



A new mode of aerobic training in older adults

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Introduction

Standard: **Treadmill, Exercise bike, Arm ergometer**


- challenge for impaired mobility, balance, LE strength, coordination
- localized leg/ arm fatigue
- uncomfortable seating
- upright posture → loading of lower back
- unfamiliar movements



Alternative: **NuStep® TRS 4000
BioStep™**

All- extremity exercise in middle age

Hass et al. (2001)

- n = 26, 48 ± 6.4 years, sedentary
- NuStep®, 20 min @ 50%  45 min @ 75% HRmax
- 3 days/wk X 12 weeks

Cardio-respiratory

↑18% VO₂max *

↓ 3% resting HR

↓ 2% systolic BP

Exercise parameters

↑ 70% duration*

Endurance

reps at 60% baseline 1 RM

56% ↑ leg press*

30% ↑ chest press*

39% ↑ back*

Strength 1RM

11% ↑ leg press*

3% ↑ chest press*

5% ↑ back*

*p<0.05

Equipment preference among older adults

Looney MA, Rimmer JH(2003)

-16 community-dwelling seniors, 82 ± 6.6 years
- used each machine for 5 mins on different days, structured one-to-one interviews after each use

▪ **NuStep® TRS 4000**



▪ **Schwinn Air Dyne**



▪ **PTS turbo Recumbent Bicycle**

▪ **Monark Bicycle ergometer**

▪ **Stairmaster**

NuStep® exercise in residents of assisted living communities

Johnson et al. (2002)

- n = 39, 85 ± 6.6 years, 34 women, 50% used gait aids, 13 weeks on NuStep®
- Group 1 (n= 23) : < 9 minutes/ week
- Group 2 (n=16) : ≥ 9 minutes/ week

Results in Group 2:

Cardio-respiratory

↓ 5% sitting
systolic BP *

Mobility

↑ 15 % on
timed walk test*

Strength

↑ 6% shoulder
press strength*

*p<0.05

Reliability and validity of NuStep® in older adults

Mendelsohn M, Overend T, Petrella R, Connelly DM (In review)

- n = 18, LTC residents, 82 ± 5 years, 3 women
- 2 trials of sub-maximal exercise one week apart
- Cosmed™ K4b² peak VO_2 and HR values compared with NuStep®

Test-retest reliability: moderate to high

HR: $\text{ICC}_{2,1} = 0.87 - 0.91$

METS: $\text{ICC}_{2,1} = 0.89 - 0.99$

Concurrent criterion validity: good to excellent

Day 1: $r = 0.89 - 0.97$

Day 2: $r = 0.85 - 0.87$

Purpose

To investigate the effects of sub-maximal aerobic exercise on residents of long term care, using a NuStep®

Study Design

Subjects

26 long term care residents

Inclusion criteria

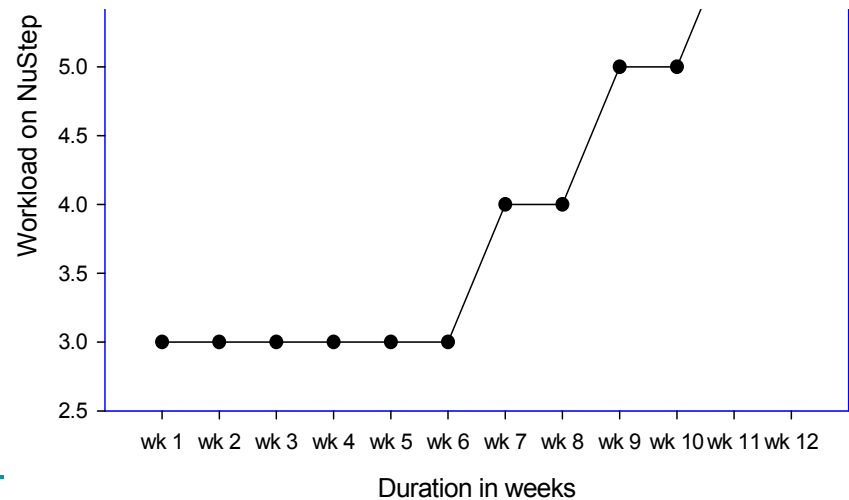
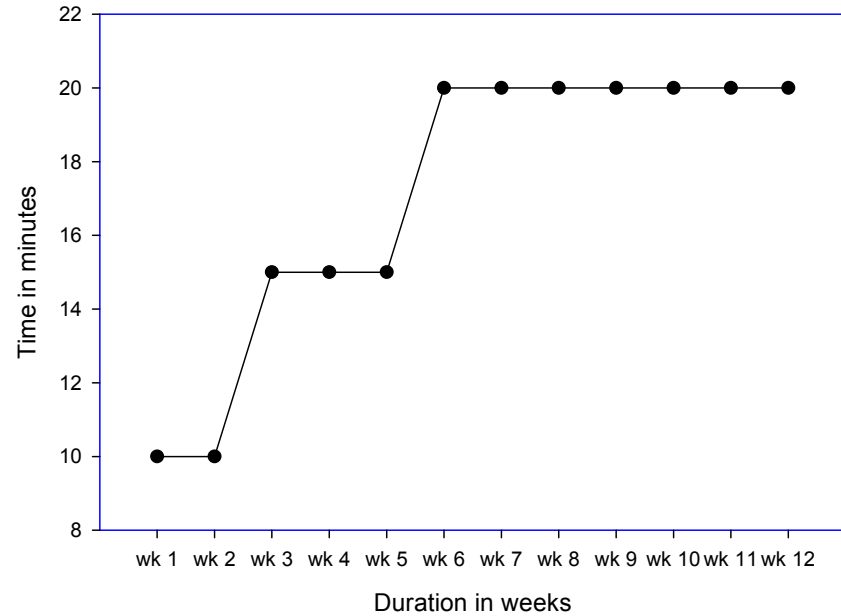
- ≥ 70 years

