Is exercising with chronic pain as easy as “Just do it”?

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Road Map

- Chronic pain (arthritis as working example)
- Self-management vs disease management
- Exercise and key psychological skills for adherence
- Current and future research directions
- Practical application
Chronic Non-Cancer Pain

- Pain lasting 3 - 6+ months
- Prevalence estimates: 12% to >50%
- Injury, chronic diseases
- Arthritis – working example
  - Pain is chronic, fluctuates (flares), and can be debilitating
  - Exercise = recommended self-management strategy

Borsook et al. (2010); Fishman et al. (2010); Merskey et al. (1994); Schopflocher et al. (2011)
Arthritis

- 100+ types

- Most prevalent: Osteoarthritis, rheumatoid arthritis

- Others: gout, lupus

PHAC (2010)
Arthritis Prevalence

- Common chronic disease
- 16% – 20% of adults
  - 50% of adults, 65+ years
  - 2030: 25%
- Affects more women than men
  - 19% women
  - 13% men

Cheng et al., 2010; CDC (2016); PHAC (2010)
Arthritis - Impacts

- Common cause of disability

- **Individual burden:** Pain, depression, anxiety, limitations in activities of daily living, lower health-related quality of life

- **Economic burden:** 6.4 CDN/128 billion USD (direct + indirect costs)

CDC (2016); PHAC (2010)
Arthritis - Impacts

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CDC (2016); PHAC (2010)
Individual and economic benefits

Behavioral strategies (e.g., exercise, diet, tobacco) decrease sickness and mortality at almost **HALF THE COSTS** as other disease management strategies (e.g., prescription drugs)

**BEHAVIOR MATTERS** in the *self-management* of chronic diseases

Fisher et al. (2011)
Behavioral Self-Management

- Encompasses tertiary prevention
  - Slow or prevent further deterioration due to disease and maximize quality of life

- How does self-management differ from disease management?
Disease Management

- Broader context of integrated care and treatment to best manage a disease

- Involves individuals, health care professionals (HCPs), and health care system
  - e.g., diagnostic testing, prescriptions, support services

Clark (2003)
Self-management

- Behaviors *individuals* undertake to live well with a chronic condition and optimize functioning

- Behavioral outcomes – monitor symptoms, take medications, seek help, *exercise*

- Processes – individual skills needed to achieve outcomes
  - e.g., technical; *psychological skills for adherence*

Clark (2003); Health Council of Canada (2012)
Self-management of Arthritis

- Centers for Disease Control (CDC) recommends:

1) Healthy diet
2) Protect joints from injury
3) Exercise at the recommended dose
Exercise Dose

- All types of arthritis: 150+ minutes of moderate+ physical activity/exercise each week
- Exercise: planned during free time
- Physical activity: movement resulting in energy expenditure above resting
- CDC; Public Health Agency of Canada (PHAC)
As easy as “Just do it”? NO
Prescription Non-adherence

- 60% of adults with arthritis do not adhere
  - Chronic pain: 16 min/week of moderate exercise

- Non-adherence: structured programs (e.g., Arthritis Foundation) and self-direct (e.g., walking)

- Result: *effectiveness* of exercise as a self-management strategy is *drastically reduced*

- Canadian Arthritis Summit: remedy poor adherence

Alliance for the CDN Arthritis Program (2006); Danise et al. (2014); Jordan et al. (2010); PHAC (2010); Pisters et al. (2010)
Targets for Adherence: Social Ecological Model

McLeroy et al. (1988)
Intrapersonal

- Characteristics of the individual

- e.g., Age, disease status, knowledge

- Psychological skills = process variables important for adherence to self-management behaviors
Exercise Failure (Non-adherence)

Psychological skills help people deal with challenges
Psychological Skills

- Ideally, should be theory-based

  ➤ Once processes are reliably identified...
    - Know *what and how* (theory) to target to improve adherence rates

- Arthritis & exercise domain: What skills seem to be important?

Baranoff et al. (2013); Brawley et al. (2012); Painter et al. (2008)
Psychological Skills/Tools

1) Self-regulatory efficacy (SRE)

2) Pain-related beliefs
Self-regulatory Efficacy (SRE)

- Confidence in abilities to change:
  - Behaviors, thoughts, and emotions when challenges arise in order to reach a desired goal
  - e.g., Regular exercise (to better self-manage pain and other arthritis symptoms)

Bandura (1986); Baumeister et al. (1994); Maddux & Gosselin (2003); Solberg Nes et al. (2009)
SRE (social cognitive theory)

- When *challenged*, people will either...
  - Persist and remain task-diagnostic
    - ✓ Reach their goals/adhere
  - Give up/non-adherence

Bandura (1986); Maddux & Gosselin (2003)
SRE (social cognitive theory)

- When *challenged*, people will either...

