

## ABSTRACT

**PURPOSE:** Evaluation of both cardiorespiratory fitness (CRF) and muscular strength occasionally dictate that maximal strength and aerobic assessments be conducted within the same session. There is a lack of literature concerning the acute interference effect between concurrent exercise tests. **METHODS:** 7 healthy, young adults that were resistance trained and regularly active in aerobic activities completed both possible orders of 1 repetition maximum (1RM) leg press and maximum oxygen uptake (VO<sub>2</sub> max) as well as supramaximal VO<sub>2</sub> at 105% peak power output (PPO) via cycle ergometer. **RESULTS:** Fatigued 1RM leg press performance non-significantly decreased 2.0% (mean difference: -7.9kg, 95% CI: -28.5-12.7kg, p=0.386, d=-0.353) and fatigued VO<sub>2</sub> peak performance non-significantly increased 1.1% (mean difference: 0.5 ml/kg/min, 95% CI: -3.1-4.1 ml/kg/min, p=0.725, d=0.139). **CONCLUSION:** Our preliminary findings suggest a lack of acute interference between maximal strength and oxygen uptake assessments. To minimize potential interference, the assessment of greater priority should be placed first in the testing order.

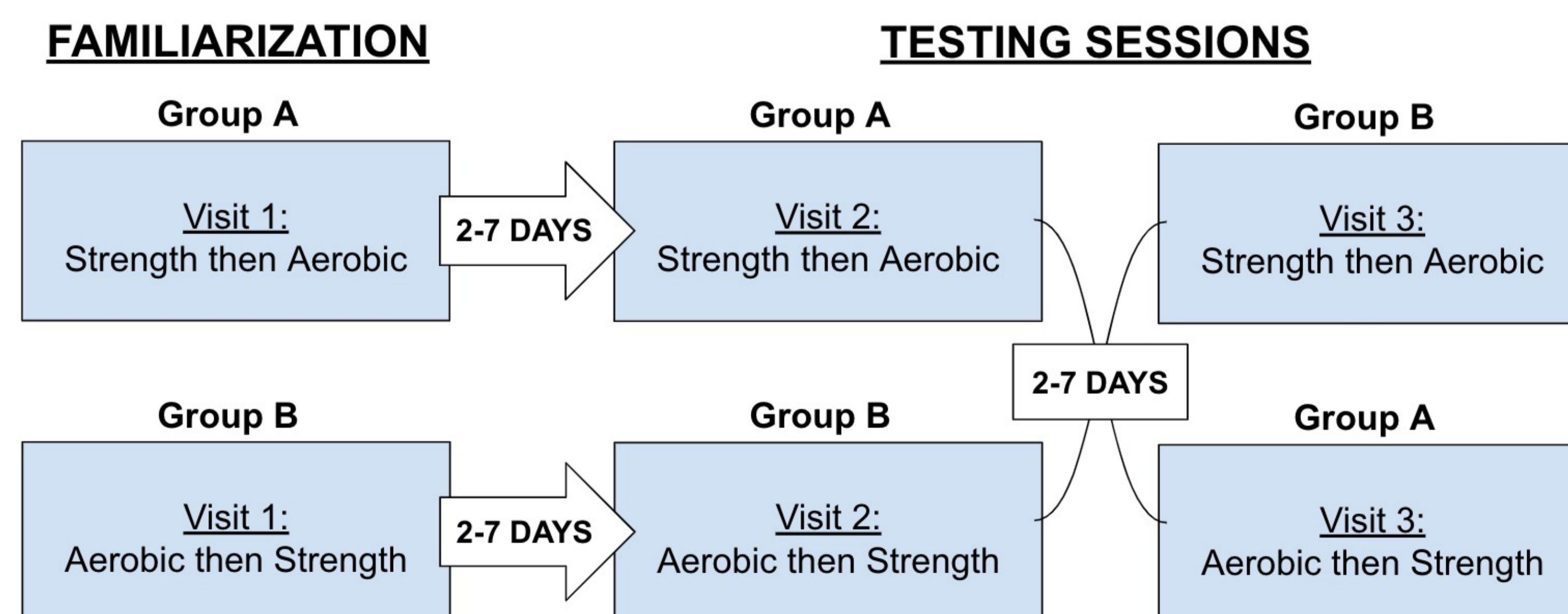
## BACKGROUND

- According to the American College of Sports Medicine (ACSM), CRF and muscular strength are key indicators of physical fitness<sup>1</sup>.
- The high test-retest reliability and low biological variability of VO<sub>2</sub> max<sup>8</sup> and 1RM leg press<sup>9</sup> make the combination useful for detection of concurrent performance changes.
- Prior works corroborate that 5% is the estimated biological variation for VO<sub>2</sub> max<sup>8</sup>. We estimate 7% as the biological variation in 1RM due to NSCA standards<sup>10</sup> and practical knowledge from administering previous 1RM protocols.
- Claims about strength endurance have evidence to support decreases in performance following maximal aerobic exercise<sup>2,3,4</sup>, although, the same results for maximal strength are not as strong<sup>2,3</sup>.
