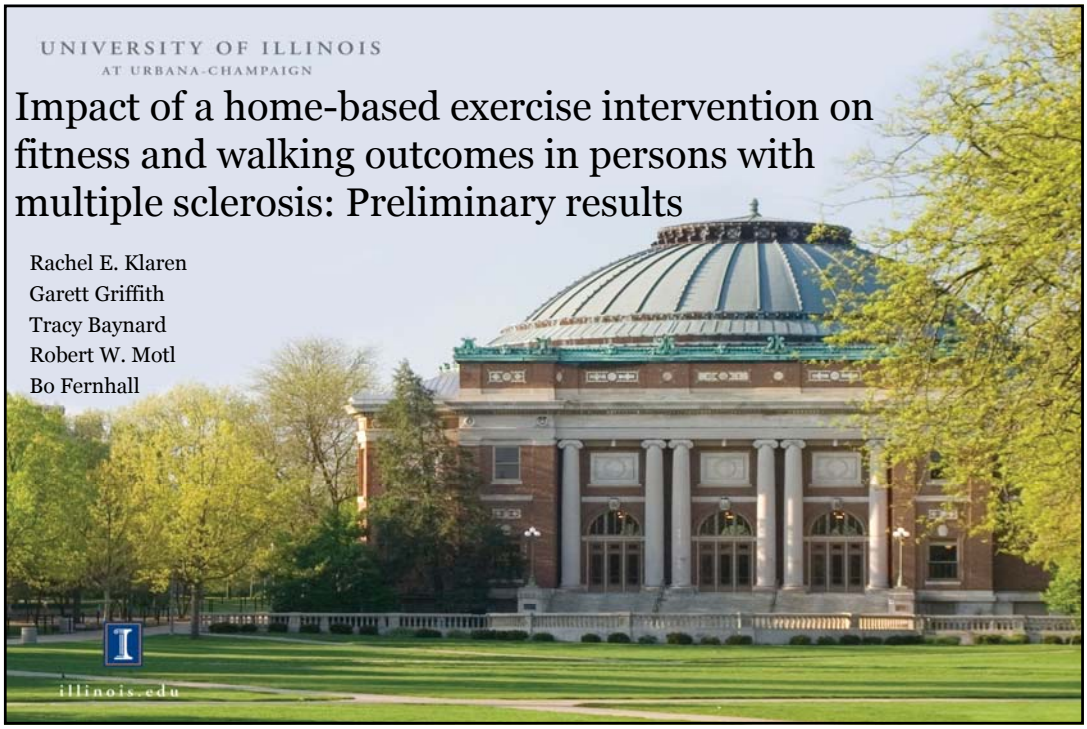

Exercise Training Interventions in MS

- 50+ clinical trials of exercise training in persons with MS
  - Exercise training is safe for persons with MS[1]
    - No increased risk of relapse or other adverse events
  - Benefits of exercise training in persons with MS[2]
    - Aerobic capacity
    - Walking mobility

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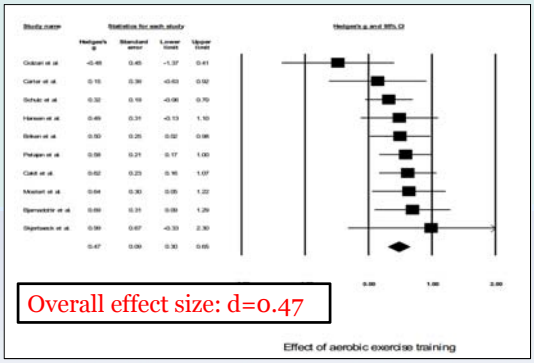
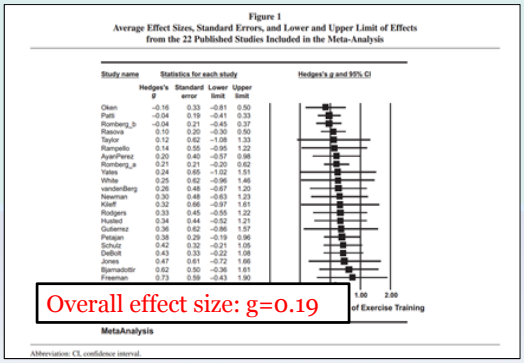
[1]Pilutti et al., 2014; [2]Motl & Pilutti, 2012



[3]Platta et al., Under Review



[4]Snook & Motl, 2009

- Supervised vs. unsupervised, home-based exercise training

- Supervised: effect size (point estimate)=0.55
- Unsupervised: effect size (point estimate)=0.03

