Study Title:	Quantifying the Trainability of Peripheral Nerve Function in Young and Older Adults.
Study Registration Number:	IRB-22-270
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Abbreviations

SAP	Statistical Analysis Plan
NCV	Nerve Conduction Velocity
nCSA	Nerve Cross-Sectional Area
FDS	Flexor Digitorum Superficialis
ANOVA	Analysis of Variance

1. Introduction

The primary objective of this study was to quantify the effects of hand grip resistance training on nerve function in young and older adults (primary aim) and to determine if training affects nerve cross-sectional area, maximal hand grip strength, and hand motor dexterity (secondary aims).

The statistical analysis plan (SAP) provides details of the statistical methods used during the analyses of data collected within the scope of IRB-22-270 and was prepared in accordance to IRB-22-270 (version 1; 9-9-2024).

2. Overview & Objectives of Study Design

This study consisted of four arms, first separated by age based on our target ranges (young = 18-35 yrs old, and older = 60+ yrs old), and then pseudo-randomly assigned to either the intervention group or control group. Conditions of inclusion were apparently healthy adults between the ages of 18 – 100 years old. Individuals with any of the following exclusion criteria were not permitted to participate: 1.) If you have been notified by a physician to refrain from exercise due to cardiovascular issues, 2.) Known orthopedic or neuromuscular limitations or illness of the upper extremities, 3.) Known neuromuscular disorders, and 4.) Individuals that were experiencing a fever (> 100.4° F) or had identified as symptomatic on the COVID-19 screening questionnaire were not permitted to participate.

Participants assigned to the intervention group performed bilateral hand grip resistance training 3×/week for 4 weeks using a specialized hand-grip kit provided to them. This included Arm 1 (Young Training Group) and Arm 3 (Older Training Group). Participants were provided with pictures and instructions for each exercise upon completion of visit 1. Those assigned to the control group were asked to maintain normal daily activities throughout the duration of the four weeks. This included Arm 2 (Young Control Group) and Arm 4 (Older Control Group).

Laboratory testing visits were performed at two time points: visit 1 (before the intervention) and visit 2 (after four weeks) at which nerve conduction velocity, nerve cross-sectional area, maximal hand grip strength, and hand motor dexterity were measured.

3. Sample Size Justification

Power calculations indicated that a sample size of > 16 was sufficient power (Cohen's d = > - 0.80) with the alpha set at 0.05 (G*Power v. 3.1, Dusseldorf, Germany). Therefore, recruitment of 80 participants pseudo-randomly assigned to 1 of 4 groups (control vs training: young; control vs training: old) should ensure a large enough sample size (>16) to report alterations in nerve conduction velocity as a result of resistance training.

4. Aims and Objectives

To quantify the effects of resistance training on nerve conduction velocity in young and older adults and to determine if age affects nerve plasticity in response to training.

5. Outcomes

This section will present the outcomes investigated to answer the study aims and objectives. Analyses are described in section 6 analysis.

5.1 Primary Outcome

Nerve conduction velocity (NCV) of the Flexor Digitorum Superficialis (FDS) muscle. It was measured at visit 1 and visit 2 (four weeks apart).

5.2 Secondary Outcomes

- Nerve cross-sectional area (nCSA).
- Maximal hand grip strength (kg)
- Hand motor dexterity (time, in seconds, to task completion)

Other laboratory parameters

n/a

5.3 Safety Outcomes

Adverse events

If adverse events occurred, adverse events were reported at each visit.

6. Analyses

All statistical analyses were performed using SPSS Version 26 (IBM, Armonk, NY, USA). Two four-way mixed factorial ANOVA model's (age [young vs old] × group [training vs. control] × time [pre vs. post] × limb [left vs. right]) were conducted to determine changes in NCV, nCSA, max strength, and dexterity. If warranted, dependent paired samples t-test were run. An alpha level of 0.05 was used for all comparisons.