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ORIGINAL PAPER

Randomized Controlled Trial of Parent and Child Mindfulness Training (MYmind) versus Medication

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Abstract

This pre-registered 'ADHD: Medication or Meditation' trial presents the effects on parental outcomes comparing a mindfulness-based intervention (MYmind) for both parents and children with medication (methylphenidate) for children's ADHD. Additionally, we examined correlations between meditation practice and outcomes in the mindfulness group. Parental scores were compared across treatments at four time points (pre-test, 2-, 4- and 10-months follow-ups). MYmind consisted of 8 weekly group-based 1,5 h mindfulness sessions for children and parallel mindful parenting for their parents, and a booster 2 months later. Medication treatment consisted of 4 months short-acting methylphenidate. Parents (70 mothers and 29 fathers) filled out self-reports on four domains: Parental stress (general stress, parenting stress and competence, parenting discipline styles), mindfulness (general mindfulness, mindful parenting, self-compassion), parental ADHD (hyperactivity/impulsivity, inattention), and parental well-being (overall well-being, externalizing and internalizing symptoms, attention problems, sleep). Regression analyses of significant interaction effects for time and condition showed that mothers in the mindfulness group improved more than mothers in the medication group on levels of overreactive parenting, self-compassion and quality of sleep. Fathers in the mindfulness group had larger improvements over fathers in the medication group on parental stress, mindful parenting, self-compassion, internalizing and attention problems. Positive relations were found for mothers only between amount of meditation practice and general mindfulness, parental stress, internalizing symptoms and sleep. All improvements between groups favored the family mindfulness intervention over medication. Our findings suggest that parents fair far better when families of children with ADHD take part in a mindfulness-based program compared to treating only the child with medication.

Keywords Mindfulness · ADHD · Parent training · Medication

Highlights

- Overall, parents of children with ADHD do far better when they take part in a family mindfulness-based program compared to treating only the child with medication;
- Mothers in the mindfulness group showed larger improvements than mothers in the medication group on overreactive parenting, self-compassion and quality of sleep;
- Fathers in the mindfulness group showed larger improvements than fathers in the medication group on parental stress, mindful parenting, self-compassion, internalizing and attention problems.

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Introduction

Parental stress occurs when the demands of parenting exceed parents' resources (Deater-Deckard, 1998). Parenting stress is very common; 36–50% of parents experience some degree of stress around parenting, child behavior or child development (e.g., Reijneveld et al., 2008). Parenting stress affects the parent-child relationship (e.g., Eo et al., 2018), higher levels of parenting stress are associated with

parental depression and anxiety and a lower quality of parenting skills (Fang et al., 2021). In addition, parental stress levels have a tendency to elevate when a child with ADHD is in the household (Theule et al., 2013; Wiener et al., 2016). ADHD is very common with a global average prevalence of around 5% and at least another 5% of children show overactivity, impulsivity or attention problems that are just below the threshold to meet full diagnostic criteria for ADHD (Sayal et al., 2018). A national survey showing ADHD prevalence estimates as high as 11.4% for US children aged 3–17 years (Danielson et al., 2024). This same study showed that almost half of the children with ADHD also show behavior or conduct problems and around 40% of them also have anxiety problems.

ADHD is classified as a neurodevelopmental disorder composed with primary symptoms of inattention, and hyperactivity-impulsivity which both can interfere with daily functioning and development. Symptoms are generally present before the age of 12 and manifest in at least two environments, such as school and home (American Psychiatric Association, 2013). Most children with ADHD experience significant challenges with respect to executive functioning, such as cognitive flexibility, self-regulation, working memory and diminished problem-solving skills (Barkley, 2015).

