A Sensory and Emotional Experience:

Pediatric Chronic Pain and Mental Health

Conflict of Interest Disclosure

- Authors Conflicts of Interest:
  - A. Clark, L., No Conflict of Interest
  - B. Wrona, S., No Conflict of Interest

Objectives

- Identify risk factors for mental health concerns in adolescents
- Compare assessment tools for mental health concerns in adolescents
- Understand of the impact of pain on mental health
- Discuss multi-modal treatment options
Definition
- Pain
- Chronic Pain

Pain Models
- Gate Control Theory
- Bio-psychosocial
- Fear-avoidance model

Gate Control
- Melzack & Wall – 1965
  - Gating mechanism in the dorsal horn
  - Excitation along large-diameter, myelinated – closes gate
  - Excitation along small-diameter, unmyelinated – opens gate
  - Current cognition and mood influence gate
  - Influences perception of pain
Bio-Psychosocial

- Interaction between biological & psychological
- Focus on the behavior surrounding the disease, not the disease itself
- Perception of sensations

Fear-Avoidance

- Pain-related fear and anxiety play roles development and maintenance of disabling chronic pain
- Fear of injury = increased disability & pain = longer than time expected for normal healing

Fear Model

![Fear Model Diagram](image-url)
Risk Factors for Mental Health Concerns

- It is estimated that 15-25% of children and adolescents suffer from various chronic pain complaints (Haraldstad, et al., 2010).
- Knook and colleagues (2011) studied children and adolescents with unexplained chronic pain and found the prevalence of psychiatric disorders was 21%.

Risk Factors for Mental Health Concerns

- Kashikar-Zuck and colleagues (2001) studied the effects of depression and impact on functional disability in pediatric chronic pain.
  - This study identified that functional disability was strongly linked with depression in children with chronic pain. The study also identified that children with musculoskeletal pain had more difficulties coping and higher disability than children with chronic daily headaches.
- Hoftun, Romundstad, and Rygg (2012)
  - This study found a high correlation with anxiety and depression with chronic pain (odds ratio 3.7 in boys and 4.1 in girls) as well as increased disability.

Risk Factors for Mental Health Concerns

- Assessing mood and quality of life in adolescents with chronic pain to identify teens at high risk for mental health needs
Project Purpose

To determine the prevalence of negative mood, quality of life, functional disability, and coping with pain prior to participation in an outpatient pain treatment program to identify adolescents at high risk for mental health problems.

Population and Sample

- The population for this project included adolescents who were seen in the Outpatient Pain Clinic Program at Nationwide Children’s Hospital for new patient intakes from January 2010 through December 2013 who completed the initial questionnaires.
- Total subjects included 155 adolescents ages 13-18 years old.

Project Design

- The DNP project design utilized a retrospective review to examine self-reported scores of Short Mood and Feeling Questionnaire (SMFQ) – CHILD version, Pediatric Quality of Life Inventory™ (PedsQL™), Functional Disability Inventory (FDI), and Pain Coping questionnaire (PCQ) questionnaire.
- A review was conducted using the NCH pain clinic database and research database for completed intake questionnaires of patient self-reported scores before participation in an outpatient pain management program in the Outpatient Pain Clinic at NCH.
- Prior to conducting the database review, an Institutional Review Board (IRB) review and approval was received from Nationwide Children’s Hospital.
The aim of the DNP Scholarly Project was to identify adolescents who meet study criteria that designates them as high risk for mental health problems who completed the intake questionnaires from 2010-2013.

1) Describe demographic clinical characteristics of this group.
2) Describe demographics and clinical characteristics of each subgroup.
3) Among adolescents at high risk, identify those at high risk on all 4 scales (SMFQ, PedsQL™, FDI, and PCQ), on 3 scales, 2 scales, and 1 scale.

