

# Nurturing Mindfulness in Children and Youth: Current State of Research

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**ABSTRACT**—*This article reviews the current state of research on contemplative practices with children and youth. It reviews contemplative practices used both in treatment settings and in prevention or health promotion contexts, including school-based programs. Although there is great interest and potential promise for contemplative interventions, enthusiasm for promoting such practices outweighs the current evidence supporting them. Interventions that nurture mindfulness in children and youth may be a feasible and effective method of building resilience in universal populations and in the treatment of disorders in clinical populations. This review suggests that meditation and yoga may be associated with beneficial outcomes for children and youth, but the generally limited quality of research tempers the allowable conclusions. Well-designed experimental studies that are grounded in developmental theory and measure multiple indicators of change must fully test the efficacy of such interventions.*

**KEYWORDS**—*mindfulness; yoga; prevention*

There is considerable concern that children and youth experience less than optimal physical and mental health and that it affects a wide range of outcomes, including academic performance, substance use, violence, and obesity (Greenberg et al., 2003). There has been a strong call to develop new ideas to nurture children's health and well-being and increasing interest in how to develop habits of mind and behavior that build resilience in the face of everyday adversity (Shonkoff, Boyce, & McEwen, 2009).

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Recent years have witnessed an explosion of interest in secular mindfulness strategies (including meditation, attention training, yoga, and other techniques) as methods to support wellness. Research with adults has clearly shown benefits for promoting health, alleviating pain, and reducing depression and anxiety (Arias, Steinberg, Banga, & Trestman, 2006; Kabat-Zinn, 2003). Furthermore, basic research has shown that certain methods are likely to have these effects because they alter organization and action of neural circuitry, which is associated with alterations in stress reactivity and immune function (Davidson et al., 2003). Thus, it is not surprising that such practices are rapidly growing in application for children and youth. One merely needs to enter such search terms as “children and yoga” or “children and mindfulness” to find thousands of sites extolling their benefits. Consumer interest and marketing have expanded such practices without sufficient knowledge of their outcomes, which might be positive, minimal, or even iatrogenic. There is also some concern regarding the spiritual or religious origin of some practices and their efficacy. Because there is currently little quality research on outcomes, widespread use is premature. However, if careful research demonstrated beneficial effects on well-being or physical health, it might provide wider public support for effective interventions.

Building from previous reviews and recent research, we construct a broad overview of the current state of knowledge regarding the feasibility and outcomes of systematically implementing contemplative practice programs with children and youth. In doing so, we highlight the key elements of high-quality research necessary to move the field forward.

## CONTEMPLATIVE PRACTICES AND CHILDREN

Although it is beyond the scope of this article to fully characterize the range of contemplative practices with children, we describe some of the shared characteristics of secularized contemplative practices that generally fall under the labels of mindfulness, meditation, and yoga. Definitions of mindful or

contemplative practices include structured activities that “require individuals to exercise volitional control over their physical and mental activity” (Davidson & Mind and Life Education Research (MLERN) Network, in press). In meditative practices, a common goal is to sustain the focus of attention on mental contents or particular objects, such as the breath, a sound, or a visual percept. This focused attention could occur through sitting meditation (Black, Milam, & Sussman, 2008), walking meditation, certain forms of yoga and martial arts, or activities common to educational approaches including Montessori (Lillard, 2011). A central goal of these practices is to fully become aware of the moment-to-moment fluctuations in the “stream of consciousness” and to adopt an open and accepting stance toward these experiences. Although different techniques have different goals, they share a focus on sharpening concentration or attention, building emotion regulation skills to effectively manage stress, and gaining self-knowledge. Some practices consciously focus on building empathy and compassion. With sustained practice, these skills are hypothesized to become routinized at neural or mental levels and subsequently to regulate behavior in relatively automatic ways.

Such conceptualizations lead to questions regarding when and how in development to nurture such skills and dispositions, at what ages to introduce differing practices, and how such practices might change in concert with the dramatic changes in cognition and emotion that occur between early childhood and young adulthood. As Roeser and Peck (2009) noted, contemplative practices require adaptation for use with children and youth. Such adapted practices may take a wide variety of forms, including nature-related activities, the arts, physical disciplines involving set postures or sequences of movements (such as tai chi or yoga), guided imagery, or various forms of sitting meditation. Further, these practices involve a relational context with other children and a teacher who is likely to emphasize values of personal growth and ethics. Thus, contemplative practices often feature a “world view” including social or moral values.

