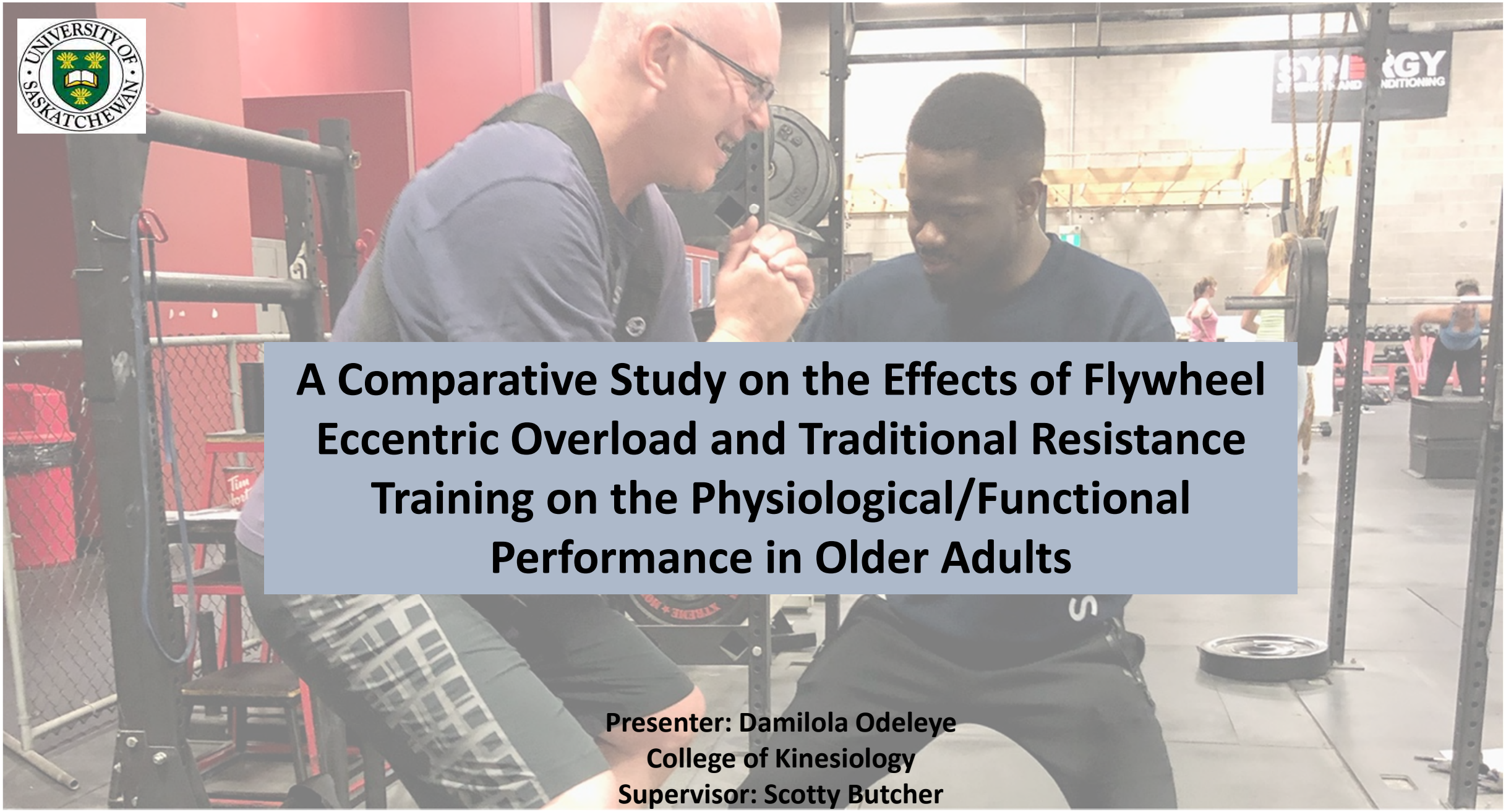

A Comparative Study on the Effects of Flywheel Eccentric Overload and Traditional Resistance Training on the Physiological/Functional Performance in Older Adults

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DECREASE IN FUNCTIONAL PERFORMANCE

DECREASE IN FUNCTIONAL MOBILITY

INCREASE IN DISABILITY

Why is the Size and Strength of a Muscle Important?

