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Complementary, Holistic, and Integrative Medicine: Meditation Practices for Pediatric Health

Erica M.S. Sibinga, MD,* Kathi J. Kemper, MD, MPH†

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Case Presentations

Case #1
Maria is a 14-year-old Hispanic girl who has developed chronic headaches and appears to be mildly depressed. She has become irritable and gotten into two fights at school this year. Her aunt, who is raising her, does not want to start her on medication. The aunt has a friend who works as a nurse and recently started a mindfulness-based stress reduction program. Maria’s aunt wants to know if she could try a similar program. What is the evidence that practicing mindfulness meditation can help someone like Maria?

Case #2
Antwan is a 12-year-old African American boy in an urban sixth-grade class who has mild hypertension. His teacher is interested in having her students learn some stress management skills to help them focus better in the classroom. She does not want anything inconsistent with her religion, but she has heard that even simple meditation can be helpful. What is the evidence that training in focused attention or concentration-type of meditation can help students like Antwan?

Case #3
Maggie is a 17-year-old girl who has anorexia nervosa and really wants to keep exercising. Her family physician advised her not to exercise vigorously to avoid further weight loss. Her mother wants to know if yoga can help decrease Maggie’s anxiety safely. Is yoga safe and effective for teens who have eating disorders?

Introduction

The word “meditation” has the same Indo-European root, “med” (to measure), as the word “medicine”; in Latin, meditation referred to physical or intellectual exercise. Just as various physical activities build different athletic capacities, various types of meditation build different mental and emotional capacities. The National Institutes of Health National Center for Complementary and Alternative Medicine (NCCAM) defines meditation as a set of techniques or practices intended to enhance focus or attention. They are characterized by NCCAM as mind-body therapies along with practices such as hypnosis, guided imagery, and biofeedback. When such practices are used in the context of a religious or spiritual practice, they also may be intended to promote a sense of oneness with the Divine; higher states of consciousness; or greater compassion, loving-kindness, peace, creativity, or forgiveness. Meditative techniques have been used by cultures throughout the world since antiquity to promote health and well-being.

Meditative techniques are widely practiced for health purposes, most often to promote overall health and to relieve stress, anxiety, insomnia, depression, and chronic pain or fatigue. In a 2007 national survey of 23,393 adults in the United States, 9.4% (representing more than 20 million people) reported using meditation for health purposes in the past 12 months, an increase from 7.6% reported in a similar survey conducted in 2002. (1)(2) Subsequent surveys found that about 5.1% of adults used yoga, while about 1% used tai chi, qi gong, or both for health reasons. (3)(4) In a 2007 pediatric survey, approximately 1% (representing 725,000 children and adolescents) used meditation for health purposes. (2) Because the surveys did not specifically list all of the various types of meditative practices, these estimates are likely to be conservative.

Few families spontaneously report CAM therapy use to their physicians. To provide comprehensive care, physicians need to ask about all the therapies that patients use. We
review scientific studies about the most commonly used meditation practices in this article to help pediatricians counsel patients using evidence-based information.

**Types of Meditation Practice**

Just as the broad category of sports includes sports played with a ball (e.g., basketball, baseball, football), a racquet (e.g., tennis, squash), skates (e.g., figure skating, hockey), running (e.g., track, cross-country), jumping (e.g., hurdles, high jump, broad jump), weight lifting, and swimming (e.g., freestyle, backstroke, butterfly stroke), meditation includes many different practices. Different practices may appeal to different individuals and have different mental and physical effects.

The most commonly included categories of meditation practice are: concentration, cultivating positive emotions or spiritual qualities, mindfulness, movement, and emptying (Table 1). Within each of these broad categories are multiple varieties of practice. For example, concentration meditation includes practices that focus on the breath, a word (e.g., transcendental meditation) or phrase (e.g., repetitive prayers, such as the Catholic rosary, the Muslim mishbaha, short scripture verses, poetry, or affirmations), an image (e.g., a candle, cross, or mandala), a body part (e.g., the heart, the “third eye” between the eyebrows, or the “dan tien” in the lower mid-abdomen), a sound (e.g., chanting), a concept (e.g., death or impermanence, inter-relatedness), or an emotion (e.g., focusing on gratitude or adoration). Closely related to this last type of concentration meditation are practices designed to cultivate emotional/spiritual states or qualities such as the Buddhist metta and tonglen meditation (cultivating compassion and loving-kindness) and forgiveness. (5)

Mindfulness practices involve the intention to notice, without judgment, the thoughts, emotions, sensations, and other experiences that arise in each moment. They can include mindful awareness of the breath, eating, listening, and moving. The most widely used training program in mindfulness, Mindfulness-Based Stress Reduction (MBSR), defines mindfulness as “paying attention on purpose” or as “moment to moment, non-judgmental awareness.” It includes three components: intention (of increasing awareness of the present moment), attention (sustained focus on current experience), and attitude (nonjudgmental acceptance).