  HIGH SRE

  - Persist and remain task-diagnostic
  - Reach their goals/adhere

  ✔️

  LOW SRE

  - Give up/non-adherence

Bandura (1986); Maddux & Gosselin (2003)
Arthritis:

- 50 years - Strongest and most consistent predictor:
  - Improved arthritis outcomes (e.g., pain, depression, fatigue, disability)

- Self-management strategies (e.g., resist excessive eating, analgesic use)

- Regardless of type, joint site, # joints involved
Exercise:
- Self-regulation skills and related SRE are key
  - Overcome barriers
  - Goal set
  - Self-monitor

- SRE: Class 1, Level A evidence: High agreement, high methodological rigor

- Efficacy enhancements = exercise

Artinian et al. (2010); Brawley et al. (2013)
Research program: Examine the contribution of SRE beliefs to exercise adherence among adults with arthritis

2 key findings
SRE: Exercise Adherence and Arthritis

- **Participants:**
  - Various types of doctor-diagnosed arthritis
  - Plans to exercise (uptake is another story)
  - Adults, 18+ years of age

- **Methods:**
  - Cross-sectional, prospective, experimental
  - Surveys
Key SRE Findings

1) SRE to overcome barriers
   - Arthritis barriers (AB) more challenging than general barriers
     - Arthritis: pain, joint stiffness, fatigue, etc.
     - General: lack of time, motivation, etc.
   - SRE-AB:
     - Predicts exercise levels
     - Higher in those meeting recommendation
     - Persistence to deal with challenging barriers

   e.g., Brittain et al. (2011); Gyurcsik et al. (2013); Sessford et al. (2015); Sessford et al. (under review)
Key SRE Findings

2) SRE to schedule and plan exercise (SRE-SP)

- Predicts exercise levels

- Higher in those meeting recommendation

  e.g., Flora et al. (2015); Sessford et al. (2015)
Psychological Skills

1) SRE
   - Help individuals learn, practice, and master key self-regulatory skills
   - Increase tools at disposal
Psychological Skills

1) SRE
   - Help individuals learn, practice, and master key self-regulatory skills

1) Pain-related beliefs
Pain-Related Beliefs

- People **report**: arthritis pain interferes with exercise

- Perplexing: Pain is no worse on exercise vs non-exercise days
  - Does **NOT** usually predict exercise, including at the recommended dose

- Why?

Brittain et al. (2011); Der Ananian et al. (2006); Focht et al. (2002); Gyurcsik et al. (2013); Hewlett et al. (2011)
Pain-Related Beliefs

- Chronic pain literature: Pain, in isolation, does not influence functioning and behaviors

- Psychological responses to pain (rather than pain itself), may be important

- Two responses:
  - PAIN ACCEPTANCE
  - PAIN ANXIETY

McCracken & Gutierrez (2011); White et al. (2012)
Pain Acceptance

- Allowing pain to be experienced, without attempts to control it
  - Reflects psychological flexibility and resiliency

Dimensions

1) Willingness: openness to experience pain

2) Activities engagement: pursue valued goals and activities despite pain

McCracken & Vowles (2006)
Pain Acceptance – is NOT

- “Sucking it up”
- “Pain does not matter”
- Rather, pain does MATTER....

- Pain acceptance IS: being willing to do valued activities even though one has pain

McCracken & Vowles (2006)
Pain Acceptance, SRE, and Exercise

- Peripheral artery disease: greater acceptance was positively associated with SRE to overcome barriers and walking.

- Could similar relationships be found in those with arthritis?

- 118 women with arthritis: Greater and weaker pain acceptance groups (n = 59/group)

Rejeski et al. (2008)
Greater vs Weaker Pain Acceptance Groups

- Greater acceptance: **less** pain, **higher** confidence (SRE-AB), and + exercise outcomes **more likely** \( (p’ s < .01) \)

Gyurcsik et al. (2011)
Moderate+ Exercise

- Greater pain acceptance: more exercise ($p < .05$)

Gyurcsik et al. (2011)
Pain Acceptance

- Findings: first to show benefit of pain acceptance

- But pain is a common outcome
  - ....inconsistent relationship with exercise was still perplexing

- Maybe participants were not in sufficient amounts of pain – pain was manageable?
Arthritis Flare – Increased Pain