### RESEARCH ON MINDFULNESS AND YOGA INTERVENTIONS WITH CHILDREN

Although contemplative practices may take numerous forms, the primary platforms have been yoga and meditative practice. Given four recent systematic reviews concerning meditative and yoga interventions with children and youth (Birdee et al., 2009; Black et al., 2008; Burke, 2009; Galantino, Galbavy, & Quinn, 2008), we only briefly review their findings and add more recently published studies.

Two systematic reviews (Black et al., 2008; Burke, 2009) examined sitting meditation and mindfulness practices with children, and two reviews (Birdee et al., 2009; Galantino et al., 2008) examined applications of yoga. Most research involved middle childhood and adolescence. These reviews illustrate the limitations of current research. Birdee et al. (2009) identified 19

experimental studies but judged most to have inadequately reported key elements, such as instructor qualifications, attrition rates, randomization methods, and appropriate data analysis. Galantino et al. (2008) concluded that no reviewed studies were of sufficient quality to produce conclusive evidence. Given this caution, we provide a brief overview of emerging evidence from interventions in clinical populations as well as outcomes for prevention and health promotion applications in universal or whole populations.

### Clinical and Targeted Interventions

#### *Meditative Interventions With Clinical or Indicated Populations*

Meditative interventions with clinical and indicated child populations have primarily involved some form of mindfulness meditation or transcendental meditation (TM). Several studies that Black et al. (2008) reviewed and two studies published more recently employed randomized controlled trial (RCT) designs using TM or mindfulness meditation and demonstrated improvements in cardiovascular functioning for African American adolescents with high blood pressure or risk for hypertension compared to controls receiving a health education program (e.g., Barnes, Bauza, & Treiber, 2003; Barnes, Treiber, & Davis, 2001; Gregoski, Barnes, Tingen, Harshfield, & Treiber, 2010; Wright, Gregoski, Tingen, Barnes, & Treiber, 2011). These reports also indicated decreased rates of absenteeism, suspension, hostility, and school infractions. It is important to note that TM uses a mantra and may be considered religious in nature and to violate the separation of church and state in public education.

Several studies (Black et al., 2009; Burke, 2009) have examined meditation in youth with academic problems, attention deficit hyperactivity disorder (ADHD), and learning disabilities. These studies reported improvements in outcomes such as attention, internalizing and externalizing behavior problems, anxiety, and academic performance (e.g., Beauchemin, Hutchins, & Patterson, 2008; Semple, Lee, Rosa, & Miller, 2009). In addition, evidence supports Mindfulness-Based Stress Reduction (MBSR) with adolescents with heterogeneous diagnoses in outpatient care (Biegel, Brown, Shapiro, & Schubert, 2009). Brown, West, Loverich, and Biegel (in press) report that the adolescents randomized to receive MBSR in the Biegel et al. (2009) study also showed increases in mindfulness as measured by an adapted Mindful Attention Awareness Scale for Adolescents. One study provided evidence for using meditation and relaxation in treating PTSD following war and tsunami (Catani et al., 2009).

#### *Yoga Interventions With Clinical or Indicated Populations*

Although several studies have used yoga with clinical populations of children, the limited number of RCTs and their noted design weaknesses temper conclusions about benefits (Birdee et al., 2009; Galantino et al., 2008). Because controlled breathing, focused attention, and relaxation are key elements of yoga, logical populations are children with respiratory difficulties, attention difficulties, or anxiety. Patients with asthma were the focus of

several studies, but most were of mixed age groups that included adults. Although conclusions are not child specific, results suggested improved respiratory functioning following regular yoga practice (e.g., Jain et al., 1991; Nagarathna & Nagendra, 1985).

Several studies examined yoga as a complementary therapy for children with ADHD and children with anxiety (Birdee et al., 2009; Galantino et al., 2008). Both reviews suggest limited preliminary evidence that yoga reduced attention difficulties and symptoms of ADHD (Harrison, Manocha, & Rubia, 2004; Jensen & Kenny, 2004; Peck, Kehle, Bray, & Theodore, 2005). There is somewhat stronger evidence that yoga may lead to reductions in self-reported and physiological indicators of anxiety, including resting heart rate (Stueck & Gloeckner, 2005; Telles, Narendran, & Raghuraj, 1997; Telles & Srinivas, 1998). One additional RCT demonstrated that an 8-week trial of yoga may reduce eating disorder symptoms in adolescents (Carei, Fyfe-Johnson, Breuner, & Brown, 2010).

