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Mindfulness in attention deficit hyperactivity disorder

*Esther I. de Bruin, Renée Meppelink,
and Susan M. Bögels*

Introduction

Although some studies show indications for a slight drop in methylphenidate consumption over the past years (e.g., Piper et al., 2018), overall, dramatic numbers of children still are prescribed ADHD-medication in our Western society (e.g., 4.3% of Dutch children [Association of Pharmaceutical Statistics, 2016] and over 9% of children in parts of the United States, according to the Centers for Disease Control and Prevention [Visser et al., 2014]) which is extremely undesirable. Perhaps, maybe, hopefully, mindfulness may provide an alternative for some of these children and their families. This chapter synthesizes the research literature on the effects of mindfulness practice for children and adolescents with ADHD and their parents.

I start to feel warmer, my heart beat increases, my palms are sweaty, I feel as if I have had too much caffeine, I'm thirsty and drink lots of water, not hungry, though, so I skip lunch, my mind is jumpy, I constantly switch between tasks, can't stay focused on one thing, my head feels very full, and although I want to, I don't have much space left to attune to others, I talk quicker than usual, my hands want to write faster and faster, and therefore my handwriting becomes messy, like my mind.

(Esther de Bruin and Susan Bögels, after 10 mg of Ritalin)

Is this perhaps how a child with attention deficit hyperactivity disorder (ADHD) feels inside sometimes? Is this the effect of medication? We don't know; whatever it is, this feeling further underlines our sense of urgency in assessing mindfulness as an alternative treatment for children with ADHD and their families.

This combination of inattentive, impulsive, and/or hyperactive behavior that occurs at school, at home, and/or in social situations and that interferes with daily functioning, also known as ADHD, is prevalent in around 5% of children (American Psychiatric Association, 2013). ADHD not only has an impact on all aspects of the child's life but also affects all dimensions of the family system. Adverse effects of ADHD may vary throughout childhood,

from excessive motor restlessness in preschoolers, to feeling different or being rejected by peers in primary school, to, for instance, low self-esteem, increased risk of academic failure, or substance abuse in adolescent years (e.g., Harpin, 2005). In addition to the core symptoms of ADHD, 60–100% of the children suffer from comorbid conditions such as oppositional, conduct, depressive, or anxiety disorders (Gillberg et al., 2004). Moreover, parents of children with ADHD suffer from significantly more parenting stress than parents of children with, for example, anxiety disorders (Telman et al. 2017), and the severity of parental stress is positively related to the severity of ADHD symptoms (Theule et al., 2013). Furthermore, parents' own ADHD symptomatology is the strongest predictor of parental stress (Theule et al., 2011). In addition to these very high personal and emotional costs for the families, ADHD is associated with increased economic health care costs. Average annual costs related to childhood ADHD in Europe range from €9,860 to €14,483 per individual, with national annual costs ranging from €1,041 million to €1,529 million (Le et al., 2014). In the United States, the national annual incremental costs of childhood ADHD have been estimated to range from \$38 billion to \$72 billion, in which the largest cost categories were health care (\$21 billion to \$44 billion) and education (\$15 billion to \$25 billion) (Doshi et al., 2012).

Effective treatment for ADHD is available. Methodologically sound randomized controlled trials (RCTs) have repeatedly shown that stimulant medication is effective in reducing symptoms of inattention, hyperactivity, and impulsivity in over 70% of the children with ADHD (e.g., Buitelaar et al., 1995; Gilmore & Milne, 2001; Schachter et al., 2001; Storebø et al., 2016). Therefore, several clinical guidelines advise medication as a first-line treatment for childhood ADHD (National Institute for Health and Care Excellence [NICE], 2018; Taylor et al., 2004). The NICE makes a distinction in their treatment guidelines between moderate and severe ADHD (Clinical Guideline [CG] 72). The first-line treatment for school-age children and young people with severe ADHD is drug treatment. However, for children with ADHD and moderate impairment, group-based parent training is usually considered the first-line treatment for parents, combined with group or individual behavioral treatment for the child. Other guidelines advise parent training combined with behavioral therapy for the child in case of insufficient response to medication (Wolpert et al., 2006). Thus, although psychosocial interventions (e.g., parent training) are part of most comprehensive international guidelines for treatment in addition to medication, and parental preferences are taken into account, it is also notable that, for instance, the guidelines of the American Academy of Child and Adolescent Psychiatry (AACAP; Pliszka, 2007) recommend to administer medication only if sufficient benefits are demonstrated in different areas of functioning. All these international guidelines are based on studies of the highest category of evidence, category 1a: evidence from meta-analyses of multiple RCTs (Shekelle et al., 2000). However, extensive data from methodologically strong studies often show no additional benefit of combined treatment

over medication alone (e.g., The Multimodal Treatment of ADHD (MTA) Cooperative Group, 2004; van der Oord et al., 2008).