### Questionnaires

- Mood and Feeling Questionnaire – M F Q
  - 1-cut-off value established by developer

- Pediatric Quality of Life – PedsQL™
  - Physical functioning - 80.00%
  - Emotional functioning - 73.00%
  - Social functioning - 76.00%
  - School functioning - 63.90%

- Pain Coping Questionnaire – PCQ
  - Information seeking - 4.8
  - Problem solving - 9.6
  - Seeking social support - 7.8
  - Positive self-esteem - 8.2
  - Self-efficacy - 4.7
  - Cognitive Distraction - 4.7
  - Behavioral Distraction - 4.7
  - Emotional/Externalizing - 2.8

- Functional Disability Inventory – FDI
  - > 30% cut-off
Data Analysis

Results

<table>
<thead>
<tr>
<th>Demographic and Clinical Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
</tr>
<tr>
<td>---------</td>
</tr>
<tr>
<td>Overall</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Condition</th>
<th>Total Sample - N(%)</th>
<th>M(%)</th>
<th>F(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Back Pain</td>
<td>47(30.3)</td>
<td>12</td>
<td>35</td>
</tr>
<tr>
<td>Musculoskeletal Pain</td>
<td>45(29)</td>
<td>11</td>
<td>34</td>
</tr>
<tr>
<td>Abdominal Pain</td>
<td>43(27.7)</td>
<td>9</td>
<td>34</td>
</tr>
<tr>
<td>Headache</td>
<td>41(26.5)</td>
<td>6</td>
<td>35</td>
</tr>
<tr>
<td>Multi-Site Pain</td>
<td>24(15.5)</td>
<td>3</td>
<td>21</td>
</tr>
<tr>
<td>Chest Pain</td>
<td>8(5.2)</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Chronic Fatigue</td>
<td>4(2.6)</td>
<td>4</td>
<td>0</td>
</tr>
</tbody>
</table>

The age at the intake was found to be younger for adolescents with abdominal pain (mean=15.6±1.45) (p=0.007)

Adolescents with the pain complaint of back pain were found to be older (mean=16.68±1.33) (p=0.001) as well as adolescents with musculoskeletal pain complaints (mean=16.71±1.33) (p=0.001).

Adolescents with chronic fatigue were noted to be significantly younger (mean=14.36±0.77) (p=0.019)

There was no significant difference in age noted for adolescents with complaint of headache, multisite pain and chest pain.
### Mean Scores for Total Sample, Low and High Risk

<table>
<thead>
<tr>
<th></th>
<th>Total Sample</th>
<th>Low Risk</th>
<th>High Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N(%)</td>
<td>Mean</td>
</tr>
<tr>
<td>SMFQ – Total</td>
<td>155</td>
<td>18.28</td>
<td>5.95</td>
</tr>
<tr>
<td>PedsQL™ Physical</td>
<td>154</td>
<td>44.43</td>
<td>21.94</td>
</tr>
<tr>
<td>PedsQL™ Emotional</td>
<td>154</td>
<td>55.75</td>
<td>23.41</td>
</tr>
<tr>
<td>PedsQL™ Social</td>
<td>151</td>
<td>69.76</td>
<td>20.57</td>
</tr>
<tr>
<td>PedsQL™ School</td>
<td>151</td>
<td>50.24</td>
<td>22.52</td>
</tr>
<tr>
<td>Overall Total</td>
<td>154</td>
<td>55.00</td>
<td>17.80</td>
</tr>
<tr>
<td>FDI – Total</td>
<td>155</td>
<td>19.86</td>
<td>11.06</td>
</tr>
<tr>
<td>PCQ</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Information seeking</td>
<td>150</td>
<td>2.27</td>
<td>0.83</td>
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<tr>
<td>Problem solving</td>
<td>148</td>
<td>2.91</td>
<td>0.86</td>
</tr>
<tr>
<td>Seeking social support</td>
<td>148</td>
<td>2.69</td>
<td>0.98</td>
</tr>
<tr>
<td>Positive self-statements</td>
<td>148</td>
<td>2.93</td>
<td>0.99</td>
</tr>
<tr>
<td>Behavioral distraction</td>
<td>148</td>
<td>2.84</td>
<td>0.84</td>
</tr>
<tr>
<td>Cognitive distraction</td>
<td>146</td>
<td>2.89</td>
<td>0.88</td>
</tr>
<tr>
<td>Externalizing</td>
<td>148</td>
<td>1.91</td>
<td>0.88</td>
</tr>
<tr>
<td>Internalizing/Catastrophizing</td>
<td>151</td>
<td>2.93</td>
<td>1.04</td>
</tr>
<tr>
<td>Overall Total</td>
<td>133</td>
<td>2.66</td>
<td>0.51</td>
</tr>
</tbody>
</table>

