The Role of Cognitive-Behavioral Intervention in Pediatric Concussion

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We are all born with great potential. Shouldn’t we all have the chance to achieve it?
Overview

• Overview of Concussion
• Define Cognitive Behavioral Therapy
• Review the evidence base for CBT and concussion symptoms
• Overview of intervention
• Introduce a model of incorporating CBT into concussion treatment
• Implications
What is a Concussion

- **CDC Definition**
  - “a disruption in the normal function of the brain that can be caused by a bump, blow, or jolt to the head, or penetrating head injury”

- **Concussion = Mild Traumatic Brain Injury (mTBI)**
Sports & Recreation Related Concussion in Youth

Bryan et al., (2016)
Concussion Symptom Domains

Physical
- Headache
- Dizziness
- Balance
- Nausea
- Visual

Emotional
- Anxiety
- Low mood

Cognitive
- Attention
- Processing speed
- Memory

Sleep/Energy
- Hypersomnia
- Hyposomnia
- Drowsiness
Biopsychosocial Approach to Understanding Concussion

Yeates & Taylor (2005)
What is Cognitive Behavioral Therapy? (CBT)

- A form of psychological intervention
- Helps patients identify and treat unhelpful thoughts, behaviors, and emotions
- In the medical setting, CBT is focused on treating thoughts, behaviors, and emotions which are negatively impacting coping, recovery, and daily functioning
What is Cognitive Behavioral Therapy? (CBT)

Situation
something happens

Thought
the situation is interpreted

Emotion
A feeling occurs as a result of the thought

Behavior
An action in response to the emotion

*Adapted from www.therapistaid.com
“But I Don’t Need Therapy!”
Why CBT for Pediatric Concussion?

• Psychological and behavioral symptoms after concussion are **NORMAL**!
  – Additionally, up to 1/3 of youth have psychological or behavioral symptoms which extend beyond the initial recovery period¹

• Incorporating CBT into multi-disciplinary treatment is ideal and can result in²:
  – Better overall functioning
  – Decreased depression/anxiety
  – Decrease in medical utilization

• The challenge lies in de-stigmatizing CBT and making services accessible

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1. CDC, 2018
What do we know?
Post-traumatic Headache (PTH)

- One of the most common symptoms after concussion
- May not respond to medication alone
- Unresolved PTH can contribute to¹:
  - Cognitive difficulty
  - Disrupted daily functioning
  - Sleep disturbances
  - Decreased quality of life
  - Behavioral responses that inhibit recovery

¹ Taylor, et al., 2007, Zasler, 2015, Martelli et al., 2007
Post-traumatic Headache (PTH)

- Non pharmacological treatment is beneficial \(^1\)
  - Biofeedback
  - CBT
  - Stress Management
  - Relaxation

- There is a greater need for alternative pain management for children.\(^2\)
  - In fact, they may be more responsive to it!\(^3\)

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1. Martelli et al., 1999; Zasler, 2015
3. Andraisik et al., 2003
Sleep

- Among the most common symptoms of concussion\(^1\)
- CBT for sleep is well established in the pediatric population and is often the treatment of choice\(^2\)
- Effective interventions\(^3\)
  - Stimulus control
  - Sleep restriction
  - Sleep hygiene
  - Relaxation

1. Jaffe et al., 2015
2. Kuhn & Elliott, 2003
Mood

• Symptoms of depression and anxiety are common\(^1\) and can increase complaints of cognitive and other post-concussive symptoms\(^2\)
• In adults, mood symptoms can matter more than the injury itself when it comes to recovery trajectory\(^3\)
• Mood symptoms can impact pain experience, sleep, and daily functioning

1. Conder & Conder, 2015
3. Mooney et al., 2005
• Cycle of pain and inactivity
  – “Decreased activity in response [to pain], can prevent normal restoration of function; perpetuate painful experience; and, in cyclic disability-producing fashion, reinforce avoidance, inactivity, and increased pain.” (Martelli et al., 1999)
Return to Learn/Play

• Pediatric patients often find themselves in either a state of inactivity or over-activity
  – Both can increase pain complaints and prolong recovery\(^1\)

• This is particularly important when considering return to school/sports

1. Hou et al., 2012
Family Coping

- Family coping can promote or inhibit recovery
- Kids need family support to implement treatment interventions
- Poor family coping and parent distress can contribute to poor outcomes in pediatric concussion
- Positive family interactions around injury can support symptom management and coping
- CBT Family Oriented Treatment
  - Altering unhelpful responses to pain
  - Supporting structured return to activity
  - Reinforcement of healthy behaviors

1. McNally et al., 2013, Olsson et al., 2013
2. Conder & Concer, 2015, Taylor et al., 2007
CBT Intervention: What is it?

What it’s not

People think you must be crackers if you’ve got a psychologist but psychology is part of the building bricks to make a top athlete.