Methylphenidate is the most widely prescribed drug in the world (Swanson, 2003), steadily increasing over the past decades, with a global consumption of as much as 72 tons in 2013 (International Narcotics Control Board, 2014). However convincing the evidence of the effectiveness of drug treatment for childhood ADHD may seem, there are many reasons for concern about the gigantic numbers of children using stimulant medication. The main concerns are the serious side effects such as insomnia, loss of appetite, headache, anxiety, abdominal pain, and nervousness (e.g., Charach et al., 2004; Graham et al., 2011; Storebø et al., 2015). The MTA study (MTA Cooperative Group, 1999) already showed that nearly two-thirds of children on this drug suffer from at least one of these side effects. Furthermore, currently, only little is known about the long-term side effects. Reduced growth and weight in children that take long-term stimulant medication are documented, and although rare, long-term effects on blood pressure, heart rate, and the occurrence of suicidal, psychotic, and manic symptoms have also been reported (De Loo-Neus et al., 2011; Faraone et al., 2008). A recent study showed that the use of methylphenidates over a period of four months in boys aged 10–12 with ADHD still increased the blood flow in the brain up to one week after quitting the medication, whereas in adult men with ADHD this effect was not found (Schrantee, 2016). Although we do not know exactly what this effect means, it shows that methylphenidate at this young age does have a prolonged impact on the functioning of the brain.

Another disadvantage of drug treatment for ADHD is the low treatment adherence. Adler and Nierenberg (2010) showed that nonadherence to treatment can be as high as 64% in people with ADHD. Particularly for the short-acting stimulant medication methylphenidate, the most commonly prescribed treatment, the adherence is low (Swanson, 2003), which is understandable because these types of medication need to be taken two to three times daily. However, given that these short-acting agents only have a short half-life, effects subside soon after medication is discontinued, and as a consequence symptoms return.

So although medication is used as a first-line treatment for childhood ADHD worldwide and has been shown to effectively reduce symptoms, we feel that with the substantial limitations and disadvantages, it is highly undesirable that in our society, we medicate millions of children from such a young age. As parents, as clinicians, and as researchers, we have the responsibility to at least examine thoroughly what other effective non-pharmacological options are available. This chapter describes how the practice of mindfulness could perhaps be one of those options for children with ADHD and their families.

What bridges mindfulness practice and ADHD?

Both from a behavioral and neuroanatomical perspective, the practice of mindfulness might go straight to the heart of the challenging behaviors encountered

by children with ADHD and their families. During mindfulness training one learns to respond (to thoughts, feelings, situations etc.) rather than to instantly react, which can be very useful for children (and parents) who usually are very impulsive and have difficulties inhibiting their responses. In addition, during mindfulness practices one learns to maintain a focused attention and to bring the attention back when it wanders, which might be especially useful for children who suffer from difficulties sustaining and focusing their attention. A variety of studies have indeed shown improvements in attentional monitoring and functioning as a result of the practice of mindfulness (e.g., Chiesa et al., 2011).

From a neuroanatomical viewpoint, the practice of mindfulness also goes straight to the core problems of ADHD. Our monkey mind jumps from one thing to the next, even more so for children with attention, hyperactivity, and impulsivity problems. Monkey mind is a term used by the Buddha to refer to the agitated, easily distracted, and constantly moving human mind, like a monkey jumping from branch to branch. Or perhaps the monkey is sometimes better described as a small lion, like in the book *There Is a Lion inside Me* about a boy with ADHD (Dieljens & Klompaker, 2006). In children without ADHD, who also have a lion inside them from time to time, the anterior cingulate (part of the frontal lobe) down-regulates the raw emotions that come up through the limbic system. However, in children with ADHD, activity in the anterior cingulate is reduced (e.g., Liotti et al., 2005), and as a result there seems to be no pause between the raw impulses, reactions, or emotions that shoot up through the limbic system and what is subsequently exerted out in the behavior. The anterior cingulate cortex seems to somehow fail to regulate the limbic system. When stimulants such as methylphenidate are taken, the limbic system is suppressed; therefore, one of the side effects of high doses of stimulant medication is emotional blunting. With mindfulness meditations, however, the inner lion is treated with kindness, compassion, and acceptance, and by practicing mindfulness skills, perhaps children with ADHD can learn to introduce a pause before acting instantly and are able to kindly tame their inner lion. Neuroimaging studies in long-term meditators demonstrate that meditation is indeed associated with activation in the anterior cingulate cortex (e.g., Brefczynski-Lewis et al., 2007).

Offering a combined parent and child mindfulness training, as we have done from the very first time we offered mindfulness to youth with ADHD (Bögels et al., 2008), is a sensible approach for different reasons. First, this way a parent really understands what the child is learning; parents know better how to support their child in practicing mindfulness and help them with the generalization of mindfulness skills in their lives. Second, parents become more aware of certain automatic patterns that they developed toward their child's problem behavior over time ("overreactive parenting") and learn how to cultivate a more accepting and nonjudging attitude toward them. For example, parents may immediately overreact by shouting at their child for throwing a jacket—for the hundredth time—on the couch instead of putting it neatly on the coat rack.

