Exercise and Secondary Conditions among Adults with Spinal Cord Injury

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Study participants
People with disabilities, in general, are less likely to be physically active as compared to people without disabilities (Heath & Fentem, 1997).

Reasons for physical inactivity:

– mobility limitations
– lack of transportation
– poor accessibility of fitness facilities, health clubs, & equipment
– information-related barriers (e.g., not knowing where to exercise)
– lack of resources (e.g., cost of the exercise program)

Ref: Rimmer, et al., 2005; Rimmer, et al., 2004; Rimmer, et al., 2000; Stuifbergen & Roberts, 1997; Washburn & Hedrick, 1997
People with SCI are at risk for a variety of secondary conditions resulting from the sedentary lifestyle often associated with disability (Case, 2004; Sable & Gravink, 1999).

Consequences of secondary conditions

- Increasing health care costs
  - The annual cost of treating pressure sores alone was estimated at $1.2 billion (Byrne & Salzberg, 1996).
- Loss of productivity (time missed from work or school)
- Delayed community reintegration
- Reduced quality of life (Lucke, 1999)
Research Questions

- Of adults with SCI, are there significant differences in the incidence of secondary conditions between exercisers and non-exercisers?
- How does exercise contribute to the decreased risks of secondary conditions in adults with SCI?
Methods

- Cross-sectional design
- Self-reported mail survey
- Adults (≥18 years old) with a SCI for at least 1 year, living in U.S.
- Snowball sampling

Analysis
- Descriptive
- Independent t-test & chi-square statistics
- Multiple logistic regression
Sample Characteristics (n=355)

- Male: 59.4%
- Hispanic origin: 5.1%
- White race: 87.9%
- Married/living with a partner: 50.7%
- Some college/college graduates: 49.0%
- Average age (year): 46.4 ± 12.6
- Average age at injury (year): 31.6 ± 14.2
- Average years since injury: 15.7 ± 12.0
Sample Characteristics (Cont.)

- Injury level
  - Cervical: 46.8%
  - Thoracic: 40.0
  - Lumbar: 7.6
  - Sacral: 0.3
  - Unknown: 5.3

- Incomplete SCI: 53.2

- Wheelchair users: 86.8
  - Power: 34.7
  - Manual: 65.3
Functional Conditions

- Need help with … ‘all the time’

%}

- Bathing/showering: 28.7%
- Dressing: 26.2%
- Eating: 5.9%
- Getting in/out of chair & bed: 25.1%
- Using toilet/commode: 28.2%
- Getting around inside the home: 5.1%
Functional Conditions (Cont.)

Need help with … ‘all the time’

- Preparing own meals: 19.7%
- Shopping for personal items: 16.3%
- Managing money: 7.9%
- Using telephone: 3.1%
- Doing heavy work around the house: 53.2%
- Doing light work around the house: 24.5%
Top Five Chronic Conditions

- Incontinence: 42.8%
- Depression: 30.4%
- Osteoporosis: 26.8%
- Arthritis: 22.0%
- High cholesterol: 19.7%
Exercise Activities

- Exercise at home & outside of home: 19.2%
- Exercise at home only: 40.0%
- Exercise outside of home only: 12.1%
- No exercise: 28.7%
Physical/Exercise Activities

- Aerobic activities
  - Arm/hand/leg cycling, walking/wheeling around, aerobic exercise, swimming/pool therapy
- Strengthening activities
  - Weight lifting, resistance training
- Flexibility activities
  - Stretching, standing (with walker/braces), rang of motion (legs/arms)
Major Reasons for not Exercising

Reasons for not exercising at home

- Accessibility (lack of money, equipment, personal help, & time)
- Physical conditions (pain, functional limitations, fatigue, lack of motivation or energy)
- Other choices (gardening, wheeling, physical activities, exercising in gyms or schools)

Reasons for not exercising outside the home

- Accessibility (cost, inconvenience, transportation, equipment, facility)
Are there significant differences in the incidence of secondary conditions between exercisers and non-exercisers?

<table>
<thead>
<tr>
<th>Condition</th>
<th>Exerciser</th>
<th>Non-exerciser</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bladder/kidney stones*</td>
<td>6.3%</td>
<td>13.7%</td>
</tr>
<tr>
<td>Respiratory infection*</td>
<td>7.9%</td>
<td>15.7%</td>
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<tr>
<td>UTI*</td>
<td>56.1%</td>
<td>68.6%</td>
</tr>
<tr>
<td>Skin breakdown*</td>
<td>32%</td>
<td>46.1%</td>
</tr>
</tbody>
</table>

* p ≤ 0.05
*** p ≤ 0.001
Secondary Conditions & Exercise by Severity Level

With complete SCI (n=134)
- Depression*: 15.9%
- Bladder/Kidney stones**: 6.0%
- Respiratory infection*: 8.7%
- UTI*: 32.7%
- Skin breakdown**: 20.0%

With incomplete SCI (n=189)
- Depression*: 17.1%
- Bladder/Kidney stones**: 7.0%
- Respiratory infection*: 20.0%
- UTI*: 70.0%
- Skin breakdown**: 29.5%

* p ≤ 0.05
** p ≤ 0.01
How does exercise contribute to the decreased risks of secondary conditions?

- Non-exercisers had increased risks of …
  - Bladder or kidney stones
    OR=2.923 (p=0.008; 95% CI: 1.315-6.498)
  - Skin breakdown
    OR= 2.013 (p=0.007; 95% CI: 1.214-3.337)
  - Respiratory infection
    OR=2.345 (p=0.028; 95% CI: 1.097-5.014)

* Controlling for gender, race, education, age at injury, completeness & level of injury, exercise frequency/duration
Conclusions

- Incidence of secondary conditions is significantly lower in exercisers than in non-exercisers among adults with SCI, particularly for those with incomplete SCI.
- Exercise is associated with the decreased risks of secondary conditions in adults with SCI regardless of their socio-demographics, injury level/severity, & frequency/duration of exercise activities.
- Accessibility is the common barrier for adults with SCI to engage in various types of exercises.
Implications

- Adults with SCI can benefit greatly by participating in exercise activities, but those benefits can be enhanced by
  - removing accessibility-related barriers
  - providing structured exercise activities that are appropriate for their physical capacity

- Longitudinal data are needed
  - to ascertain the causal relationship between exercise & secondary conditions
Implications (Cont.)

The relationship between exercise & secondary conditions among adults with complete SCI can be further studied using a larger/representative sample & longitudinal data.