Evidence In-Sight:
Mindfulness training for children and youth

Date: February, 2012
Revised January, 2014
This report was researched and written to address the question(s):

- Are mindfulness therapies effective for children and adolescents? Is there any research indicating an effect on brain development?
- We also investigated the role of mindfulness in parent components of treatment for children and youth with mental health concerns, and searched for evidence-informed examples of mindfulness in practice in Ontario.

We prepared the report given the contextual information provided in our first communications (see Overview of inquiry). We are available at any time to discuss potential next steps.

We appreciate your responding to a brief satisfaction survey that the Centre will e-mail to you within two weeks. We would also like to schedule a brief phone call to assess your satisfaction with the information provided in the report. Please let us know when you would be available to schedule a 15-minute phone conversation.

Thank you for contacting Evidence In-Sight. Please do not hesitate to follow up or contact us at evidenceinsight@cheo.on.ca or by phone at 613-737-2297.
1. Overview of inquiry

This report was provided for an agency that provides a range of services for children with trauma, anxiety, behavioural and developmental disabilities. The particular program it will help inform planning in has four child and youth workers and one supervisor that currently uses the Free to Be Me program for children ages 3-8 to explore feelings and ways to express them appropriately. The program has elements for both children and parents, but the agency has not evaluated it for outcomes.

Clinical staff have not been formally trained in mindfulness interventions, but a consulting psychologist has recommended mindfulness techniques. Staff have been trained in cognitive behavioural therapy (CBT) and use CBT and some mindfulness techniques (breathing, relaxation, mindfulness meditation) to facilitate learning. The agency wants to know whether there is research that supports mindfulness and meditation and the overall effectiveness of mindfulness for young children and adolescents. They are also open to information on the effectiveness of mindfulness training for parents. Useful information would include examples of mindfulness in practice, evidence-informed techniques, evaluation results, and research that indicates the effect on brain development. This information will be used to inform program delivery.

This report addresses the questions: Are mindfulness therapies effective for children and adolescents? Is there any research indicating an effect on brain development?

2. Summary of findings

- At the time of writing, most research on mindfulness has been conducted with adult populations.
- Although still in initial stages, research with child and adolescent populations indicates that mindfulness approaches are a promising intervention for general improvements in healthy populations (i.e., improvements in concentration, academic abilities), and as part of treatment for clinical issues (i.e., anxiety, Attention Deficit Hyperactivity Disorder, externalizing behaviours).
- There is reasonable support for the viability and acceptability of mindfulness approaches for children and adolescents, but most studies lack scientific rigour. Meta-analyses reported that in general, methodologies and research designs are weak, rely on small sample sizes, and lack randomization and control groups.
- Mindfulness training for children is typically taught in small group activities designed to promote awareness. The person leading the teaching of mindfulness should have specific training in this capacity.
- One program that may be suited to the needs of the requesting agency is Mindful Awareness Practices (MAPs). This program is evidence-informed and is grounded in mindfulness-based stress reduction / mindfulness-based cognitive therapy models.
- Mindfulness brain imaging studies have been conducted on adult populations and are now beginning to be done with children or youth. Studies have found that meditation and mindfulness practice lead to neurophysiological changes in adults. These findings should not be generalized to children because of considerable differences in development.
3. Answer search strategy

- Search tools: EBSCO Host (Medline, PsycInfo, CINAHL, Health Business Elite, Nursing & Allied Health Connection: Comprehensive, Psychology and Behavioural Sciences Collection, Biomedical Reference Collection, Comprehensive), Google Scholar, The Cochrane Library, and the Campbell Library
- Search terms: mindfulness, mindfulness training, children, youth/adolescents, brain development, brain changes, neuroimaging

4. Findings

Mindfulness involves trying to focus attention on the present moment without judging the thoughts and emotions that one experiences (Lillard, 2011). It refers to a cognitive state where one engages in “paying attention in a particular way: on purpose, in the present moment, and nonjudgmentally” (Kabat-Zinn, 1994). Mindful awareness practices, including forms of meditation and yoga, are exercises intended to promote heightened attention to moment-to-moment experiences (Flook et al., 2010). Mindfulness-based stress reduction is a manualized form of mindfulness meditation, designed explicitly as a health intervention. Similarly, mindfulness-based cognitive therapy is an adaptation for the developmental needs of school-aged children (Black, Milam & Sussman, 2009).