Moving meditative practices include mindful yoga, tai chi, and qi gong. Many cultures also include meditations based on repetitive movements such as circle dancing, stamping, and whirling (Sufi dervishes). Emptying meditations include Christian practices such as centering prayer. Among related meditative practices are the Quaker practice of sitting in communal silence and “waiting on the Light” or the “still, small voice within.” Just as a basketball player also may run track, those who primarily practice one type of meditation also may practice others. For example, Zen practices incorporate concentration, cultivating positive attitudes, mindfulness, and movement.

Formal training and the intensity, duration, and frequency of practice vary for different types of meditation and different people. Just as health guidelines recommend 30 to 60 minutes daily of physical exercise to maintain physical health, recommendations for meditation practice typically range from just a few minutes for young children to 10 minutes twice daily for school-age children to 45 minutes daily for older adolescents and adults engaged in mindfulness practice. Those who have greater needs or higher aspirations may engage in longer practices and seek formal training or guidance.

This review focuses on meditation practices for which there are at least five published pediatric studies available through PubMed or PsycInfo databases since 1972. Dis-

<table>
<thead>
<tr>
<th>Types of Meditation Practice</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concentration on a word, thought, sensation, or image</td>
<td>Transcendental meditation; relaxation response; breath-focused meditation; mantra repetition; meditation on a prayer, mandala, or other image</td>
</tr>
<tr>
<td>Mindfulness</td>
<td>Mindfulness-based stress reduction, Vipassana</td>
</tr>
<tr>
<td>Movement-based meditation</td>
<td>Yoga, tai chi, qi gong, Sufi dancing</td>
</tr>
<tr>
<td>Cultivating positive emotions (such as compassion, forgiveness, gratitude, or loving-kindness)</td>
<td>Buddhist metta or tonglen practices (cultivating compassion and loving-kindness), Institute of HeartMath training (cultivating gratitude or compassion)</td>
</tr>
<tr>
<td>Emptying</td>
<td>Centering prayer, waiting on the inner voice or inner light</td>
</tr>
</tbody>
</table>

Note: Some practices include more than one type of meditation. For example, yoga practices may include meditation on the breath, a word phrase, or sensation as well as movement and postures. All of these practices involve mental training that enhances the ability to focus or sustain attention.
Meditation appears to affect subsystems of attention. (29) Some studies also suggest increased creativity, intelligence, and learning ability. (30)(31)(32)(33) Experimental studies also show decreased pain sensitivity in those who meditate, even after very brief training. (34)(35)(36)

Research on the physiologic effects of meditation practice among children is needed.

Clinical Effects in Adults

Despite methodologic variability, the hundreds of meditation studies conducted in adults suggest significant benefits for both physical and mental health. (37) Physical benefits have been reported for pain, fatigue, hypertension, asthma, autoimmune disorders, epilepsy, irritable bowel syndrome, and premenstrual symptoms. (38)(39)(40)(41) Mental health benefits include improved moods and decreased stress, anxiety, obsessive-compulsive thoughts, depression, aggressiveness, and substance abuse. (6)(20)(39)(41)(42)(43)(44)(45)(46)

Experience with focusing attention and building the capacity to monitor attention as it wanders and returns can help individuals more readily recognize precursors to aggressive or addictive thoughts and feelings, even among those who have intellectual disabilities. (47)(48) Those who practice most consistently report the greatest physical and mental health benefits. (49) It is not always clear whether the benefits are greater in such individuals because of the effects of the intervention per se or the general personality characteristics of those who adhere or whether adherence is related to other beneficial changes in health behavior. In rare cases, meditation has been associated with precipitation of psychosis or psychotic episodes among individuals who have pre-existing schizophrenia or significant thought disorders, but no other serious adverse effects have been reported. (38)

A number of products (such as CDs, DVDs, and books) and training programs (both in person and online) have been developed for adults and children, targeting conditions such as attention-deficit disorder, chronic pain, eating behaviors, sleep problems, anxiety, and depression.