There are several individual characteristics of parents and children that can have an impact on the level of stress of parents with children with ADHD (Moen et al., 2016; Mofokeng & van der Wath, 2017). Children with ADHD are generally less attentive, can be prone to angry outbursts, more easily frustrated and less capable to follow rules than their peers (Heath et al., 2015; Kent et al., 2011). Additional stressors for parents can come from higher medical bills, unfulfilled needs of professional and personal support, marital distress and social stigma (Laugesen & Groenkjaer, 2015). In addition, parents of children with ADHD have a higher chance of also having ADHD, adding to their overall equation of limited resources to deal with mounting problems (Theule et al., 2011). In one meta study, it was found that a prevalence of 20% of parents of children with ADHD also have ADHD (Cheung & Theule, 2016). And in cases of clinically referred parents, around 60% have children with ADHD (Minde et al., 2003). Parents' own ADHD symptoms can also be a major predictor of parental stress in families of children with ADHD (Theule et al., 2011). Although parental stress might be part of everyday life, elevated stress of parents is associated with many negative outcomes for children with ADHD as well as for their parents. Among the negative outcomes are exacerbated ADHD symptoms, the child being less responsive to interventions, a deterioration in the quality of the parent-child relationship and a decline in parental psychological well-being (Deault, 2010; Graziano et al., 2011; Haack et al., 2016; Theule et al., 2013). The increase in ADHD symptoms of the child can be explained through negative child-rearing methods that result in the parent's elevated levels of stress such as disciplinary and hostile parenting styles (Venta et al., 2016) that lead to reinforcing a child's undesired behaviors (Choe et al., 2013; Patterson, 2002; Pinquart, 2017).

Undesirable behavior in children can raise parents' stress level, due to parents feeling a sense of incompetence (Heath et al., 2015; Kent et al., 2011). It has been found that raising children with ADHD is associated with higher parenting stress and lower self-efficacy (Ben-Naim et al., 2019). A parent's lower sense of competence can lead to a continuing cycle in which the child's behavior leads to more parental stress and the child's unwanted behavior becomes entrenched, both of the latter feeding one another. Sense of parental self-efficacy (e.g. a parent's optimistic sense of competence or confidence to be able to influence their child's behavior) is one of the best predictors of more challenging child behaviors later in life (Durand, 2021).

Parental well-being, particularly parenting stress and its sometimes consequential parenting styles and behavior play a large role in the exacerbation of ADHD symptoms of the child (Choe et al., 2013; Patterson, 2002). Subsequently this aggravated ADHD behavior may in turn have a negative effect on parental well-being (Heath et al., 2015; Kent et al., 2011; Patterson, 2002). Stress can lead to more authoritarian or permissive parenting styles, which in turn can exacerbate executive functioning difficulties found in children with ADHD (Hutchison et al., 2016). Li and Lansford (2018) found that among parents of children with ADHD, higher stress levels lead to harsher parenting styles, which lead to their concluding that treating parental stress could lead to more consistent parenting and better child outcomes. Another longitudinal study examining the bidirectional relationship between family functioning and childhood ADHD found that particularly maternal overreactive parenting was predictive of more ADHD symptoms in the child, and more ADHD symptoms in the child in turn predicted more maternal life stress and depression. The authors suggest that interventions targeting ADHD symptoms of the child, maternal overreactive parenting and maternal stress would hold promise for breaking the negative cycle between child ADHD symptoms and family functioning in the long run (Breaux & Harvey, 2019).

Guidelines of Treatment for (Symptoms of) ADHD in Children

There are different guidelines available for the treatment of childhood ADHD, with mainly overlapping conclusions but also some subtle differences across countries and health care systems as pointed out by the European ADHD

Guidelines Group (EAGG; Coghill et al., 2023). For instance, the guidelines of the American Academy of Pediatrics (AAP) state that for children aged 4–6 parent and/or classroom interventions are the first treatment of choice and if these do not lead to significant improvement and serious problems remain, medication can be used (CDC, 2024). Although the guidelines in the Netherlands are generally similar, they place more emphasis on psychoeducation and parent and/or teacher training, and explicitly state that medication is not registered for this young age group, that safety has been insufficiently studied, and health care professionals should be reluctant prescribing medication for this age group. Whereas for children of 6 years and above the AAP guidelines refer to a combination of medication and behavior therapy (CDC, 2024), the Dutch guidelines also seem to be more cautious when it comes to medication. Only for children with severe ADHD plus behavior problems should parent/teacher training be combined with medication. For moderate ADHD, the guidelines are more reluctant to advise medication and for mild ADHD they recommend parent and/or teacher training should be sufficient (Akwa, 2019).

Medication and Behavioral Parent or Teacher Training for ADHD

Medication can decrease ADHD symptoms, improve quality of life, lead to better daily adaptive functioning (Coghill et al., 2017) and improve cognitive executive functioning (Tamminga et al., 2016). Stimulant medication (methylphenidate) is effective for 70% of children (Storebø et al., 2015). However, medication comes also with disadvantages. It is not effective for 20–35% of children with ADHD (Childress & Sallee, 2014). Medication has a low usage adherence (roughly only 25%; Brinkman et al., 2018), and side effects such as loss of appetite, sleep disturbance, headaches (Graham et al., 2011; Storebø et al., 2015). Further, there is debate about whether it is effective in the long run (Swanson, 2019). Medication is only effective when being used (Abikoff et al., 2004). This means that children must continue usage of medication in order for it to be effective (Thiruchelvam et al., 2001). And since medication is an external agent, it is unlikely to give the child (or the parent) a sense of self-mastered skills or empowerment.

Meta-analyses show that non-pharmacological interventions for ADHD symptoms, such as behavior training for parents, are certainly effective but less effective than medication (Sonuga-Barke et al., 2013; Van der Oord et al., 2008). Further, although short-term benefits of parent training on the ADHD behavior of the child, parental stress and sense of competence have been demonstrated, its long-term effects remain uncertain, as children with ADHD may struggle to learn self-regulation without ongoing parental supervision (Zwi et al., 2011). In addition, there are several effective teacher-based behavior trainings for children with behavioral difficulties (e.g. see review of Alperin et al., 2021). However, another meta-analysis found limited evidence for effective use of cognitive behavioral training in the reduction of ADHD symptoms in children (Daley et al., 2014).

In addition, parents under stress can be impaired from effectively implementing techniques they have learned from parental training courses. This in turn leads to more feelings of frustration for parents and can further lead to increased parent-child conflict (Bögels et al., 2014). While there is a general pattern of evidence that parent training helps reduce noncompliant and oppositional ADHD symptoms in children and improves parenting, there is a lack of evidence that parental training alone reduces ADHD core symptoms (Daley et al., 2018).

To improve outcomes for parent and child, several studies have recommended that in addition to ADHD behavior being the main target of the intervention, attention should also be paid to the well-being of the parents, such as their stress levels (Theule et al., 2013). This way the vicious cycle of behavior of parent and child might be interrupted. An intervention that simultaneously approaches the behavior of the child (inattentiveness, impulsivity and hyperactivity) as well as parental well-being may be a promising approach for these families (Chan et al., 2018). Family-based mindfulness interventions are designed do exactly that (Bögels et al., 2010; Duncan et al., 2009; Kabat-Zinn & Kabat-Zinn, 2021; Parent & DiMarzio, 2021). Mindfulness-based interventions aim to make participants more aware of their impulses instead of mainly responding automatically (Kabat-Zinn, 2003). One learns to better focus the attention, notice when the mind wanders, become more aware of thoughts, feelings, and impulses and instead of impulsive reacting, take a pause and act with more attention and thoughtful consideration. Since core symptoms of ADHD are difficulties with attention, concentration, impulsivity and inhibition, it seems to make sense for these children (and their parents) to explore if mindfulness is a helpful intervention to them.

The current study concerns one of these family-based mindfulness programs (MYmind) but examines only the parental outcomes (child outcomes are presented by Meppelink et al., 2024). There is a growing field of mindfulness-based interventions designed for psychotherapeutic use. The two most widely used mindfulness-based programs are Mindfulness Based Stress Reduction (MBSR; Kabat-Zinn, 1982, 2003) and Mindfulness Based Cognitive Therapy (MBCT; Segal et al., 2002a), which are conducted with a protocol of 8-week group based training sessions that include home practice between sessions. MBCT is largely based on the MBSR program with

cognitive behavioral therapy components. While MBSR was originally developed for people with chronic pain and later adapted to help people reduce automatic negative reaction to stress, MBCT is geared towards those with chronic depression (Segal et al., 2002a).

Mindfulness-based Interventions for Parents

Mindful Parenting is a more recent intervention in mental health care deriving from MBSR and MBCT that is targeted to parents with a lot of stress in relation to their parenting and parent-child interactions (Bögels & Restifo, 2013). In the 8-week training, parents learn general mindfulness techniques from MBSR and MBCT, specifically acceptance and how to see themselves and their child in a non-judgmental manner. In addition, the program focuses on parental well-being and stress reduction with exercises geared towards management skills for parental stress (Bögels et al., 2008; Bögels et al., 2010). Parents learn how to recognize stress, take a breathing moment and accept they can't change the waves of life and parenting, but they can learn how to surf them. Parents also learn to address and give attention to their own needs (Bögels & Restifo, 2013).

Mindful Parenting further addresses parents stress by intervening in the feedback loop between parental stress and dysfunctional parenting styles. As stated above, parents with stress can be reactive and dismissive when interacting with their children (Venta et al., 2016), which can lead to a cycle of discord and conflict. The feedback pattern has a capacity to create and strengthen thought schemas, emotional feelings and overall interaction patterns. In Mindful Parenting, parents learn to create a moment of contemplation before reacting to a stressful moment with their child, thus allowing them to better evaluate the actual circumstances of interactions with their children as opposed to being trapped in reactionary behavior to their own automatic thoughts. This allows the parent to consciously act as opposed to reacting to a situation, making a choice instead of following behavioral patterns (Duncan et al., 2009). In a pre- post-treatment study investigating mindfulness-based programs in comparison to Treatment as usual (TAU), i.e. medication, (Liu et al., 2021) found that parents of children with ADHD that took part in a Mindful Parenting program saw greater reductions in stress levels and an increase in overall mindfulness compared to parents in the TAU-group. The main starting point of mindful parenting is the acknowledgement and recognition that parental stress is an inevitability to be managed.

Family-based Mindfulness Interventions and ADHD

Among the burgeoning interest in mindfulness-based programs (Lee et al., 2021), there are several meta studies specifically about mindfulness-based programs and benefits for youth with ADHD (e.g. Chimiklis et al., 2018; Evans et al., 2018; Lee et al., 2022; Oliva et al., 2021). Also, essential elements such as self-awareness, non-judging, acceptance, compassion or decentering that may be driving the outcomes have been identified for youth (Felver et al., 2022). Further, there are studies finding effects of mindfulness-based interventions on reducing stress in child rearing environments in both clinical and non-clinical populations (Bögels et al., 2014; Burgdorf et al., 2019; Neece, 2014; Potharst et al., 2019). (Lo et al., 2020) also found greater reductions in stress levels for parents of children with ADHD who participated in a family-based mindfulness intervention.

Previous Studies on the MYmind Program for Children and Parents

Research specifically on the MYmind program further found that parents of children with ADHD reported a reduction in stress from pre- to post- treatment (Haydicky et al., 2013) whereas parents from a waitlisted control group experienced no reduction in stress. The parents from the treatment group continued to see reductions in stress at the 6-week follow-up, indicating that parents continued to experience benefits of the intervention over the course of time. Those in the MYmind training also saw increases in mindful parenting. However, this study was limited by the small sample ($n = 18$), the lack of randomized control group and the reliance on self- and parent-reports. Similar results have been found in more recent and methodologically strong studies. (Bögels et al., 2021) compared MYmind treatment to a waitlist group and found reductions in overreactive parenting styles and increased mindful parenting at post-test as well as 1-year follow-up. Parental stress was found to decrease up to 1-year follow-up and this study covered a large sample ($n = 167$). Further, a Randomized Controlled Trial (RCT) using the MYmind program randomised children with remaining ADHD symptoms after TAU to MYmind next to further TAU ($n = 55$) versus further TAU alone ($n = 48$; Siebelink et al., 2021). In this study TAU consisted mainly of medication, which is indeed part of national and international treatment guidelines for ADHD (e.g., Akwa GGZ, 2019; EAGG, 2023; CDC, 2024). Post training improvements on parent outcomes were shown on their own ADHD symptoms, well-being and mindful parenting, and at follow-up, additional beneficial effects of the mindfulness-based program appeared on other psychological symptoms and self-compassion. Effects on parents were larger than effects on children. In a waitlist control RCT ($n = 15$ in both conditions) with MYmind as the active condition, (Valero and colleagues, 2021) observed decreases in parental stress and improved

parenting styles at post-test in addition to reductions in parental stress at both post-test and 6-month follow-up. MYmind has also been examined for acceptability and feasibility in a non-Western culture (Chan et al., 2018; Zhang et al., 2017). Families in Hong Kong were randomized over MYmind ($n = 69$) versus an active control group of Cognitive Behavior Therapy (CBT; $n = 69$) and both interventions were found to be effective in reducing attention and behavior problems (Wong et al., 2023).

Although the evidence base is steadily growing, current treatment guidelines still place mindfulness programs for childhood ADHD in the innovative and experimental category, stating that although they are popular and sometimes helpful if other treatments do not work, more research is still needed (e.g., Akwa, 2019).

Aim of the Current Study

The aim of the current study is to examine treatment outcomes for parents of children with ADHD, comparing parents whose children receive methylphenidate to treat ADHD symptoms to both parent(s) and child following the 8-week family mindfulness-based program MYmind. Children's outcomes were described elsewhere (Meppelink et al., 2024). In short, both treatments were effective in the reduction of the child's ADHD symptoms but medication was more effective than family mindfulness at 2- and 4-months according to multi-informant questionnaires but not according to objective (neuropsychological and blind observer) measures. Differences between treatments diminished after 4-months and disappeared at 10-months. For the current parental outcomes, we hypothesized that in comparison to parents whose child takes ADHD medication (the medication group), parents in the mindfulness group will do better on four domains of parental functioning, that is: (1) experience less parental stress, (2) show higher parental mindfulness and self-compassion, (3) show a larger decrease of parental ADHD symptoms, and (4) show a larger increase in parental well-being. In addition, we explored the relation between amount of time spent in meditation practice and parental outcomes. It was expected that more parental meditation practice would be positively correlated to more improvements in outcomes.

Methods

Design and Procedure

Data was collected for a pre-reregistered trial (https://onderzoekmetmensen.nl/nl/trial/22179). The Medical Ethical Committee of the Amsterdam Medical Center approved the RCT and in line with CONSORT-guidelines the trials protocol was published prior to results being analysed (Meppelink et al., 2016). Parents and children from the age of 12 had given their consent to randomisation. Families were randomized to conditions of either medication use for the child or the 8-week mindfulness-based intervention for child and at least one parent. Stratified randomization was used to make sure both conditions included an equal number of boys and girls. Allocation to condition was carried out by a computer-generated list of random numbers. Sample size was calculated a priori for the number of children as reported in the study's protocol (Meppelink et al., 2016). In addition, a preference trial was set up for ethical reasons for families that insisted on one form of treatment over the other. Due to non-randomness of missing data as well as a low number of parents participating, analysis of the preference trial was not conducted. Attempts at merging the two studies also lead to data not missing at random. While parents were randomized along with their children, parents themselves were allowed to choose which parent, or both parents, participated. This introduces an element of bias, as factors such as level of involvement in child care or parental own ADHD can affect likelihood to participate (Bögels et al., 2021). Assessments took place at pre-test, 2-months follow-up (short-term)-, 4-months follow-up (medium-term) and 10-month follow-up (long-term) (see also the CONSORT flow chart in Meppelink et al., 2024).

Participants

Families ($n = 85$) were recruited via referrals from general practitioners, mental health care professionals, the website for the study, posters, flyers and local media outlets (including newspapers, radio, magazines and social media sources). Children were assessed for eligibility at either Buro van Roosmalen or UvA minds in accordance with the study's published protocol (Meppelink et al., 2016) and then assigned to either take medication or mindfulness training. Parents were eligible if they were able to speak and understand sufficient Dutch language to take part in the group and follow the exercises. In the mindfulness group 2.7% of mothers and 4.8% of fathers scored above the clinical threshold for attention problems; for hyperactivity/impulsivity problems this was 0% and 4.8% respectively. In the medication group 8.1% of mothers and 6.1% of fathers scored above the clinical threshold for attention problems; for hyperactivity/impulsivity this was 2.7% and 0% respectively. Further baseline characteristics of parents in both groups can be found in Table 1.

Intervention and Treatment Integrity

Families were randomly assigned to one of two treatment conditions: the family mindfulness-based intervention

Table 1 Baseline Characteristics (pre-test) of Mothers and Fathers

	Mothers	Fathers
Total number	74	54
Age (M; SD)	44.86 (5.25)	47.26 (4.45)
Educational level - No (%)		
University or college	54 (72.9%)	31 (57.4%)
Vocational school	11 (14.9%)	14 (25.9%)
Secondary school or less	9 (12.2%)	9 (16.8%)
Treatment preference – No (%)		
Strong Mindfulness	37 (50.0%)	23 (42.6%)
Light Mindfulness	19 (25.7%)	14 (25.9%)
No preference	10 (13.5%)	7 (13.0%)
Light Medication	5 (6.8%)	7 (13.0%)
Strong Medication	2 (2.7%)	3 (5.6%)
Missing	1 (1.4%)	0 (0.0%)

MYmind or methylphenidate for the child. At least one parent needed to take part in MYmind. Parents of children who took medication (methylphenidate) did not receive any further treatment between 0 and 4 months. Families in both conditions were provided with psycho-education about ADHD. MYmind was composed of 8 weekly 1.5 sessions for children and their parents in parallel. Most of the sessions children and parents were in separate groups but at the beginning, halfway and at the end, part of the sessions took place with all children, parents and trainers together to to share experiences within and across families. Parents learn to be more present with and non-judgmental towards their child, to be more compassionate towards themselves, and to calmly respond rather than overreact to challenging behavior of their child. The importance of parents practicing daily is emphasized, to learn to embody mindfulness, to be a role model for their child who is also invited to practice daily at home, and for their own inattention and/or hyperactivity/impulsivity symptoms, if present. Session themes and main practices of the MYmind program for parents and children are presented in Table 2.

Parents and children were encouraged to continue meditating and given a 1.5 h booster session 2-months after the end of the training (4-months after pre-test). The MYmind -Treatment Adherence and Competence Scale (MYmind -TACS) was used to assure treatment integrity, and 169 (70%) of parent sessions were recorded for assessment. The Adherence part of the MYmind -TACS assesses to what extent the different exercises of each session are administered by the trainers. This was rated on a scale of 0–2. The Competence part of the MYmind -TACS assesses the extent to which mindfulness trainer skills are demonstrated during the sessions. This part was based on the Mindfulness-Based Interventions Teaching Assessment Criteria (MBI-TAC; Crane et al. 2013), and the Mindfulness-Based Cognitive

Table 2 Session Themes and Core Practices of the MYmind Program

Session	Session Theme	Core practices children	Core practices parents
Week 1	Man from Mars (Beginners mind)	Man from Mars; Breathing meditation	Morning stress; Child as a raisin; Breathing meditation
Week 2	Home in your body	Bodyscan with stretching/releasing; Ragdoll robot; Yoga	Bodyscan; Morning stress from perspective of friend
Week 3	The breath	Breathing space; Rubber duck	Breathing space; Meditation of body and breath
Week 4	Distractors!	Meditation with distractors; Sounds meditation	Sounds and thoughts meditation; Child as distractor
Week 5	Stress	Halfway evaluation; Body scan release only; Stress and breathing space	Halfway evaluation; Choiceless awareness; Coping meditation parental stress
Week 6	Highway, walking way	Highway and breathing space; Walking meditation	Rupture and repair; Walking meditation
Week 7	Autonomy (and acceptance for parents)	Repetition sessions with quiz; Children as meditation and yoga teachers	Imagination practice on acceptance and autonomy; Roleplay limits
Week 8	The future	Children as meditation and yoga teachers; Meditation plan for the coming 8 weeks	Meditation and yoga guided by the children; Meditation plan for the coming 8 weeks
Week 16	Starting anew again each time	Repeating all meditations; Sharing experiences past 8 weeks; Meditation plan	Repeating all meditations; Sharing experiences past 8 weeks; Meditation plan

Therapy Adherence Scale (MBCT-AS; Segal et al., 2002b) but simplified to fit the clinical practice of teaching mindfulness to children with ADHD and their parents. Example items are: "To what extent does the trainer show a curious attitude?"; "To what extent does the trainer facilitate the group learning process?". These skills were rated on a scale from 1–5. Trainers were (clinical) psychologists with a lot of experience in working with children with ADHD, and their families, who had completed an 8-day teacher training of the MYmind program. Prior to taking part in this teacher training, they completed a mindfulness training for themselves (i.e., MBCT), at least one 5-daymeditation retreat, and had at least a year of own mindfulness practice.

Two psychology graduate students were trained by the first author of the study's protocol (R. Meppelink) to be participant observers. Interrater reliability of MYmind -TACS was assessed by the trainer and one trainee randomly scoring seven sessions of the parent groups. Percentages of absolute agreement for the parent groups were 94.7% for adherence and 86.6% for competence. Further, Intra Class Correlation (ICC) was excellent; 0.86 for adherence and 0.88 for competence. Subsequently, 50 randomly selected parent sessions were rated: 91.6% of the program was adhered to by the trainers, 3.8% was partially adhered to and 4.7% was not delivered. Trainer competence was rated at 4.60 out of 5 ($SD = 0.27$).

Parents in the medication group received no further treatment themselves, but their child was prescribed short-acting methylphenidate by a child psychiatrist (parents are present in these meetings with the child psychiatrist), hereby following the multidisciplinary guidelines ADHD (e.g. Stijntjes et al., 2014). The initial dosage was three times daily 2.5 or 5 mg and the psychiatrist kept in weekly contact with the family until optimal titration was obtained. Medication was also taken at school and therefore both parents and teachers were included as informants to observe potential changes in the child's behavior. After one week the psychiatrist contacted the family: when the medication already had the desired effect, the dose was not increased further. However, when medication was not yet effective, the dose was increased by 2.5 or 5 mg. Every four weeks after that the child and parent(s) came to the treatment center to evaluate with the psychiatrist. Every time the dose was increased, the psychiatrist contacted the family the week after to evaluate. If needed, the dose was increased further with another 2.5 or 5 mg with a maximum of 20 mg methylphenidate per dose until optimal titration was achieved. Every four weeks the child and at least one of the parents were invited to come to the treatment center for a face-to-face consultation with the child psychiatrist and a physical examination. When methylphenidate was not effective or the child suffered from severe side effects, a change in dose or medication type was made after consultation by the psychiatrist.

Measures

Parental Stress

Parents self-reported their levels of general stress using the 10-item *Perceived Stress Scale* (PSS; Cohen, 1988). Reliability was measured for pre-test, 2-, 4- and 10-month follow-ups: $\alpha = 0.86$, 0.83, 0.87 and 0.90. Example items are 'How often have you found that you could not cope with all things that you had to do?'; 'How often have you felt nervous and stressed?'. The 17-items *Parenting Sense of Competence Scale* (PSOC; Ohan et al., 2000) was employed to look at specific parenting stress and the feeling of parenting competence. Reliabilities for the four assessment points were: $\alpha = 0.85$, 0.88, 0.87 and 0.89. The PSOC covers the subscales of Efficacy and Satisfaction, but in this study only the total score was used. Example items are 'Being a parent is manageable, and any problems are easily solved'; 'Being a parent makes me tense and anxious'.

The *Parenting Scale* (PS; Arnold et al., 1993) consists of 30 items looking at parenting discipline patterns. The subscales Over-Reactivity and Laxness were included in this study, with items being scored on a continuous scale offering 2 extremes. Reliabilities of the sub-scale Over-reactivity (10 items) at pre-test, 2-, 4- and 10-month follow-ups were: $\alpha = 0.78$, 0.78, 0.79 and 0.74. For the 11 item sub-scale for Laxness, reliabilities were: $\alpha = 0.80$, 0.79, 0.81 and 0.80. Example items are 'When my child misbehaves I raise my voice or yell ------- I speak to my child calmly'; 'When my child does something I don't like I do something about it every time it happens ------- I often let it go'.

Parental Mindfulness and Self-compassion

The 24-items short form of the *Five Facet Mindfulness Questionnaire* (FFMQ; Bohlmeijer et al., 2011) was used to measure overall mindfulness. The FFMQ is composed of the following subscales: Observing, Describing, Acting with awareness, Nonjudging, and Nonreactivity. In the current study only the total score was included. Reliability was measured for pre-test, 2-, 4- and 10-month follow-ups: $\alpha = 0.77$, 0.83, 0.85 and 0.85. Example items are 'I rush through activities without being really attentive to them'; 'Usually when I have distressing thoughts or images, I step back and am aware of the thought or image without getting taken over by it'. The 29-items *Interpersonal Mindfulness in Parenting Scale* (IM-P; de Bruin et al., 2014; Duncan, 2007) was used to look at levels of mindfulness in the parenting relationship. The IM-P is comprised of the following six sub scales: Listening with Full Attention, Compassion for Child, Non-judgmental Acceptance of Parental Functioning, Emotional Non-reactivity in