Exclusion criteria

- Cognitive function (MMSE ≤ 24)
 - Neurological, musculoskeletal conditions and/ or unstable CV disease
 - Contraindications to exercise testing (ACSM 2000)
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Protocol

- **Workload:**
60% (HR max) corresponding to RPE \leq 2-3 (“light”/“moderate”) o BORG CR10 scale
- **Frequency: 3 times /wk x 12 wks**
- **Duration: 20 minutes**
- **Work rate: 60 steps /min**

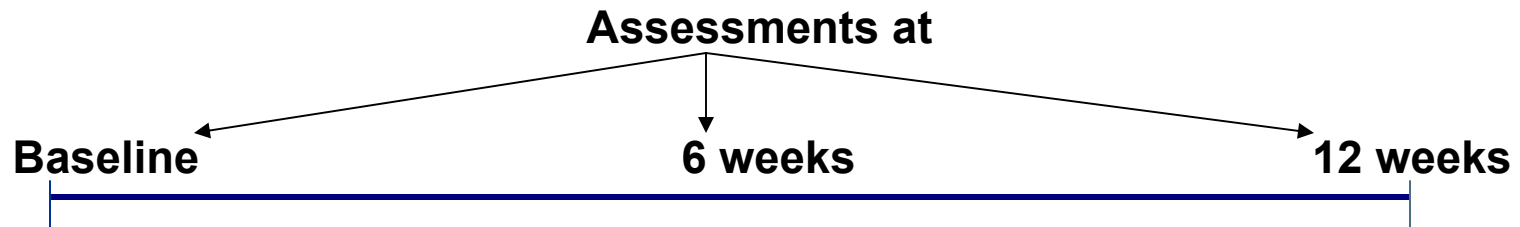


Equipment



NuStep® TRS 4000 Recumbent Cross Trainer

Study Design



Physiological

- Heart Rate
- RPE
- Metabolic Equivalents (METS)

Mobility

- 2 minute Walk/ Wheelchair Test
- Nursing Home Life-Space Diameter (NHLSD)

Self- efficacy

- Activities – specific Falls Concerns in Long Term Care (AFC-LTC)
- Subjective Exercise Experience Scale (SEES)