Clinical Effects in Pediatrics

This review divides the data from pediatric studies into three practices: mindfulness, concentration (e.g., relaxation response, transcendental meditation [TM], or similar practices), and movement-based practices (yoga and tai chi).
An emerging body of research suggests the potential benefit of mindfulness instruction for children. Many of the mindfulness studies use age-appropriate adaptations of the MBSR developed for adults. (62) Case reports, small studies, and multimodal studies suggest acceptability.

### Table 2. Mindfulness Meditation Practices for Health: Pediatric Studies

<table>
<thead>
<tr>
<th>Investigator</th>
<th>Condition/Study Participants</th>
<th>Practice/Training</th>
<th>Study Design/Training Period</th>
<th>Outcome/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biegel, 2009</td>
<td>14- to 18-year-olds in Outpatient psychiatric facility n=102</td>
<td>MBSR</td>
<td>Randomized, controlled trial 8 weeks with WLC</td>
<td>Reduced anxiety, depression, somatic distress, increased self-esteem and sleep quality</td>
</tr>
<tr>
<td>Bootzin, 2005</td>
<td>Adolescents who have substance abuse n=17</td>
<td>Stimulus control, bright light therapy, cognitive therapy, MBSR, and sleep education</td>
<td>6 sessions; no control group</td>
<td>Improved sleep, decreased worry, and decreased mental health distress</td>
</tr>
<tr>
<td>Flook, 2010</td>
<td>Second and third graders n=64</td>
<td>Mindful awareness practices</td>
<td>30 minutes twice per week×8 weeks Randomized control (silent reading period)</td>
<td>Improved executive function for students with lower baseline (P&lt;0.02) by teacher and parent rating</td>
</tr>
<tr>
<td>Lee, 2008</td>
<td>9- to 12-year-old students n=25</td>
<td>MBCT-C</td>
<td>12 weekly 45-minute sessions; no control</td>
<td>Improved attention and anger management by parental report</td>
</tr>
<tr>
<td>Napoli, 2005</td>
<td>First through third graders n=194</td>
<td>Attention Awareness Program (AAP)</td>
<td>12 45-minute sessions every 2 weeks Control group (no AAP)</td>
<td>Reduced test anxiety, improved behavior, attention</td>
</tr>
<tr>
<td>Ott, 2002</td>
<td>GI symptoms n=1</td>
<td>MBSR</td>
<td>Case report of individual MBSR instruction</td>
<td>Improved GI symptoms and function</td>
</tr>
<tr>
<td>Saltzman, 2008</td>
<td>Fourth through sixth graders and their parents n=32 (MBSR=24; WLC=8)</td>
<td>MBSR</td>
<td>Nonrandom WLC</td>
<td>Improved attention (parents and children), reduced emotional reactivity (parents&gt;children)</td>
</tr>
<tr>
<td>Semple, 2005</td>
<td>Anxious 7- to 8-year-old children n=5</td>
<td>MBCT-C</td>
<td>6 weekly 45-minute sessions; no control</td>
<td>Feasible; may be beneficial for anxiety</td>
</tr>
<tr>
<td>Sibinga, 2008</td>
<td>HIV n=5 Qualitative</td>
<td>MBSR</td>
<td>8 weeks; no control group</td>
<td>Reduced reactivity, improved self-care</td>
</tr>
<tr>
<td>Singh, 2008</td>
<td>Mindfulness for teen who has Prader-Willi syndrome</td>
<td>Mindful eating Meditation</td>
<td>Phased study: Baseline, exercise, exercise + food awareness, exercise + food awareness + mindfulness; 12 months of each phase</td>
<td>Significant weight loss with addition of mindfulness</td>
</tr>
<tr>
<td>Wall, 2005</td>
<td>Middle-school students (11 to 13 years old) n=11</td>
<td>MBSR and tai chi</td>
<td>1 hr/wk for 5 weeks</td>
<td>Decreased reactivity and increased well-being, calmness, relaxation, self-awareness, and self-care</td>
</tr>
<tr>
<td>Zylowska, 2008</td>
<td>Adults (n=24) and adolescents (n=8)</td>
<td>MBSR</td>
<td>2.5 hr/wk for 8 weeks</td>
<td>Improved ADHD symptoms, attention and cognitive inhibition, anxiety, depression</td>
</tr>
</tbody>
</table>

