CADTH RAPID RESPONSE REPORT: SUMMARY OF ABSTRACTS

Yoga and Mindfulness for Children and Youth with Developmental or Behavioural Conditions: Clinical Effectiveness and Guidelines
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Acknowledgments:

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About CADTH: CADTH is an independent, not-for-profit organization responsible for providing Canada’s health care decision-makers with objective evidence to help make informed decisions about the optimal use of drugs, medical devices, diagnostics, and procedures in our health care system.
Research Questions
1. What is the clinical effectiveness regarding the use of yoga for children and youth with developmental or behavioural conditions?
2. What is the clinical effectiveness regarding the use of mindfulness programs or interventions for children and youth with developmental or behavioural conditions?
3. What are the evidence-based guidelines regarding the use of yoga for children and youth with developmental or behavioural conditions?
4. What are the evidence-based guidelines for mindfulness programs or interventions for children and youth with developmental or behavioural conditions?

Key Findings
Four systematic reviews, three systematic reviews with meta-analyses, five randomized control trials, and 11 non-randomized studies were identified regarding yoga or mindfulness for children and youth with developmental or behavioural conditions. Additionally, one evidence-based guideline was identified.

Methods
A limited literature search was conducted on key resources including PubMed, The Cochrane Library, University of York Centre for Reviews and Dissemination (CRD) databases, ECRI, Canadian and major international health technology agencies, as well as a focused Internet search. Methodological filters were applied to limit retrieval to health technology assessments, systematic reviews, meta-analyses, randomized controlled trials, non-randomized studies, and guidelines. Where possible, retrieval was limited to the human population. The search was also limited to English language documents published between January 1, 2012 and March 29, 2017.

Selection Criteria
One reviewer screened citations and selected studies based on the inclusion criteria presented in Table 1.

Table 1: Selection Criteria

<table>
<thead>
<tr>
<th>Population</th>
<th>Children or youth with developmental or behavioural conditions (e.g., including, but not limited to: cerebral palsy, brain injury, autism, ADHD, OCD, anxiety, depression, etc.)</th>
</tr>
</thead>
</table>
| Intervention| Q1.3: Yoga  
Q2.4: Mindfulness programs/interventions |
| Comparator  | Q1-4: No comparator |
| Outcomes    | Q1-2: Clinical effectiveness (e.g., reduction in problematic symptoms, etc.)  
Q3-4: Guidelines |
| Study Designs | Health technology assessments, systematic reviews, meta-analyses, randomized controlled trials, non-randomized studies, evidence-based guidelines |
Results

Rapid Response reports are organized so that the higher quality evidence is presented first. Therefore, health technology assessment reports, systematic reviews, and meta-analyses are presented first. These are followed by randomized controlled trials, non-randomized studies, and evidence-based guidelines.

Four systematic reviews, three systematic reviews with meta-analyses, five randomized-controlled trials, and 11 non-randomized studies were identified regarding yoga or mindfulness for children and youth with developmental or behavioural conditions. Additionally, one evidence-based guideline was identified. No relevant health technology assessments were identified.

Additional references of potential interest are provided in the appendix.

Overall Summary of Findings

Four systematic reviews, three systematic reviews with meta-analyses, five randomized-controlled trials, and 11 non-randomized studies were identified regarding yoga or mindfulness for children and youth with developmental or behavioural conditions. Detailed study characteristics are provided in Table 2.

Yoga therapies were the focus of 11 studies and mindfulness-based interventions were the focus of 13 studies.

Overall, yoga appears to be beneficial for children and youth with autism spectrum disorder (ASD), attention deficit hyperactivity disorder (ADHD), eating disorders (ED), both generalized and social anxiety, and exposure to traumatic events. Mindfulness-based interventions also appear to be beneficial for children and youth with ADHD, ED, both generalized and social anxiety, and sleeping disorders. However, no benefit of mindfulness therapy was found in one study for students with anxiety, depression, or ED and, after the intervention, anxiety appeared to increase in both male participants and individuals with low baseline levels of depression or weight/shape concerns.

One evidence-based guideline was identified regarding mindfulness-based therapies for social anxiety disorders in all ages, including children, and recommends against the use of mindfulness interventions to treat social anxiety patients.