Results

Subject characteristics

- n = 14, 84 ± 6.4 years, 9 women
- MMSE score = 27 ± 2.4

Health conditions

- 11 hypertension
- 12 arthritis
- 3 stroke
- 2 asthma
- 1 Parkinson's Disease

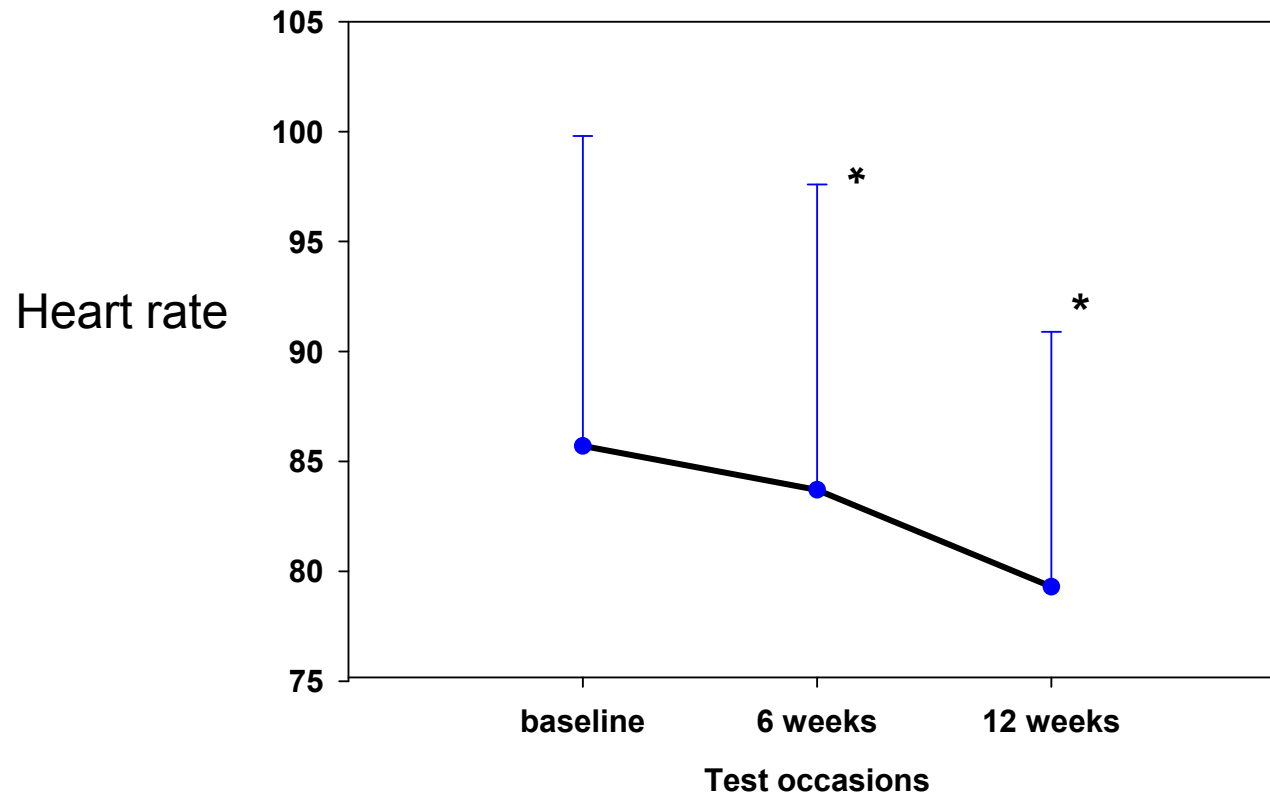
Gait aids

- 7 rollator/ walker
 - 6 wheelchair
 - 1 cane
-

Results

n=14

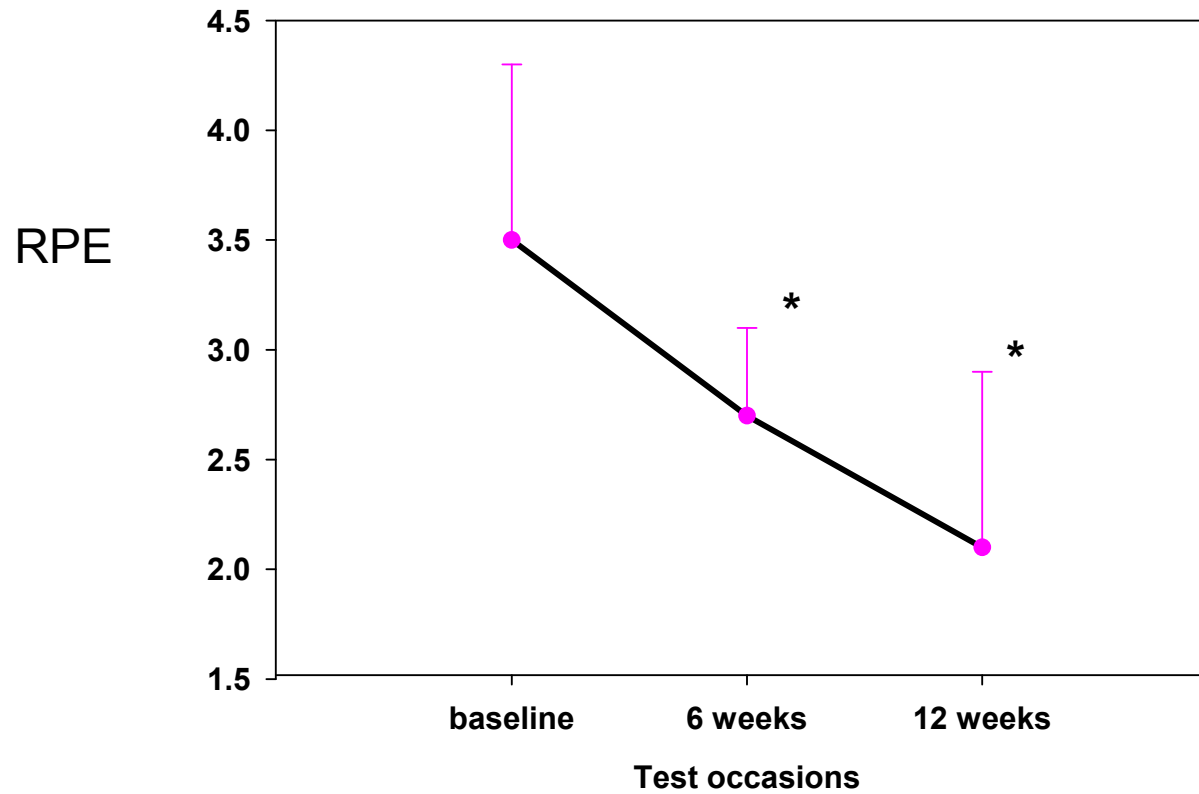
Physiological



*p<0.05

Results