- *Arthritis flare* pain may pose a greater challenge to exercising

- Flare = exacerbation of typical arthritis symptoms, including pain

- Also examined SRE-AB and SRE-SP exercise

Bandura (1986); Bingham III et al. (2009); Focht et al. (2002)
Arthritis Flare

2 Weeks

Time 1
SRE-SP
SRE-AB
Pain intensity

Time 2
Exercise Flare factors

MANOVA: met ($n = 24$) vs not meet exercise dose ($n = 32$)
Comparing Exercise Groups

- No differences in pain or flare factors
Comparing Exercise Groups

**Met dose: higher confidence beliefs, p < .01**

![Graph showing Comparing Exercise Groups](image-url)
Arthritis Flare

- Pain does not differentiate exercise even under the increased challenge of a flare

- Further support for SRE

- SRE may be advantageous for adherence when experiencing chronic disease-related challenges

Sessford, Gyurcsik, Brawley, & Spink (2011)
Pain Anxiety

- People frequently experience arthritis pain anxiety
- More common than depression

Murphy et al. (2012)
Pain Anxiety

- Emotional state involving anticipation of a threat
  - May cause avoidance of a future event expected to cause pain (e.g., exercise)
  - How might anxiety impact exercise?

Asmundson et al., 2004; Carleton & Asmundson, 2009; Leeuw et al., 2006; PHAC, 2010
Fear Avoidance Model

Two pathways in response to pain anxiety:

Avoidance (failure)

Confrontation (success)

Lethem et al., 1983; Crombez et al., 2012; Slade et al., 1983; Vlaeyen & Linton, 2000
Avoidance Pathway (failure)

- People negatively interpret pain → Increases in pain anxiety and exercise avoidance
- Fear avoidance model: Use maladaptive exercise responses to pain anxiety
  - Watch TV; Spend time relaxing with a friend; rest
Confrontation Pathway (success)

- People respond more positively to pain and anxiety, leading to continued participation

- Fear avoidance model: Use adaptive exercise responses:
  - Modify exercise type, time, frequency, intensity

- What may help people use adaptive responses?
  - Pain resiliency: reflected by pain acceptance
  - Acceptance is a moderator of anxiety-adaptive response relationship
Procedures – Study Design

Online surveys

Time 1

2 Weeks

Time 2

Exercise

- Pain
- Pain Anxiety
- Pain Acceptance
- Maladaptive SR Responses
- Adaptive SR Responses

Cary, Gyurcsik, & Brawley (2015)
Avoidance: Anxiety $\rightarrow$ Maladaptive Responses

**Step 1**

- Pain

**Step 2**

- Pain
- Anxiety

\[ r^2_{\Delta} = .40^{***} \]

\[ B_{\text{std.}} = .65^{***} \]

Full model $r^2_{\text{adj}} = .44^{***}$

\[ *p < .05, ***p < .001 \]

Cary et al. (2015)
Confrontation: Anxiety X acceptance → Adaptive

**Step 1**
- Pain
  - $B_{std.} = .20^*$

**Step 2**
- Pain Anxiety
  - $r^2 = .12^{***}$
  - Pain Acceptance

**Step 3**
- Pain Anxiety
  - $r^2 = .03^*$
  - Pain Acceptance

Full model $r^2_{adj} = .20^*$

Cary et al. (2015)
Moderation by Pain Acceptance

Cary et al. (2015)
Moderation by Pain Acceptance

✓ Pain acceptance helps people deal with anxiety:
  ▪ Promotes use of adaptive responses *only when needed*

Lower pain anxiety
  ▪ Higher pain acceptance: less use of adaptive responses
  ▪ Lower pain acceptance: more use

Higher pain anxiety
  ▪ ↑ use regardless of pain acceptance levels

Cary et al. (2015)
Higher Pain Acceptance: Beneficial

- Higher pain acceptance: pain anxiety is a challenge (requiring adaptation), *only* when higher

- Benefit: Do not drain our “thinking fuel tank”
  - Fuel (strength) left to persist in dealing with other exercise challenges

(Crombez et al., 2012; Leeuw et al., 2006; Vlaeyen & Linton, 2000)
Lower Pain Acceptance: Draining

- **Lower pain acceptance**: pain anxiety is a challenge \textit{at all times}

- Use adaptive strategies, regardless of pain anxiety level, which drains “fuel tank”
  - Less able to deal with other challenges

(Crombez et al., 2012; Leeuw et al., 2006; Vlaeyen & Linton, 2000)
What about INACTIVE people?