Combating Age Related Declines in Strength and Muscle Thickness

- Strength Training Methods: What to do? Eccentric Flywheel or Traditional Training
- Flywheel Tech: intro'd Berg & Tesch, combat muscle loss in space
- Traditional Resistance: Been around for a while, involves free weights (barbells/dumbbells)

Benefits Associated with ECC or TRAD (Predictors)

- Traditional Resistance
  - Increases strength/FP
  - High force production
  - Easily accessible

- Eccentric Flywheel
  - Increases strength/FP
  - ECC strength is maintained in seniors
  - Improvement in balance
  - Variable resistance (not fixed)
  - Ecc overload

Gaps in Literature

A lot of research on Flywheel has focused on the younger population

Also, the research focused on single muscle groups like quads (for knee extensions) at submax loads

We proposed compound exercises (exercises that involve more than one muscle group) in seniors

Research Objectives

- Determine which strength training method is more effective in improving strength, muscle thickness, functional performance and reducing fat mass

Research Hypotheses

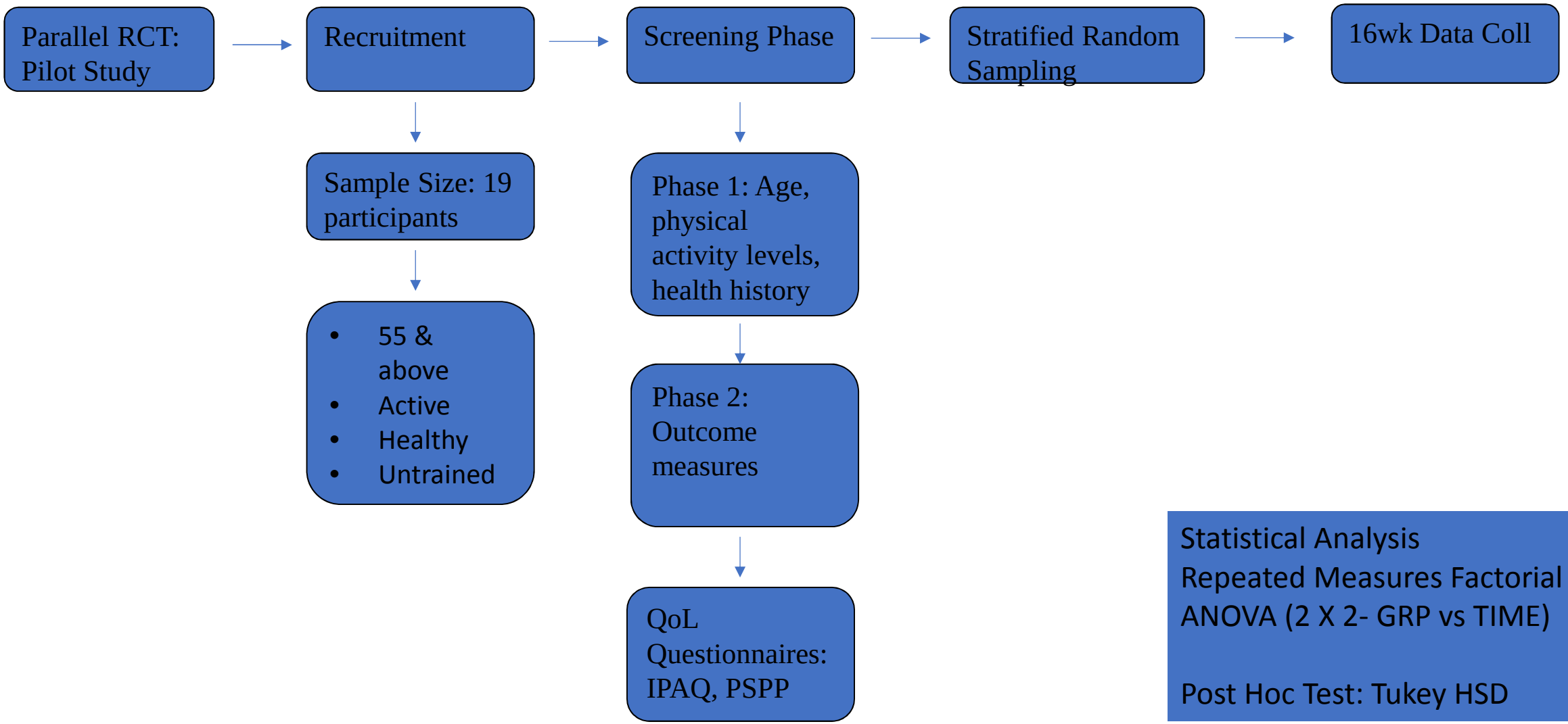
Within a whole-body strength program, eccentric flywheel overload training will result in greater increases in:

