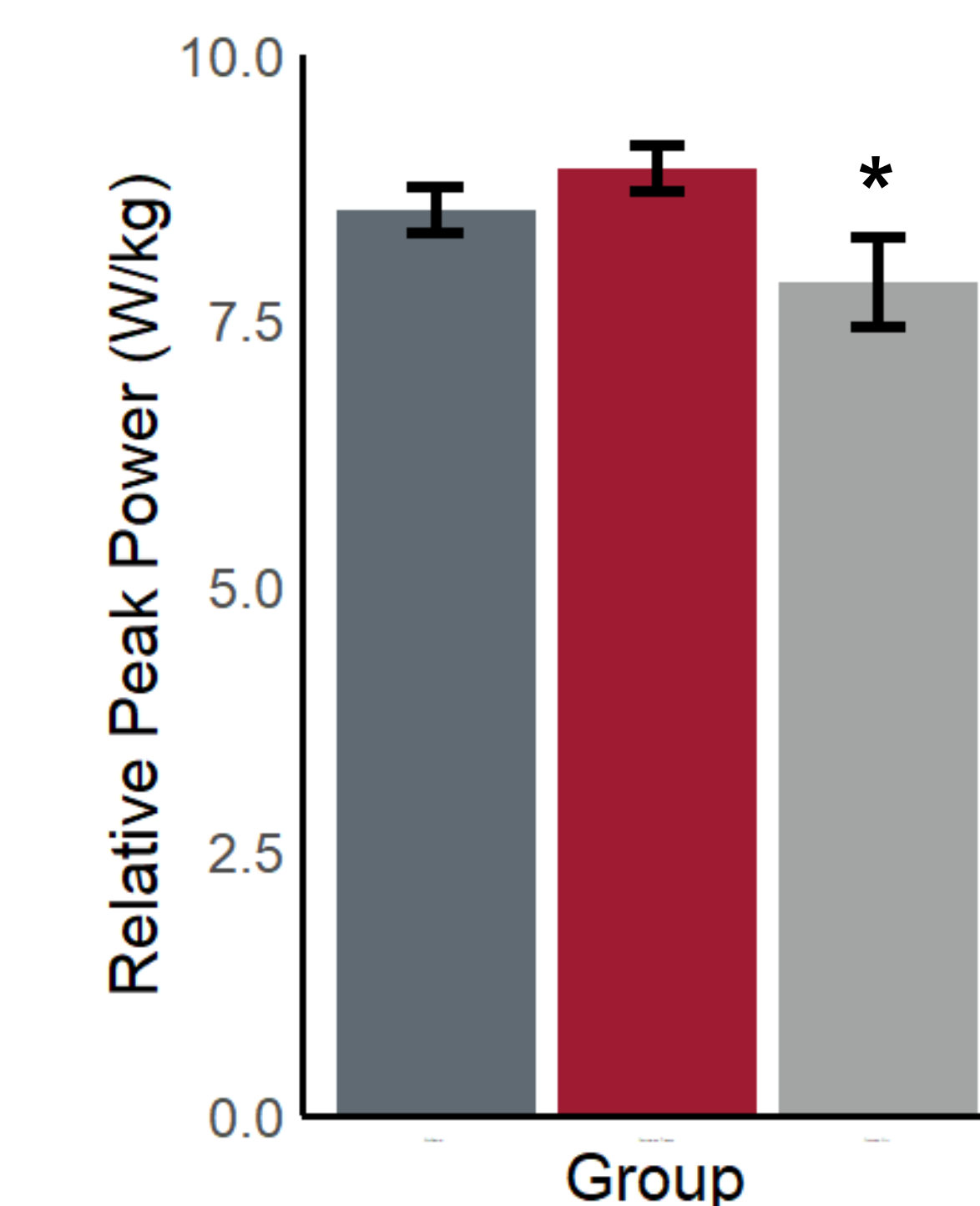


Figure 6: Relative peak power achieved during the Wingate anaerobic test between groups. \* significantly (*p*<0.05) different from the “Completed Training” group.

