

**Date:** June 10, 2014

**Title:** The Use of Yoga to Improve Strength, Balance, and Coordination

### Clinical Question

- P (Population/Problem) In children ages 7 – 17 demonstrating decreased occupational performance\*  
I (Intervention) does yoga\* in addition to standard care  
C (Comparison) versus standard care alone  
O (Outcome) improve strength\*, balance\* and/or coordination\*?

*Definitions for terms marked with \* may be found in the Supporting Information section.*

### Target population for the recommendation

#### Inclusions:

Patients presenting for therapy to address decreased occupational performance due to decreased strength, balance and/or coordination.

#### Exclusion:

Are less than 7 years of age  
Are unable to follow simple directions

*This recommendation should be used with caution among patients who:*

Are pregnant  
Have ocular pressure disorders  
Have disk disease of the spine and neck

### Recommendations

1. It is recommended that yoga be used in conjunction with standard care to improve the following skills:
  - a. Balance\* (*Birdee 2009 [1a]; Jeter 2014 [1b]; Dacey 2013 [1b]; Galantine 2008 [1b]*)
  - b. Coordination\* (*Birdee 2009 [1a]; Dacey 2013 [1b]; Galantine 2008 [1b]; Telles 2013 [2b]*)
  - c. Strength\* (*Birdee 2009 [1a]; Galantine 2008 [1b]; Telles 2013 [2b]; Donahoe-Fillmore 2010 [4a]*)
2. It is recommended caution be taken in using yoga with patients with the following conditions:
  - a. Certain poses should be avoided, modified or used with caution during pregnancy (*Dacey 2013 [1b]*). Modifications should be offered during balance poses in order to avoid falls; corpse pose should be modified to encourage left side lying instead of supine; most backbends and inversions should be avoided; open twists which may compromise or overstretch the abdominal area should be avoided.
  - b. Inverted poses should be avoided in patients with ocular pressure disorders and those with disk disease of the spine and neck (*Dacey 2013 [1b]*).

### Discussion/Synthesis of Evidence related to the recommendation

The grade of the body of evidence for the use of yoga to improve strength, balance, and coordination in children is moderate. In total, four systematic reviews, one randomized controlled trial, and one case-controlled study informed the PICO question.

**Strength\*:** Two systematic reviews, one randomized controlled trial, and one case control study informed the PICO question in terms of the use of yoga to improve strength in the pediatric population. Improvements in hand grip strength were noted in two systematic reviews relevant to this PICO question (*Birdee 2009 [1a]; Galantine 2008 [1b]*). While no significant difference was found in strength as measured by sit-ups/minute between a pediatric exercise group and a pediatric yoga group in the randomized control trial, improvements in strength were found when measure

pre/post-test within the yoga group (Telles 2013 [2b]). Similarly, improvements in strength as measured by the *Bruininks-Oseretsky Test of Motor Proficiency* were found pre-test/post-test in a convenience sample of 33 female adolescents (Donahoe-Fillmore 2010 [4a]).

**Balance\***: Four systematic reviews and one case-control study inform the PICO question in terms of the use of yoga to improve balance in the pediatric population. The two systematic reviews which only included the pediatric population found evidence of improved balance in children through the use of yoga (Birdee 2009 [1a]; Galantine 2008 [1b]). The remaining systematic reviews which included adult and children also noted improved balance through yoga (Jeter 2014 [1b]; Dacey 2013 [1b]). No improvement in balance was found in the case-control trial which informs this question. The authors hypothesized that this was likely due to already high balance scores measured at pre-test (Donahoe-Fillmore 2010 [4a]).

**Coordination\***: Three systematic reviews and one randomized control trial inform the PICO question in terms of the use of yoga to improve coordination. Birdee et al (2009 [1a]) found inconsistent evidence for the use of yoga in improving coordination: one study found improved hand steadiness pre-test/post-test a 10 day yoga program, while another study sited found no significant difference pre-test/post-test in tweezer dexterity. Galantine (2008 [1b]) and Dacey's (2013 [1b]) systematic reviews highlighted the use of yoga in improving reaction time, planning and execution times in the Tower of London test, and improvements in finger tapping tests. While no significant difference was found in coordination as measured by a plate-tapping test between a pediatric exercise group and a pediatric yoga group in the randomized control trial, improvements in motor speed were found when measure pre/post-test within the yoga group (Telles 2013 [2b]).