Isokinetic knee extension strength	Squat strength/power,	Lean mass	Functional Performance

And greater decreases in:

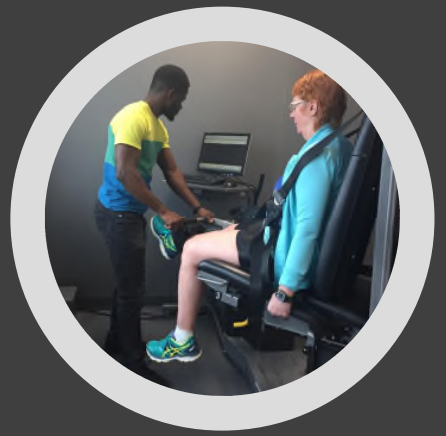
Fat mass than traditional resistance training in older adults

Methodology



Testing Procedure

- Muscle Strength (Isokinetic Dynamometer) Using a Knee Extension
- Muscle Thickness (Ultrasound)
- Body Composition (Lean/Fat Mass-DEXA)
- Functional Performance (30s Sit to Stand & SCPT)



Compound Exercise Specific Strength Tests

- Deadlifts
- Back squats
- Bench Presses

Flywheel/Back squat Video

Training Protocol

19 PARTICIPANTS WERE SPLIT INTO TWO GROUPS AFTER STRATIFIED RANDOM SAMPLING (USING EXCEL TO GENERATE RANDOM NUMBERS)

FLYWHEEL OR BARBELL GROUP

3 WEEKS OF FAMILIARIZATION

13 WEEKS OF TRAINING

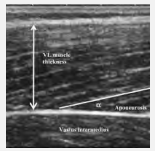
PROGRESSIVE EXERCISES (BACK SQUATS, DEADLIFTS, BENCH PRESSES)

STARTED WITH 2 SETS OF 6 REPETITIONS, TILL THEY COULD ONLY DO A MAX OF 4 REPS

Results Summary

Muscle Strength significant difference over time for both

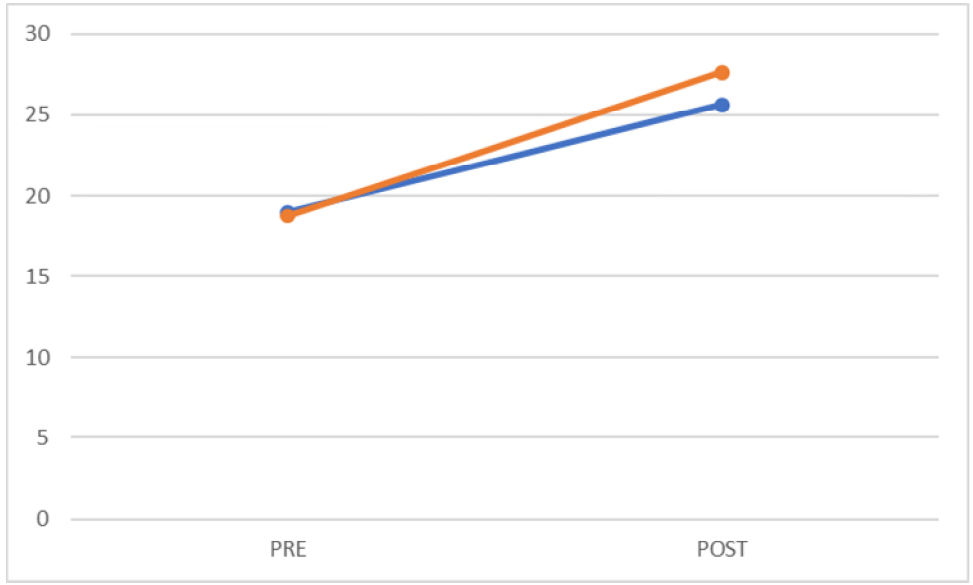
Body Mass (Body Composition- lean/fat)



