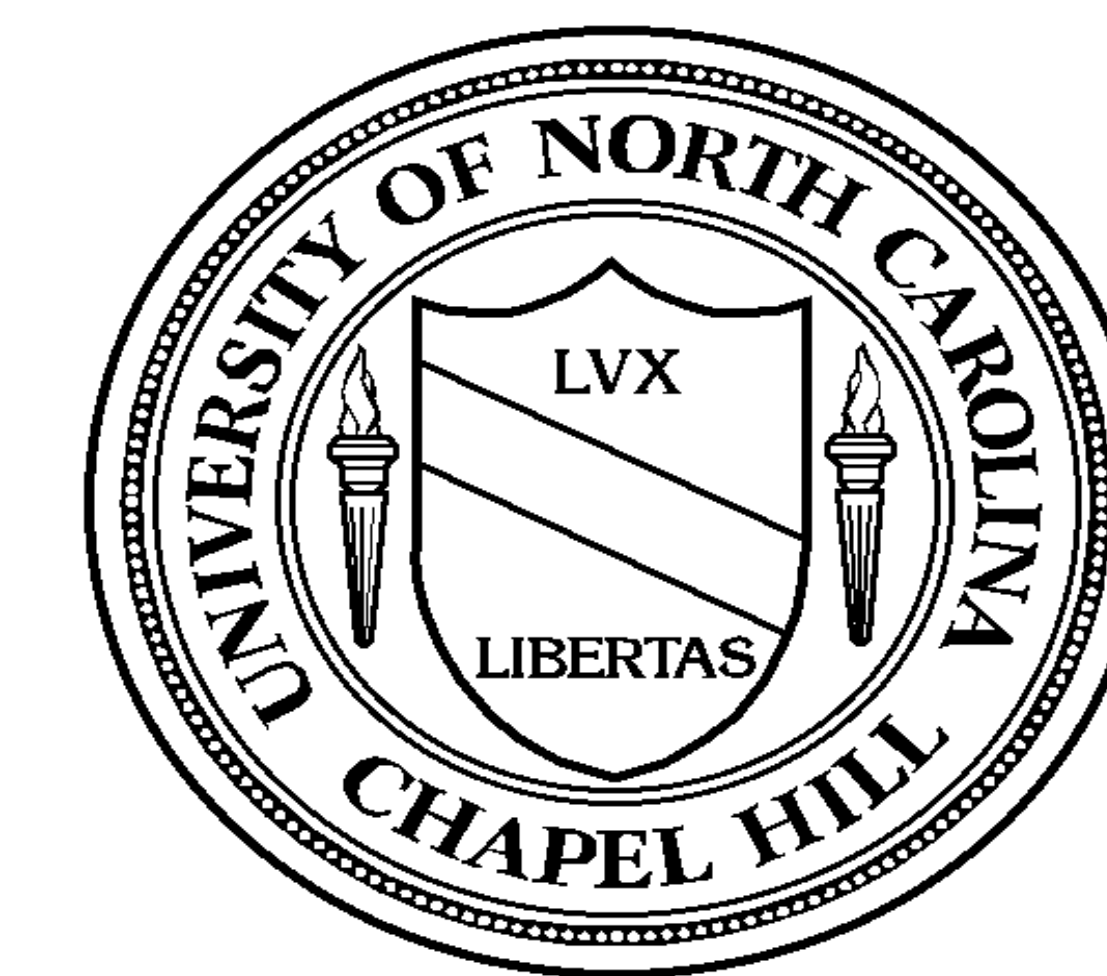


TEST-RETEST RELIABILITY OF A NOVEL AND PORTABLE LEG PRESS ASSESSMENT IN YOUNG AND OLDER ADULTS

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INTRODUCTION

Lower body (LB) strength is often quantified by peak force (PF) measured using a powered¹ and weight-loaded leg press dynamometer.² However, there is a need for a reliable, portable, and cost-effective measurement of PF in field settings.

OBJECTIVE: The purpose of this investigation was to examine test-retest reliability and minimum difference (MD) values of a novel and portable isometric leg press assessment in young and older adults.

PARTICIPANTS

- 20 young adults (9 women) and 15 older adults (9 women) were enrolled (Table 1).

Table 1. Participant demographics (mean ± standard deviation)

Group	Age (yrs)	Height (cm)	Weight (kg)	BMI (kg/m ²)
Young	20.8 ± 0.89	170.6 ± 9.7	69.6 ± 9.6	23.9 ± 2.4
Old	69.3 ± 3.1	168.5 ± 12.1	73.5 ± 18.1	25.6 ± 4.5

METHODS

Leg Press Assessment

- Participants visited the laboratory on two occasions (2-10 days apart).
- Participants were seated in the portable leg press with the knee angle at 60 degrees (Figure 1). A pancake load cell was located below the foot plate of the leg press.
- Participants were secured with a belt wrapped around the waist and arms across the chest.
- The dominant limb PF was tested.
- Following a warm-up of three isometric submaximal contractions, participants performed three maximal voluntary contractions (MVC).
- Maximal isometric PF of each visit was determined by the highest MVC.

METHODS



Figure 1. Portable Leg Press Assessment

Signal Processing

- Force was sampled at 2 KHz with a Biopac data acquisition system.
- Custom-written software was used to process all signals.
- Signals were filtered with a zero-phase shift, fourth order, low-pass (150 Hz) Butterworth filter.
- Peak force was defined as the highest 500 ms epoch during MVC plateau.

Statistical Analysis

- Test-retest reliability for PF was evaluated using the procedures described by Weir² and analyzed in a custom-written program.
- One-way repeated-measures ANOVAs were used to examine the systematic variability across testing days.
- The ICC was calculated from model '2,1', as described by Shrout and Fleiss³
- SEM and MD values were calculated using the mean square error term from the ANOVA, expressed as a percentage of the mean.
- Alpha levels were set *a priori* at 0.05.

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RESULTS

The young adults (1,740.7 ± 518.0 N) had greater PF values ($P < 0.001$) than the older adults (1,116 ± 369.6 N). Results indicated no significant systematic error across sessions for the entire sample ($P = 0.128$) or separately for young ($P = 0.507$) or older adults ($P = 0.101$). Test-retest reliability statistics are presented in Table 2.

Table 2. Test-retest reliability statistics for leg press peak force (PF) among the entire sample, and separately for young and older adults.

Variable	Peak Force		
	All	Young	Old
P Value	0.128	0.507	0.101
ICC_{2,1}	0.964	0.955	0.936
SEM (N)	102.93	113.25	89.39
SEM (%)	6.99	6.51	8.00
MD (N)	285.31	313.91	247.78

CONCLUSION

These data suggest this isometric leg press assessment is a reliable, portable, and cost-effective measure of LB strength in young and older adults.

PRACTICAL APPLICATION

The custom-built leg press dynamometer may be an attractive LB assessment for researchers and practitioners who work in various field settings that may not have access to more common laboratory leg press dynamometers.