**Limitations and Recommendations for further research**: The systematic reviews consistently caution that while preliminary results of the use of yoga to improve strength, balance, and coordination in children is promising, much of the research has methodological limitations including a small number of trials, poorly described intervention techniques, poor reporting of withdrawals/dropouts, lack of control groups or control groups receiving other treatment and no reporting qualifications of yoga instructors specifically for the pediatric population. (Birdee 2009 [1a]; Jeter 2014 [1b]; Dacey 2013 [1b]; Galantine 2008 [1b]). Furthermore, the pediatric research examining the use of yoga to improve strength, balance, and coordination is based on a healthy child population. This may not translate directly to children seen for treatment in occupational therapy and physical therapies who routinely perform below average in strength, balance, and coordination.

*In determining the strength of the recommendation, the development group made a considered judgment in a consensus process which was reflective of critically appraised evidence, clinical experience, and these dimensions:*

*Given the dimensions below and that more answers to the left of the scales indicate support for a stronger recommendation, the recommendation statement above reflect the strength of the recommendation as judged by the development group. (Note that for negative recommendations, the left/right logic may be reversed for one or more dimensions.)*

<b>1. Grade of the Body of Evidence</b>	<input type="checkbox"/> High	<input checked="" type="checkbox"/> Moderate	<input type="checkbox"/> Low
<i>Rationale: One level 1a, three level 1b, one 2b, one 4a, and one 5a articles were included, where validity threats were present within studies in systematic reviews, giving the body of evidence a moderate grade per the CCHMC LEGEND for grading a body of evidence.</i>			
<b>2. Safety/Harm (Side Effects and Risks)</b>	<input checked="" type="checkbox"/> Minimal	<input type="checkbox"/> Moderate	<input type="checkbox"/> Serious
<i>Rationale: In both healthy and children with non-contraindicated conditions, yoga was found to be safe when under the supervision of a qualified instructor with knowledge of contraindications (Dacey 2013 [1b]).</i>			
<b>3. Health benefit to patient</b>	<input type="checkbox"/> Significant	<input checked="" type="checkbox"/> Moderate	<input type="checkbox"/> Minimal
<i>Rationale: Health benefits may include improvements in strength, balance, and coordination, which improve the participant's ability to engage in functional life tasks.</i>			
<b>4. Burden to adhere to recommendation</b>	<input checked="" type="checkbox"/> Low	<input type="checkbox"/> Unable to determine	<input type="checkbox"/> High
<i>Rationale: Low cost of equipment and space needed to engage in yoga.</i>			
<b>5. Cost-effectiveness to healthcare system</b>	<input type="checkbox"/> Cost-effective	<input checked="" type="checkbox"/> Inconclusive	<input type="checkbox"/> Not cost-effective
<i>Rationale: All evidence in this review utilized yoga in a group format; some funding sources do not cover group charges.</i>			
<b>6. Directness of the evidence for this target population</b>	<input type="checkbox"/> Directly relates	<input checked="" type="checkbox"/> Some concern of directness	<input type="checkbox"/> Indirectly relates
<i>Rationale: The evidence related to yoga to improve strength and coordination in children is based on several studies which included healthy children (Birdee 2009 [1a]; Galantine 2008 [1b]; Telles 2013 [2b]) and one review which included both children and adults (Dacey 2013 [1b]). The evidence related to balance in children is based on a systematic review which included studies on both children and adults (Jeter 2014 [1b]).</i>			
<b>7. Impact on morbidity/mortality or quality of life</b>	<input type="checkbox"/> High	<input checked="" type="checkbox"/> Medium	<input type="checkbox"/> Low
<i>Rationale: Evidence supports the use of yoga to improve the quality of life in adults with and without chronic conditions, though limited evidence currently exists in pediatrics (Dacey 2013 [1b]).</i>			

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## IMPLEMENTATION

### Applicability & Feasibility Issues

Potential barriers to implementing these recommendations include:

It is recommended that the provider be certified by the Yoga Alliance in teaching yoga.

