Biopsychosocial factors influencing physical activity participation among people with chronic pain

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Acknowledgements

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  - Angela Loucks-Atkinson, PhD
  - LeAnne Petherick, PhD
  - Sandra LeFort, PhD, MN, RN

- NLCAHR-HARP Master’s Award
Outline of Presentation

- Introduction to the Research Issue: Chronic Pain and Physical Activity Participation
- Review of the Literature
- Methodology
- Results
- Future Analyses and Discussion
Introduction: Chronic Pain

• Pain
  ▫ “an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage” (Merksey, 1994).

• Chronic Pain
  ▫ Ongoing or intermittent pain which has persisted for at least 6 months.
The Impact of Chronic Pain: Older Adults

27%  16%
Physical Activity Levels Decrease with Age

Leisure-time physical activity (% at least moderately active), Canadians 20+ years, by sex and age group

64%
Physical Activity Limitations and Chronic Pain

- Chronic pain may interfere with physical activity, particularly among older adults (Sawatsky, R. et al., 2007)

- 53% of those with severe pain report that pain interfered with most activities (Ramage-Morin 2008)
Literature Review

What factors influence physical activity participation among people with chronic pain?
The Biopsychosocial Model of Chronic Pain
The Biopsychosocial Model of Pain

1. Chronic pain
2. Worry about cause of pain and future consequences
3. Avoidance of movement and physical activities due to fear of making it worse
4. Increase in disuse, loss of fitness, depression and social withdrawal
Leisure as Temporary Escape

Negative Life Events

Life Stress

Leisure

Coping Behavior

Functional, Overwhelmed

Maintained, Worse

Physical & Mental Health
How can people with chronic pain overcome the barriers to exercise?

Self-efficacy

- an individual’s beliefs that he or she will be able to successfully perform the behaviour required to produce desired outcomes (Bandura 1977).

- Higher exercise self-efficacy is associated with higher levels of exercise participation and satisfaction with physical function (Medina-Mirapeix, Escolar-Reina et al. 2009; McAuley, Courneya et al. 1994; Rekeski, King, et al. 2008).

- People with more pain sites have lower exercise self-efficacy (Leveille 2003).
Objectives:

1. To explain the associations between pain, physical activity participation, exercise self-efficacy, and stress.
2. To explore individuals’ beliefs about physical activity and pain.
Research Questions

1. What are the associations between stress, pain, physical activity participation, and exercise self-efficacy?
2. Does physical activity participation mediate the relation between stress and pain?
3. What are the differences between older adults (50 years and older), and younger adults (under 50 years) in terms of these associations?
4. What are the differences between more active and less active participants in terms of the study variables?
Methodology

Mixed methods

Phase I: Quantitative
- Self-Administered Paper and Web Surveys

Phase 2: Qualitative
- One-on-One Interviews
Phase I: Quantitative

- Sampling and Recruitment
  - Purposeful sampling of adults (age 19+) with CP living in Atlantic provinces (NL, NB, PEI, NS).
  - 42% snowball sampling
  - 14% Arthritis Society
  - 10% Community events
  - 10% Posters in physician’s offices
### Phase I: Quantitative Results

<table>
<thead>
<tr>
<th>Sample</th>
<th>%</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survey Response</td>
<td>21%</td>
<td>99/480</td>
</tr>
<tr>
<td>Paper Web</td>
<td></td>
<td>91/8</td>
</tr>
<tr>
<td>Rural* Urban*</td>
<td></td>
<td>22/43</td>
</tr>
</tbody>
</table>

*34 Missing Data
<table>
<thead>
<tr>
<th>Socio-demographics</th>
<th>%</th>
<th>N</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>71% female</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>57.6</td>
<td></td>
<td>15.43</td>
</tr>
<tr>
<td>Marital Status</td>
<td>59% married or common-law living in same residence</td>
<td></td>
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</tr>
<tr>
<td>Income</td>
<td>35% annual household income of $60,000 or more</td>
<td></td>
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</tr>
<tr>
<td>Education</td>
<td>65% had attained a certificate or diploma from a trade school, or a college or university graduate degree</td>
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<tr>
<td>Employment</td>
<td>53% retired</td>
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</tbody>
</table>
## Descriptive Results

<table>
<thead>
<tr>
<th>Chronic Pain</th>
<th>57% Arthritis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>52% chronic low back pain</td>
</tr>
<tr>
<td></td>
<td>25% Fibromyalgia</td>
</tr>
<tr>
<td>Pain severity: Mean = 4.8 ($SD = 2.12$)</td>
<td></td>
</tr>
<tr>
<td>Pain interference: Mean = 4.8 ($SD = 2.63$)</td>
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</tbody>
</table>
Descriptive Results

<table>
<thead>
<tr>
<th>Physical Activity</th>
<th>Work PA</th>
<th>Leisure PA</th>
<th>Sport PA</th>
<th>Total PA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>+</td>
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</tbody>
</table>