— David James —
Intervention – Behavioral Pain Management

- Diaphragmatic Breathing
- Progressive Muscle Relaxation
- Guided Imagery
- Patients are provided with tools for home practice
- Individualized preferred strategies are built upon over time
Intervention - Sleep

- Structuring evenings and bedtimes
- Education on healthy sleep habits
- Scheduling appropriate nap and wake times
- Families are asked to incorporate:
  - Consistent bedtime
  - Limiting electronic use before bed
  - Using bed only for sleep
  - Engaging in relaxation prior to bedtime
Intervention – Activity Pacing

• Daily schedules for school and extracurricular activities
• Time management strategies
• Scheduling structured breaks during demanding activities
• Decreasing physical and cognitive accommodations over time
Intervention – Behavioral Activation

• Increasing pleasurable activities and approved exercise
• Structuring daily activity, requiring increasing effort over time
• Identifying pleasurable activities for promotion of positive mood/coping
• Examining thought patterns around pain and shifting to more helpful ways of thinking
Intervention - Mood

• Participating in positive activities
• Promoting social engagement
• Identifying/using coping strategies
• Exploring ways to adjust peer interactions
• Challenging unhelpful thinking patterns
Intervention – Executive Functioning

- Organizational strategies for balancing makeup work
- Strategies for communicating needs and structuring expectations with teachers
Intervention – Supporting Adherence

• Strategies/resources for tracking hydration and nutrition
• Establishing reinforcement programs for medication adherence
• Increasing family support and access to medical treatment team
Intervention – Family Coping

- Parent education on how to respond to pain symptoms
- Focus on reinforcing daily functioning and promoting small gains
- Referrals for appropriate support when caregivers are in need
- Reviewing skills/strategies with caregivers after every individual session
A model for CBT in Concussion Treatment

• Clinic Setting
  – Outpatient tertiary care
  – All patients assessed by Nursing, Medicine, and Neuropsychology
  – Patients are referred for CBT based on presenting concerns
  – Patients receive up to four CBT sessions targeted toward treating acute concerns and speeding re-integration to daily life
  – If further intervention is warranted, patients are referred for outpatient therapy with pediatric psychology providers
## A model for CBT in Concussion Treatment

<table>
<thead>
<tr>
<th>Participant Demographic Characteristics</th>
<th>n</th>
<th>percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>23</td>
<td>50%</td>
</tr>
<tr>
<td>Female</td>
<td>23</td>
<td>50%</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean Age</td>
<td>13.91 years (range 8-18)</td>
<td></td>
</tr>
<tr>
<td>Time From Referral to Eval</td>
<td>1.7 weeks (range 14-10)</td>
<td></td>
</tr>
<tr>
<td><strong>Race</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White, Non-Hispanic</td>
<td>32</td>
<td>69.5%</td>
</tr>
<tr>
<td>Black, Non-Hispanic</td>
<td>11</td>
<td>23.9%</td>
</tr>
<tr>
<td>Other</td>
<td>3</td>
<td>6.5%</td>
</tr>
<tr>
<td><strong># Injuries</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First mTBI</td>
<td>37</td>
<td>80.4%</td>
</tr>
<tr>
<td>Multiple mTBI</td>
<td>9</td>
<td>19.5%</td>
</tr>
<tr>
<td><strong>Mental Health</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Previous MH diagnosis</td>
<td>22</td>
<td>47.8%</td>
</tr>
<tr>
<td>Prior Outpatient Psychiatry</td>
<td>1</td>
<td>2.1%</td>
</tr>
<tr>
<td>Prior Outpatient Therapy</td>
<td>3</td>
<td>6.5%</td>
</tr>
</tbody>
</table>
A model for CBT in Concussion Treatment

Referral Concerns

- Pain: 36%
- Stress: 35%
- Anxiety: 23%
- Mood: 34%
- Coping: 30%
- Sleep: 7%
- Trauma: 1%
- Behavior: 10%

% of Patients
## Psychological Intervention Provided by Session #

<table>
<thead>
<tr>
<th>Area of Intervention</th>
<th>Session 1</th>
<th>Session 2</th>
<th>Session 3</th>
<th>Session 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relaxation</td>
<td>50.0%</td>
<td>54.2%</td>
<td>57.1%</td>
<td>40.0%</td>
</tr>
<tr>
<td>Sleep</td>
<td>30.4%</td>
<td>45.8%</td>
<td>35.7%</td>
<td>20.0%</td>
</tr>
<tr>
<td>Activity Pacing</td>
<td>23.9%</td>
<td>25.0%</td>
<td>28.6%</td>
<td>20.0%</td>
</tr>
<tr>
<td>School/Homework</td>
<td>19.6%</td>
<td>29.2%</td>
<td>28.6%</td>
<td>20.0%</td>
</tr>
<tr>
<td>Bx Activation/Exercise</td>
<td>17.4%</td>
<td>20.8%</td>
<td>28.6%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Mood (general)</td>
<td>13.0%</td>
<td>29.2%</td>
<td>50.0%</td>
<td>60.0%</td>
</tr>
<tr>
<td>Executive Functioning</td>
<td>8.7%</td>
<td>16.7%</td>
<td>7.1%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Med Recs/Hydration</td>
<td>4.3%</td>
<td>4.2%</td>
<td>7.1%</td>
<td>7.1%</td>
</tr>
<tr>
<td>Parent Training</td>
<td>2.2%</td>
<td>4.2%</td>
<td>7.1%</td>
<td>0.0%</td>
</tr>
</tbody>
</table>

### General Recommendations and Resources

<table>
<thead>
<tr>
<th></th>
<th>Session 1</th>
<th>Session 2</th>
<th>Session 3</th>
<th>Session 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychology Follow up in Clinic</td>
<td>60.9%</td>
<td>58.3%</td>
<td>57.1%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Outpatient Psychology Follow Up</td>
<td>19.6%</td>
<td>20.8%</td>
<td>21.4%</td>
<td>60.0%</td>
</tr>
</tbody>
</table>
Conclusions

• Mood and behavioral symptoms are a normal part of concussion recovery
• CBT is recommended in the multi-disciplinary treatment of concussion
• CBT is effective in treating a number of concussion-related symptoms
• CBT can help to speed recovery and prevent lingering symptoms
• It is possible to incorporate CBT in the multi-disciplinary treatment of concussion with minimal burden to patients, families, and treatment team members.
Thank you for your attention

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