Research on mindfulness as a clinical intervention has mostly focused on adult populations. Reviews of the available literature indicate that mindfulness interventions for adults may help in treating a variety of conditions including depression, anxiety, substance use disorders, panic disorders and eating disorders (Black, Milam & Sussman, 2009). We found literature on mindfulness interventions that have been adapted youth and children as young as seven that suggest that training in mindfulness might help to improve attention, social skills, and academic functioning, and decrease symptoms of externalizing behaviours, anxiety, and Attention Deficit Hyperactivity Disorder. However, the degree and quality of research involving children and youth is much more limited than it is with adults.

Although results are promising, the study of mindfulness in children lacks a firm research base. In addition, there are currently no published brain or neuro-imaging studies on children or adolescents, and therefore we are unable to state whether mindfulness interventions affect brain development. Imaging studies are currently underway, so it is worth searching the literature again to see if new findings have emerged.

5. Mindfulness and mental health

Mindfulness is a skill that can be learned and its practice can help individuals learn to recognize anxious feelings and self-monitor coping strategies (Roemer & Orsillo, 2002). Children who engage in regular practice can increase levels of self-awareness and improve impulse control and self-regulation (Burke, 2010). Unlike cognitive-behavioural therapy, mindfulness teaches the individual to be accepting of their thoughts, rather than focusing on creating more positive or adaptive thoughts (Roemer et al., 2002).

In the adult literature, mindfulness interventions have been found to be related to well-being (Brown, Ryan, & Creswell, 2007; Hofmann, Sawyer, Witt, & Oh, 2010). A meta-analysis of 21 studies with adults on the effectiveness of mindfulness for clinical conditions including chronic pain, anxiety, and depression, found it to have a large post-treatment effect size (Baer, 2003).
5.1 Effectiveness of mindfulness interventions for children and youth

Mindfulness training for children is often one component of a larger treatment plan, making it more difficult to determine the effectiveness of mindfulness as a discrete intervention (Baer, 2003). Validated measures are critical to the advancement of research in this field, and while there are measures of mindfulness for adults, until 2011 there were no validated measures of mindfulness for children and adolescents (Burke, 2010). The Child and Adolescent Mindfulness Measure (CAMM) was developed and validated for children over the age of nine and appears to be a promising measure to assess mindfulness in children (Greco, Baer, & Smith, 2011).

Research on mindfulness interventions for children and youth is less conclusive than it is for adults. A review of mindfulness modalities (mindfulness meditation, transcendental meditation, mindfulness-based stress reduction, and mindfulness-based cognitive therapy) of research through 2008 found promising but inconclusive outcomes (Black, Milam & Sussman, 2009). Among children it appears that mindfulness has contributed to treating children with anxiety and ADHD (Semple, Lee, & Miller, 2005), and may be relevant for children and adolescents with developmental challenges (Thompson & Gauntlett-Gilbert, 2008). Sitting meditation might be an effective intervention in the treatment of youth with emotional and behavioural concerns (Black, Milam & Sussman, 2009).

A randomized-controlled trial on the effect of the mindfulness-based stress reduction (MBSR) program for adolescents aged 14-18 (n=102) with various diagnoses, in an outpatient setting, found promising effects (Biegel et al., 2009). Compared to a treatment as usual comparison group, the MBSR participants self-reported reduced symptoms of anxiety, depression and somatic distress, and increased self-esteem and sleep quality. The MBSR group also showed improved diagnostic improvement over the five month study period, and significant improvement in global functioning scores. While not conclusive, this one study suggests that mindfulness based stress reduction could be used as an adjunct to other treatments in outpatient settings.

Mindfulness based cognitive therapy has been studied as an intervention for youth who continue to report symptoms of depression after treatment (Ames et al., 2013). A qualitative study with youth who continued to have residual symptoms of depression, after treatment of anxiety and co-occurring mood problems, followed an adaptation of the MBCT 8-week program. Participants reported high levels of satisfaction with the manualized program, and pilot data suggested reduced depressive symptoms and positive changes in quality of life and rumination.

