Improving Clinical Outcomes and Physical Activity in Older Adults with Comorbidity: A Randomized Controlled Trial

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Disclosure

• The authors have nothing to disclose

• Learning objectives
  – Describe the design and methods of the *Staying Active with Arthritis (STAR)* Study conducted in older adults with the comorbidities of osteoarthritis of the knee (OAK) and hypertension (HBP)
  – Explain the improvements in clinical outcomes and physical activity found in the *STAR* Study
Disclosure (continued)

• Support was provided by
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  – Research registries
    • Pittsburgh Pepper Center Registry (NIH, NIA, P30 AG024827)
    • University Center for Social and Urban Research Gerontology Program Research Registry
    • University of Pittsburgh Clinical and Translational Science Institute Research Participant Registry (NIH, CTSA, UL1 TR001857)
Background

- Over 9 million Americans have OAK and half of those have HBP (Eymard et al., 2015)
- Physical activity is recommended for OAK and HBP (Hochberg et al., 2012; Eckel et al., 2014)
  - Only 13% with OAK (Wallis et al., 2013) and 28% with HBP (Healthy People 2020) meet physical activity guidelines
- Knee pain and functional limitations in OAK hinder physical activity
Background (continued)

• Physical activity interventions can reduce pain and improve physical function in OAK (Fransen et al., 2015)

• No interventions have been tailored to those with OAK and comorbid HBP
STAR Study

- Randomized controlled trial of an individually delivered, home-based, 6-month lower extremity exercise and fitness walking intervention based on self-efficacy theory (Bandura, 1977) with older adults with OAK and HBP
Purposes

• To evaluate effect of STAR intervention compared to attention control at immediate post-intervention and 6 months after end of intervention on
  – Knee pain
  – Physical function
  – Fitness walking
  – Lower extremity exercise
  – BP
Interventions

• **STAR**
  – Usual care
  – 6 weekly sessions with physical therapist for evaluation, graduated therapeutic exercises, and progressive fitness walking
  – 9 biweekly telephone sessions with nurse for ongoing counseling

• Attention control
  – Usual care
  – 6 weekly and 9 biweekly telephone sessions with nurse on senior health topics
Instruments

• Knee pain and physical function
  – Western Ontario and McMaster Universities (WOMAC) Osteoarthritis Index

• Fitness walking
  – e-Diary of daily minutes
  – Accelerometer of daily activity minutes (Dunlop et al., 2011)
    • None to very low: 0-99 counts
    • Light: 100-2,019 counts
    • Moderate-to-vigorous: > 2,020 counts
Instruments (continued)

- Lower extremity exercise
  - e-Diary
    - Daily minutes
    - Performance (repetitions \( \times \) sets/week)

- Systolic and diastolic BP
  - Automatic BP monitor
Analyses

• Linear mixed modeling to examine effect of STAR intervention vs. attention control on clinical outcomes and physical activity over time

• Standardized mean differences between the treatment groups (d[between]) for change from baseline to immediate post-intervention and to 6 months after end of intervention
Analyses (continued)

• Standardized mean differences within $STAR$ group ($d_{[within]}$) for change from baseline to immediate post-intervention and to 6 months after end of intervention
Participants ($N=182$)

- **Age:** $M=65$ years ($SD=8$, range 50-90)
- **Sex:** 73% ($n=133$) female
- **Race:** 73% ($n=133$) white
## Results: Knee Pain

<table>
<thead>
<tr>
<th>$F_{G \times T}$</th>
<th>$p$</th>
<th>d[between]</th>
<th>$STAR$ d[within]</th>
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<td>Post-intervention</td>
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<tr>
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<td>-0.183</td>
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<tr>
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Group Response Profiles for WOMAC Pain Score (Unadjusted)
## Results: Physical Function

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<th>$STAR$ $d$[within]</th>
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<tr>
<td></td>
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<td>Post-intervention</td>
<td>6 months after end of intervention</td>
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<td>4.22</td>
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<td>-0.208</td>
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</table>
Group Response Profiles for WOMAC Physical Function Score (Unadjusted)

Predicted Mean WOMAC Physical Function Score

Baseline 6 months 12 months

Treatment Group
Control
STAR
Results: Fitness Walking by e-Diary

<table>
<thead>
<tr>
<th>$F_{G \times T}$</th>
<th>$p$</th>
<th>d[between]</th>
<th>$STAR$ d[within]</th>
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<td>10.98</td>
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Group Response Profiles for Mean Daily Minutes of Fitness Walking (Unadjusted)

Predicted Mean Daily Minutes of Fitness Walking

Time

Baseline
6 months
12 months

Treatment Group
Control
STAR
Results: Fitness Walking by Accelerometer

- No significant group by time interactions were found by accelerometer for
  - None to very low: $F=0.33, p=0.723$
  - Light: $F=0.33, p=0.720$
  - Moderate-to-vigorous: $F=1.98, p=0.140$
## Results: Lower Extremity Exercise

<table>
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Group Response Profiles for Mean Daily Minutes of Leg Exercises (Unadjusted)
Group Response Profiles for Mean Daily Volume of Leg Exercises (Unadjusted)
Results: BP

- No significant group by time interactions were found for
  - Systolic BP: $F=1.08, p=0.342$
  - Diastolic BP: $F=0.40, p=0.670$
Discussion

- **STAR** intervention had
  - Small effects on improvements in knee pain and physical function at immediate post-intervention that were maintained at 6 months after end of intervention
  - Effects were lower at immediate post-intervention but similar at 6 months after end of intervention compared to a systematic review of exercise for OAK (Fransen et al., 2015)
Discussion (continued)

- \textit{STAR} intervention had
  - Large effects on improvements in self-reported fitness walking and lower extremity exercise at immediate post-intervention with slight declines at 6 months after end of intervention
  - Fitness walking increased from 3 to 12 mean daily minutes and lower extremity exercise increased from 1 to 9 mean daily minutes in \textit{STAR} group, while attention control did not change
Discussion (continued)

- 12 mean daily minutes (84 minutes/week) of fitness walking in STAR group is greater than minimum threshold of 45 minutes/week to improve physical function (Dunlop et al., 2017), which likely contributed to improvements in knee pain and physical function.
Discussion (continued)

- *STAR* intervention did not find improvements in objectively assessed fitness walking
  - Self-reported fitness walking data may be biased
  - Participants may reduce other physical activity when fitness walking is added so activity counts do not significantly change
Discussion (continued)

• *STAR* intervention did not find improvements in BP
  – Fitness walking fell short of the goal of 21 mean daily minutes (150 minutes/week), which may have contributed to lack of group differences in BP
Recommendations

- Explore enhancements to the STAR intervention, such as addition of significant other support, to further improve physical activity to the minimum threshold of 150 minutes/week in national guidelines.
References