Cultural differences should be considered when offering yoga as a treatment modality; yoga has origins in Indian philosophy and may be deemed by some families to run counter to their own philosophical or religious beliefs.

### Relevant CCHMC Policies for Implementation

Policy Number MCP-D-105, Effective Date 11/04/2011

Diversity 4.1.1.2.

Provide a patient experience in which an understanding of the patient's and their family's background are reflected in their treatment, care and overall experience.

### Outcome Measures and Process Measures

It is suggested that the Canadian Occupational Performance Measure (COPM) be administered at baseline and following treatment. The COPM is frequently used by The Department of Occupational Therapy, Physical Therapy, and Therapeutic Recreation, is a readily available at each satellite at this facility, and is a valid and reliable measure of change in occupational performance (*Law, M [5a]*).

It is suggested that Bruininks-Oseretsky Test of Motor Proficiency, Second Edition (BOT™-2) be administered at baseline and following treatment. It is frequently used by The Department of Occupational Therapy, Physical Therapy, and Therapeutic Recreation, is a readily available at each satellite of this facility, and is a valid and reliable measure of strength, balance, and coordination (*Bruininks, R [5a]*).

## SUPPORTING INFORMATION

### Background/Purpose of BEST Development

Yoga is an ancient philosophy and way of living originating in India. The philosophy is summarized as having “8 limbs” and includes guidance for how to treat others (‘yama’), how to treat oneself (‘niyama’), postures for wellness (‘asana’), breathing exercises (‘pranayama’), stages of meditation (‘Pratyahara’, ‘Dharana,’ and ‘Dhyana’) and elation in connection to the divine (‘Samadhi’) (*Satchidananda [5a]*). The research examining the use of yoga for improving strength, coordination, and balance focuses primarily on the use of specific postures and breathing exercises (asana and pranayama).

Recent statistics indicate that just over two percent of children practice yoga and that yoga is among the top ten complementary health approaches in the United States (*Barnes 2008 [4a]*; *National Center for Complementary and Alternative Medicine [5a]*). As yoga use in the community increases, so too has the variety of pediatric yoga trainings in the therapy community. A simple google search for “pediatric yoga training” has over two million hits and includes training programs such as Radiant Child Yoga, Zensationalkids Yoga, Rainbow Kids Yoga, and Color Me Yoga.

The popularity of pediatric yoga is likely tied to the perceived benefits of the practice. Yoga is popularly believed to be an activity which can be enjoyed by people of all ages, emphasizes mental and physical wellness, does not involve expensive equipment and is relatively safe and non-competitive. It is increasingly available to the general public and theoretically would be a positive community setting for children following discharge from therapy. Given the potential positive outcomes associated with yoga, the purpose of this BEST is to appraise the current level of evidence in the use of yoga for children. This BEST looks specifically at the use of yoga in improving strength, balance, and coordination due to the large number of children seen in the clinic with deficits in one or more of these areas.

### Definitions

**Occupational performance:** the accomplishment of the selected occupation resulting from the dynamic transaction among the client, the context and environment, and the activity (*Roley 2008 [5a]*).

**Yoga:** A mind and body practice with origins in ancient Indian philosophy. The various styles of yoga typically combine physical postures, breathing techniques, and meditation or relaxation (*National Center for Complementary and Alternative Medicine 2013 [5a]*).

**Strength:** Pertains to skills that require generation of muscle force appropriate for effective interaction with task objects (*American Occupational Therapy Association 2002 [5a]*).

**Balance:** Pertains to the ability to maintain the center of gravity within a base of support that is static (called static balance) or moving (dynamic balance) (*Jeter 2014 [1b]*).

**Coordination:** Relates to using more than one body part to interact with task objects in a manner that supports task performance (*American Occupational Therapy Association 2002 [5a]*).

### Search Strategy

Databases: Medline, Cochrane, PubMed, Cinahl Plus with Full Text, Alt Healthwatch, SPORTDiscus, PsycInfo, ERIC, Natural Standard, PEDro, OTseeker, Google Scholar

Search Terms: strength, balance, coordination, pediatric, yoga

Limits, Filters, Search Date Parameters: English language only

Date most recent search was completed: February 2014

### Group/Team Members

#### Multidisciplinary Team

Team Leader/Author: Mara Sampson, M.Ed, OTR/L, RYT-200

#### Other BEST Development Support

Support/Consultants: Rachel Baker, PhD, RN

### Conflicts of Interest were declared for each team member and

- No financial or intellectual conflicts of interest were found.  
 The following conflicts of interest were disclosed:

**Note:** Full tables of the LEGEND evidence evaluation system are available in separate documents:

- Table of Evidence Levels of Individual Studies by Domain, Study Design, & Quality (abbreviated table below)
- Grading a Body of Evidence to Answer a Clinical Question
- Judging the Strength of a Recommendation (dimensions table below and Rationale)

**Table of Evidence Levels** (see note above):

Quality level	Definition
1a† or 1b†	Systematic review, meta-analysis, or meta-synthesis of multiple studies
2a or 2b	Best study design for domain
3a or 3b	Fair study design for domain
4a or 4b	Weak study design for domain
5a or 5b	General review, expert opinion, case report, consensus report, or guideline
5	Local Consensus

†a = good quality study; b = lesser quality study

**Table of Language and Definitions for Recommendation Strength** (see note above):

Language for Strength	Definition
It is strongly recommended that... It is strongly recommended that... not...	When the dimensions for judging the strength of the evidence are applied, there is high support that benefits clearly outweigh risks and burdens. (or visa-versa for negative recommendations)
It is recommended that... It is recommended that... not...	When the dimensions for judging the strength of the evidence are applied, there is moderate support that benefits are closely balanced with risks and burdens.
There is insufficient evidence and a lack of consensus to make a recommendation...	

Copies of this Best Evidence Statement (BEST) and related tools (if applicable, e.g., screening tools, algorithms, etc.) are available online and may be distributed by any organization for the global purpose of improving child health outcomes.

Website address: <http://www.cincinnatichildrens.org/service/j/anderson-center/evidence-based-care/bests/>

Examples of approved uses of the BEST include the following:

- Copies may be provided to anyone involved in the organization's process for developing and implementing evidence based care;
  - Hyperlinks to the CCHMC website may be placed on the organization's website;
  - The BEST may be adopted or adapted for use within the organization, provided that CCHMC receives appropriate attribution on all written or electronic documents; and
  - Copies may be provided to patients and the clinicians who manage their care.
- Notification of CCHMC at [EBDMinfo@cchmc.org](mailto:EBDMinfo@cchmc.org) for any BEST adopted, adapted, implemented, or hyperlinked by the organization is appreciated.

Please cite as: Sampson, M., Cincinnati Children's Hospital Medical Center: Best Evidence Statement, The Use of Yoga to Improve Strength, Balance, and Coordination, <http://www.cincinnatichildrens.org/service/j/anderson-center/evidence-based-care/bests/>, BEST 187, pages 1-6, 6/10/14

This Best Evidence Statement has been reviewed against quality criteria by two independent reviewers from the CCHMC Evidence Collaboration. Conflict of interest declaration forms are filed with the CCHMC EBDM group.

The BEST will be removed from the Cincinnati Children's website, if content has not been revised within five years from the most recent publication date. A revision of the BEST may be initiated at any point that evidence indicates a critical change is needed.

**Review History**

Date	Event	Outcome
June 10, 2014	Original Publication	New BEST developed and published

For more information about CCHMC Best Evidence Statements and the development process, contact the Evidence Collaboration at [EBDMinfo@cchmc.org](mailto:EBDMinfo@cchmc.org).

**Note**

This Best Evidence Statement addresses only key points of care for the target population; it is not intended to be a comprehensive practice guideline. These recommendations result from review of literature and practices current at the time of their formulation. This Best Evidence Statement does not preclude using care modalities proven efficacious in studies published subsequent to the current revision of this document. This document is not intended to impose standards of care preventing selective variances from the recommendations to meet the specific and unique requirements of individual patients. Adherence to this Statement is voluntary. The clinician in light of the individual circumstances presented by the patient must make the ultimate judgment regarding the priority of any specific procedure.