ADHD=attention-deficit/hyperactivity disorder, GI=gastrointestinal, HIV=human immunodeficiency virus, MBCT-C=mindfulness-based cognitive therapy for children, MBSR=mindfulness-based stress reduction, WLC=wait list control
A number of studies in school settings show improved attention and behavior. (53)(54)(56)(67) For example, a trial of 120 high school seniors using a school-based mindfulness curriculum showed reductions in negative affect, tiredness, and aches and pains and increases in emotion regulation, feelings of calmness, relaxation, and self-acceptance. (68) A randomized, controlled study of mindfulness practices in 64 second- and third-graders showed improvements in executive function among students who had poorer executive function at baseline, as assessed by both parents and teachers using the Behavior Rating Inventory of Executive Function. (52) In a pilot study, urban youth who participated in MBSR reported fewer fights (verbal and physical), improved relationships, increased reflection on internal processes, and better self-regulation. (69) Further, a randomized, controlled trial of MBSR compared with usual care for adolescents in outpatient psychiatric treatment showed significant reductions in anxiety and depression and improvements in global assessments. (50) These studies suggest that mindfulness instruction may result in improved physical, cognitive, behavioral, and psychological outcomes in children and youth, but more rigorous research is needed to evaluate the specific role of mindfulness compared with other types of meditation training or other interventions.

Concentration Meditation: Transcendental Meditation and the Relaxation Response (Table 3)

TM involves the use of a sound or mantra as a focus for the practitioner’s attention and is practiced for 15 to 20 minutes twice per day while sitting comfortably with closed eyes. Controlled studies of TM for pediatric populations primarily focus on the effect on cardiovascular risk factors and school-related outcomes. Several studies have shown that compared with a health education control in school settings, TM practiced 15 minutes twice per day for 4 months resulted in significant decreases in systolic and diastolic blood pressures as well as blood pressure reactivity to a social stressor interview. (70)(72) In addition, Barnes assessed problem behaviors in school-age children and found that students who practiced TM had reductions in absenteeism, school infractions, and suspension for behavioral problems. (71) In a series of three studies of high school students (n=372), TM practiced twice daily for 15 to 20 minutes compared with napping resulted in improvements in cognitive tasks (e.g., testing distractibility and creativity) and anxiety. (33) Additional small studies have shown associations between TM and beneficial psychological, self-regulatory, and academic outcomes. (64)(81) Looking at potential causes for benefit from TM practice, a small controlled study of healthy college students showed greater frontal brain wave coherence and reduced sleepiness. (82) Studies of TM’s effect in youth on cardiovascular risk, cognition, affect, and behavior are promising, but larger, more definitive comparative effectiveness research is needed.

A few pilot studies have evaluated Benson’s relaxation response (RR), a form of brief focused attention on breath, in children and youth. These small studies suggest that the RR is feasible in pediatric populations and that it may have benefits related to reducing headaches, reducing anxiety, and improving self-esteem and self-concept. (73)(74)(75)(80) Larger trials with more rigorous designs are needed for better understanding of the effects of the RR compared with other types of concentration and mindfulness training in diverse pediatric populations.

Mindful Movement: Yoga and Tai Chi (Table 4)

Numerous types of yoga are offered in the United States. Some, such as Ashtanga or Power yoga, focus primarily on physical fitness; others, such as Integral, Kundalini, and Sivananda yoga, aim toward spiritual enlightenment; and still others, such as Kripalu and Viniyoga, focus on healing. (88) Most yoga practices offer a combination of physical postures, meditation, and breathing exercises. Among adults, those who take up yoga are more likely than non-yoga students to be Caucasian, female, and college-educated; adults typically use yoga to help with musculoskeletal or mental health challenges. (3)

Birdgee and associates (83) conducted a systematic review of 19 randomized, controlled trials and 15 non-randomized, controlled trials of yoga for children and adolescents up to 21 years of age published before December, 2008. The primary conclusion was that more rigorous research is needed to address problems with randomization, withdrawal/dropouts, and details regarding the type and content of the yoga training provided (many included training in meditation, postures, and breathing, and it is difficult to sort out the effects of each component). However, the authors concluded that yoga was safe, with no reported adverse effects in any of the 34 trials reviewed. (83) Benefits that appeared to be consistent across two or more studies included: greater physical fitness and strength, better mood, lower stress and anxiety, better attention and behavior, and better verbal and spatial memory and visual perception. (83) A few small studies also reported benefits for adolescents...
Table 3. **Transcendental Meditation (TM) and Relaxation Response (RR) Practices for Health: Pediatric Studies**