Table 2: Summary of Included Studies on Yoga or Mindfulness for Children and Youth with Developmental or Behavioural Conditions

<table>
<thead>
<tr>
<th>First Author, Year</th>
<th>Study Characteristics</th>
<th>Population, Condition</th>
<th>Outcomes</th>
<th>Conclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Systematic Reviews and Meta-Analyses – Yoga</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Bremer, 2016¹ | • SR  
• 13 included studies | • 16 year olds  
• ASD | • Behavioural outcomes | • Exercise interventions (yoga) can improve behavioural outcomes (stereotypic behaviours, social-emotional functioning, cognition and attention) |
## Table 2: Summary of Included Studies on Yoga or Mindfulness for Children and Youth with Developmental or Behavioural Conditions

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</table>
| Cerrillo-Urbina, 2015 | • SR & MA  
• 8 included RCTs  
• n=249 | • Children and adolescents  
• ADHD | • ADHD symptoms | • Yoga exercises may improve core symptoms of ADHD |
| Weaver, 2015 | • SR  
• 16 included studies  
• Evidence base from 1990-2014 | • Adolescents (aged 3-18)  
• Anxiety disorder | • Anxiety | • Majority of included studies indicated reduced anxiety after the intervention |
| Balasubramaniam, 2012 | • SR  
• 16 included studies | • Adults and children  
• ADHD, schizophrenia, depression, SD, cognitive disorders, ED | • Efficacy | • Two RCTs indicate a benefit of yoga in children with ADHD |
| Serwacki, 2012 | • SR  
• 12 included studies | • School aged children  
• ASD, intellectual disabilities, learning disabilities, emotional disturbance | • Effectiveness | • Participation in school-based yoga appears to be beneficial |
| Borquist-Conlon, 2016 | • SR & MA  
• 5 included studies  
• N=188  
• Evidence base from 1980 to 2015 | • Youth (aged 5 to 18)  
• Anxiety disorders | • Effectiveness | • There was a moderate and statistically significant effect of MBI |
| Zenner, 2014 | • SR & MA  
• 24 included studies  
• N=1348 | • Students (grades 1 to 12) | • Psychological outcomes | • Emotional problems were improved  
• MBIs are promising for improving cognitive performance and resilience to stress |

### Systematic Reviews and Meta-Analyses – MBI

| Borquist-Conlon, 2016 | • SR & MA  
• 5 included studies  
• N=188  
• Evidence base from 1980 to 2015 | • Youth (aged 5 to 18)  
• Anxiety disorders | • Effectiveness | • There was a moderate and statistically significant effect of MBI |

### Randomized Controlled Trials – MBI

| Blake, 2016 | • RCT  
• N=123 | • Adolescents (aged 12 to 17)  
• Anxiety disorders  
• SD | • Sleep improvement  
• Anxiety levels | • Intervention has significantly greater improvements in sleep related outcomes  
• Reduced concomitant anxiety symptoms |
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</thead>
<tbody>
<tr>
<td>Ebrahiminejad, 2016</td>
<td>RCT, N=30</td>
<td>Female students, SA</td>
<td>Self esteem, SA levels</td>
<td>Treatment was effective in reducing social anxiety (measured by social phobia inventory) and improving self esteem</td>
</tr>
<tr>
<td>Johnson, 2016</td>
<td>RCT, N=132</td>
<td>Students, Anxiety disorders, Depression, ED</td>
<td>Anxiety levels, Depression, Wellbeing, Weight/shape concerns</td>
<td>No significant improvements observed in any outcomes directly after intervention nor at 3 month follow-up. Anxiety increased in males and individuals with low baseline levels of depression or weight/shape concerns</td>
</tr>
<tr>
<td>Atkinson, 2015</td>
<td>RCT, N=347</td>
<td>Female adolescents, ED</td>
<td>Weight and shape concern, Dietary restraint, ED symptoms, Psychosocial impairment</td>
<td>Under optimal facilitation, the intervention reduced outcomes at 6 month follow-up</td>
</tr>
<tr>
<td>Swart, 2014</td>
<td>RCT, N=84</td>
<td>Male adolescents (aged 14 to 17), Conduct issues</td>
<td>Behavioural outcomes</td>
<td>MDT was superior to CBT in improving target behavioural outcomes</td>
</tr>
</tbody>
</table>