- Supervised: effect size (g)=0.32
- Unsupervised: effect size (g)=0.03

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Exercise Training Interventions in MS

- Expresso S3u Novo cycle
  - Precise control of exercise prescription
  - Internet portal

- Weekly contact
  - Exercise trainer or behavioral coach
  - Teach approaches for behavior change

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Purpose & Hypothesis

- The current study investigated the effects of a novel, home-based exercise intervention that optimizes compliance and participation on aerobic fitness and walking mobility in persons with MS
  - We expected the aerobic exercise (i.e., cycle ergometry) condition would demonstrate increased fitness and walking mobility compared to the attention control (stretching along with minimal muscle strengthening stimuli)

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Participant Inclusion Criteria

- Physically inactive (<2 days/week of structured exercise)
- BMI < 40 kg/m^2
- Mild MS disability (EDSS: 0-4)
- Relapse free for past 30 days
- Confirmed diagnosis of MS
- Asymptomatic and no documented CVD
- No changes in medications within previous 6 months
- Physician approval

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Measures

- Aerobic fitness (VO_{2peak})
  - Maximal, incremental exercise test on a cycle ergometer and indirect calorimetry
    - Measured in ml/kg/min
- Walking mobility
  - Timed 25-Foot Walk (T25FW)[5]
    - Measured in speed (ft/s)
  - Six-Minute Walk (6MW)[6]
    - Measured in m

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[5]Motl et al., 2010; [6]Goldman et al., 2008

Intervention Conditions

- Aerobic exercise condition:
  - 12-week period
  - Three days/week of cycle ergometry using Expresso S3u Novo cycle
  - Initially for 10 minutes/day at 40% VO_{2peak} and progressing to 30 minutes/day at 60% VO_{2peak}
- Attention control condition:
  - 12-week period
  - Three days/week of stretching exercises
  - Beginning with one set of five different stretches and progressing to two sets of 10 stretches

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Intervention Components

- Participants took part in weekly, one-on-one video coaching sessions
- Sessions were semi-scripted and based on principles of supportive accountability
- Content was based on Social Cognitive Theory[7]
  - Outcome expectations
  - Goal-setting
  - Self-efficacy
  - Facilitators and barriers for exercise

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[7]Bandura, 2004

Procedure

- All participants provided informed consent approved by University IRB
- Participants provided demographic/clinical information, measured height/weight, underwent an EDSS examination, and completed fitness and walking tests in the laboratory at baseline
- Participants were randomly assigned into aerobic exercise or attention control conditions
- Participants returned to laboratory at endpoint (12 weeks) to repeat fitness and walking tests
- Assessors were not blinded to group assignment

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Data Analysis

- Data were analyzed in SPSS v.22.0
- Examined baseline differences between groups in demographic/clinical characteristics using independent samples *t*-tests and χ^2 statistics
- Examined group differences in aerobic fitness and walking mobility using a 2×2 ANOVA
  - Group (aerobic exercise and attention control) × Time (baseline and post-intervention)
- Provide the effect size (*d*) per measure for expressing magnitude of difference

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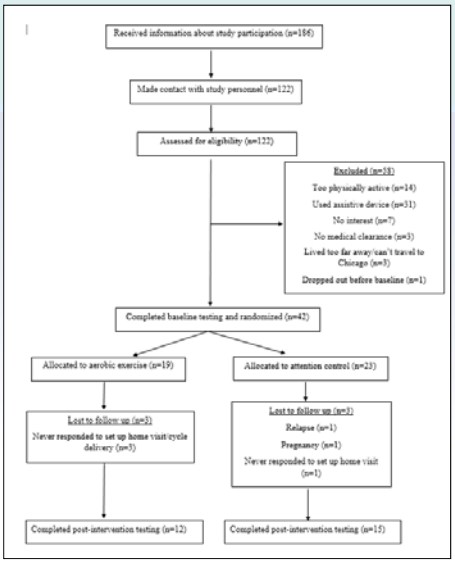
Participants

- Preliminary sample included 27 participants who were randomly assigned into aerobic exercise (n=12) or attention control (n=15) conditions and completed baseline and post-intervention testing



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Participant Characteristics

Variable	Aerobic exercise (n=12)	Attention control (n=15)
Age (years)	46.7 (10.9)	43.9 (10.2)
Sex (% female)	66.7	86.7
Race (% Caucasian)	83.3	66.7
BMI (kg/m^2)	26.8 (4.8)	27.5 (6.6)
Disease Duration (years)	10.6 (6.4)	9.5 (8.3)
EDSS Score (median, IQR)	3.5 (1.0)	3.5 (1.0)
Type of MS (% RRMS)	100%	100%

Note. Values are mean (standard deviation), unless otherwise noted.