Range: 2.6 - 7.6
Mean: 5.4 (SD = 1.09)
Descriptive Results

Stress

72% score 20 or lower

Mean = 16.56

(\textit{SD} = 7.31)
## Descriptive Results

<table>
<thead>
<tr>
<th>Exercise Self-Efficacy</th>
<th>Confidence in continued exercise participation at least 3 times per week for at least 30 minutes at moderate intensity over incremental week periods for 8 weeks.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean = 56.8% (SD = 37.53)</td>
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</table>
### Bivariate Correlation Analyses

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Age</td>
<td>.202*</td>
<td>-.061</td>
<td>-.129</td>
<td>-.049</td>
<td>-.265**</td>
<td></td>
</tr>
<tr>
<td>2. Total PA</td>
<td></td>
<td>-.360**</td>
<td>-.285**</td>
<td>.389**</td>
<td>-.086</td>
<td></td>
</tr>
<tr>
<td>3. Pain Severity</td>
<td></td>
<td></td>
<td>.598**</td>
<td>-.360**</td>
<td>.261**</td>
<td></td>
</tr>
<tr>
<td>4. Pain Interference</td>
<td></td>
<td></td>
<td></td>
<td>-.504**</td>
<td>.514**</td>
<td></td>
</tr>
<tr>
<td>5. Exercise self-efficacy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-.140</td>
<td></td>
</tr>
<tr>
<td>6. Stress</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

*p<.05, **p<.01
Regression Analyses

• Sport PA
  - Stress ($\beta = -.356, p \leq .001$)
  - Pain severity ($\beta = -.416, p \leq .001$)
  - Pain interference ($\beta = -.681, p \leq .001$)
  + Exercise self-efficacy ($\beta = .584, p \leq .001$)
Mediation Analysis

- Stress → Pain Interference: 0.514***
- Sport PA → Pain Interference: -0.702***
- Stress → Sport PA: -0.342***
Mediation Analysis

- Stress 
  - .310***
  - -.342***

- Sport PA

- Pain Interference
  - -.702***
Mediation Analysis - Participants Under Age 50

- Stress → Pain Interference
  - Stress → Sport PA
  - Sport PA → Pain Interference

Correlations:
- Stress: .381**
- Sport PA: -.342***
- Pain Interference: -.702***
Mediation Analysis - Participants 50+

Stress → Pain Interference

Sport PA

Stress → Sport PA

Pain Interference → Sport PA

\[ r = .265^{**} \]

\[ r = -.342^{***} \]

\[ r = -.702^{***} \]
Phase II: Qualitative

1. What influences physical activity participation among people with CP?
2. What is the meaning of physical activity to people with CP?
3. Why are some people with CP more active while others are less active?

- In-depth semi-structured interviews, ~ 1 hr
- Participants (N= 6)
  - Age 50+
  - 3 rural; 3 urban
  - Extreme cases

- Content analysis
Introduction

- Kinesis = self-induced movement

Self-kinesis

An individual’s self-chosen movement, influenced through the interactive energy of biopsychosocial factors
Self-Kinesis

- Endurance
- Power
- Strength
- Flexibility
- Balance
- Energy
Endurance

Purpose through routine movement

*If I stopped from my pain I wouldn’t do what I want to do in life. You know I want to do whatever I can. I mean I’m not gonna give up – that’d be pretty stupid... I do all that because I have a purpose. There’s purpose...I get up, I get dressed, there’s a purpose. That’s how I look at it. (Mary)*
Power

Control of the mind

You have to change the focus. So whether that’s getting up from your chair, whether that’s getting a cup of tea, whether it’s changing the station, whether it’s recognizing the fact that you may need to turn your body in a different direction. Whatever it is, you need to do something. (Dee)
Strength

Influence of others

“If you have 100 pounds of flour to carry, it makes it easier to have someone help you carry it doesn’t it? A burden shared is the same as sharing a heavy weight.” (Lucy)
Flexibility

Adaptability to change

“I work through the pain...let’s say my hip is really bad one day. I go to the gym and the instructor says, ‘we’re gonna do 87 squats’. I’m gonna say, ‘well you know I prefer to go out and walk the track’, which is easier for me, easier on the joint, still exercising. It’s always a matter of choices...you have to know your limitations, but you also have to know your capabilities. “ (Dee)
Balance

Listening to and ignoring the body

“You know your body will always react to stresses.. your body will tell you – you need to make changes but we’re not really good at listening to it.” (Dee)
Energy

A blockage called pain

I find with Fibromyalgia – I don’t know if everyone finds the same thing, but I find it moves – it’s moving from one part of your body to another continually (Lucy).

Like in myself, there’s a battle every day, to live, to cope with everything when you’ve got so much stuff in your body going on. (Joy)
Discussion of Findings

• Total PA increases with age – Leisure PA did not.
  ▫ Subculture of work physical activity in NL (Witcher et al., 2007).

• More active versus less active participants reported less pain interference.

• Sport PA moderates the relation between stress and pain interference.