A substantial number of the yoga reports were conducted in India. As yoga has a long history in India and is a normative part of Hindu culture, it is possible that its cultural meaning and acceptance may influence outcomes. Future studies are necessary to examine the impact of yoga interventions with youth in Western cultural settings.

### Universal Preventive and Health Promotion Interventions

#### *Meditation in Universal Populations*

The two previous reviews found that very few trials of meditation-based interventions with children had been conducted with universal populations (Black et al., 2009; Burke, 2009). Some limited evidence, including one RCT (Napoli, Krech, & Holley, 2005), suggested that interventions that include brief forms of mindfulness practice may help improve children's social skills and school-related functioning. Most studies, however, suffer from problems in design, sample size, and measurement, reducing confidence in the findings. There are no carefully designed trials that would meet the criteria of effectiveness from such organizations as the Collaborative for Academic, Social, and Emotional Learning (2003), the Department of Education's What Works Clearinghouse (Institute of Educational Sciences, 2008), or the Society for Prevention Research (2004).

#### *Yoga in Universal Populations*

As with meditative approaches, few studies used yoga in universal populations, and the extant evidence is of low quality. Previous reviews (Birdee et al., 2009; Galantino et al., 2008) and one recent quasi-experimental study (Donahoe-Fillmore, Brahler, Fisher, & Beasley, 2010) suggest that yoga may lead to improvements in motor functioning, executive function (EF), spatial perception, muscle strength, and respiratory capacity. The results have been mixed for stress and coping. An 8-week trial of a yoga-based mindfulness intervention with fourth- and fifth-grade girls showed no main effects for program participation and reported a potentially iatrogenic effect wherein girls in the yoga intervention

reported higher levels of perceived stress than controls (White, in press). Beets and Mitchell (2010), however, reported improved quality of life and decreases in perceived stress in high school students after a 2-week yoga intervention. Recent RCTs (see below) have further explored the potential of yoga to be used as a school-based universal program to promote health and well-being.

### Recent Developments in School-Based Contemplative Interventions

Most contemplative interventions with children have been adapted from models developed for adults, but recent programs have been developed specifically for children in universal school-based prevention and promotion contexts. Mendelson et al. (2010) evaluated a yoga-based intervention program to reduce social-emotional and behavioral problems in an underserved urban population. Inner-city fourth- and fifth-grade students were randomized to a control group or a 12-week yoga intervention four times a week, which included yoga postures, breathing techniques, and guided mindfulness meditation. Compared to controls, yoga students reported decreases in involuntary stress responses, including lower scores on the subscales of rumination, intrusive thoughts, and emotional arousal.

Noggle and Khalsa (2010) found that rural high school students randomized to a semester of yoga showed significant mental health benefits compared to students randomized to their school's regular physical education curriculum. Controls showed deterioration on tension and anxiety, negative affect, anger control, fatigue, confusion, and resilience, whereas yoga participants maintained baseline or improved on these measures. Both of these implementations demonstrated feasibility and acceptability of yoga programs in schools.

Three recent studies have evaluated meditation-focused programs. Broderick and Metz (2009) evaluated the Learning to Breathe program in a nonrandomized trial; high school senior girls received the program and were compared to a comparison group of juniors. This six-lesson program is an adolescent-focused adaptation of the MBSR model. Participants showed significant decreases in negative affect and increases in self-reported calm, relaxation, and self-acceptance.

Flook et al. (2010) reported an RCT of the InnerKids Program, an 8-week school-based curriculum of mindfulness activities for second and third graders that included short meditative practices focused on breath awareness and movement-based activities. Although there were no main effects of program on parent or teacher reports of EF, there was a significant moderating effect of baseline EF, such that significant EF improvements were seen in intervention students with lower baseline. However, there were no objective tests of actual EF skills (only parent and teacher reports), and teachers were aware of intervention status.

A mindfulness program for fourth through seventh graders was recently piloted in a nonrandomized, wait-list control trial (Schonert-Reichl & Lawlor, 2010). This 10-lesson classroom-based program focused on mindful awareness of the senses,

positive emotions, self-regulation, and goal setting. In addition to weekly lessons, teachers led students three times a day in brief segments of attention training and mindful breathing. Compared to controls, intervention students showed improvements in self-reported optimism, positive affect, and externalizing behavior, as reported by teachers involved in the intervention. There was evidence of benefits in self-concept for preadolescent students (Grades 4–5) but not for early adolescents (Grades 6–7). Teacher ratings also indicated improvements in student attention and social-emotional competence.