By becoming aware of this automatic reaction to shout, parents now create the opportunity to choose how to respond in a more accepting and nonjudging manner. Third, because of the heritable component of ADHD, parents of children with ADHD often also suffer from ADHD symptoms (Epstein et al., 2000; Thapar et al., 2007). A mindful parent training program, therefore, may also help reducing parents' own ADHD symptoms. Consequently, parents who suffer less from their own ADHD symptoms may become better in structuring the environment of their child and learn to be more consistent, clear, and calm toward their child, which is found to be especially beneficial for children with ADHD (Sonuga-Barke et al., 2002). Lastly, combining a mindful parenting program with a mindfulness training for the children is a more holistic approach in which the implicit message is that we, as a family, experience problems, recognizing that the dynamics and interaction within the family contribute to the behavior of the child and family functioning, so we as a family are going to work on that during the mindfulness training. Such a family systems approach is in contrast to medicating a child, as this may indirectly imply that only the child has a problem, so the child needs to undergo treatment.

Research on mindfulness practices for children with ADHD

Research on mindfulness practices for families with ADHD is rapidly emerging. The first meta-analysis of the effects of mindfulness-based programs (MBPs) on symptoms of ADHD in both children and adults came out in 2016 (Cairncross & Miller, 2016). Of the 10 included studies, six reported on the effectiveness of MBPs on inattention in children with ADHD, with an average effect size of 0.66, and five reported about the effectiveness of MBPs on hyperactivity/impulsivity, with an average effect size of 0.47.

Subsequently, three systematic reviews were published (Evans et al., 2018; Mak et al., 2018; Tercelli & Ferreira, 2019). The majority of the studies included by Evans et al. (2018) showed large effects on symptoms of ADHD; however, some studies did not show any effects or even showed the opposite. In addition, the studies varied largely in methodological quality. Mak et al. (2018) specifically examined the effects on neuropsychological measures of attention and executive functioning. Five of the 13 included studies showed medium to large effects; the other eight studies did not. Tercelli and Ferreira (2019) included 10 studies and found positive effects of MBPs on attention deficits in children with ADHD but showed that in terms of hyperactivity the evidence was less conclusive. MBPs also effectively reduce parental stress and improve family functioning, but overall, published studies still suffered from several methodological limitations, and therefore the current evidence on the impact of MBPs on ADHD is nonconclusive, according to these authors. Finally, a combined systematic review and meta-analysis investigating the effects of yoga and mindfulness interventions for youth with ADHD was published in 2018 (Chimiklis et al., 2018). Eleven studies were included, showing significant

effects on hyperactivity and inattention (parent and teacher reports) as well as on parent-child relationship, executive functioning, parental stress, and parental mindfulness. These authors also emphasized the methodological limitations. Thus, although preliminary findings indicate beneficial effects of MBPs for youth with ADHD, positive effects should be interpreted with caution, and MBPs should as yet not be considered first-line interventions for youth with ADHD (Chimiklis et al., 2018).

Two main approaches for assessing the effects of mindfulness practice for children with ADHD and their families can be distinguished in the literature. First is the “individual-based approach,” in which individual children (sometimes with their parents) are trained and effects are monitored individually over time, sometimes daily, with a research design consisting of a baseline phase and an intervention phase. These types of studies are also known as single-case experimental designs (SCEDs), of which multiple baseline designs studies are an example. Second is the “group-based approach” which can be divided into three subgroups; the first are studies in which MBPs for (small) groups of children with ADHD are evaluated, usually by using a repeated measures design with wait-list, pretest, posttest, and follow-up assessments. Second are studies in which MBPs are investigated from a family dynamic perspective. Children then follow a mindfulness training, and in conjunction parents take part in a parallel mindful parenting training. And third are the large-scale randomized controlled trials (RCTs), an approach that is rapidly emerging in this field.

A recent review by Cassone (2015) underlines the potential of including the practice of mindfulness as an adjunct to parent training for parents of children with ADHD, or as a mindful parenting training in itself. Interestingly, currently running RCTs (Chan et al., 2018; Lo et al., 2016; Lo et al., 2017; Meppelink et al., 2016a; Siebelink et al., 2018) seem to approach ADHD from this family dynamic perspective. Below an overview is given of the different types of studies and findings so far, and further details of the different studies can be found in Table 5.1.

Individual-based approach

Singh et al. (2010) trained two mother-child with ADHD dyads in mindfulness, in which a 12-session individual mother training was followed by a subsequent 12-session individual child training. Children in this study, in contrast to most of the other studies, were of below average intellectual ability. Mothers recorded their child's behavior on a daily basis. Although core ADHD symptoms were not monitored in this study, compliance of the child improved after the mother-training and improved even further when the child was subsequently trained, as did the parent-child interaction and happiness in parenting. As expected, no changes occurred during the baseline period preceding both training phases. Effects were maintained up to the six-month follow-up.