- Differ in psychological skills (including pain-related beliefs) from:
  - Meet dose (150+ mins/week)
  - Insufficient exercisers who do not meet dose

- If so, promote psychological skills development to level of sufficient exercisers
Psychological Skills Profile

- Over two weeks:
  - 83 met the dose (330 mins/week)
  - 89 did not meet (66 mins/week)
  - 103 inactive

- Compared pain, acceptance, and anxiety

- MANOVA was significant ($p < .01$)
Profile – Pain Variables

- Inactive: **less** acceptance; **higher** anxiety and pain

Gyurcsik, Cary, Sessford, Flora et al. (2014)
Profile – Pain Variables

- Insufficient: less acceptance; higher anxiety

Gyurcsik, Cary, Sessford, Flora et al. (2014)
Psychological Skills Profile

- *Inactive* individuals: different profile
  - Pain, acceptance, and anxiety

- *Insufficiently* active: differ than *sufficiently* active
  - Pain beliefs: acceptance and anxiety

*Suggests*

- Decrease pain to manageable levels first (disease management)
- Enhance pain acceptance (buffers anxiety)
Psychological Skills

- How do we help individuals with chronic pain exercise and learn key psychological skills?

1) SRE
- Help individuals learn, practice, and master key self-regulatory skills

1) Pain-related beliefs
Ask the Experts

- People with chronic pain, significant others, HCPs, and exercise providers

- Objective: Identify gaps/needs in services and related pain and psychological skills education

Tupper, Cary, Gyurcsik, Ratcliffe-Smith, & Brawley (under review)
Ask the Experts

- 10 focus groups
- Rural and urban

N = 63, 24 – 85 years ($M = 56$ yrs)
  - 29 chronic pain; 10 significant others; 10 HCPs; 14 exercise providers

- Three primary themes...

Tupper et al. (under review)
1) **Opportunities** for people with chronic pain to exercise

2) **Knowledge** about chronic pain, exercise, and psychological skills

3) **Supports** to exercise with chronic pain and receive psychological skills education

Tupper et al. (under review)
Opportunities

- Many exercise opportunities in urban settings (all)
  - But few for people with chronic pain (all)

- Limited/no education on exercising with chronic pain, and pain/psychological skills education (all)

- Uncertain about safe/recommended exercise (chronic pain, significant others, HCPs)

Tupper et al. (under review)
Knowledge

- Need more information on exercise and chronic pain (all)
- Limited/no awareness of psychological skills (all)
- HCPs know of recommended exercise program for referral (chronic pain)

- Exercise providers are key knowledge delivery agents (chronic pain, significant others)

Tupper et al. (under review)
Knowledge

- Lack of training and knowledge about exercise and chronic pain (HCPs, exercise providers)

Tupper et al. (under review)
Supports

Chronic Pain

- Exercise group programs with high standard of care (no variability between programs)

- Program not specific to chronic pain participants (provider – adapt exercises and educate)

- Referred by HCPs (lack of time & knowledge)

Tupper et al. (under review)
Supports

- **Exercise providers** need training on modifying exercise and education on pain/psychological skills training (significant others)

- Better linkages between HCPs (referrals) and exercise providers (HCPs, exercise providers)

Tupper et al. (under review)
HCPs refer chronic pain patients to knowledgeable exercise providers that offer high quality programs.

- Provider: trained in exercise adaptation, chronic pain, and psychological skills education
- Offering standard exercise programs is not enough

Exercise providers are key to helping people with pain adhere to exercise.
What is next?

Exercise Providers

- Develop and test an educational tool to increase knowledge about:
  - Chronic pain, exercise adaptations, and psychological skills

- Longer-term: Continuing education/certification
  - Adapt exercise + chronic pain + psychological skills to promote adherence
  - Ensure high quality of care
Short term – What can be done?

- Recognize exercise is a commitment for a lifetime
- Not as easy as
  - Failure is natural and expected (lapse)
  - Key → prevent relapse (long-term inactivity)

- How?
  - Make regular plans to exercise (SRE-SP)
  - Identify and practice strategies to deal with barriers (SRE to overcome barriers)
Enhance SRE to Overcome Barriers

- Identify **challenging** barriers
  - Possible coping strategies (own; best with others)

- Process: Try and fail; try again – flexible strategy use
- With time – figure out what works (increase SRE)

- Be nice to yourself: use adaptive strategies when pain is higher
  - Alter time, type, and intensity of exercise
  - Break if necessary
Develop Pain Acceptance

- Acceptance and Commitment Therapy (ACT)
  - Mindfulness-based

- Learn to:
  - Make room for painful sensations and responses/emotions (e.g., pain anxiety) in order to pursue valued activities (e.g., exercise)

- Allow presence of pain without struggling

Veehof et al. (2011); Yu & McCracken. (2016)
Exercise Adherence: Psychological skills are a key piece
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