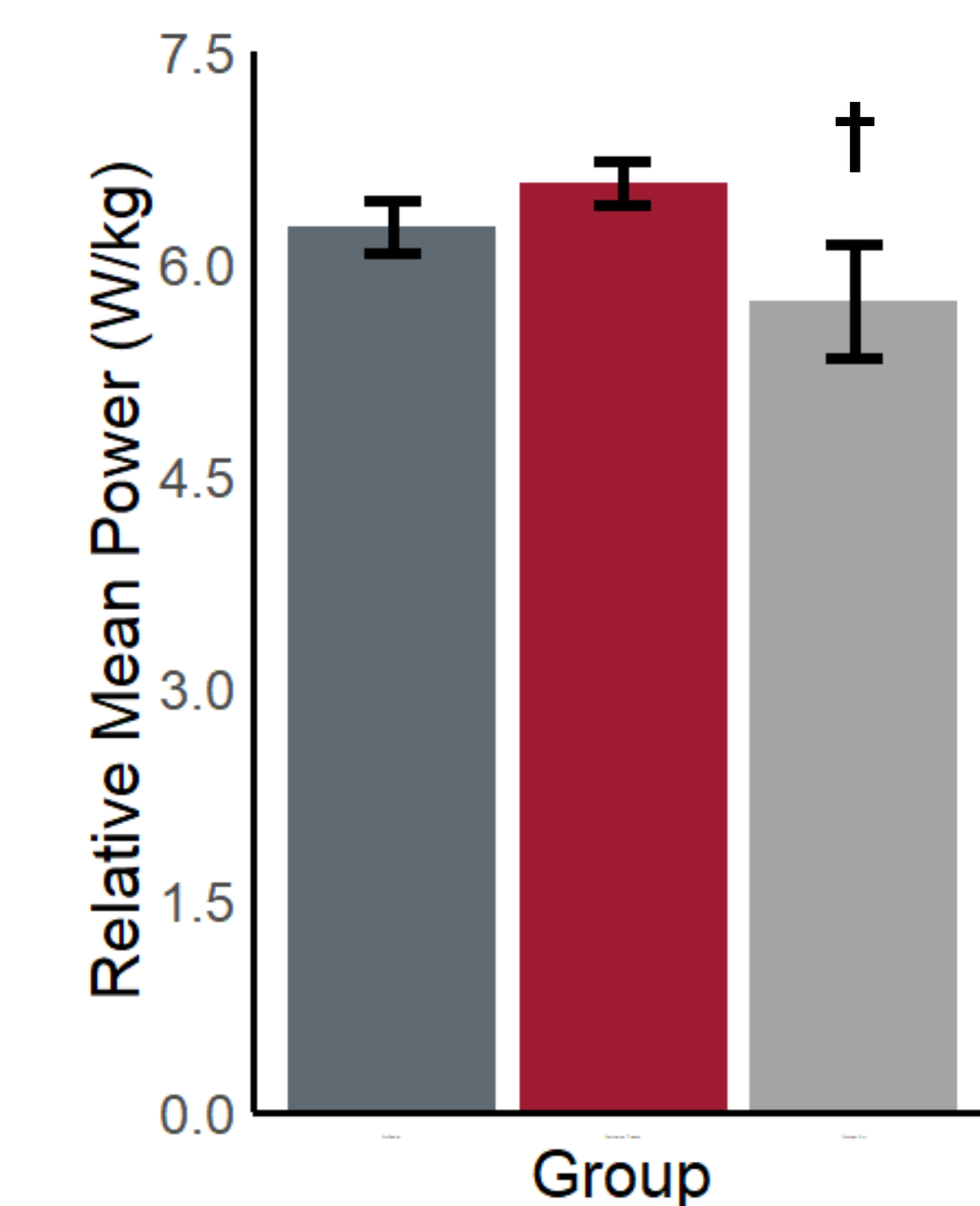


Figure 7: Relative mean power achieved during the Wingate anaerobic test between groups. † trending towards (*p*=0.07) being different from the “Completed Training” group.

## Conclusion & Practical Application

- Higher relative peak and mean power at baseline may serve as a predictor of who has a higher chance of completing FF training.
- Firefighting academies and training programs should consider encouraging applicants to increase anaerobic power prior to attending training.
- Additional surveillance and assessment of physical fitness indices in FF recruits, including anaerobic power, is warranted.