Table 5.1 Summary of study results assessing the effects of MBPs for children with ADHD and their families

Research group	Study design	Sample size	Age in years	Type of MBP	Primary (borderline) significant outcomes on ADHD measures	Secondary (borderline) significant outcomes
Bögels et al. (2008) ¹	WL; pretest; posttest; FU	n = 4	11–18	Previous version of 8-week MYmind program	Reduced: Attention problems (YSR/CBCL) Improved: Sustained attention (D2)	Reduced: Internalizing problems (YSR), externalizing problems (YSR/CBCL) Improved: Happiness (SHS), mindful awareness (MAAS), self-control (SCRS), attunement to others (CSBQ), withdrawal (CSBQ), personal goals (parent and child)
Zylowska et al. (2008) ²	Pretest; posttest	n = 8	15–18	8-week MAP program	Reduced: Inattention and hyperactivity (ADHD Rating Scale IV/SNAP-IV) Improved: Attentional conflict (ANT conflict/SCWT), set-shifting (TMT)	n/a
Grosswald et al. (2008)	Pretest; posttest	n = 10	11–14	3-month TM practice	Reduced: ADHD symptoms (YSR) Improved: Expressive attention and accuracy (CAS)	Reduced: Stress (RCMAS), anxiety (RCMAS/YSR/CBCL), total psychopathology (YSR/CBCL) Improved: Executive functioning (BRIEF)

Simple et al. (2010) ³	RCT (MBCT-C vs. WL) with pretest; posttest; FU	n = 5	9–13	12-week MBCT-C Program	Reduced: Attention problems (CBCL)	Reduced: Behavior problems (CBCL)
Singh et al. (2010)	Multiple baseline design	n = 2	10; 12	12-week parent training; subsequent 12-week child training	n/a	Improved: Compliance of child, parent-child interaction, happiness parent
van der Oord et al. (2012)	WL; pretest; posttest; FU	n = 22	8–12	Previous version of 8-week MYmind program	Reduced: Child and parental inattention (DBDRS/ASR), child and parental H/I (DBDRS/ASR)	Reduced: Parental stress (PSI), parental overreactivity (PS) Improved: Mindful awareness (MAAS)
Haydicky et al. (2012) ⁴	RCT (MMA vs. WL) with pretest; posttest	n = 28	12–18	20-week MMA training	n/a	Reduced: Externalizing behavior (CBCL), oppositional defiant problems (CBCL), conduct problems (CBCL) Reduced: Externalizing problems (CBCL/YSR), internalizing problems (CBCL/YSR), paternal parenting stress (PSI), maternal overreactivity (PS) Improved: Executive functioning (BRIEF), paternal overreactivity (PS)
van de Weijer-Bergsma et al. (2012)	Pretest; posttest; FU1; FU2	n = 10	11–15	Previous version of 8-week MYmind program	Reduced: Attention problems (CBCL) Improved: Sustained attention (ANT2.1)	

(Continued)

Table 5.1 (Continued)

Research group	Study design	Sample size	Age in years	Type of MBP	Primary (borderline) significant outcomes on ADHD measures	Secondary (borderline) significant outcomes
Haydicky et al. (2015)	WL; pretest; posttest; FU	n = 18	13–18	8-week MYmind program	Reduced: Inattention (Conner's 3-P)	Reduced: Depression (Conner's 3-P), CD (Conner's 3-P), ODD (Conner's 3-SR), depression/anxiety (RCADS), learning problems (RCADS), aspects of parenting stress (SIPA) Improved: Executive functioning (Conner's 3-P), peer relations (Conner's 3-P), family relations (Conner's 3-SR), mindful parenting (IM-P), family functioning (FAD)
Zhang et al. (2017)	Pretest; posttest	n = 11		8-week MYmind program	Improved: Attention (CPT 3: detectability, omissions), selective/focused attention (TEA-Ch: Skye Search, Map Mission)	n/a

Lo et al. (2017)	RCT	n = 100	8-week Mindfulness Matters program	Reduced: Hyperactivity (SWAN) Improved: attention (SWAN)	Reduced: Child internalizing and externalizing problems (CBCL), parental stress (PSI), dysfunctional parent-child interactions (PSI) Improved: Parental quality of life (WHO-5)
Bögels et al. (in preparation)	WL; pretest; posttest; FU1; FU2	n = 187	8-week MYmind program	Reduced: Child ADHD symptoms (DBDRS/CBCL/YSR), parental ADHD symptoms (ADHD rating scale/ASR)	Reduced: Child and parental psychopathology (CBCL/ASR), parental over reactivity (PS), parental stress (PSI) Improved: Child executive functioning (BRIEF), mindful parenting (IM-P)