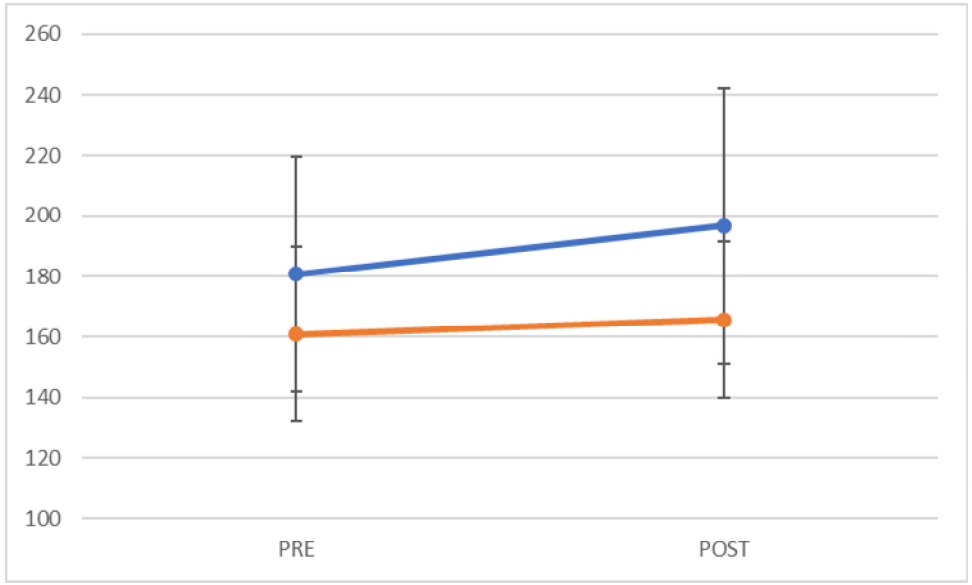
Muscle Thickness (length/diameter)- no differences

Functional Performance (30s STS & SCPT) significant difference over time

Functional Performance Results



Flywheel= Blue
Trad= Orange



30s Sit to Stand Test
$p < .001$

Stair climb Power test
$p = .041$

Conclusions

- Both Eccentric Flywheel and Traditional Resistance Training are valid options for improving;
  - Muscle strength (Isometric, Concentric & Eccentric)
  - Lean/Fat mass
  - Functional Performance – 30s STS & SCPT


HEALTH. FITNESS. SPORT.
LIMITATIONS EXIST IF YOU DECID
POWER
LIFT
PROGRESSION

Thank you!

Summary of Results

- Overall we discovered that between groups there were no significant differences (i.e. both groups could possibly have the same effects on strength, mass (body composition), muscle thickness and functional performance
- There was a difference in isometric strength though

- Body Composition (Fat/Lean mass)- significant difference from pre to post intervention (in eccentric but not trad group)
- Dias et al 2015 study showed similar results (no difference between ecc and con

- Body comp (lean/fat mass- using DEXA; mueller 2009): according to Brady & Straight 2014- Muscle Capacity, there is an increase in adiposity which has been reported as a leading cause of disability
- Physical Function/Functional Performance: there is a decline in physical function/the ability to complete every day tasks, in US, 23% aged 60-69 report great than 1 physical limitation e.g. ascending 10 steps, stooping, lifting and carrying 10 pounds, kneeling
- Muscle thickness: