

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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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

Population	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.)
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,^{1,4,6-7} three systematic reviews with meta-analyses,^{2-3,5} five randomized-controlled trials,⁸⁻¹² and 11 non-randomized studies¹³⁻²³ 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^{1,3-4,6-7,13-14,16,19,21-22} and mindfulness-based interventions were the focus of 13 studies.^{2,5,8-12,15,17-18,20,23}

Overall, yoga appears to be beneficial for children and youth with autism spectrum disorder (ASD),^{1,7,22} attention deficit hyperactivity disorder (ADHD),^{3,6,13,21} eating disorders (ED),¹⁶ both generalized and social anxiety,⁴ and exposure to traumatic events.^{14,19} Mindfulness-based interventions also appear to be beneficial for children and youth with ADHD,²³ ED,¹¹ both generalized and social anxiety,^{2,8,9,15} and sleeping disorders.^{8,20} 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.¹⁰

One evidence-based guideline²⁴ 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.²⁴

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

First Author, Year	Study Characteristics	Population, Condition	Outcomes	Conclusions
Systematic Reviews and Meta-Analyses – Yoga				
Bremer, 2016 ¹	<ul style="list-style-type: none"> SR 13 included studies 	<ul style="list-style-type: none"> 16 year olds ASD 	<ul style="list-style-type: none"> Behavioural outcomes 	<ul style="list-style-type: none"> 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

First Author, Year	Study Characteristics	Population, Condition	Outcomes	Conclusions
Cerrillo-Urbina, 2015³	<ul style="list-style-type: none"> SR & MA 8 included RCTs n=249 	<ul style="list-style-type: none"> Children and adolescents ADHD 	<ul style="list-style-type: none"> ADHD symptoms 	<ul style="list-style-type: none"> Yoga exercises may improve core symptoms of ADHD
Weaver, 2015⁴	<ul style="list-style-type: none"> SR 16 included studies Evidence base from 1990-2014 	<ul style="list-style-type: none"> Adolescents (aged 3-18) Anxiety disorder 	<ul style="list-style-type: none"> Anxiety 	<ul style="list-style-type: none"> Majority of included studies indicated reduced anxiety after the intervention
Balasubramaniam, 2012⁶	<ul style="list-style-type: none"> SR 16 included studies 	<ul style="list-style-type: none"> Adults and children ADHD, schizophrenia, depression, SD, cognitive disorders, ED 	<ul style="list-style-type: none"> Efficacy 	<ul style="list-style-type: none"> Two RCTs indicate a benefit of yoga in children with ADHD
Serwacki, 2012⁷	<ul style="list-style-type: none"> SR 12 included studies 	<ul style="list-style-type: none"> School aged children ASD, intellectual disabilities, learning disabilities, emotional disturbance 	<ul style="list-style-type: none"> Effectiveness 	<ul style="list-style-type: none"> Participation in school-based yoga appears to be beneficial
Systematic Reviews and Meta-Analyses – MBI				
Borquist-Conlon, 2016²	<ul style="list-style-type: none"> SR & MA 5 included studies N=188 Evidence base from 1980 to 2015 	<ul style="list-style-type: none"> Youth (aged 5 to 18) Anxiety disorders 	<ul style="list-style-type: none"> Effectiveness 	<ul style="list-style-type: none"> There was a moderate and statistically significant effect of MBI
Zenner, 2014⁵	<ul style="list-style-type: none"> SR & MA 24 included studies N=1348 	<ul style="list-style-type: none"> Students (grades 1 to 12) 	<ul style="list-style-type: none"> Psychological outcomes 	<ul style="list-style-type: none"> Emotional problems were improved MBIs are promising for improving cognitive performance and resilience to stress
Randomized Controlled Trials – MBI				
Blake, 2016⁸	<ul style="list-style-type: none"> RCT N=123 	<ul style="list-style-type: none"> Adolescents (aged 12 to 17) Anxiety disorders SD 	<ul style="list-style-type: none"> Sleep improvement Anxiety levels 	<ul style="list-style-type: none"> Intervention has significantly greater improvements in sleep related outcomes Reduced concomitant anxiety symptoms

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

First Author, Year	Study Characteristics	Population, Condition	Outcomes	Conclusions
Ebrahiminejad, 2016⁹	<ul style="list-style-type: none"> RCT N=30 	<ul style="list-style-type: none"> Female students SA 	<ul style="list-style-type: none"> Self esteem SA levels 	<ul style="list-style-type: none"> Treatment was effective in reducing social anxiety (measured by social phobia inventory) and improving self esteem
Johnson, 2016¹⁰	<ul style="list-style-type: none"> RCT N=132 	<ul style="list-style-type: none"> Students Anxiety disorders Depression ED 	<ul style="list-style-type: none"> Anxiety levels Depression Wellbeing Weight/shape concerns 	<ul style="list-style-type: none"> 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
Atkinson, 2015¹¹	<ul style="list-style-type: none"> RCT N=347 	<ul style="list-style-type: none"> Female adolescents ED 	<ul style="list-style-type: none"> Weight and shape concern Dietary restraint ED symptoms Psychosocial impairment 	<ul style="list-style-type: none"> Under optimal facilitation, the intervention reduced outcomes at 6 month follow-up
Swart, 2014¹²	<ul style="list-style-type: none"> RCT N=84 	<ul style="list-style-type: none"> Male adolescents (aged 14 to 17) Conduct issues 	<ul style="list-style-type: none"> Behavioural outcomes 	<ul style="list-style-type: none"> MDT was superior to CBT in improving target behavioural outcomes
Non-Randomized Studies – Yoga				
Chou, 2017¹³	<ul style="list-style-type: none"> Pre-post intervention N=49 	<ul style="list-style-type: none"> Children ADHD 	<ul style="list-style-type: none"> Visual pursuit test Determination test 	<ul style="list-style-type: none"> Reaction time and accuracy time significantly improved in the intervention group Yoga can be a complementary therapy in ADHD
Beltran, 2016¹⁴	<ul style="list-style-type: none"> Prospective cohort N=10 	<ul style="list-style-type: none"> Male children (aged 8 to 12) in urban settings Primarily African-American Trauma exposure 	<ul style="list-style-type: none"> Attendance Interpersonal functioning 	<ul style="list-style-type: none"> Significant improvements in interpersonal strengths, intrapersonal strengths, family involvement and strength index scores as rated by the parents of the participants
Hall, 2016¹⁶	<ul style="list-style-type: none"> Pilot study N=20 	<ul style="list-style-type: none"> Female adolescents Urban setting ED 	<ul style="list-style-type: none"> Anxiety levels Depression Body image disturbance 	<ul style="list-style-type: none"> There was a statistically significant decrease in anxiety levels, depression score and body image disturbance No negative changes in weight
Culver, 2015¹⁹	<ul style="list-style-type: none"> Case comparison N=76 	<ul style="list-style-type: none"> Children (aged 7 to 17) Orphans in Haiti 	<ul style="list-style-type: none"> Trauma-related symptoms Emotional 	<ul style="list-style-type: none"> Yoga has a significant effect on trauma symptoms Both dance-based classes and

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

First Author, Year	Study Characteristics	Population, Condition	Outcomes	Conclusions
		<ul style="list-style-type: none"> Trauma exposure 	<ul style="list-style-type: none"> symptoms Behavioural symptoms 	<ul style="list-style-type: none"> yoga suggest an insignificant reduction in all outcomes
Hariprasad, 2013²¹	<ul style="list-style-type: none"> Exploratory study N=9 	<ul style="list-style-type: none"> Children (aged 5 to 16) Child psychiatry unit Moderate to severe ADHD 	<ul style="list-style-type: none"> ADHD symptoms 	<ul style="list-style-type: none"> Yoga had a significant effect on outcomes at the time of discharge
Koenig, 2012²²	<ul style="list-style-type: none"> Pre-post intervention 	<ul style="list-style-type: none"> Children ASD 	<ul style="list-style-type: none"> Maladaptive behaviour 	<ul style="list-style-type: none"> Significant decreases in maladaptive behaviour after yoga program
Non-Randomized Studies – MBI				
Cotton, 2016¹⁵	<ul style="list-style-type: none"> Pilot study N=10 	<ul style="list-style-type: none"> Youth GAD, SA, separation anxiety 	<ul style="list-style-type: none"> Anxiety levels 	<ul style="list-style-type: none"> MBI was associated with decreased anxiety levels Reported high feasibility, acceptability and usefulness of MBI
Sharma, 2016¹⁷	<ul style="list-style-type: none"> Pre-post intervention N=50 	<ul style="list-style-type: none"> Youth (aged 18 to 25) Aggression issues 	<ul style="list-style-type: none"> Anger Hostility Verbal and physical aggression QoL 	<ul style="list-style-type: none"> There were positive changes in all outcomes at one month follow-up
Singh, 2016¹⁸	<ul style="list-style-type: none"> Pre-post intervention N=3 	<ul style="list-style-type: none"> Adolescents Prader-Willi Syndrome 	<ul style="list-style-type: none"> Verbal and physical aggression 	<ul style="list-style-type: none"> Verbal aggression decreased to minimal levels Physical aggression was almost eliminated
Bei, 2013²⁰	<ul style="list-style-type: none"> Pilot study N=10 	<ul style="list-style-type: none"> Female adolescents (aged 13 to 15) SD 	<ul style="list-style-type: none"> Sleep improvement 	<ul style="list-style-type: none"> Significant improvement in outcome High acceptability and completion Some changes in aspects of measured anxiety
Van der Oord, 2012²³	<ul style="list-style-type: none"> N=22 	<ul style="list-style-type: none"> Children (aged 8 to 12) ADHD 	<ul style="list-style-type: none"> Parent rated ADHD behavior Mindful awareness ODD symptoms 	<ul style="list-style-type: none"> 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

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Guidelines and Recommendations

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Full-text available: <https://www.nice.org.uk/guidance/cg159/resources/social-anxiety-disorder-recognition-assessment-and-treatment-35109639699397>
See: 1.6 Interventions that are not recommended to treat social anxiety disorder, 1.6.3, page 31

Appendix — Further Information

Previous CADTH Reports

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Non-Randomized Studies – Alternate Population

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