1 – cut-off value established by developer
2 – cut-off > 25th percentile

### Demographics of Gender and Questionnaire Outcomes
- **SMFQ**
  - No difference total overall risk scores between genders
- **PedsQL™**
  - Physical functioning subsection showed a significant difference with risks for females 99.7% (n=43) versus males 10.4% (n=5) with $x^2 = 5.388$, $p=0.020^*$
  - There was no difference noted for risks in any other subsections (emotional, social or school) or the overall score of the PedsQL™
- **Functional Disability Inventory (FDI)**
  - No significant difference total overall risk scores between genders

### Demographics for Gender and Questionnaire Outcomes
- **Pain and Coping questionnaire (PCQ)**
  - Answers were divided in eight subscales for scoring.
  - There were no significant differences seen in the information seeking, problems solving, behavioral distraction, externalizing, and internalizing/catastrophizing subscale between genders.
  - Seeking social support subscale females were at higher risk at 65.9% (n=29) than males 34.1% (n=15), $x^2 = 5.382$, $p=0.021$.
  - Positive self-statement there was a significance difference noted with females 66.7% (26) and males 33.3% (13), $x^2 = 3.954$, $p=0.047$ at higher risk.
  - Cognitive distraction there was a difference noted in females 66.7% (12) than males 33.3% (n=16) with $x^2 = 5.275$, $p=0.22$ at higher risk.
**PedsQL™ Study Findings Compared to Varney, et al. Chronically Ill Sample**

<table>
<thead>
<tr>
<th>PedsQL™</th>
<th>Total Sample Adolescents with Chronic Pain</th>
<th>Varney, et al. Chronically Ill Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>Mean ± SD</td>
<td>N</td>
</tr>
<tr>
<td>Physical</td>
<td>154 44.43 ± 21.04</td>
<td>366 77.36 ± 20.36</td>
</tr>
<tr>
<td>Emotional</td>
<td>154 55.75 ± 23.41</td>
<td>366 76.40 ± 21.48</td>
</tr>
<tr>
<td>Social</td>
<td>151 69.76 ± 20.37</td>
<td>367 81.60 ± 20.24</td>
</tr>
<tr>
<td>School</td>
<td>151 50.24 ± 22.52</td>
<td>362 73.43 ± 19.57</td>
</tr>
<tr>
<td>Overall Total</td>
<td>154 55.00 ± 17.80</td>
<td>367 77.19 ± 15.53</td>
</tr>
</tbody>
</table>

**High Risk for Mental Health Problems and Type of Pain Complaint**

- There was no significant difference in risk scores for adolescents with and without abdominal pain, chest pain, headache, multi-site pain, or musculoskeletal pain.

- The proportion of adolescents without back pain who were at high risk on the PedsQL™ emotional functioning subscale, more adolescents without back pain (n=24, 22.2%) were at high risk compared to adolescents who had back pain (n=18, 38.3%; $\chi^2=4.284$, $p=0.038$).

- Compared to adolescents without chronic fatigue, significantly more adolescents with chronic fatigue had high risk scores on three PCQ subcales: problem solving (n=3, 7.7% versus n=44, 29.1%; $\chi^2=3.879$, $p=0.049$); seeking social support (n=4, 100% versus n=40, 26.5%; $\chi^2=10.358$, $p=0.001$), and internalizing/catastrophizing (n=4, 100% versus n=42, 27.8%; $\chi^2=9.73$, $p=0.002$).