Although these models hold promise, they are pilot studies that are inconclusive and point to the need for larger, well-designed trials. In all cases, findings were reported only at post-test (no follow-up), and most used self-report measures or the reports of adults aware of student participation.

#### Developing a More Rigorous Scientific Base

A report on contemplative education by the Garrison Institute (2005) comprehensively overviewed the types and scope of programs being implemented in schools. These included small voluntary programs, social and emotional learning programs that include contemplative practices, and schools whose mission and curricula are designed around contemplative traditions. Despite the number and variety of programs it documented, the report noted both the “paucity of rigorous research” and the desire of many programs to be evaluated. The existing evidence suggests that programs of contemplative practices, such as meditation and yoga, may be beneficial in several areas of child development, and that such programs are feasible and acceptable in a variety of settings including schools. The poor quality of most existing evidence raises questions that a new generation of well-designed research studies can address. We now outline several steps to strengthen the evidence base.

#### *Designing Studies to Provide High-Quality Evidence*

The reviews we cited above all noted the absence of high-quality research designs. There have been few RCTs, and even fewer have been of high quality. There is a need to have sufficient power, validated and unbiased measures, and longer term follow-up (at least 6 months). The nature of control groups is also a concern. As we develop clearer theories of the impact of contemplative practices, active control groups could help further differentiate the key components of interventions. For example, studies could compare a program that involves core mindfulness meditation practices to one that involves progressive relaxation to identify the unique contributions of contemplative practice (e.g., Ortnier, Kilner, & Zelazo, 2007). Some yoga studies use exercise as an active control to rule out benefits strictly due to physical activity (e.g., Streeter et al., 2010).

#### *Taking a Developmental Perspective*

There is a need to further identify what “age-appropriate” practices are, and qualitative work may be very useful here. For exam-

ple, some forms of sitting meditation practices may be developmentally inappropriate for younger children and even adolescents. This may be due to children’s more limited attention span or their lower levels of metacognitive ability, which may render certain practices ineffective. Alternatively, some interventions may be more successful for younger students. Schonert-Reichl and Lawlor (2010) reported intervention effects on self-concept in younger students but not for early adolescents. They theorized that with adolescents’ increasing self-consciousness, introspective practices may have led to critical self-evaluations. Careful consideration of developmental theories is essential in future research (Zelazo & Lyons, in press), and researchers need to be cognizant of the possibility of iatrogenic effects that certain practices could have with children of different ages and characteristics.

#### *Developing Logic Models*

Taking a developmental perspective can facilitate more thoughtful consideration of theories of change and mechanisms of action. We support the recommendation of the Garrison Institute (2005) report that processes related to cognitive/attentional control and social/emotional control be studied as potential mediators (Davidson & Mind and Life Education Research (MLERN) Network, in press). These processes are also highly relevant to educational goals and academic success (Blair, 2010). One obvious disconnect in this research is that outcomes are driven by investigator interest and background, and research has been clearly divided into studies assessing health risk and outcomes and those measuring cognitive and behavioral outcomes. There needs to be greater integration. For example, one might hypothesize that a yoga intervention might alter attentional capacity and reduce depression but also affect obesity-related markers and neural functioning. Thus, collaborative research involving practitioners and scientists from diverse backgrounds should lead to more comprehensive logic models and broader measurement of outcomes including short-term mediators (emotional regulation and attention), the underlying neural or physiological mechanisms, and longer term psychosocial, health, and educational outcomes. Further, there is a need for systematic qualitative research to illuminate processes of change related to contemplative practice.

#### *Clear Description of the Intervention*

The diversity of practices that fall under the contemplative umbrella necessitates clear description of interventions in reports. “Yoga” could refer to any number of practices from any number of traditions. Different traditions of yoga and meditation employ different practices to varying extents and toward various goals. In addition to the content, the intervention should describe the timing and duration of practices and the amount and nature of teacher training and qualifications.