Notes

- 1 The study by Bögels et al. (2008) included a total sample size of n = 14 of adolescents with externalizing problems; n = 4 of those met criteria for ADHD. Separate results for this subgroup were not provided.
- 2 The study by Zylowska et al. (2008) included a total sample size of n = 32 of adults and adolescents; n = 8 of those were adolescents. Separate results for adolescents were not provided.
- 3 The study by Semple et al. (2010) included a total sample size of n = 25 children; n = 5 of those had clinically elevated attention problems, of which n = 2 met criteria for ADHD.
- 4 The study by Haydicky et al. (2012) included a total sample size of n = 60 of adolescents with intellectual disabilities; n = 28 of those met criteria for ADHD. ANT = Attention Network Test; ANT2.1 = Amsterdam Neuropsychological Tests version 2.1; ASR = Adult Self Report; BRIEF = Behavior Rating Inventory of Executive Functioning; CAS = Cognitive Assessment System; CBCL = Child Behavior Check List; CD = Conduct Disorder; CPT 3 = Conner's Continuous Performance Test 3rd Edition; CSBQ = Children's Social Behavior Questionnaire; DBDRS = Disruptive Behavior Disorder Rating Scale; FAD = Family Assessment Device; FU = Follow Up; H/I = Hyperactivity/Impulsivity; IM-P = Interpersonal Mindfulness in Parenting Scale; MAAS = Mindful Attention Awareness Scale; MAP = Mindful Awareness Practices; MBCT-C = Mindfulness Based Cognitive Therapy-Child version; MBPs = Mindfulness-Based Interventions; MMA = Mindfulness Martial Arts; P = Parent; PS = Parenting Styles; ODD = Oppositional Defiant Disorder; PSI = Parenting Stress Index; QoL-C = Quality of Life-Child; QoL-P = Quality of Life-Parent; RCADS = Revised Child Anxiety and Depression Scale; RCMAS = Revised Children's Manifest Anxiety Scale; SCRS = Self Control Rating Scale; SCWT = Stroop Color Word Test; SHS = Subjective Happiness Scale; SIPA = Stress Index for Parents of Adolescents; SNAP = Swanson, Nolan and Pelham; SR = Self Report; SWAN = Strengths and Weaknesses of ADHD Symptoms and Normal Behaviors Rating Scales; TEA-Ch = Test of Everyday Attention for Children; TM = Transcendental Meditation; TMT = Trail Making Test; WHO-5 = World Health Organization Well-Being Index; WL = Wait-List; YSR = Youth Self Report.

Shecter (2013) followed 13 parents and nine adolescents during baseline, eight-week MYmind mindfulness training, parallel for parents and adolescents, with a six-month follow-up period. Both parents and adolescents reported reductions in stress and family conflict, and due to the multiple baseline design, these effects could be contributed to the training. Parents further reported a decrease in the inattention, hyperactivity, and impulsivity of the adolescents; however, adolescents themselves did not report this change. Most effects were maintained up to the six-month follow-up. The author further reported a positive relationship between meditation practice and stress reduction; the more both parents and adolescents meditated, the larger the stress reducing effects they experienced.

Group-based approach

Group studies with mindfulness training focusing only on children with ADHD

In a feasibility study with pretest and posttest assessments of an eight-week mindfulness meditation training (mindful awareness practices [MAPs]) for 24 adults with ADHD, eight adolescents (aged 15–18) with ADHD were included (Zylowska et al., 2008). Although results for adolescents were not presented separately, ADHD symptoms were significantly reduced after training. Furthermore, neurocognitive measures showed improvements in attentional conflict monitoring at posttest and improved set shifting at posttest as compared to pretest.

Another study investigated the effects of 10 minutes of transcendental meditation (TM) twice daily for three months for 10 children with ADHD (aged 11–14) in a school setting (Grosswald et al., 2008). At posttest, as compared to before the training period, they found significant reductions in symptoms of ADHD, stress, and anxiety as well as improved executive functioning.

Semple et al. (2010) adapted mindfulness-based cognitive therapy (MBCT) for children (MBCT-C) and conducted a small RCT in which 25 children (aged 9–13) were randomized to MBCT-C or to a wait-list. MBCT-C is a 12-week group program that aims to enhance self-management of attention and improve affect regulation by learning to decenter from thoughts and emotions and increase social-emotional resiliency. Although this study was not primarily targeting children with ADHD, at the outset, five children met the threshold for clinically elevated attention problems, and two of them met criteria for ADHD. Directly after the intervention, but not after wait-list, the children with ADHD showed significantly fewer attention problems, and these improvements were maintained up to three months after the training.

Haydicky et al. (2012) applied a 20-week mindfulness martial arts (MMA) training to adolescents (aged 12–18) with learning disabilities ($n = 60$), of which 28 also met criteria for ADHD. Half of the adolescents were randomized

to the mindfulness training, and the other half to the wait-list control group. A pretest, posttest design was used. According to parent ratings, the externalizing, oppositional, and conduct behaviors were significantly reduced in the intervention group as compared to the wait-list control group. Further subgroup analyses showed that adolescents with clinically elevated hyperactive/impulsive or attentive symptoms (just below the threshold for a full ADHD classification) showed improved monitoring skills and reduced social problems after the mindfulness training as compared to the wait-list group.

Group studies with combined mindfulness training for children with ADHD and their parents

All group studies described in this section, although carried out by different research groups, have assessed the effects of the (preliminary versions of the) MYmind mindfulness training program, which runs parallel versions for children and parents. This program is described in more detail in the next section. Moreover, all studies have a similar repeated measures study design.

Bögels et al. (2008) carried out the first study, in which the eight-week mindfulness training for children (a preliminary version of the MYmind program) was combined with a parallel eight-week mindful parenting training. The authors included 14 adolescents with externalizing disorders, of which four met criteria for ADHD, and used a wait-list, pretest, posttest, follow-up design. Although results for the adolescents with ADHD were not presented separately, significant improvements on personal goals, happiness, and mindful awareness were found for the whole group. Furthermore, they reported significantly lowered internalizing, externalizing, and attention problems after the training. More objective neuropsychological measures of attention confirmed the improved attentional functioning. Independent of the children, parents confirmed the improvement in their children's personal goals, externalizing, and attention problems, and further reported improved self-control, attunement to others, and a decrease in withdrawal. Parents further reported improvements in their own goals. Most effects were maintained up to two months after the training. Furthermore, mediation analysis showed that increased mindful awareness in the youth-mediated reductions in parent-reported externalizing and attention problems of the youth.

Whereas the study of Bögels et al. (2008) included a heterogeneous group of adolescents, subsequent studies examined groups of children with ADHD as the primary classification. Van der Oord et al. (2012) studied the effects of the combined child and parent MYmind training in 22 children with ADHD (aged 8–12). Parents as well as teachers reported a significant decrease in ADHD symptoms after the training. Moreover, parents showed a decline in their own symptoms of ADHD, stress levels, and reported decreased overreacting in their parenting. Van de Weijer-Bergsma et al. (2012) extended these findings further in a sample of 10 children (aged 11–15) with ADHD and their parents using

a pretest, posttest, follow-ups (two follow-up measurements) design. Children themselves as well as their fathers and teachers reported a significant reduction in their symptoms of ADHD. Interestingly, significant improvements in attention were also found on objective computerized tests of attention. In addition, mothers significantly reduced their overreactive parenting style, and fathers reduced their stress levels.

Another research group assessed the effects of the MYmind mindfulness training in 18 adolescents with ADHD (aged 13–18) and their parents (Haydicky et al., 2015). As compared to the wait-list period, in which no changes occurred, after the training, internalizing, inattention, and conduct problems of the adolescents significantly decreased and their peer relationships improved, as rated by the parents. For themselves, parents reported feeling significantly less stressed and more mindful in their parenting role.

A small nonrandomized study on the feasibility, acceptability, and effects of the MYmind program was conducted in a Chinese sample of 11 children with ADHD and their parents (Zhang et al., 2017). Acceptability and feasibility in a different cultural setting was high; attendance rate (≥ 6 out of 8 sessions) was 91%, and only one family withdrew from the training. Results showed a significant improvement in some of the objective attention subtests but not on parent-rated child problems, parent-rated executive functioning of the children, and parents' own stress, mindfulness, and parenting.

A large non-randomized study of the effectiveness of the MYmind program is currently in preparation (Bögels et al. in preparation). Children ($n = 187$) and their parents ($n = 128$ fathers and $n = 179$ mothers) completed measurements at wait-list, pretest, posttest, eight-week, and one-year follow-up. As expected, no changes occurred during the wait-list period. Significant reductions in children's ADHD symptoms were reported at posttest, two months later, and one year later as compared to pretest. Parents' own ADHD symptoms significantly reduced at posttest, two months later, and one year later as compared to pretest. Further improvements were found on children's internalizing and externalizing symptoms, according to parent reports, in some but not all cases, and also according to the children and adolescents themselves. Overreactive parenting significantly decreased after the training and effects were maintained at both follow-ups. At one-year follow-up, mindful parenting and executive functioning of the children significantly improved, and parental stress and parents' own psychopathology significantly decreased.

Recently, critical concerns about a positive reporting bias of mindfulness clinical trials have been raised. Apparently, nearly 90% of the published RCTs, mainly related to depression, reported positive outcomes (Coronado-Montoya et al., 2016). Hardly any mindfulness trials reported negative or null findings. Although the trials that were reviewed did not concern childhood ADHD, it is of great importance to be aware of this pitfall. The studies discussed in this chapter, although there are no large-scale RCTs just yet, show promising results; however, not all findings are as expected. For instance, some studies

did not show significant effects for maternal parenting stress, paternal overre-activity, parental and child mindful awareness, teacher-rated ADHD symptoms of the child, and child's self-reported ADHD symptoms (e.g., Shecker, 2013; van de Weijer-Bergsma et al., 2012; van der Oord et al., 2012), as would be expected.

Large scale randomized clinical trials

Findings from uncontrolled trials seem very promising and have now become apparent from a variety of research groups. Moreover, although one small RCT has been carried out (Haydicky et al., 2012), the majority of the currently available studies are of a quasi-experimental nature (category 2b), and only a few include a control group without randomization (category 2a, Shekelle et al., 2000). Therefore, larger-scale RCTs are now a logical next step.