**Among adolescents at high risk, identify those at high risk on:**

- 0 questionnaire – 52 (35.9)
- 1 questionnaire – 62 (42.8)
- 2 questionnaire – 24 (16.6)
- 3 questionnaire – 7 (4.5)
- 4 questionnaire – 0 (0)
Discussion about project

- Factors that are sometimes associated with an increased prevalence of chronic pain in adolescents include ethnicity, low self-esteem, depression, anxiety, and school stress.
- Of the 155 adolescents who completed the SMFQ, more than 16% of them have a positive score of ≥12 which is considered positive for depression screening. This percent is greater than the prevalence of major depressive episodes among U.S. adolescents according to NIMH data from 2012 which ranged from 7.1% to 11.8% for teens from ages 13-18 years of age (NIMH, 2012).
- These findings suggest that adolescents with chronic pain may be at higher risk for mental health problems which need to be addressed with evidence-based treatment interventions.

Mental Health Assessment Tools

- Mood
- Quality of Life
- Coping with Pain
- Functional Disability

- Short Mood and Feeling Questionnaire (SMFQ)
- General Anxiety Disorder (GAD)
- Multidimensional Anxiety scale for Children (MASC)
- Anxiety sensitivity (KASI)
- State Trait Anxiety Inventory for Children (STAIC)
- Children’s Depression Inventory (CDI)
- Revised Children’s Anxiety and Depression Scale (RCADS)
- Children’s Fear Scale (CFS)
Mental Health Assessment Tools

- Quality of Life
  - Pediatric Quality of Life Inventory (PEDsQL™)
  - Childhood Health Assessment Questionnaire (CHAQ)
  - Family Interaction Macro-Coding System (FIMS)

- Coping with Pain
  - Pain Perception Questionnaire for young people (PPQ-YP)
  - Pain-relate fear (SESA-KJ)
  - Pain Catastrophizing Scale – PCS
  - Fear of Pain Questionnaire (FQPC)
  - Adolescent Pain Behavior Questionnaire (APBQ)
  - Adult Responses to Children’s Symptoms (ARCS)
  - Chronic Pain Acceptance Questionnaire (CPAC)

- Functional Disability
  - Functional Disability Inventory (FDI)
  - Canadian Occupational Performance Measure (COPM)
  - Pain-Related Disability (P-PDI)
  - Children Sleep Habit Questionnaire (CSHQ)
  - Pain Response Inventory (PRI)
### Mental Health Assessment Tools

- **PROMIS**
- **Multiple assessment tools**

### General Assessment

<table>
<thead>
<tr>
<th>Test of Condition</th>
<th>Age Group</th>
<th>Completion Checklist</th>
<th>Time to Complete (Minutes)</th>
<th>Test Format</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Behavior Checklist (TBC)</td>
<td>3-18</td>
<td>Teacher, Parent</td>
<td>50</td>
<td>Pencil-Paper</td>
</tr>
<tr>
<td>Behavioral Assessment System for Children, 3rd Ed. (BASC-3)</td>
<td>4-18</td>
<td>Teacher</td>
<td>30</td>
<td>Pencil-Paper</td>
</tr>
<tr>
<td>Multidimensional Anxiety Scale for Children (MASC)</td>
<td>8-17</td>
<td>Student</td>
<td>20</td>
<td>Pencil-Paper</td>
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<tr>
<td>Multidimensional Anxiety Scale for Children (MASC)</td>
<td>8-17</td>
<td>Parent</td>
<td>20</td>
<td>Pencil-Paper</td>
</tr>
<tr>
<td>Parent-Child Interaction Inventory (PCII)</td>
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</tr>
<tr>
<td>Parent-Child Interaction Inventory (PCII)</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Child Behavior Checklist (CBC)</td>
<td>2-18</td>
<td>Parent</td>
<td>30</td>
<td>Pencil-Paper</td>
</tr>
<tr>
<td>Child Behavior Checklist (CBC)</td>
<td>2-18</td>
<td>Teacher</td>
<td>30</td>
<td>Pencil-Paper</td>
</tr>
<tr>
<td>Child Behavior Checklist (CBC)</td>
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<td>Clinician</td>
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<td>Pencil-Paper</td>
</tr>
<tr>
<td>Child Behavior Checklist (CBC)</td>
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<td></td>
<td>Online?</td>
</tr>
<tr>
<td>Child Behavior Checklist (CBC)</td>
<td>2-18</td>
<td></td>
<td></td>
<td>Free</td>
</tr>
<tr>
<td>Child Behavior Checklist (CBC)</td>
<td>2-18</td>
<td></td>
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</tr>
</tbody>
</table>