Despite the lack of research involving younger children, there is extensive evidence that mindfulness can feasibly be taught to child and adolescent populations (Thompson et al., 2008). Montessori education relies on principles of mindfulness education, and this system has been successfully taught to very young children, including pre-school age children (Lillard, 2011). It has been suggested that age-appropriate mindfulness exercises are suitable for young children, including pre-school aged children, and can effectively foster healthy development and self-regulation (Zelazo et al., 2011).

5.2 Brain changes

Developmental social cognitive neuroscience suggests that mindfulness training activities target both top-down (controlled) influences on behaviour and bottom-up (automatic) influences on self-regulation (Zelazo & Lyons, 2012). Attending to moment-to-moment experiences results in top-down reflection, while practicing non-judgment produces
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calmness, and therefore mindfulness training disrupts automatic emotional responses. This repeated pairing of the prefrontal cortex and the limbic system should strengthen connections between these neural regions and grow the neural circuitry that will support emotion regulation (Zelazo et al., 2012).

Brain changes have been observed following short-term meditation in adults (Tang, Lu, Geng, Stein, Yan, & Posner, 2010). Specifically, changes in white matter (responsible for relaying and communicating to other brain regions) in the anterior cingulate cortex (involved in the development of self-regulation) have been observed following meditation practice (Tang et al., 2010). Neuroimaging studies indicate that meditation leads to changes in the central nervous system, but it is unknown which specific neural changes occur as a result of different meditative (including mindfulness) practices (Cahn et al., 2006). Many studies involving electroencephalographic (EEG) measurement have been conducted in adult populations and different types and amounts of meditative practice (including mindfulness) lead to different activations and changes in the brain. See Cahn et al. (2006) for a complete review on adult studies using EEG.

5.3 Practice considerations

Children differ from adults in their attentional, cognitive, and interpersonal functioning abilities (Semple et al., 2005), and therefore mindfulness teachings with children must be developmentally appropriate (Ott, 2002). It is unclear what stage needs to be reached before mindfulness practice can begin (Thompson et al., 2008). It has been suggested that children should be at an age where abstract and hypothetical reasoning are possible (i.e., the ‘formal operations stage’, around the age of 12; Wagner, Rathus, & Miller, 2006), while others have found it possible to effectively work with children during the ‘concrete operations’ stage (between the ages of 7-12; Verduyn, 2000).

When adapting programs for children, exercises should be shorter than those for adults and activities should be sensory-focused (Semple et al., 2005). Children struggle to hold their attention for longer than three to five minutes so shorter practices should be used for children, between three and five minutes (Semple et al., 2006; some recommend practice be between one to five minutes [Wagner et al., 2006]). An advantage of longer practice is that it allows children to work at accepting discomfort and learn to resist urges to move and fidget (Thompson et al., 2008). Mindfulness exercises for children should be enhanced by props – for example a child could place an object on their stomach to help them notice their breath (Zelazo & Lyons, 2011). Although mindfulness can be taught to individuals, groups can strengthen the effectiveness of the practice.

5.4 Parent involvement

Involvement of parents and caregivers in practice can help reinforce and model mindful behaviour (Thompson et al., 2008). Caregivers and/or teachers should be involved so that they are informed and can support the practice at home or at school (Burke, 2010), and co-participation can strengthen the treatment (Saltzman & Goldin, 2008). In terms of parent-practice for preschoolers, it has been found that parents who practice mindfulness themselves are better able to contend with the emotional demands of parenting than those who are not mindful (Bluth & Wahler, 2011). As parents become more mindful, they become more aware of patterns and interactions between themselves and their children and interactions eventually become less habitual (Bluth & Wahler, 2011). The amount of effort required in parenting can become reduced with mindful practice, and therefore an increase in parental mindfulness could lead to a decrease in parenting effort (Bluth & Wahler, 2011). Mindfulness in parenting breaks the automaticity of engagement and allows parents to change patterns and behaviours (Dumas, 2005).
5.5 Mindfulness training

