Mindfulness Approaches to Pain Management
Danielle Ruskin, PhD, CPsyCh (Psychologist – Hospital for Sick Children)

1. What is mindfulness?

2. How can mindfulness benefit patients with chronic pain?

3. What is the evidence?

4. Description of a Pilot 8 week Mindfulness Group for Teens with Chronic Pain
Try nonpharmacologic and non-opioid therapies first, the Centers for Disease Control and Prevention (CDC) recommended in a recently published opioid prescribing guideline for primary care clinicians in outpatient settings (Dowell D et al. JAMA. 2016;315[15]:1624-
Automatic Pilot

Thoughts About Past

Thoughts About Future
What is Mindfulness?

Key Concepts:
- Paying attention
- On purpose
- In the present moment
- Without judgment
- Compassion / Kindness

Patience

Trust the Process

Let Go

Non-Judgment

Acceptance

Trust the Process

Patience

Let Go

Non-Judgment

Acceptance
How can Mindfulness Based Interventions (MBIs) Help People with Chronic Pain?
How can mindfulness help?
Primary and secondary suffering

“I can’t stand the pain”
“I’ll never achieve my goals”
“I am afraid the pain will get worse”
“My friends won’t want to be with me”

Anger
Sadness
Shame
Worry

Efforts to avoid/resist the unwanted experience
(sleeping during day, substance use, self harm)

Sometimes pain is unavoidable, but suffering is optional
How can mindfulness help?

Responding versus reacting in knee-jerk/habitual ways to our experience

Using the breath as an anchor to the present moment

Cultivating the ability to simply notice our experiences (thoughts, emotions, physical sensations) rather than get hooked by them
Meditation: Bringing comfort to pain
Some Practice Together
### How Mindfulness Helps:

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Benefits</th>
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</thead>
<tbody>
<tr>
<td><strong>Exposure</strong></td>
<td>Exposure to pain sensations without desensitization and reduced emotional reactivity to pain sensations; reduced avoidance behaviours; noting that sensations can be transient and can change</td>
</tr>
<tr>
<td><strong>Attention</strong></td>
<td>Focused attention on chosen object (e.g., breath); reduced focus on pain sensations; whenever distracted re-focusing attention on breath; noticing thoughts vs becoming absorbed</td>
</tr>
<tr>
<td><strong>Regulation</strong></td>
<td>Approaching emotions in a novel way, non-judgmentally and with compassion; reduced emotional distress, self-efficacy in dealing with previously powerful emotions</td>
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<tr>
<td><strong>Cognitive Change</strong></td>
<td>Observing, noticing thoughts that pass through mind, non-judgmentally; recognizing that these are ‘just thoughts’ and may not reflect reality</td>
</tr>
<tr>
<td><strong>Compassion</strong></td>
<td>Noticing critical voice; self acceptance; acceptance of experience</td>
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Typical Components of MBIs

8 – 10 week course, 2- 2.5 hrs per session

1. Formal Meditation Practice:
   **Body Scan** – attention is directed sequentially to areas of the body. Notice sensations and let them be. Focus on *noticing* sensations / thoughts NOT changing.

2. Informal Meditation Practice:
   **Being more mindful/“present” in everyday activities:**
   - Walking to meetings/ classes
   - Showering
   - Eating your breakfast

3. Compassion towards self / others
   Non judgment towards our experience (thoughts, emotions, sensations)

4. Home Practice

5. Yoga
We Adapted Adult Mindfulness Program for Adolescents

<table>
<thead>
<tr>
<th></th>
<th>Adult</th>
<th>Adolescent</th>
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<tbody>
<tr>
<td>Session Length</td>
<td>2.5 hours</td>
<td>1.5 - 2 hours</td>
</tr>
<tr>
<td>Session Content</td>
<td>Didactic; Abstract Concepts</td>
<td>Less didactic, more experiential</td>
</tr>
<tr>
<td>Group Process</td>
<td>Identified leader who teaches concepts</td>
<td>Collaborative and exploratory</td>
</tr>
<tr>
<td>Meditations</td>
<td>Long meditations 45 minutes - day long retreat</td>
<td>Shorter and greater variety of meditations (5 min – 35 min)</td>
</tr>
<tr>
<td>Homework</td>
<td>45 minutes/ 6 days a week</td>
<td>5 minutes daily with use of apps (stop, breathe, think; buddhify) to encourage home practice</td>
</tr>
<tr>
<td>Group Composition</td>
<td>Few restrictions</td>
<td>Grouping according to developmental stage</td>
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What is the Evidence for Mindfulness Approaches?
What is the Evidence?