Non-Randomized Studies – Yoga

<table>
<thead>
<tr>
<th>First Author, Year</th>
<th>Study Characteristics</th>
<th>Population, Condition</th>
<th>Outcomes</th>
<th>Conclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chou, 2017</td>
<td>Pre-post intervention, N=49</td>
<td>Children, ADHD</td>
<td>Visual pursuit test, Determination test</td>
<td>Reaction time and accuracy time significantly improved in the intervention group. Yoga can be a complementary therapy in ADHD</td>
</tr>
<tr>
<td>Beltran, 2016</td>
<td>Prospective cohort, N=10</td>
<td>Male children (aged 8 to 12) in urban settings, Primarily African-American, Trauma exposure</td>
<td>Attendance, Interpersonal functioning</td>
<td>Significant improvements in interpersonal strengths, intrapersonal strengths, family involvement and strength index scores as rated by the parents of the participants</td>
</tr>
<tr>
<td>Hall, 2016</td>
<td>Pilot study, N=20</td>
<td>Female adolescents, Urban setting, ED</td>
<td>Anxiety levels, Depression, Body image disturbance</td>
<td>There was a statistically significant decrease in anxiety levels, depression score and body image disturbance. No negative changes in weight</td>
</tr>
<tr>
<td>Culver, 2015</td>
<td>Case comparison, N=76</td>
<td>Children (aged 7 to 17), Orphans in Haiti</td>
<td>Trauma-related symptoms, Emotional</td>
<td>Yoga has a significant effect on trauma symptoms. Both dance-based classes and</td>
</tr>
</tbody>
</table>
### Table 2: Summary of Included Studies on Yoga or Mindfulness for Children and Youth with Developmental or Behavioural Conditions

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</table>
| Hariprasad, 2013\(^2\) | • Exploratory study  
• N=9 | • Children (aged 5 to 16)  
• Child psychiatry unit  
• Moderate to severe ADHD | • ADHD symptoms | Yoga had a significant effect on outcomes at the time of discharge |
| Koenig, 2012\(^2\) | • Pre-post intervention  
• Children  
• ASD | • Maladaptive behaviour | | Significant decreases in maladaptive behaviour after yoga program |
| Non-Randomized Studies – MBI | | | | |
| Cotton, 2016\(^5\) | • Pilot study  
• N=10 | • Youth  
• GAD, SA, separation anxiety | • Anxiety levels | MBI was associated with decreased anxiety levels  
Reported high feasibility, acceptability and usefulness of MBI |
| Sharma, 2016\(^1\) | • Pre-post intervention  
• N=50 | • Youth (aged 18 to 25)  
• Aggression issues | • Anger  
• Hostility  
• Verbal and physical aggression  
• QoL | There were positive changes in all outcomes at one month follow-up |
| Singh, 2016\(^1\) | • Pre-post intervention  
• N=3 | • Adolescents  
• Prader-Willi Syndrome | • Verbal and physical aggression | Verbal aggression decreased to minimal levels  
Physical aggression was almost eliminated |
| Bei, 2013\(^2\) | • Pilot study  
• N=10 | • Female adolescents (aged 13 to 15)  
• SD | • Sleep improvement | Significant improvement in outcome  
High acceptability and completion  
Some changes in aspects of measured anxiety |
| Van der Oord, 2012\(^3\) | • N=22 | • Children (aged 8 to 12)  
• ADHD | • Parent rated ADHD behavior  
• Mindful awareness  
• ODD symptoms | Parent-rated ADHD behaviour decreased significantly post-intervention  
Mindful awareness increased  
Teacher-rated outcomes were unchanged |

Abbreviations: ADHD = attention deficit hyperactivity disorder; AHRQ = Agency for Healthcare Research and Quality; ASD = autism spectrum disorder; CBT = cognitive behavioural therapy; ED = eating disorders; GAD = generalized anxiety disorder; MA = meta-analysis; MBI = mindful-based interventions; MDT = mode deactivation therapy; ODD = oppositional defiant disorder; QoL = quality of life; RCT = randomized controlled trials; SA = social anxiety; SD = sleep disturbance; SR = systematic review.
References Summarized

Health Technology Assessments

No literature identified.

Systematic Reviews and Meta-analyses


Randomized Controlled Trials


Non-Randomized Studies


Guidelines and Recommendations

Appendix — Further Information

Previous CADTH Reports


Systematic Reviews – Adult Population


Non-Randomized Studies – Alternate Population


Review Articles


Additional References

Measurement tools available: https://goamra.org/resources/measuring-mindfulness/

See: Yoga and Mindfulness for Special Needs Children