- Strength endurance may not be a critical factor for strength followed by aerobic bouts<sup>5,6,7</sup>. Intensities for resistance exercise have not exceeded 5RM for this order<sup>7</sup> (i.e., no true test of maximal strength).
- A gap in the literature is presented as lower body 1RM and VO<sub>2</sub> max have not been concurrently assessed with the aim of understanding acute interference.

## METHODS

**Population:** 7 healthy, young adults (4 males/3 females) that were resistance trained (1.5±0.6yrs), experienced with maximal resistance exercise, and recreationally active in aerobic activities (≥2, 30 min aerobic sessions per week).

**Measurements:** 1) 1RM Leg Press and 2) VO<sub>2</sub> max from both GXT and supramaximal assessment at 105% PPO were compared in non-fatigued (performed first) and fatigued (performed second) conditions.



**Figure 1.** Outline of Study Design. Participants were counterbalanced and performed both possible orders of assessment. To best prepare participants for the tasks in the first testing day, the order of familiarization was identical to the first order tested.

**Purpose:** To evaluate if order impacts performance for concurrent testing of maximal strength and oxygen uptake.

**Analysis:** At least three of five criteria were needed to determine acute interference between concurrent assessments.

TABLE 1. CRITERIA FOR INTERFERENCE

CRITERION	1RM	VO <sub>2</sub> peak
Paired t-Test	<input type="checkbox"/>	<input type="checkbox"/>
Cohen's D	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Bland-Altman	<input type="checkbox"/>	<input type="checkbox"/>
ICC	<input type="checkbox"/>	<input type="checkbox"/>
Biological Variation	<input type="checkbox"/>	<input type="checkbox"/>

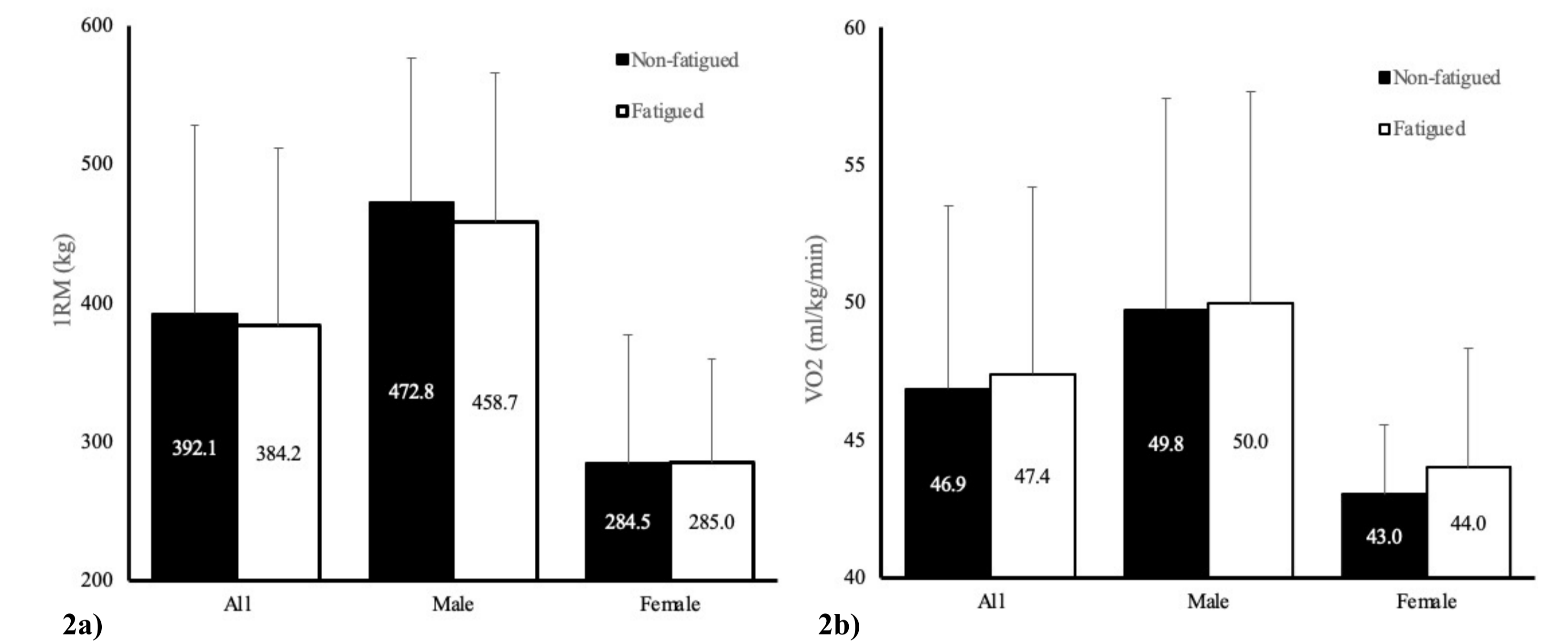
**Conclusion:** Our preliminary findings suggest a lack of acute interference between maximal strength and oxygen uptake assessments