Systematic review and meta-analyses of mindfulness in adult literature (clinical, non clinical populations)
Medium Effect sizes $d = 0.30 – 0.60$

Evidence in Kids?

Few studies on clinical populations (mainly externalizing disorders, anxiety, substance use, mixed mental health – anxiety/depression primary)
Only 1 RCT

Effect size for clinical populations 3 x greater vs non clinical ($d = 0.5$ vs $0.197$)

Greatest impact for psychological symptoms (anxiety / depression) $d = 0.373$
Acceptance- and mindfulness-based interventions for the treatment of chronic pain: a meta-analytic review

M. M. Veehof\textsuperscript{a,b}, H. R. Trompetter\textsuperscript{a}, E. T. Bohlmeijer\textsuperscript{a} and K. M. G. Schreurs\textsuperscript{a,c}

Looked at RCTs  \( N = 25 \), ages 35-60, majority female
Acceptance or MBI  \textbf{versus}  wait list control, TAU or Education/Support Control

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Post Tx</th>
<th>Follow-Up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain Intensity</td>
<td>.24</td>
<td>.41</td>
</tr>
<tr>
<td>Depression</td>
<td>.43</td>
<td>.50</td>
</tr>
<tr>
<td>Quality of Life</td>
<td>.44</td>
<td>.66</td>
</tr>
<tr>
<td>Anxiety</td>
<td>.51</td>
<td>.57</td>
</tr>
<tr>
<td>Pain Interference</td>
<td>.62</td>
<td>1.05</td>
</tr>
</tbody>
</table>

Effect Size:
- \( d = 0.2 \) (small)
- \( d = 0.5 \) (medium)
- \( d = 0.8 \) (large)

Effects more pronounced over time
20 meditators vs 20 non-meditators (age-gender matched)

Meditators:
Avg 9 yrs meditating experience

Daily meditation < 60 min

Cortex thicker in meditators - The cortex atrophies with age; in meditators, however, these enlarged areas were the same thickness as what was measured in nonpractitioners twenty years younger

Prefrontal Cortex
Executive Function

Insular Cortex
Integrates sensory – emotional Empathy

Sara Lazar – Harvard Neuroscientist
N = 75 Healthy Pain Free, meditation naive volunteers (x age = 27, 38 male, 37 female)

Randomized to 4 groups

Placebo Analgesia = “Lidocaine” cream (really Vaseline) applied
Mindfulness Meditation = 4 days 20 min/day mindfulness instruction
Sham Meditation = 4 days 20 min/day subj told they were assigned to meditation group “take a deep breath as we sit here in meditation” repeated every 2-3 minutes
Control Group = Listened to audio book (20 min/day of same book)
Mindfulness condition showed significantly greater reductions (pre-post training) in pain intensity and unpleasantness vs all other groups.

Mindfulness:  
- Pain intensity: 27% reduction
- Pain unpleasantness: 44% reduction

Sham Meditation:  
- Pain intensity: 8% reduction
- Pain unpleasantness: 27% reduction

**Figure 3.** Psychophysical pain ratings (mean ± SEM) in MRI Session B. Mindfulness meditation produced greater reductions in both pain intensity (left) and pain unpleasantness (right) compared with placebo. **Mindfulness meditation also was significantly (p < 0.05) more effective at reducing pain intensity (left) and pain unpleasantness (right) ratings than sham mindfulness meditation and control conditions.** *All cognitive manipulations were significantly (p < 0.004) more effective at reducing pain intensity and unpleasantness ratings compared with the control group.*
Mindfulness condition showed distinct brain mechanisms vs other conditions