### Anxiety Assessment

<table>
<thead>
<tr>
<th>Anxiety Symptoms</th>
<th>Age Group</th>
<th>Completion Checklist</th>
<th>Time to Complete (Minutes)</th>
<th>Test Format</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social Anxiety</td>
<td>7+</td>
<td>Parent, Teacher</td>
<td>10</td>
<td>Pencil-Paper</td>
</tr>
<tr>
<td>Social Anxiety</td>
<td>7+</td>
<td>Student</td>
<td>10</td>
<td>Pencil-Paper</td>
</tr>
<tr>
<td>Social Anxiety</td>
<td>7+</td>
<td></td>
<td></td>
<td>Online?</td>
</tr>
<tr>
<td>Social Anxiety</td>
<td>7+</td>
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<td></td>
<td>Free</td>
</tr>
<tr>
<td>Social Anxiety</td>
<td>7+</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Notes

- Test time may vary based on the number of items.
- Some tests are available online and may be free.
- Clinicians may administer tests to children, while parents complete forms for children's behavior in different situations.
- The Mental Health Assessment Tools can be used for various populations, including children, adolescents, and adults.
Mental Health Concerns that affect pain

- Pain beliefs
- Mood
- Pain related anxiety
- Pain related fear
Cognitive

- Pain Beliefs
  - Organic
    - Pain cause by immediate / imminent physical harm
    - Pain is the result of tissue damage
  - Psychological
    - Pain caused by internal / external factors
    - Thinking about pain makes it worse

Mood

- Depression
  - 1 pain site = 2x more likely to be depressed
  - >1 pain site = 4x more likely to be depressed
  - Longer duration of pain = increased risk for depression

- Anxiety
  - 1 pain site – 2x more likely to be anxious
  - >2 pain sites = 3 times more likely to be anxious

Behavioral

- Pain-related anxiety = future pain encounters = avoidance behaviors
- Pain-related fear = current pain encounter = escape behaviors
Behavioral
- Avoidance Behavior (short term) = protected behavior
- Avoidance behavior (long term) = maladaptive behavior
- Maladaptive driven by anxiety or fear or re-injury.
- Lead to self-reported disability, non-specific physical complaints and decreased physical capacity.
- Secondary Gain
  - Activity limitation = increased attention, decreased responsibilities

Pain and Suicide
- Risk of suicide increases with overwhelming chronic pain
- Chronic pain = 3x more likely to have suicidal ideation

Multi-Modal Treatment
Biopsychosocial
- Start with multi-disciplinary evaluation
- Medication
- CAM
- Herbs / Supplements
- Psychological Support
- Physical Therapy
Citalopram treatment of pediatric recurrent abdominal pain and comorbid internalizing disorders: an exploratory study

- Twenty-five clinically referred children and adolescents with recurrent abdominal pain aged 7 to 18 years
- 12-week, flexible-dose, open-label trial of citalopram
- Outcome measure was the Clinical Global Impression Scale-Improvement
- Side-effects were assessed using a standardized checklist
- Twenty-one subjects (84%) were classified as responders (Clinical Global Impression Scale-Improvement score < 2)
- Citalopram was generally well tolerated
- Ratings of abdominal pain, anxiety, depression, other somatic symptoms, and functional impairment all improved significantly over the course of the study compared with baseline
- This study suggests that Citalopram is a promising treatment for functional pediatric recurrent abdominal pain
- Studies currently in process