In Hong Kong, two RCTs are being carried out with different age groups and different MBPs. One RCT examines the effects of an eight-week MBP (Snel, 2014) for children aged 5–7 ($n = 100$) with (symptoms of) ADHD and their parents (Lo et al., 2016). Families are randomized to the mindfulness training or to a wait-list control group, and those assigned to the control group follow the family-based mindfulness training later. Children from families in the MBP showed greater improvements in inattention (effect size 0.60) and hyperactivity (effect size 0.59) than families on the wait-list. In addition, parenting stress and well-being significantly improved for the parents in the MBP, but no changes in parental ADHD symptoms or interpersonal mindfulness were found (Lo et al., 2017).

The second RCT in Hong Kong follows up on the nonrandomized pilot study mentioned earlier (Zhang et al., 2017). The effects of the eight-week MYmind program (Bögels, 2020) are studied in a sample of $n = 140$ children (aged 8–12) and their parents, randomized over the MBP and an active control group that is offered a CBT program. Primary and secondary outcomes are children's attention, ADHD-related symptoms, executive functioning, and mindfulness levels. Parental stress, parenting styles, ADHD related symptoms, well-being, rumination, and parental mindfulness levels are also measured. Measurements are taken at baseline, immediately after the intervention, and three and six months later (Chan et al., 2018).

Further, two RCTs examining the MYmind program are currently running in the Netherlands. In the "MindChamp" study, children and adolescents ($n = 100$; aged 8–16) with ADHD are randomized to care-as-usual or care-as-usual plus the MYmind program. Primary outcome is parent-rated self-control of the child, and secondary outcomes are teacher-rated self-control and computerized tasks of self-control of the child. Psychological symptoms, well-being, and level of mindfulness of the child are also measured. Similar measures of self-control, psychological symptoms, well-being, and mindfulness are included for the parents (Siebelink et al., 2018).

The RCT “ADHD: Medication or Meditation?” is being carried out by the authors of this chapter (Meppelink et al., 2016a, 2016b). In this RCT, the (cost) effectiveness of medication versus mindfulness training for children with ADHD ($n = 91$, aged 8–18) and their parents ($n = 172$) is examined. Primary outcomes of this trial are symptoms of ADHD; rated by parents and children but also by teachers ($n = 81$) and independent observers ($n = 85$). In addition, the two treatments are compared on other measures of child functioning (i.e., psychopathology, stress, sleep), and measures of parent functioning (i.e., own symptoms of ADHD, stress, quality of life, sleep). Furthermore, underlying mechanisms of change are assessed. For instance, it is hypothesized that the effects of MYmind mindfulness training on a reduction in ADHD symptoms of the child will be mediated by improved mindful awareness and self-compassion in the parents, elements that are specifically targeted in the mindful parenting training but that are obviously not necessarily part of medication treatment. After randomization into the trial, eight-week mindfulness or methylphenidate treatment is administered. Pretest is completed before the start of the treatment, followed by posttest immediately after eight weeks of treatment. Subsequently, for children in the MYmind mindfulness group, a period of eight weeks of own mindfulness practice follows, whereas children in the medication group keep taking daily methylphenidate. After eight weeks, a booster session follows in the mindfulness training, and subsequent measurements in both groups are taken. A second follow-up measurement is taken after six months to determine long-term effects. Between the first and the second follow-up measurement, however, children and their families are free to choose other treatment, stop treatment, or change to the other intervention group (for ethical reasons). Since it is expected that not all families want to be randomized and/or have a strong preference for either medication or mindfulness training, a nonrandomized preference trial ($n = 29$ children and $n = 52$ parents) is also being carried out, in which families are assessed that take part in the treatment of their choice.

MYmind program for children and adolescents with ADHD and their parents

The MYmind program consists of eight weekly 1.5-hour sessions for the children and separately for their parents in group format, followed by a booster session eight weeks after the last session. Children follow the MYmind program: Mindfulness training for Youngsters with ADHD (Bögels, 2020), and the parents of children with ADHD follow an adapted version of the Mindful Parenting program, as described by Bögels and Restifo (2014), is used. Both children and parents are asked to practice daily meditations at home; for the children, the home practice is around 15 minutes a day, whereas for the parents this is around 30–45 minutes a day. Children practice focusing and sustaining their attention, becoming aware of being distracted and bringing back their attention to the original focus, and enhanced bodily awareness, by practicing

(short) meditations, yoga, and playful exercises and games to make it fun. For instance, in one exercise the children take turns in being the “meditators” versus the “distractors.” The meditators sit in a small circle with the trainer leading a meditation with focus on the breath, while the distractors walk around the room and make all sorts of distracting noises. The meditators experience how hard it is to keep meditating with all these distractors around them, and at the same time, the trainers experience how amazingly well these children can actually keep their attention focused on the breath already after a few weeks of practice. In the session where “Home in our Body” is the theme, the children are asked where they feel the ADHD in their bodies. They draw their bodies life-size on a large piece of paper and color in where the ADHD inhabits their bodies. Sometimes children color in their arms and legs, and when asked, they explain the feeling of hyperactive motor movements in their limbs that we recognize as part of ADHD. But very often they color in their heads and their brains and explain that their head is so full, so chaotic, so messy, so unorganized, and how they would like to be able to feel calmer, less jumpy, think more before they act, pause more, and pay more attention to daily chores.