Mindfulness has more top–down, active cognitive reappraisal mechanisms independent of respiration vs bottom up regulation of pain associated with placebo analgesia or sham meditation.
Examining the Feasibility and Acceptability of an MBI adapted for teens with Chronic Pain – A Pilot Study

Sara Ahola-Kohut
Jennifer Stinson
Katie Walker
Ardith Baerveldt
Lauren Harris
Michelle Gagnon
Mindfulness Group Structure – Pilot Study

- 2 hr session 4:30 – 6:30 for 8 weeks, Fall Group and Spring Group
- Recruited from Chronic Pain Clinic
- Pre Assessment, Post Assessment Directly After Group, 3 month follow-up
- Parent Workshop To Introduce Parents to Mindfulness Skills at session 2
- Focus Group

**Primary question:** What is the feasibility of the Mindfulness Group? Estimates of recruitment, retention and withdrawal rate

**Secondary question:**
Is group helpful? To what extent did teens feel engaged in the group and find group acceptable?
Key Messages Across Sessions

1. Improving ability to ‘be with’ pain

2. Approaching thoughts, emotions, physical sensations with attitude of curiosity and openness

3. Awareness of thoughts, emotions and physical sensations

4. Letting-go

5. Responding instead of reacting to situations

6. Self Compassion

Meditations: Breathing, Body Scan, Eating Meditation, Walking Meditation, Mountain Meditation

Fun Experiential activities: Music, Dance, Art, Improv
13-18 y.o.
Chronic Pain Diagnosis
No Significant Cognitive Impairment
Not in Psychiatric Crisis

42 Eligible Patients

21 Enrolled
50% recruitment rate

#1 Reason Declined = Scheduling Conflict
#2 Reason = Unable to Contact
**Table 1: Adolescent Characteristics n = 21**

<table>
<thead>
<tr>
<th></th>
<th>Average</th>
<th>Range</th>
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<tbody>
<tr>
<td><strong>Age</strong></td>
<td>15.5</td>
<td>13-17</td>
</tr>
<tr>
<td><strong>Pain Duration (months)</strong></td>
<td>35.8</td>
<td>10-120</td>
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<table>
<thead>
<tr>
<th>Gender</th>
<th>Fall 2014 (n=10)</th>
<th>Spring 2015 (n=11)</th>
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<tbody>
<tr>
<td>Female</td>
<td>9</td>
<td>11</td>
</tr>
<tr>
<td>Male</td>
<td>1</td>
<td>0</td>
</tr>
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</table>

* Percentages may not sum to 100 due to rounding.*

* Mixed = Nociceptive, Neuropathic

* Neuropathic 14%  
  * Mixed (10%)
  * Other (10%)
  * Headache (9%)

Muskuloskeletal (57%)
Results

Estimates of recruitment, retention and withdrawal rate

90.5 % participants completed treatment (attended \( \geq 6/8 \) sessions)

No Drop Outs

Satisfaction Rating = 8.25/10
## Initial Outcomes

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Pre</th>
<th>Post</th>
<th>3 months</th>
<th>$\chi^2$</th>
<th>$p$</th>
<th>ES*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Functional Disability Index</td>
<td>18</td>
<td>22.67</td>
<td>26.69</td>
<td>26.39</td>
<td>4.55</td>
<td>.10</td>
<td>.31</td>
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<tr>
<td>Multidimensional Anxiety Scale for Children – Anxiety Disorders Index</td>
<td>16</td>
<td>54.63</td>
<td>58.00</td>
<td>55.50</td>
<td>3.32</td>
<td>.19</td>
<td>.09</td>
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<tr>
<td>Columbia Depression Intensity Scale</td>
<td>15</td>
<td>9.53</td>
<td>10.42</td>
<td>9.60</td>
<td>2.29</td>
<td>.32</td>
<td>-.01</td>
</tr>
<tr>
<td>Pain Catastrophizing Scale</td>
<td>16</td>
<td>25.31</td>
<td>25.62</td>
<td>25.43</td>
<td>.03</td>
<td>.98</td>
<td>-.01</td>
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<tr>
<td>Child Acceptance and Mindfulness Measures</td>
<td>16</td>
<td>53.88</td>
<td>50.45</td>
<td>52.94</td>
<td>4.88</td>
<td>.09</td>
<td>-.12</td>
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**Chronic Pain Acceptance Questionnaire**