<table>
<thead>
<tr>
<th>Investigator</th>
<th>Condition/Study Participants</th>
<th>Practice</th>
<th>Design and Training Period</th>
<th>Outcome/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barnes, 2001 (70)</td>
<td>35 teens ages 15 to 18 years with resting BPs at 85th to 95th percentile for age</td>
<td>TM</td>
<td>Random assignment to health education control or TM practiced 15 minutes twice daily for 2 months during school and prescribed for home</td>
<td>TM group had greater decrease in SBP, HR, and CO reactivity ($P&lt;0.03$) to simulated car driving stressor and in SBP reactivity ($P&lt;0.03$) to social stressor interview</td>
</tr>
<tr>
<td>Barnes, 2003 (71)</td>
<td>45 African American teens ages 15 to 18 years with high normal SBP</td>
<td>TM</td>
<td>Random assignment to health education control ($n=20$) or TM ($n=25$) for 15 minutes daily for 4 months</td>
<td>Decreased absenteeism by 6.4 days versus increase of 4.8 days in control ($P&lt;0.05$), decreased school infractions ($P&lt;0.03$), and decreased school suspension days ($P&lt;0.04$) for behavior problems</td>
</tr>
<tr>
<td>Barnes, 2004 (66)</td>
<td>100 teens with high normal SBP</td>
<td>TM</td>
<td>RCT Ambulatory 24-hour BP pretest, 2- and 4-month posttests and 4-month follow-up evaluation</td>
<td>Decreases in daytime SBP and DBP ($P&lt;0.04$ and $P&lt;0.06$) in TM versus control across visits</td>
</tr>
<tr>
<td>Barnes, 2004 (72)</td>
<td>BP in 73 12-year-old children</td>
<td>Concentration on breath</td>
<td>RCT by classroom (health education control) to meditation practices 10 minutes at school and home daily for 3 months</td>
<td>Resting SBP: 2.7 versus 1.1 mm Hg pre/post change</td>
</tr>
<tr>
<td>Benson, 1994 (73)</td>
<td>37 high-school students</td>
<td>RR</td>
<td>RCT Intervention 15 minutes 3 times/wk</td>
<td>Increased self-esteem with RR ($P&lt;0.05$)</td>
</tr>
<tr>
<td>Benson 2000 (74)</td>
<td>1,037 sixth through eighth graders</td>
<td>RR (taught to teachers and students)</td>
<td>In class RR per teachers (no control group)</td>
<td>Exposure to &gt;2 semesters with RR teachers: better grade point average, work habits, cooperation Dose response ($P&lt;0.05$)</td>
</tr>
<tr>
<td>Day, 1982 (75)</td>
<td>62 students 10 to 12 years old</td>
<td>RR</td>
<td>RCT RR 10 minutes daily for 6 weeks Control: reading activity</td>
<td>RR group had lower general anxiety scale and test anxiety scale ($P&lt;0.01$), but effect did not persist at 3 weeks</td>
</tr>
<tr>
<td>Fentress, 1986 (76)</td>
<td>18 children 8 to 12 years old</td>
<td>RR</td>
<td>RCT: 4 weeks of baseline, followed by 9 1-hour treatment sessions over 11 weeks $n=6$ had EMG biofeedback, RR training, and behavior management $n=6$ had RR training and behavior management $n=6$ wait list controls</td>
<td>Headache diaries for 15-week study and 4 weeks 1 year later Both active treatment groups had significant reduction in headache symptoms ($P&lt;0.05$)</td>
</tr>
</tbody>
</table>

(continued)
who had irritable bowel syndrome, (89) asthma, (90) and eating disorders. (91)

Since the Birdee article was published, a pilot study has been presented that evaluated the impact of Ashtanga yoga for obese children and adolescents in Florida. (84) In this study, 20 predominantly Hispanic children ages 8 to 15 years were enrolled in a 12-week yoga program. Among the 14 who completed the program, weight decreased from an average of 61.2 kg to 59.2 kg ($P=0.01$). In another pilot study, fourth- and fifth-graders were enrolled in either a yoga or other after-school program for 12 weeks. (85) The researchers did not detect significant improvements in the primary outcome of self-esteem, but they noted that yoga participants had significantly better scores on negative behaviors and improved balance compared with control children. In a third study of 154 adolescents who had eating disorders and were randomized to yoga or treatment as usual, those who

Table 3. Transcendental Meditation (TM) and Relaxation Response (RR) Practices for Health: Pediatric Studies—Continued

<table>
<thead>
<tr>
<th>Investigator</th>
<th>Condition/Study Participants</th>
<th>Practice</th>
<th>Design and Training Period</th>
<th>Outcome/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kindlon, 1983 (77)</td>
<td>35 undergraduate students</td>
<td>Sitting meditation; concentration on breath</td>
<td>RCT Meditation for 30 minutes daily Control: rest for same period of time</td>
<td>No significant differences on test anxiety</td>
</tr>
<tr>
<td>Linden, 1973 (78)</td>
<td>26 disadvantaged third-graders</td>
<td>Meditation, unspecified</td>
<td>RCT Meditation versus guidance (attention control) versus regular class (no attention control) 18 weeks</td>
<td>Decreased test anxiety ($P&lt;0.05$) More &quot;field independent&quot; ($P&lt;0.05$) No effect on reading achievement</td>
</tr>
<tr>
<td>Mengel, 1979 (79)</td>
<td>27 10- to 15-year-old boys who had learning disabilities</td>
<td>TM/RR</td>
<td>Meditation for 6 weeks Control group: music appreciation</td>
<td>No differences on reading scores</td>
</tr>
<tr>
<td>Oldfield, 1986 (80)</td>
<td>21 disruptive fourth- through sixth-graders</td>
<td>RR</td>
<td>RCT 1.5-hour training (RR or control), then 15 min/day for 80 school days Control: behavior charting</td>
<td>RR scored higher on behavior, intellectual, and school status ratings (Children’s Self Concept Scale) and self-concept ($P&lt;0.05$)</td>
</tr>
<tr>
<td>Rosaen, 2006 (81)</td>
<td>10 African American seventh-graders who practiced for 1 year</td>
<td>TM (qualitative design)</td>
<td>20 minutes daily for 1 year No control group</td>
<td>Increasing “restful alertness” Improved self-control, self-reflection, and flexibility in emotional response Improved academic performance</td>
</tr>
<tr>
<td>So, 2001 (33)</td>
<td>362 high-school students in three studies</td>
<td>TM</td>
<td>15 to 20 minutes twice daily for 6 or 12 months Control groups included napping, no interest control, contemplation control</td>
<td>TM practice produced significant improvements in measures of creativity, anxiety, and practical intelligence compared with controls ($P&lt;0.05$)</td>
</tr>
<tr>
<td>Travis, 2009 (82)</td>
<td>50 healthy college students (Full data on 38 students)</td>
<td>TM</td>
<td>Wait list control compared with TM training for 10 weeks</td>
<td>Significant impact on Brain Integration Scale, sleepiness, habituation rates ($P&lt;0.007$)</td>
</tr>
</tbody>
</table>

BP=blood pressure, DBP=diastolic blood pressure, EMG=electromyography, HR=heart rate, CO=cardiac output, RCT=randomized, controlled trial, SBP=systolic blood pressure

A meta-analysis of other studies, including studies in adults and children, not cited within this table. (22)
received yoga had greater decreases in eating disorder scores and food preoccupation, and there was no adverse effect on weight compared with treatment as usual. (86) Although these data are promising, additional studies are needed that include randomized control groups to reduce potential bias and larger sample sizes to test the hypothesis that yoga programs are more effective than other interventions for weight loss or improved self-esteem in children and adolescents.

Tai Chi is an Asian meditative movement practice that sometimes is taught in conjunction with mindfulness meditation training. (65) Qualitative research in middle-school students suggests that regular tai chi practice is associated with improved well-being, calmness, relaxation, improved sleep, less reactivity to stress, greater self-care, and an improved sense of interconnection with other people and with nature. (60) In a study of 12 high school girls, weekly tai chi

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**Table 4. Yoga Practices for Health: Pediatric Studies**