Pain Interference

• Distraction (power)
• Adaptability (flexibility)
• Influence of others (strength)
Future Analysis

- Path Analysis
  - To examine hypothesized models of associations between stress, pain, PA, and exercise self-efficacy
References

References

Themes

Self-Kinesis

Biological

Psychological

Sociological
How do we respond to stress?

- General Adaptation Syndrome (Seyle, 1956)

  - **Alarm Reaction**
    - Triggered by psychological or physical trauma
  - **Resistance**
    - Initial symptoms disappear; adaptation
  - **Exhaustion**
    - Body fails to cope/ unable to resist to stressor
Which of the following have you been diagnosed with?

- Arthritis
- AIDS
- Cancer
- Chronic fatigue syndrome
- Chronic neck/shoulder pain
- Chronic low back pain
- Chronic pelvic pain
- Irritable bowel syndrome
- Fibromyalgia
- Motor vehicle accident related pain
- Never injury pain
- Phantom limb pain
- Peripheral neuralgia
- Post surgical pain
- Raynaud’s disease
- Spinal cord injury
- Sport-related injury
- Work-related injury
- Other
- Don’t Know
Do you have chronic pain?

Are you able to participate as you like in physical activities?

What things in life seem to influence your pain?

PARTICIPANTS NEEDED FOR CHRONIC PAIN RESEARCH

I am looking for volunteers and invite you to complete a survey aimed at understanding your pain and beliefs about physical activity. Please ask the receptionist for a survey if you are willing to help, or you can complete the survey online at www.surveymonkey.com

If you have questions, please contact Jen Hulburt at 737-3138
jenhulburt@gmail.com

Memorial University of Newfoundland, Department of Human Kinetics and Recreation
Questions?
# Regression Analyses

## Table 13: Hierarchical regression analysis of stress and pain severity controlling for gender and age

<table>
<thead>
<tr>
<th>Variable</th>
<th>Beta</th>
<th>β</th>
<th>F</th>
<th>df</th>
<th>R²</th>
<th>R² adj</th>
<th>R²Δ</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender (^a)</td>
<td>-.101</td>
<td>.214</td>
<td></td>
<td></td>
<td>.043</td>
<td>.023</td>
<td>.043</td>
</tr>
<tr>
<td>Age</td>
<td>-.178</td>
<td>.099</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Step 2</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pain severity (^b)</td>
<td>.274**</td>
<td>.100**</td>
<td></td>
<td></td>
<td>.115</td>
<td>.086</td>
<td>.071</td>
</tr>
</tbody>
</table>

* p < .05, ** p < .01  
\(^a\) 0 = male, 1 = female  
\(^b\) 0 = “no pain”, 10 = “pain as bad as you can imagine”
### Regression Analyses

**Table 13: Hierarchical regression analysis of stress and pain interference controlling for gender and age**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Beta</th>
<th>$\beta$</th>
<th>F</th>
<th>df</th>
<th>$R^2$</th>
<th>$R^2_{adj}$</th>
<th>$R^2\Delta$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender $^a$</td>
<td>.014</td>
<td>.006</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>-.142</td>
<td>-.141</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td><strong>Step 2</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pain interference $^b$</td>
<td>0.517***</td>
<td>.088***</td>
<td>13.514***</td>
<td>3.93</td>
<td>.304</td>
<td>.281</td>
<td>.260</td>
</tr>
</tbody>
</table>

$^a$ 0 = male, 1 = female

$^b$ 0 = “does not interfere”; 10 = “completely interferes”

$^{***}$ p < .001
## Descriptive Results

<table>
<thead>
<tr>
<th>Physical Activity</th>
<th>Work Activity</th>
<th>Sport Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>91% low activity occupations</td>
<td>74% low intensity sport; 55% walking</td>
</tr>
<tr>
<td></td>
<td>Mean = 2.4 (SD = 1.08)</td>
<td>Mean = 2.8 (SD = .64)</td>
</tr>
</tbody>
</table>
## Descriptive Results

<table>
<thead>
<tr>
<th>Physical Activity</th>
<th>Leisure PA</th>
<th>Total PA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>48.4% said their Leisure PA was “less” or “much less” than others their age</td>
<td>Mean: 5.4 (SD = 1.09)</td>
</tr>
<tr>
<td></td>
<td>Mean = 0.6 (SD = 0.55)</td>
<td>2.6 (min) to 7.6 (max)</td>
</tr>
</tbody>
</table>
Physical Activity and Chronic Pain

“Any bodily movement caused by muscle contraction and characterized by the level of physical effort” (ACSM/AHA 2007).

Physical activity is now well recognized as being beneficial for individuals with CP (Jones, Adams et al. 2006).
Chronic Pain and Stress

- Pain predicts daily stress and disability (Tsai, Tak et al. 2003)

- Perceived stress can initiate chronic pain, contribute to its perpetuation, or pain itself can be a stressor (Sauro and Becker 2009).
Differences Among More Active and Less Active Participants

- More active participants ($M = 4.1$, $SD = 2.58$) versus less active participants ($M = 5.9$, $SD = 2.23$) also reported less pain interference.

- Active participants compared to less active participants reported lower stress. *not statistically significant*