#### *Examining Dosage and Intensity*

Because there has been little experimental variation of program intensity or duration, little is known regarding the differential

effects of these parameters. Programs vary widely from single sessions to daily practice over weeks or months. Repetition and practice may be critical to alter neural activity and create healthy habits of mind and body, so understanding the differential effects of dosage and intensity and how they may vary by age, population, and intervention goals is a key goal for future research. For example, Huppert and Johnson (2010) reported that students' frequency of home practice varied widely, and they predicted changes from baseline in well-being and mindfulness during a 4-week trial. Analyzing variations in intervention frequency and intensity could also address the possibility that limited exposure to mindfulness practice may initially increase awareness of stress and emotional experience before observable benefits occur (Hayes & Feldman, 2004; White, in press).

### SUMMARY

Interventions that nurture mindfulness may be a feasible and effective method of building resilience in universal populations of children and youth and in the treatment of disorders in clinical populations. Enthusiasm for promoting such practices, however, outweighs the current evidence supporting them. These contemplative interventions represent an opportunity to cultivate positive habits of mind and body and to promote the health and well-being of children and youth in our schools, but much more research is necessary to identify specific appropriate and effective practices. Previous research suggests that meditation and yoga are associated with beneficial outcomes for children and youth, but the generally limited quality of research has tempered the conclusions that can be drawn. Well-designed and carefully reported experimental studies that are grounded in developmental theory and measure multiple indicators of change over time will greatly add to the field.

### REFERENCES

- Arias, A. J., Steinberg, K., Banga, A., & Trestman, R. L. (2006). Systematic review of the efficacy of meditation techniques as treatments for medical illness. *Journal of Alternative and Complementary Medicine*, *12*, 817–832.
- Barnes, V. A., Bauza, L. B., & Treiber, F. A. (2003). Impact of stress reduction on negative school behavior in adolescents. *Health and Quality of Life Outcomes*, *1*(10). Available at <http://www.biomedcentral.com/content/pdf/1477-7525-1-10.pdf>
- Barnes, V. A., Treiber, F. A., & Davis, H. (2001). Impact of transcendental meditation on cardiovascular function at rest and during acute stress in adolescents with high normal blood pressure. *Journal of Psychosomatic Research*, *51*, 597–605.
- Beauchemin, J., Hutchins, T. L., & Patterson, F. (2008). Mindfulness meditation may lessen anxiety, promote social skills, and improve academic performance among adolescents with learning difficulties. *Complementary Health Practice Review*, *13*, 34–45.
- Beets, M. W., & Mitchell, E. (2010). Effects of yoga on stress, depression, and health-related quality of life in a non-clinical, bi-ethnic sample of adolescents: A pilot study. *Hispanic Health Care International*, *8*, 47–53.
- Biegel, G. M., Brown, P. L., Shapiro, S. L., & Schubert, C. (2009). Mindfulness-based stress reduction for the treatment of adolescent psychiatric outpatients: A randomized clinical trial. *Journal of Clinical and Consulting Psychology*, *77*, 855–866.
- Birdee, G. S., Yeh, G. Y., Wayne, P. M., Phillips, R. S., Davis, R. B., & Gardiner, P. (2009). Clinical applications of yoga for the pediatric population: A systematic review. *Academic Pediatrics*, *9*, 212–220.
- Black, D. S., Milam, J., & Sussman, S. (2008). Sitting-meditation interventions among youth: A review of treatment efficacy. *Pediatrics*, *124*, 532–541.
- Blair, C. (2010). Stress and the development of self-regulation in context. *Child Development Perspectives*, *4*, 181–188. doi:10.1111/j.1750-8606.2010.00145.x
- Broderick, P. C., & Metz, S. (2009). Learning to BREATHE: A pilot trial of a mindfulness curriculum for adolescents. *Advances in School Mental Health Promotion*, *2*, 35–46.
- Brown, K. W., West, A. M., Loverich, T. M., & Biegel, G. M. (in press). Assessing adolescent mindfulness: Validation of an adapted mindful attention awareness scale in adolescent normative and psychiatric populations. *Psychological Assessment*, doi: 10.1037/a0021338.
- Burke, C. A. (2009). Mindfulness-based approaches with children and adolescents: A preliminary review of current research in an emergent field. *Journal of Child and Family Studies*, *19*, 133–144. doi:10.1007/s10826-009-9282-x
- Carei, T. R., Fyfe-Johnson, A. L., Breuner, C. C., & Brown, M. A. (2010). Randomized controlled clinical trial of yoga in the treatment of eating disorders. *Journal of Adolescent Health*, *46*, 346–351.
- Catani, C., Mahendren, K., Ruf, M., Schauer, E., Elbert, T., & Neuner, F. (2009). Treating children traumatized by war and tsunamis: A comparison between exposure therapy and meditation-relaxation in North-East Sri Lanka. *BMC Psychiatry*, *9*(22), 1–11.
- Collaborative for Academic, Social, and Emotional Learning. (2003). Safe and sound: An educational leader's guide to evidence-based SEL programs. Retrieved April 13, 2011, from <http://casel.org/publications/safe-and-sound-an-educational-leaders-guide-to-evidence-based-sel-programs/>
- Davidson, R. J., Kabat-Zinn, J., Schumacher, J., Rosenkranz, M., Muller, D., Santorelli, S. F., et al. (2003). Alterations in brain and immune function produced by mindfulness meditation. *Psychosomatic Medicine*, *65*, 564–570.
- Davidson, R. J., & Mind and Life Education Research (MLERN) Network. (in press). Contemplative practices and mental training: Prospects for American education. *Child Development Perspectives*, *XXX*, XXX–XXX.
- Donahoe-Fillmore, B., Braehler, C. J., Fisher, M. I., & Beasley, K. (2010). The effect of yoga postures on balance, flexibility, and strength in healthy high school females. *Journal of Women's Health Physical Therapy*, *34*, 10–17.
- Flook, L., Smalley, S. L., Kitil, M. J., Galla, B. M., Kaiser-Greenland, S., Locke, J., et al. (2010). Effects of mindful awareness practices on executive functions in elementary school children. *Journal of Applied School Psychology*, *26*, 70–95.
- Galantino, M. L., Galbavy, R., & Quinn, L. (2008). Therapeutic effects of yoga for children: A systematic review of the literature. *Pediatric Physical Therapy*, *20*, 66–80.