<table>
<thead>
<tr>
<th>Investigator</th>
<th>Condition/Study Participants</th>
<th>Practice</th>
<th>Training Period</th>
<th>Controls</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birdee, 2009 (83)</td>
<td>Multiple (review) Review of 34 pediatric yoga articles through December 2008</td>
<td>Review of 34 pediatric yoga articles through December 2008</td>
<td>19 RCTs and 15 non–RCTs</td>
<td>May be useful for physical fitness and cardiorespiratory health</td>
<td>Need more rigorous trials No adverse effects reported</td>
</tr>
<tr>
<td>Benavides, 2009 (84)</td>
<td>20 obese 8- to 15-year-old children Ashtanga yoga 12 weeks No controls; pre/post design</td>
<td>Weight loss average from 61.2 kg at baseline to 59.2 kg (P&lt;0.01)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Berger, 2009 (85)</td>
<td>39 yoga 32 control fourth- and fifth-grade students in an after-school program 1 hr/wk after school 12 weeks Control: another after-school program</td>
<td>Harter’s Global Self-Worth and Physical Appearance Subscales improved negative behavior scores and balance in yoga group (P&lt;0.05) No significant difference in self-worth</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carei, 2010 (86)</td>
<td>54 adolescents who had eating disorders Yoga 8 weeks Treatment as usual</td>
<td>Eating Disorder Examination: improved eating disorder scores and decreased food preoccupation after each session No significant difference between groups in depression, anxiety, or weight</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Derezotes, 2000 (87)</td>
<td>9 male adolescent sex offenders Yoga, breathing, and meditation 6 to 9 months No controls; pre/post design</td>
<td>Qualitative, open-ended questions of both teens and parents 0 relapses over course of study All felt it was helpful, with better sleep, less anger, more self-awareness of emotions, greater clarity in thinking, better control of thoughts and feelings</td>
<td></td>
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</table>

RCT = randomized, controlled trial
training was associated with improvements in mood and quality of life. (92) We did not find any randomized, controlled comparative effectiveness trials of tai chi in children or adolescents.

Trainers, Teachers, and Therapists for Pediatric Meditation

Tables 5 and 6 provide resources for books, CDs, and online training options. Some psychologists and other mental health professionals have undergone specific pediatric training and certification to provide specific training (eg, MBSR or mindfulness-based cognitive behavioral therapy or dialectical behavior therapy). Similarly, some yoga teachers have undergone specific pediatric training and certification. Nevertheless, due to the absence of consistent national certification for pediatric mind/body training, it is prudent for pediatricians to ask for evidence of explicit training and experience before recommending trainers. Even licensure and certification do not ensure a perfect fit between a trainer and a patient, so it is helpful to ask for recommendations among patients and colleagues and to meet local trainers. Ask how many sessions are standard; the duration of training; expectations for home practice; costs; how many pediatric patients or students they have taught in the past year; and whether they work individually, in groups, or by telephone or internet.

As with other clinicians, look for those who are welcoming, warm, empathetic, and show genuine interest in people, not just their favorite techniques. The most effective teachers and trainers offer steadfast acceptance and positive regard and create an atmosphere of safety.

Table 5. Mindfulness and Concentration Meditation Resources for Children and Adolescents

Books

- Gordhamer S. Just Say Om!: Your Life's Journey. Adams Media Corporation, 2001
- MacLean KL. Moody Cow Meditates. Wisdom Publications, 2009
- MacLean KL. Peaceful Piggy Meditation. Albert Whitman & Co, 2004

CDs

- Salzman A. Still, Quiet Place: Mindfulness for Young Children. 2004

Online Training or Practice Guides

- eMindful provides online interactive courses for a fee, including courses specifically for children and teens and others focused on specific physical or mental health challenges: http://www.emindful.com/schedules/
- Learning Meditation. Patsy Gray has developed this site that provides free audio files and printable scripts for children to use to learn simple techniques: http://www.learningmeditation.com/children.htm
- Meditation Society of Australia. This site has guided meditations for children that can be downloaded; a few introductory scripts are free, but access to others requires an online subscription (about $8 for access): http://children.meditation.org.au/. The site also has pages for adults: http://download.meditation.org.au/mediationalphabet.htm
- Meditations for the Constantly Connected. This site offers audio files for a fee: http://www.sorengordhamer.com/Homepage_1.html
- Amy Saltzman offers free online guided meditations: http://www.Stillquietplace.com
- Mindfulness in Education. http://www.mindfuled.org/innerkids/
and trust, while fostering independence and acknowledging patients’ strengths and capacities.

