ENVIRONMENTAL BARRIERS TO EXERCISE FOR PEOPLE WITH ARTHRITIS

Molly Vaughan, DPT
Doctoral Candidate, PhD in Rehabilitation Sciences
Boston University, Sargent College

Environmental Barriers: Background

- Physical activity is a non-invasive strategy for people with arthritis
- Most people with arthritis do not meet recommended levels of physical activity
- People with arthritis may encounter barriers to exercise in their physical environment
Environmental Barriers: Background

- Environment: “the physical, social, and attitudinal environment in which people live.” (ICF, 2001)

Environmental Barriers: Evidence

- Current research on environmental barriers to physical activity focuses on general and older adults

- Literature review of 40 studies
  - Environmental barriers for people with arthritis
  - Link between environment and community mobility or physical activity
  - Count method of significant and insignificant findings used to summarize results of studies
Environmental Features: Evidence

- Sidewalk conditions (e.g., uneven sidewalks, physical obstacles)
- Safety (i.e., perceived safety of the neighborhood)
- Walking infrastructure (e.g., availability of sidewalks)
- Places to sit/rest (e.g., benches)

Environmental Features: Evidence

- Fitness centers in the neighborhood
- Specific exercise classes/facilities tailored to people with arthritis
- Parks/green space (e.g., parks within walking distance)
- Accessibility (e.g., accessible entrances to local destinations)
Environmental Features: Evidence

- Walking paths/trails (e.g., presence of trails, maintenance)
- Mixed land-use (e.g., amenities nearby, such as grocery or retail stores)
- Traffic conditions (e.g., volume, noise, traffic-calming structures)
- Weather (e.g., temperatures, precipitation, ice)

Environmental Barriers: Evidence

- Most studies do not include people with mobility limitations
- Few studies on people with arthritis are quantitative
- Heterogeneity in research methods
- Most research conducted in urban settings
Environmental Barriers: Conclusions

- Qualitative and cross-sectional evidence: environmental features may relate to physical activity of people with arthritis

- Research gap: greater quantitative evidence is needed

EXERCISE ADHERENCE IN ARTHRITIS: ENVIRONMENTAL INNOVATIONS TO PROMOTE PHYSICAL ACTIVITY

Molly Vaughan, DPT
Doctoral Candidate, PhD in Rehabilitation Sciences
Boston University, Sargent College
Background: Environmental Features

- Sidewalk conditions (e.g., uneven sidewalks, physical obstacles)
- Safety (i.e., perceived safety of the neighborhood)
- Walking infrastructure (e.g., availability of sidewalks)
- Places to sit/rest (e.g., benches)

Background: Environmental Features

- Fitness centers in the neighborhood
- Specific exercise classes/facilities tailored to people with arthritis
- Parks/green space (e.g., parks within walking distance)
- Accessibility (e.g., accessible entrances to local destinations)
Background: Environmental Features

• Walking paths/trails (e.g., presence of trails, maintenance)
• Mixed land-use (e.g., amenities nearby, such as grocery or retail stores)
• Traffic conditions (e.g., volume, noise, traffic-calming structures)
• Weather (e.g., temperatures, precipitation, ice)

Technological Innovations & the Environment

• The physical environment can encourage physical activity into daily routines:
  • Urban planning
  • Building and product design
  • Applications & websites
  • Interactive public installations

• Limited research evidence
Product & Building Design

NYC’s Active Design Guidelines for building design¹:

• Provide interesting corridors and unenclosed stairwells
• Provide bike storage and showers onsite
• Pedestrian-friendly exteriors and location of building functions to encourage brief bouts of walking

¹http://www.nyc.gov/

Product & Building Design

Skip-stop elevators¹

• Elevators stop at every 3rd floor
• Encourages physical activity through use of stairs
• Decreases non-productive time spent waiting for elevator

¹http://activelivingresearch.org
Product & Building Design

Skip-stop elevators, evidence:\(^1\):

- 24-week experiment in Californian 13-story building
- Surveyed 299 participants: 72% used stairwell daily
- Open stairwell used 33x more than enclosed stairwell


Product & Building Design

Treadmill workstations:

- Systematic review (n=32 studies) found increased energy expenditure, no detrimental effect on work performance, improved health markers\(^1\)

Product & Building Design

Bicycle Designs:

- Foldable bikes encourage multi-modal transit

Product & Building Design

Bicycle Designs:

- Copenhagen Wheel Project (MIT)\(^1\)
  - Hybrid bike that stores energy
  - Wheel has sensor that records information about user’s effort level and surroundings
  - Plan bike routes based on congestion, pollution, and road conditions through phone app

\(^1\)http://senseable.mit.edu/copenhagenwheel/

https://superpedestrian.com/gallery
Applications/Websites

LocaLeikki:
• Website for finding places for physical activity while traveling
• Search by type of terrain, number of street crossings, distance, etc.
• User can add information about new places or rate locations

MapMyFitness:
• User plan or find routes to walk, run, or bike
• User can track activity location during exercise through phone GPS
• Track other health information, such as diet
• Share information with friends who are also members of application
Applications/Websites

SeeClickFix:

- Allows user to point out non-emergency issues in community
- Alerts local governments to public concerns
- Track reported issue over time
- Promotes involvement in community

Interactive Public Installations

- Musical Light Swings (Montreal & Colorado)
  - Each swing creates a musical note
  - Encourages movement and social interaction & cooperation through music making
Interactive Public Installations

- Piano stairs:
  - Steps emit musical notes
  - Encouraged 66% more pedestrians to use stairs over escalators

- Auckland Ferry Building:
  - Dancing projected 5 stories

Technological Innovations & Environment

- Environment can enable physical activity in daily routines

- Technological innovations allow for environmental modifications at any scale

- More research is needed to assess evidence of environmental modifications for promoting adherence to physical activity
Thank you!

Molly Vaughan, DPT
Doctoral Candidate, PhD Rehabilitation Sciences
Boston University, Sargent College
of Health & Rehabilitation Sciences
e-mail: mvaughan@bu.edu