While mindfulness meditation practices are drawn from Buddhist origins, programs have been secularized and can be universally applied (Burke, 2010). Prominent forms of mindfulness-based training approaches include mindfulness-based stress reduction (MBSR), mindfulness-based cognitive therapy (MBCT), dialectical behaviour therapy (DBT), and acceptance and commitment therapy (ACT; Burke, 2010). MBSR and MBCT or MBCT-C (children) use traditional mindfulness meditation exercises, while DBT and ACT focus on psychological and behavioural aspects of mindfulness (Burke, 2010). MBCT was developed as a combination of CBT and MBSR and is more of a general intervention (Segal, Williams & Teasdale, 2002). MBSR and MBCT are both eight week, experiential-type programs that require at-home practice. Group sessions use guided meditation, discussion, and psychoeducational exercises.

Mindful awareness practices (MAPs) is group programming based in MBSR/MBCT models. The program includes sitting exercises and movement and body scan (where attention is moved through the body in a sequential way). MAPs is based on classic secularized mindfulness training for adults and uses age-appropriate exercises to promote awareness of self, awareness of others, and awareness of the environment (Flook, 2010). Many of the exercises involve interactions between the students and the instructor. Each single session is divided into three components, with the amount of reflective practice increasing over the course of the program. The first segment of a session includes a three-minute sitting meditation, a period of activities and games that promote the current week’s learning objective, followed by a five-minute body scan meditation (Flook, 2010). The length of the two meditation segments gradually lengthen over course of the program while the game and activity period shortens. The program is delivered twice a week for eight weeks. More information can be found on MAPs programming in Burke, 2010. See Flook (2010) for a full description of the program.

6. Next steps and other resources

A mindfulness-based program that may be useful is Mindfulness-Based Cognitive Therapy for Anxious Children: A Manual for Treating Childhood Anxiety (Semple & Lee, 2011). Programming is based on MBSR and MBCT principles and connects mindfulness interventions with an accessible manual. The book provides structured age-appropriate interventions for children and teens, and dozens of mindfulness activities for children.

The Mindfulness Research Guide (http://www.mindfulexperience.org/) is an information resource and lists scales, with supporting literature, that can be used as mindfulness measures. It also links to literature on mindfulness.

Integra (http://www.integra.on.ca/prog5.htm), a child and youth mental health agency in Ontario, was successful at implementing mindfulness martial arts training to youth with learning disabilities and co-occurring mental health difficulties. This adapted program may be appropriate for implementation in other organizations.

Knowing what works and receiving training on an evidence-informed practice or program is not sufficient to actually achieve the outcomes that previous evaluations indicate are possible. A program that has been shown to improve mental health outcomes for children and youth but that is poorly implemented will not achieve successful outcomes (Fixsen et al, 2005). In order for a program to be evidence-informed, it needs to be applied with fidelity to the design and it needs to be implemented using supportive “drivers” related to staff competency, organizational leadership and organizational capacity. These drivers include assessing and monitoring the outcomes of your practice using evaluation...
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or performance measurement frameworks, which are particularly important when there is insufficient evidence in the literature to guide clinical decisions. Choosing a practice is an initial step toward implementation, but the implementation drivers are essential to ensure that the program reaches appropriate clients, that outcomes are successful and that clinical staff members are successful in their work.

The Ontario Centre of Excellence for Child and Youth Mental Health has a number of resources and services available to support agencies with implementation, evaluation, knowledge mobilization, youth engagement and family engagement. For more information, visit: 
http://www.excellenceforchildandyouth.ca/what-we-do or check out the Centre’s resource hub at http://www.excellenceforchildandyouth.ca/resource-hub.

For general mental health information, including links to resources for families:
http://www.ementalhealth.ca
References


Flo0k, L., Smalley, S. L., Kitil, M. J., Galla, B. M., Kaiser-Greenland, Locke, J. et al. (2010). Effects of mindful awareness...
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Appendix A

↑: increase, ↓: decrease, =: no change (e.g. ↑Social Skills: There was an improvement noticed in social skills as a result of the intervention.)