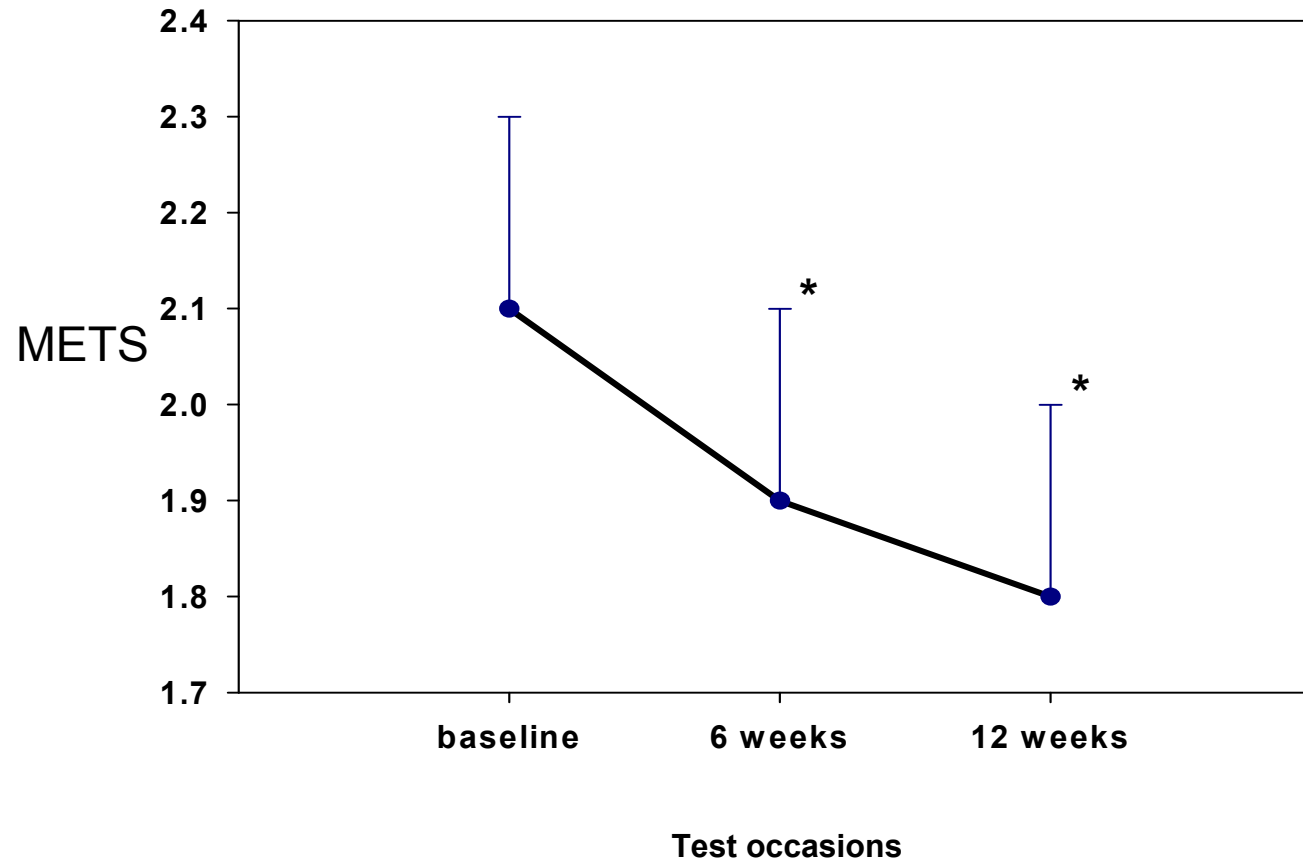
Physiological



* $p < 0.05$

Results

Physiological



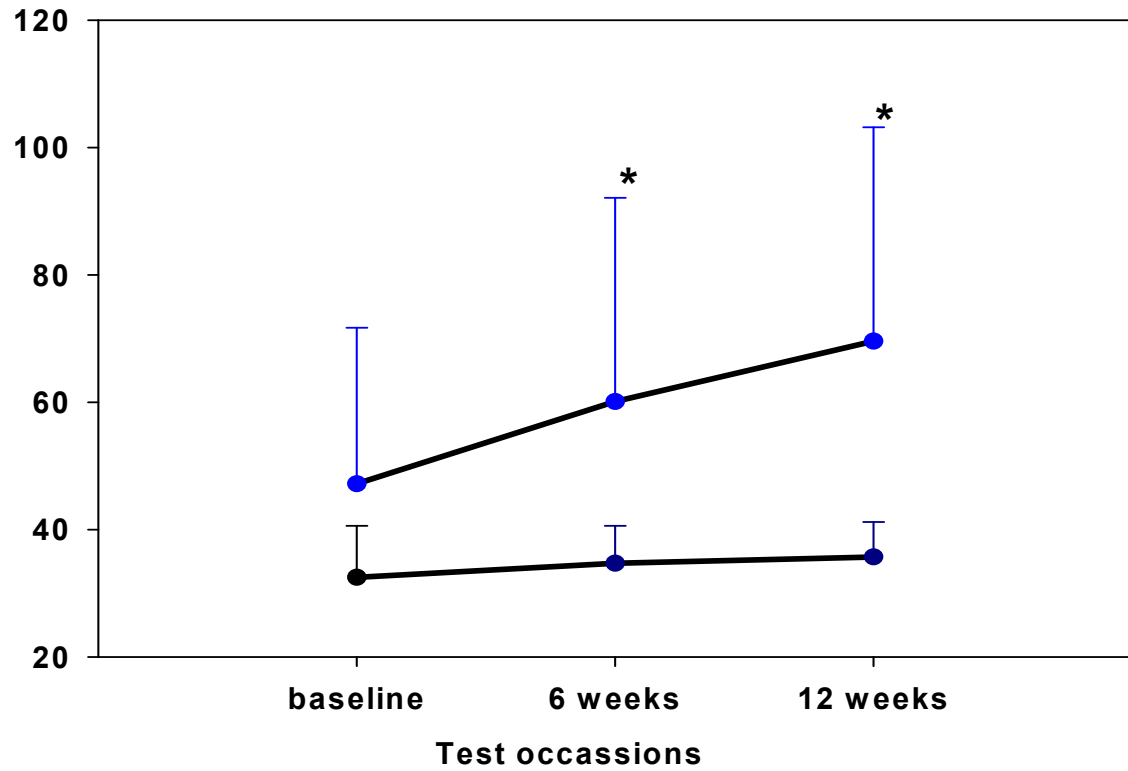
* $p < 0.05$

Results

Mobility

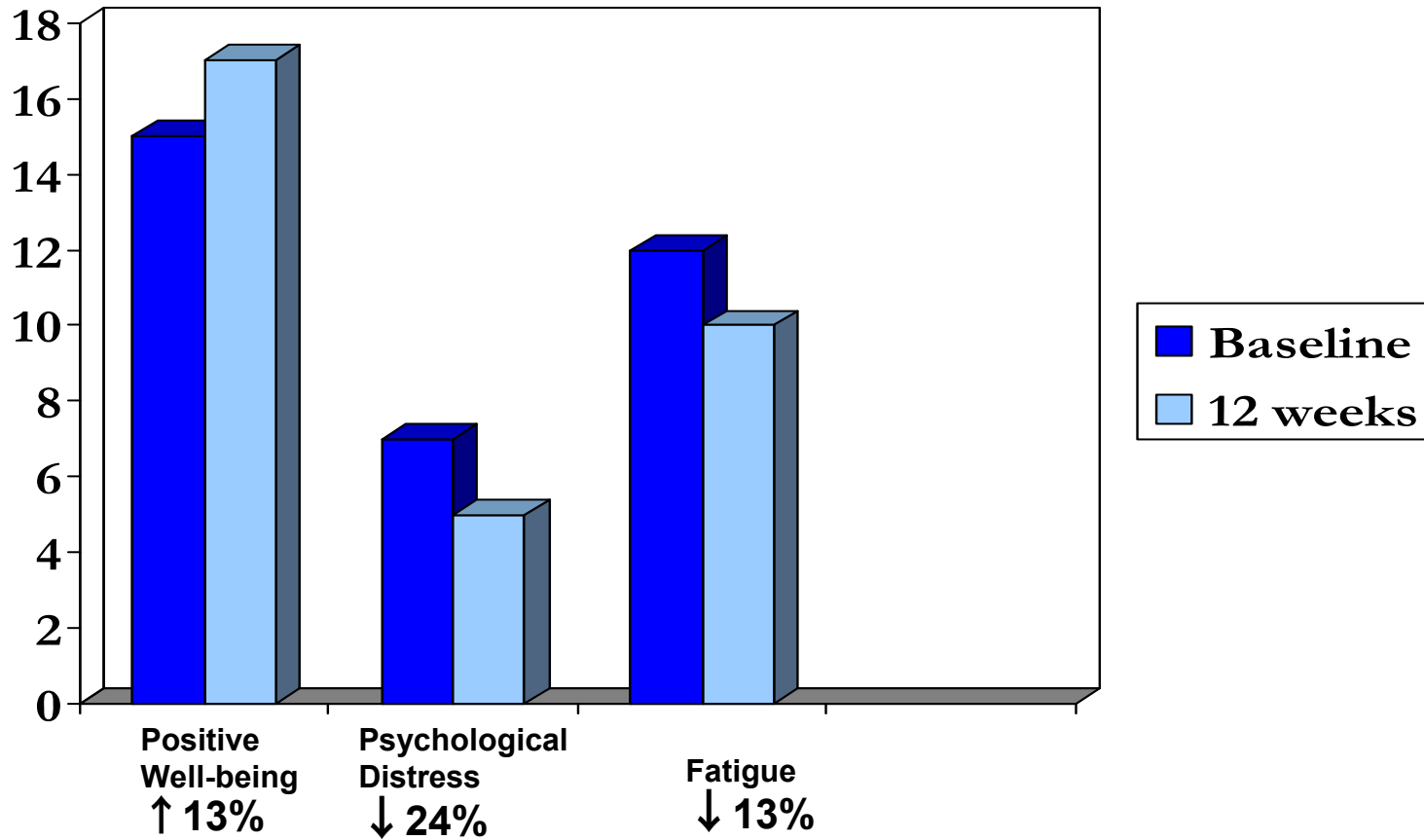
2 Minute Walk/
Wheelchair test

NHLSD



Results

Self- efficacy



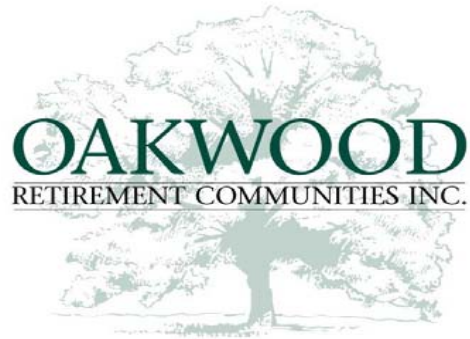
Subjective Exercise Experience Scale

Summary to date

- **14 subjects have completed training, 4 in training, 2 dropped out and 3 ready to begin in May 2007.**
 - **NuStep® provides promising results in improving aerobic fitness (HR, RPE) in our group of older adults.**
 - **Increased aerobic fitness translates into improved functional mobility.**
 - **Aerobic training increased self-reported positive well-being and decreased psychological distress and fatigue in our subject group.**
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Special thanks to:

- **RBJ Schlegel –University of Waterloo Research Institute for Aging**
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 - **Dr. A Myers (Activities – specific Falls Concerns in Long-Term Care scale)**
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Thank you

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