Antidepressants – Treatment for Anxiety & Depression

**Triyclics**
- Includes: amitriptyline, clomipramine, imipramine
- Effective for treatment of depression, OCD, separation anxiety, ADHD
- MOA: blocks reuptake of norepinephrine and serotonin
- Side effects: weight gain, dry mouth, sweating, tremor, agitation, can prolong QT interval and increase risk for fatal ventricular tachycardia
- Narrow therapeutic index

**SSRIs**
- Includes: fluoxetine, sertraline, paroxetine, fluvoxamine, citalopram, escitalopram
- Effective for treatment of depression, OCD
- MOA: block reuptake of serotonin into presynaptic cleft
- Long half-life
- Can induce mania in children
- Many drugs not studied in children

Antidepressants Continued...

- **Bupropion**
  - One study showed efficacy in treatment ADHD in adolescents

- **Venlafaxine**
  - Only one study done with children showed not more effective than placebo in treatment of depression
  - Acts by inhibiting reuptake of both norepinephrine and serotonin
The National Institute of Health (http://ncbi.nlm.nih.gov) identifies many different CAMs:

- Meditation, yoga, Acupuncture, deep breathing, progressive relaxation, guided imagery, hypnotherapy, qi gong and Tai Chi,
- Spinal manipulation and massage therapy as well as the movement therapies of Feldenkrais, Alexander technique, pilates and rolfing
- Whole-body techniques such as Ayurvedic and traditional Chinese medicine
- Equine Assisted Therapy is available for therapeutic horseback riding
- Biofeedback
- Omega 3 Fatty Acid

Cautions:
- Select the CAM practitioner with care
- Share the information about the use of any CAMs to any other of your providers

**Herbs used for Psychotrop effect**

- St John's Wort – for mild to moderate depression
- Valerian – sedative and anxiolytic activity
- Kava – "tranquilizer", sedative, may be helpful for generalized anxiety disorder
- Lemon Balm – anxiolytic
- Black Cohosh – used for anxiety
- German Chamomile - used for GI spasms, sedative, hypnotic, anxiety
- Evening Primrose – treatment of schizophrenia, childhood hyperactivity, and dementia
- Hops – mild sedative
- Passion Flower – sedative hypnotic for adjustment disorder with anxious mood
- Scullcap – sedative and anticonvulsant
- Ginkgo – treat memory and cognitive impairments with dementia
- Ginseng – treat stress and fatigue
- Melatonin – treat sleep

Caution:
- Remember that some supplements may interact with other supplements and herbs.
Core Components CBT Model for Anxiety in Youth

- Parent Interventions
  - Provides parents education regarding the risks of continued avoidance and guidance in managing anxiety
    - Basic parenting strategies
    - Positive/negative reinforcement
    - Planned ignoring
    - Modeling
    - Reward planning

http://www.effectivechildtherapy.com/sccap/?m=sPro&fa=pro_CBTforAnxiety

Biofeedback

- Real-time feedback through various physiological responses
  - Helps the individual with developing awareness of the changes in the body and to learn individualized ways of voluntarily controlling the bodies responses

Kerns, R., Sellinger, J., & Goodin, B. (2011)

Biofeedback for Pain Management

- Targets factors that are related to pain responses on the body
  - Related to pain exacerbations
  - Related to emotional responses to the pain
  - Helps identifying strategies that are ineffective and effective for reducing pain responses on the body

Kerns, R., Sellinger, J., & Goodin, B. (2011)
Evidence of Biofeedback in Children and Adolescents with Chronic Pain

- Banez, G (2008)
  - Study 64 children and adolescents with recurrent abdominal pain
  - Randomly assigned 4 groups for biofeedback
    - Results revealed all groups showed improvements with self reported pain
- Palamaro, T., et al. (2010)
  - CBT, Biofeedback and relaxation clinically significant for reducing pain in children with headaches, abdominal pain and fibromyalgia p<0.0001

Physical Therapy

- Beneficial
  - Improves function
  - Improves quality of life
- Tailored program
- Balance exercise and recovery

References