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Research Findings</th>
<th>Reference</th>
<th>Additional Study Information</th>
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| Interventions for pre-school aged children | ↑ Executive functioning  
↑ Social skills  
↑ Temperament                        | Smalley et al 2007. (unpublished)        | Randomized controlled trial of 44 children (aged 4-5) in an early childhood centre. Intervention was twice weekly for eight weeks and used mindful awareness practices (MAPs), modified for age. Study limited by small sample size, and potential rating bias. Results suggest that young children can participate in mindfulness practices. |
| Interventions in elementary school | ↓ Test anxiety  
↑ Attention  
↑ Social skills  
↑ Visual attention  
= No changes on sustained attention | Napoli et al. (2005)                  | Randomized controlled trial of 228 non-clinical grade 1-3 students who participated in an Attention Academy Program (AAP). The program included twelve 45-minute sessions administered over 24 weeks. Effect sizes ranged from small to medium ($d = .39-.60$). Study limitations: teacher ratings leave potential for bias. |
|                                  | ↑ Social Skills  
↑ Scores on an attention scale                | Biegal & Brown (2010)             | Seventy-nine 2nd and 3rd grade students attended 15-minute mindfulness training sessions over a 5-week time-span. The study is limited in that this was a pilot study and was not peer reviewed. |
|                                  | ↑ Attention  
↑ Emotional reactivity  
↑ Meta-cognition                          | Salzman & Goldin (2008)           | Seventy-four child and parents met weekly for an 8-week MBSR intervention with their parents. Children in grades 4-6 were compared to randomized controls. Measures were self and parent reported. Limitations include small sample size, randomization not reported, and parents and teachers were not blind to study outcomes. |
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<th>Mindfulness training</th>
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| ↓ Externalizing behaviours  
= Internalizing behaviours | Lee et al. (2008) | Twenty-five children aged 9-12 participated in a 12-week MBCT-C program. Effect sizes ranged from small to medium ($d = .11$-$40$). Study limited by small sample size, lack of randomization and control group, and reliance on ratings by parent and self. |
| ↓ Externalizing behaviours  
↓ Internalizing behaviours  
↑ Academic functioning | Semple et al. (2005) | Five, 7 & 8 year olds with anxiety symptoms participated in weekly 45-minute MBCT-C interventions for 6 weeks. Study limited by lack of control group, small sample size and potential rating bias. |
| ↑ Behavioural regulation  
↑ Meta-cognition  
↑ Executive functioning | Flook (2010) | Sixty-four children participated in a MAPs program. Questionnaires were completed at baseline and follow-up. Participants were randomized into either the MAPs program, or a control group. Study is limited by lack of blindness to group assignment and small size. |

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<th>Interventions for high-school aged children</th>
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| ↓ Anxiety  
↑ Social skills  
↑ Academic achievement | Beauchemin et al. (2008) | Thirty-four 13 to 18 year-old youth with learning difficulties participated in a pre-post intervention of classroom meditation. Teachers led a 5-10 minute mindfulness meditation daily for 5 weeks. Non-participators engaged in non-disruptive activities. Study limited by small sample size, lack of a control group and randomization, and potential rating bias. |
| ↑ Well-being (dose dependent)  
= Resilience | Huppert & Johnson (2010) | Peer-reviewed controlled study assessing mindfulness in schools. Fourteen and fifteen year-old boys attended 4, 40-minute sessions once per week ($n = 173$) and were compared to a matched control group. This is a strong study with promising results. |
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<tr>
<th>↓ ADHD symptoms</th>
<th>↑ Neurocognitive measures</th>
<th>Zylowska et al. (2007)</th>
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<tbody>
<tr>
<td></td>
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<td>Thirty-two adolescents and adults (8 adolescents, mean age: 15.6, 24 adults) with ADHD or probable ADHD participated in weekly 2.5 hour MAP training session for 8 weeks. Homework practice included a 5-15 minute sitting meditation. Study is limited by small sample size, lack of control group and randomization, and a self-report outcome measure.</td>
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<th>↑ Mental health</th>
<th>Biegel et al. (2009)</th>
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<td>One hundred and two 14-18 year olds under psychiatric care participated in an 8-week randomized controlled MBCR intervention. Control groups were wait-listed or received treatment as usual. Clinicians were blind to treatment conditions. Effect sizes ranged from $d = .15$ to .79 This is a strong study with promising findings.</td>
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