- Garrison Institute. (2005). *Contemplation and education: A survey of programs using contemplative techniques in K-12 educational settings: A mapping report*. New York: Author.
- Greenberg, M. T., Weissberg, R. P., Utne O'Brien, M., Zins, J. E., Fredericks, L., Resnik, H., et al. (2003). Enhancing school-based prevention and youth development through coordinated social, emotional, and academic learning. *American Psychologist, 58*, 466–474.
- Gregoski, M. J., Barnes, V. A., Tingen, M. S., Harshfield, G. A., & Treiber, F. A. (2010). Breathing awareness meditation and LifeSkills Training Programs influence upon ambulatory blood pressure and sodium excretion among African American adolescents. *Journal of Adolescent Health, 48*, 59–64. doi:10.1016/j.jadohealth.2010.05.019
- Harrison, L. J., Manocha, R., & Rubia, K. (2004). Sahaja yoga meditation as a family treatment programme for children with attention deficit-hyperactivity disorder. *Clinical Child Psychology and Psychiatry, 9*, 479–497. doi:10.1177/1359104504046155
- Hayes, A., & Feldman, G. (2004). Clarifying the construct of mindfulness in the context of emotion regulation and the process of change in therapy. *Clinical Psychology: Science and Practice, 11*, 255–262. doi:10.1093/clipsy/bph080
- Huppert, F. A., & Johnson, D. M. (2010). A controlled trial of mindfulness training in schools: The importance of practice for an impact on well-being. *Journal of Positive Psychology, 5*, 264–274.
- Institute of Educational Sciences. (2008). *What works clearinghouse procedures and standards handbook*. U.S. Department of Education. Retrieved November 17, 2010, from [http://ies.ed.gov/ncee/wwc/pdf/wwc\\_procedures\\_v2\\_standards\\_handbook.pdf](http://ies.ed.gov/ncee/wwc/pdf/wwc_procedures_v2_standards_handbook.pdf)
- Jain, S. C., Rai, L., Valecha, A., Jha, U. K., Bhatnagar, S. O. D., & Ram, K. (1991). Effects of yoga training on exercise tolerance in adolescents with childhood asthma. *Journal of Asthma, 28*, 437–442.
- Jensen, P., & Kenny, D. (2004). The effects of yoga on the attention and behavior of boys with Attention-Deficit/Hyperactivity Disorder (ADHD). *Journal of Attention Disorders, 7*, 205–216.
- Kabat-Zinn, J. (2003). Mindfulness-based interventions in context: Past, present and future. *Clinical Psychology, Science and Practice, 10*, 144–156.
- Lillard, A. S. (2011). Mindfulness practices in education: Montessori's approach. *Mindfulness, 2*, 78–85. doi:10.1007/s12671-011-0045-6
- Mendelson, T., Greenberg, M. T., Dariotis, J. K., Gould, L. F., Rhoades, B. L., & Leaf, P. J. (2010). Feasibility and preliminary outcomes of a school-based mindfulness intervention for urban youth. *Journal of Abnormal Child Psychology, 38*, 985–994.
- Nagarathna, R., & Nagendra, H. R. (1985). Yoga for bronchial asthma: A controlled study. *British Medical Journal (Clinical Research Edition), 291*, 1077–1079.
- Napoli, M., Krech, P. K., & Holley, L. C. (2005). Mindfulness training for elementary school students: The Attention Academy. *Journal of Applied School Psychology, 21*, 99–125.