**Costs and Insurance**

Aside from care provided by licensed psychologists or counselors, meditation training is unlikely to be covered under most insurance plans. Some flexible medical spending programs cover the costs if the treating physician writes a letter indicating the condition being treated and the rationale for training. Some trainers and teachers of meditation and yoga take a percentage of patients with limited means as part of their community service. Reduced-price classes may be available from student/trainee teachers. Students and trainees who offer these services are generally idealistic, compassionate, diligent individuals who receive ongoing supervision and feedback from experienced mentors and provide their services for very modest or reduced rate fees.

### Table 6. Resources on Yoga for Children and Adolescents

**Books**

- Calhoun Y, Calhoun MR. *Create a Yoga Practice for Kids*. Sunstone Press, 2006
- Chryssicas MK. *Breathe: Yoga for Teens*. DK CHILDREN, 2007
- Chryssicas MK. *I Love Yoga (Yoga for Kids)*. DK CHILDREN, 2005
- Gruber T, Kalish L, Fatus S. *Yoga Pretzels (Yoga cards)*. Barefoot Books, 2005
- Stewart M. *Yoga for Children*. Fireside, 1993

**DVDs**

- *A Child’s Way to Yoga*. This DVD features an outdoor setting with a creative teacher working with preschool children.
- *Teen Yoga*. Yoga teacher Kathleen Kastner leads Miss Teen USA 2005, Allie LaForce, through an energizing power yoga program.
- *Yoga for Children With Special Needs*. Taught by an occupational therapist, this DVD is for children and adolescents who can stand, bend, and touch the floor and can imitate and follow directions.
- *YogaKids® DVDs*. These three 40-minutes videos are designed for children from 3 to 6 years of age.
- *Yoga For Families: Connect With Your Kids*. For ages 4 and up.

**OnLine Training or Practice Sites (noncommercial sites)**

- *Global Family Yoga* guides parents and teachers through yoga training to teach children yoga at churches and other nonprofit settings across the United States. E-courses are being developed. [www.globalfamilyyoga.org](http://www.globalfamilyyoga.org)
- *Yoga Calm* is designed to train parents and teachers to teach children more than 60 activities integrating physical yoga practices, mindfulness, and social and emotional self-regulatory skills. [www.yogacalm.org](http://www.yogacalm.org)
- *Yoga 4 Kids* offers adult training and professional development to provide yoga therapy to infants, children, and teens, particularly those who have special needs. [www.yoga4kids.org](http://www.yoga4kids.org)
- *Yoga in Schools* wants to make yoga available in all schools to improve body-mind awareness and the ability to nurture well-being. [http://yogainschools.org](http://yogainschools.org)

**Yoga Professional Training and Certification (to find teachers locally)**

- *Yoga Alliance* is a national education and support organization for yoga in the United States. Use [http://www.yogaalliance.org/teacher_search.cfm](http://www.yogaalliance.org/teacher_search.cfm) to find a local registered yoga teacher.

### Cases Discussions

Scientific studies suggest that mindfulness meditation training may be a good choice for Maria to help with her headaches, mood, stress, and school behavior. Similarly, the research on concentration meditation, particularly TM and RR, generally supports its benefits for patients who have hypertension and stress; it has been used successfully in classroom settings for middle-school students like Antwan. Yoga training has been used safely for adolescent girls like Maggie who have eating disorders without risking additional weight loss. However, clinicians should consider the many types of yoga and encourage patients to select a type that focuses less on athleticism and more on mindfulness, meditation, or breathing aspects of the practice. Clinicians considering referring adolescents who have the recent onset of behavior or psychiatric problems such as Maria and Maggie should screen for thought disorders and other symptoms of schizophrenia before recommending meditation training.
Summary
Interest in, practice of, and research about a variety of meditation forms for children and youth is growing. Thus far, the evidence supports the feasibility and acceptability of numerous meditative practices, including mindfulness practices, TM, RR, yoga, and tai chi. A number of well-controlled studies support the use of meditation for blood pressure reduction. In addition, research suggests that meditative practices are associated with improvements in attention, behavior, and psychological functioning in children and youth. More rigorous comparative effectiveness research in larger, diverse pediatric populations is needed to be confident that these results are related specifically to the instruction and practice of meditative practices and to tailor recommendations to specific patients. Despite the desirability of additional research, meditation is a very safe practice, with a variety of approaches that can suit diverse unique needs, values, and preferences. Clinicians should use similar approaches and considerations in referring pediatric patients for meditation training as for other complementary therapies and therapists such as massage and acupuncture.

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