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Pre</th>
<th>Post</th>
<th>3 months</th>
<th>$\chi^2$</th>
<th>$p$</th>
<th>ES*</th>
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</thead>
<tbody>
<tr>
<td>Activity Engagement</td>
<td>16</td>
<td>36.06</td>
<td>39.13</td>
<td>41.00</td>
<td>1.19</td>
<td>.55</td>
<td>.47</td>
</tr>
<tr>
<td>Pain Willingness</td>
<td>16</td>
<td>20.94</td>
<td>24.13</td>
<td>26.44</td>
<td>8.98</td>
<td>.01</td>
<td>.54</td>
</tr>
<tr>
<td>Total</td>
<td>16</td>
<td>57.00</td>
<td>63.25</td>
<td>67.44</td>
<td>7.65</td>
<td>.02</td>
<td>.55</td>
</tr>
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**Multidimensional Scale of Perceived Social Support**

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Pre</th>
<th>Post</th>
<th>3 months</th>
<th>$\chi^2$</th>
<th>$p$</th>
<th>ES*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Pain</td>
<td>9</td>
<td>5.11</td>
<td>5.33</td>
<td>5.50</td>
<td>3.47</td>
<td>.18</td>
<td>-.18</td>
</tr>
</tbody>
</table>
Changes in Pain Acceptance from Baseline to Follow Up

“My life is going well even though I have chronic pain”

“it’s not necessary to control my pain in order to live my life well.”

“I need to concentrate on getting rid of my pain”

“I avoid putting myself in situations where my pain might increase”
Today’s session helped me cope with….

Across 8 Sessions

<table>
<thead>
<tr>
<th>Completely True</th>
<th>Not at all True</th>
</tr>
</thead>
<tbody>
<tr>
<td>True</td>
<td>* p &lt; .05</td>
</tr>
<tr>
<td>True</td>
<td>** p &lt; .01</td>
</tr>
</tbody>
</table>

- Blue line: pain
- Red line: stress
- Green line: body awareness
- Purple line: Feel less alone

Across 8 Sessions
Lessons Learned

Group modality is key – social support and being with others that “get it”

If you are going to have a wide age range (e.g., 12-18), ensure to include a few participants within same age bracket

Introduce meditations that invite participants to “be with their pain” in a paced manner, using lots of cues to be “gentle with themselves”, “with kindness”, “can come back to the breath whenever they need it”

Set reasonable expectations at beginning of the group – while group may assist with pain, practices are most helpful for reducing the distress/suffering pain can bring into life (i.e., secondary suffering)
Next Steps

Randomized Control Trial Comparing Our Mindfulness Group for Children with Chronic Pain to Treatment as Usual

Inclusion of Additional Outcomes:

Parent Reported Measures of Children’s Function (Distress, Disability, Peer Relationships)

Health Care Utilization

Hope to disseminate mindfulness protocol to other centers
Helpful Resources

TED Talk: Fadel Zeidan, Assistant Professor of Neurobiology and Anatomy, and Associate Director of Neuroscience at the Wake Forest Center for Integrative Medicine.
https://www.youtube.com/watch?v=OLQJJDrbj6Q

Vidyamala Burch
Breathworks, UK
Summary

Mindfulness can reduce secondary suffering associated with health conditions by teaching:

Exposure to unwanted internal sensations with attitude of curiosity/compassion -> cultivating self efficacy in coping with what comes our way

Pausing before responding to upsetting experience

Recognizing when we are in “autopilot” and use present moment awareness to ground us

Recognition of the transient, ever changing nature of our experience

Research base is growing to show that MBIs are most powerful for clinical populations, are most effective at reducing secondary suffering with effects maintained over time

Next step – RCTs to assess effectiveness in pediatric clinical populations