- Noggle, J., & Khalsa, S. B. S. (2010). *A controlled trial evaluation of the benefits of a yoga program in a secondary school*. Unpublished paper, Sleep Disorders Research Program, Brigham and Women's Hospital, Boston.
- Ortner, C. N. M., Kilner, S. J., & Zelazo, P. D. (2007). Mindfulness meditation and reduced emotional interference on a cognitive task. *Motivation and Emotion, 31*, 271–283. doi:10.1007/s11031-007-9076-7
- Peck, H. L., Kehle, T. J., Bray, M. A., & Theodore, L. A. (2005). Yoga as an intervention for children with attention problems. *School Psychology Review, 34*, 425–424.
- Roeser, R. W., & Peck, S. C. (2009). An education in awareness: Self, motivation, and self-regulated learning in contemplative perspective. *Educational Psychologist, 44*, 119–136.
- Schonert-Reichl, K., & Lawlor, M. S. (2010). The effects of a mindfulness-based education program on pre- and early adolescents' well-being and social and emotional competence. *Mindfulness, 1*, 137–151.
- Semple, R. J., Lee, J., Rosa, D., & Miller, L. F. (2009). A randomized trial of mindfulness-based cognitive therapy for children: Promoting mindful attention to enhance social-emotional resiliency in children. *Journal of Child and Family Studies, 19*, 218–229. doi:10.1007/s10826-009-9301-y
- Shonkoff, J. P., Boyce, W. T., & McEwen, B. S. (2009). Neuroscience, molecular biology, and the childhood roots of health disparities: Building a new framework for health promotion and disease prevention. *Journal of the American Medical Association, 301*, 2252–2259.
- Society for Prevention Research. (2004). *Standards of evidence: Criteria for efficacy, effectiveness and dissemination*. Falls Church, VA: Author.
- Streeter, C. C., Whitfield, T. H., Owen, L., Rein, T., Karri, S. T., Yakhind, A., et al. (2010). Effects of yoga versus walking on mood, anxiety, and brain GABA levels: A randomized controlled MRS study. *Journal of Alternative and Complementary Medicine, 16*, 1145–1152.
- Stueck, M., & Gloeckner, N. (2005). Yoga for children in the mirror of the science: Working spectrum and practice fields of the training of relaxation with elements of yoga for children. *Early Child Development and Care, 175*, 371–377.
- Telles, S., Narendran, P., & Raghuraj, P. (1997). Comparison of changes in autonomic and respiratory parameters of girls after yoga and games at a community home. *Perceptual and Motor Skills, 84*, 251–257.
- Telles, S., & Srinivas, R. (1998). Autonomic and respiratory measures in children with impaired vision following yoga and physical activity programs. *International Journal of Rehabilitative Health, 4*, 117–122.
- White, L. S. (in press). Reducing stress in school-age girls through mindful yoga. *Journal of Pediatric Health Care*. doi:10.1016/j.pedhc.2011.01.002
- Wright, L. B., Gregoski, M. J., Tingen, M. S., Barnes, V. A., & Treiber, F. A. (2011). Impact of stress reduction interventions on hostility and ambulatory systolic blood pressure in African American adolescents. *Journal of Black Psychology, 37*, 210–233. doi:10.1177/0095798410380203
- Zelazo, P., & Lyons, K. E. (in press). The potential benefits of mindfulness training in early childhood: A developmental social cognitive neuroscience perspective. *Child Development Perspectives, XXX, XXXX–XXXX*.