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Compliance

- Aerobic exercise frequency: 27/36 sessions; 73.8%
  - 100% compliance for duration and intensity
- Attention control frequency: 31/36 sessions; 85.0%

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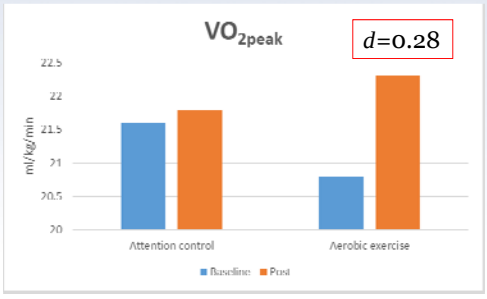
Results

Measure	Aerobic exercise (n=12)		Attention control (n=14)	
	Baseline	Post (12 weeks)	Baseline	Post (12 weeks)
VO_{2peak}, ml/kg/min	20.8 (4.8)	22.3 (6.0)	21.6 (5.1)	21.8 (5.4)



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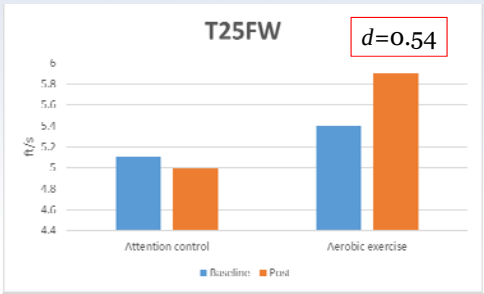
- No significant group by time interaction: ($F(1,24)=1.78, p=0.20, \eta^2=0.07$)

Results

Measure	Aerobic exercise (n=12)		Attention control (n=15)	
	Baseline	Post (12 weeks)	Baseline	Post (12 weeks)
T25FW, ft/s	5.4 (1.1)	5.9 (1.4)	5.1 (1.2)	5.0 (1.3)



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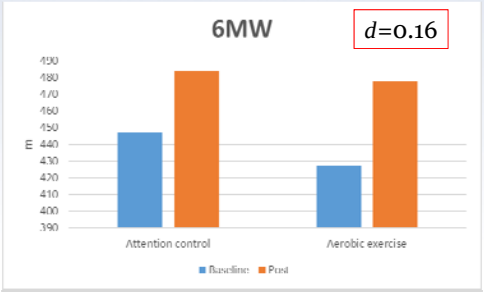
- No significant group by time interaction: ($F(1,25)=3.86, p=0.06, \eta^2=0.13$)

Results

Measure	Aerobic exercise (n=12)		Attention control (n=15)	
	Baseline	Post (12 weeks)	Baseline	Post (12 weeks)
6MW, m	427.4 (81.2)	478.0 (77.0)	447.0 (82.6)	484.1 (115.7)



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- No significant group by time interaction: ($F(1,25)=0.28$, $p=0.60$, $\eta^2=0.01$)

Exploratory Results

- Change (post – baseline) in VO_{2peak} (ml/kg/min) and T25Fw (ft/s)
- Pearson correlation (r)
  - Overall sample: $r=0.537$, $p<0.01$ (2-tailed)
  - By group:
    - Attention control: $r=0.219$
    - Aerobic exercise: $r=0.624$, $p<0.05$ (2-tailed)

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Preliminary Findings

- A home-based aerobic exercise intervention can be efficacious for increasing aerobic fitness and walking mobility in persons with MS
- Interventions might need to adopt approaches that monitor and maximize compliance
- Support notion that an increase in aerobic fitness might be important for increasing walking mobility in persons with MS[8]

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[8]Motl et al., 2010

Strengths & Limitations

- Strengths:
  - Novel intervention delivery
  - Capacity to measure compliance
  - Standard performance-based measures of mobility disability in persons with MS
- Limitations
  - Halfway done with the study
  - Demographic/clinical characteristics of sample
  - 12-week intervention

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Conclusion

- Home-based exercise may be a good approach for increasing aerobic capacity and walking mobility in persons with MS
- Potential value of home-based exercise for large numbers of persons with MS who cannot undertake supervised, center-based exercise programs
- Results contribute to the process of understanding how therapeutic interventions such as exercise training impact persons with MS

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Thank you! Questions?

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