**Implication:** To minimize the effects of potential interference, the assessment of greater priority should be tested first.

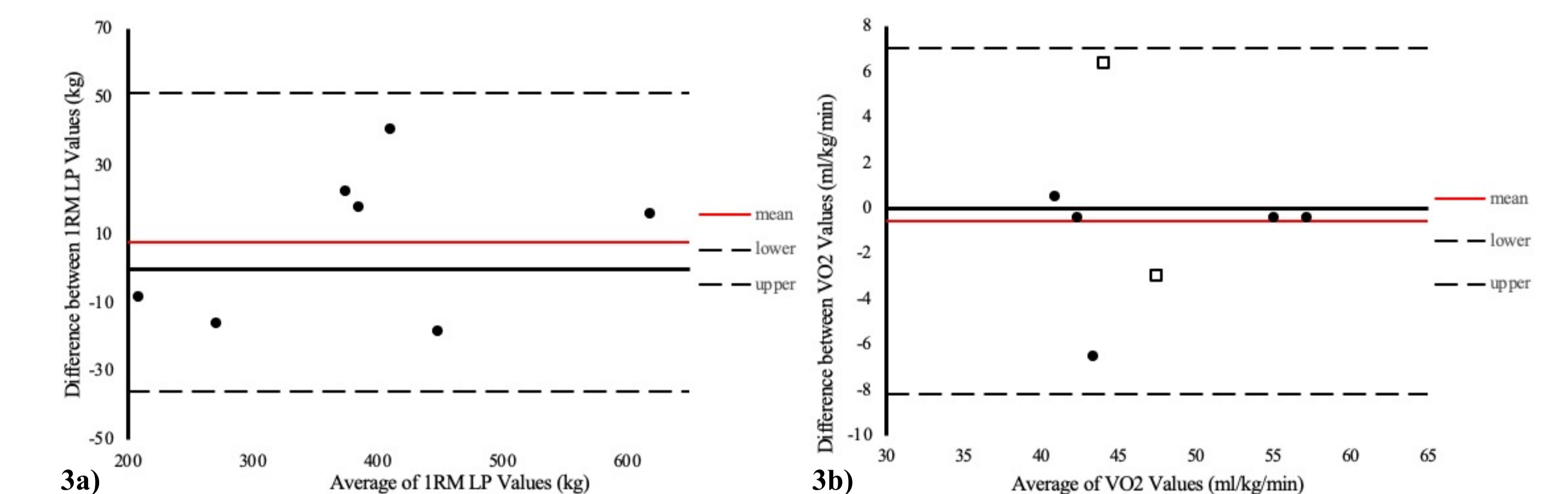
This project was funded by the Salisbury Family Honors Carolina Excellence Fund. To access the full text, scan the QR code.



## RESULTS



**Figure 2.** a) Non-fatigued vs. Fatigued 1RM and b) Non-Fatigued vs. Fatigued VO<sub>2</sub> Peak Performance



**Figure 3.** a) Bland-Altman Analysis of 1RM and b) Bland-Altman Analysis of VO<sub>2</sub> Peak. Differences were calculated as non-fatigued performance minus fatigued. VO<sub>2</sub> values used were the greater value from the GXT or subsequent supramaximal test. 95% CI upper and lower bounds are also shown. The square points denote instances where a VO<sub>2</sub> value may have been compromised due to equipment error.

TABLE 2. STATISTICS FOR NON-FATIGUED VS. FATIGUED 1RM & VO<sub>2</sub> PERFORMANCE

Assessment	% Change	Mean Difference	95%CI	p-value (Effect Size)	ICC
1RM	-2.0%	-7.9 kg	-28.5 - 12.7 kg	p=0.386 (d=-0.353)	0.987
VO <sub>2</sub>	+1.1%	+0.5 ml/kg/min	-3.1 - 4.1 ml/kg/min	p=0.725 (d=0.139)	0.799

## REFERENCES

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