

Lower Limb Asymmetries Among Older Adults

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Introduction

- Falls are a primary cause of injury and mortality among older adults with 28.7% reporting falling each year.⁽¹⁾⁽²⁾
- Previous research found lower limb asymmetries are not strictly due to strength differences or previous injury among young, healthy individuals.⁽³⁾⁽⁴⁾
- Our proposed strategy will assess aerobic capacity between limbs and quantify asymmetries by comparing VO₂ peak and power in single-limb cycling vs double-limb cycling conditions.
- Hypothesis: Individuals with asymmetries will have greater fall risk and lower mobility than individuals without asymmetries.

Methods

- Individuals 65 years of age and older.
- Waterloo Footedness Questionnaire-Revised to determine limb dominance.
- Visit 2: Double-limb cycling test - measuring VO₂ peak and power
- Visit 3 and 4: Single-limb cycling tests - measuring VO₂ peak and power

Could differences in aerobic capacity between lower limbs negatively impact mobility among older adults?



Figure 1. Single-limb cycling test with metabolic cart for VO₂ peak and power data collection.



Figure 2. Right single-limb cycling design with the non-pedaling limb stabilized and counter-weight added for reduced hip flexor activation.

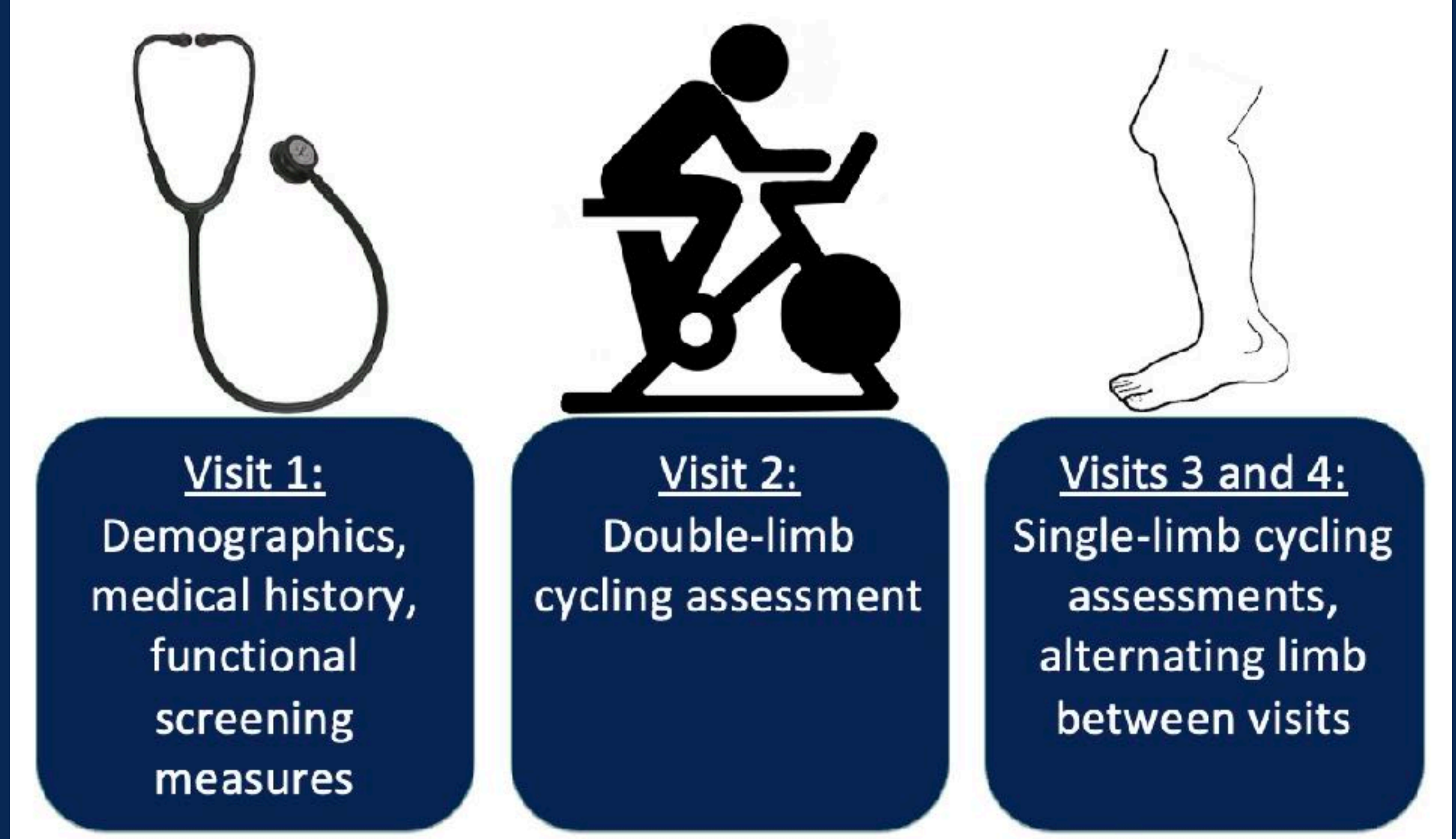


Figure 3. Visit design showing cycling measures visits 2-4.

Supporting Data

- It is often assumed that both limbs contribute equally during double-limb cycling. A 2019 study tested this assumption on 12 subjects. The study showed that the dominant limb exhibited greater oxygen uptake, sustained a higher power outlook level, and demonstrated higher levels of deoxygenation responses compared to non-dominant limb.⁽⁵⁾
- Results from cycling tests will be compared to 400m walk test (bilateral mobility) and fall risk (questionnaires and reactive balance) which are commonly used to evaluate overall mobility.

Possible Mechanisms Involved In Lower Limb Asymmetries

- Has the dominant limb developed increased oxidative potential through peripheral adaptation?
- Does the nondominant limb set an 'upper limit' of oxygen delivery in bilateral movement?

References

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