Parents, in turn, practice awareness of their own physical responses to the challenging behavior of their child and how to calmly respond instead of overreacting to such challenging behavior from their child. They cultivate an attitude of nonjudgmental acceptance of the ADHD of their child. They also practice being fully present with their child, as well as with themselves, in the parent-child interaction. They further practice self-compassion and learn how to (better) take care of themselves. For instance, in one exercise the parents are asked to visualize the morning stress they encounter taking their unwilling child to school in a rush. During the meditation they are invited to observe their bodily signals, thoughts, emotions, and action tendencies and learn to see what happens when under stress, and how hard one can sometimes be on oneself as a parent. A more detailed description of themes and exercises in the children’s and parents’ sessions is outlined in Table 5.2.

Conclusion

Overall, the evidence base of promising effects of the practice of mindfulness for children and families with ADHD seems to be building gradually, with overall medium-sized effects in the reduction of core symptoms of ADHD and similar effects on parental stress and parental functioning. However, at this moment, a cautious attitude is warranted, since most currently published studies are small, nonrandomized and noncontrolled, and measures are often self-reports. However, with several currently running RCTs with active comparison groups in different countries and different cultures, the level and quality of evidence is expected to improve in the near future so firmer conclusions can be drawn about the effectiveness of mindfulness for children with ADHD and their families.

Table 5.2 Overview of sessions of the MYmind training for children with ADHD and their parents

Session	Session's theme	Core practices children	Core practices parents
Session 1	Beginner's Mind	Man from Mars; sitting meditation	Exercise Morning Stress; sitting meditation
Session 2	Home in our Body	Body scan with stretches; Exercise Ragdoll Robot, yoga	Body scan; Exercise Morning Stress with Compassion
Session 3	The Breath	Breathing Space: Exercise Rubber Duck; yoga	Body scan; Breathing Space
Session 4	Distractors!	Distractor Meditation; sound meditation; yoga	Sitting meditation with sounds and thoughts; exercise attention for yourself
Session 5	Stress	Halfway evaluation; body scan relax only; exercise stress	Halfway evaluation; sitting meditation choice less awareness; exercise parenting stress
Session 6	Highway, Walkway	Role-play exercise: conflict breathing space; walking meditation	Imagination practice and role-play exercise: rupture and repair; walking meditation
Session 7	Autonomy	Repetition of the past session in the form of a quiz; children as meditation and yoga teachers	Imagination practice: acceptance and autonomy; role-play exercise: limits
Session 8	The Future	Children as meditation and yoga teachers; making a meditation plan for the next eight weeks	Meditation and yoga practices guided by the children; making a meditation plan for the next eight weeks
Session 9	Each time beginning anew	Body scan; sharing experiences of the past eight weeks; making a meditation plan for the next year; individual evaluation per family	Body scan; sharing experiences of the past eight weeks; making a meditation plan for the next year; individual evaluation per family

Note: Session 9 is a booster session, at about two months follow-up after the MYmind training.

If the practice of mindfulness turns out to be a good alternative for the current standard treatment of medication for childhood ADHD, that is, if the effects are similar on some primary outcomes such as attention problems, hyperactivity, and impulsivity, this will be of substantial clinical, economical, ethical, and scientific relevance for our society. Perhaps the next generation of child psychiatrists, psychologists, and pediatricians will prescribe these families “five minutes of meditation twice a day” to learn to tame their inner lion. However, the practice of mindfulness is not a quick fix, or as a father in one of our groups put it nicely, “Mindfulness is great, but in a way similar to taking medication for ADHD; in order to maintain the effects, you have to continue taking the pills, I have realized that I (and my son) need to keep meditating.”

Working as a mindfulness teacher with children with ADHD, and trying to cultivate an open mind, an attitude of not-knowing, non-judging, and not-expecting, leads to surprising outcomes every time. Imagine for instance a very impulsive, overly active boy with ADHD who faced big behavioral challenges, also during the MYmind training, who was leading the Man from Mars exercise for all the children and parents in the last session: “So now, all look at your decorated cake . . . what do you see? and what can you smell when you put it by your nose? and now put the cake by your ears . . . can you hear anything? and now try and taste just one small piece with only your lips and tongue . . . what do you notice? . . . and now, you can slowly swallow and eat the rest of your cake with full attention to all your senses. . . .” The next moment this boy started laughing and put the cake with the fruit and lots of cream all over his face. Everybody laughed with him and genuinely applauded him. What a brilliant eating meditation, and an amazing sense of control over his feelings, impulses, and action tendencies he had just displayed; he managed to tame his inner lion! He only forgot that being mindful also includes to not judge yourself and others. When his father could not inhibit his action tendency to take a lick of the cream during the meditation, the boy looked at him in irritation and said: “That’s not allowed yet dad!”

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