Parenting, Emotional Awareness of Child, and Emotional Awareness of Self. In the current study only the total score was included. Reliabilities were good: α = 0.87, 0.89, 0.89 and 0.86. Example items are 'I am listening to my child with full attention'; 'I am usually unaware of my child's feelings'. The 12-items *Self Compassion Scale* (SCS; Raes et al., 2011) looked at parents' sense of self compassion, also showing good reliabilities at all four time points: α = 0.85, 0.87, 0.90 and 0.89. The SCS covers six subscales: Self-Kindness, Self-Judgment, Common Humanity, Isolation, Mindfulness, and Over-identification, but in the current study only the total score was used. Example items are 'When I'm going through a very hard time, I give myself the caring and tenderness I need'; 'When I feel inadequate in some way, I try to remind myself that feelings of inadequacy are shared by most people'.

Parental ADHD

The subscales of Attention Problems (11 items) and Hyperactivity/Impulsivity (12 items) of the *Self-Report Questionnaire on Attention Problems and Hyperactivity/Impulsivity* (SQAH; Kooij et al., 2005) were administered. Reliability of Attention Problems and Hyperactivity/Impulsivity at the four time points was good: α = 0.90, 0.88, 0.87 and 0.88 and α = 0.81, 0.81, 0.80 and 0.81 respectively. Example items are 'I have difficulty organizing tasks and activities'; 'I am always on the go or act as if driven by a motor'.

Parental Well-being

The *World Health Organization Five Well-being Index* (WHO; Topp et al., 2015) is composed of five questions on well-being with good reliability in our sample: α = 0.85, 0.89, 0.89 and 0.90. An example item is 'The last weeks I have felt calm and relaxed'. The *Pittsburgh Sleep Quality Index* (PSQI; Buysse et al., 1989) is comprised of seven subscales, of which in this study only the subscale of Sleep Quality was used. Given that this subscale consisted of only item ('How would you rate the quality of your sleep?'), a test of construct internal consistency was not possible. In addition, the 8 items Insomnia subscale of the *Holland Sleep Disorder Questionnaire* (HSDQ; Kerkhof et al., 2013) was used. This subscale showed good to excellent reliabilities in our sample: α = 0.88, 0.91, 0.92 and 0.91. An example item is 'At night, I lie awake for a long time'. Last, the *Adult Self-Report* (ASR; Achenbach & Rescorla, 2003) is a 123 items assessment of adaptive and maladaptive functioning for adults between the ages of 18 and 59. For our study, we examined the subscales Internalizing Problems (39 items, i.e. 'I feel worthless or inferior'), Externalizing Problems (35 items, i.e. 'I have a hot temper') and Attention Problems (15 items, i.e., 'I have trouble concentrating or paying attention for long'). Reliabilities for the Internalizing Problems were excellent: α = 0.92, 0.92, 0.92 and 0.91, for Externalizing Problems were good: α = 0.84, 0.84, 0.81 and 0.86, as were reliabilities for Attention Problems at the four time points: α = 0.88, 0.88, 0.88 and 0.91.

Mindfulness Dosage

The amount of mindfulness practice parents in the mindfulness group were exposed to per week was defined in three ways: number of classes attended, number of home sessions and minutes of meditation. For the number of classes, parents were asked to select the number of sessions they attended (0 - 8) between pre-test and 2-months follow-up. The parents were further asked to select the frequency with which they meditated at home per week between pre-test and 2-months follow-up. And last, parents in the mindfulness group were asked to state the number of minutes per week that they meditated at home on average between pre-test and 2-months follow-up. These questions were reported retrospectively at 2-months.

Analyses

The data was analyzed with regression analysis using SPSS 29. After running Little's MCAR test for mothers and fathers separately, it was found that data were missing completely at random for the families that were randomly assigned. However, data was not missing at random when running Little's MCAR for mothers and fathers together. In order to account for this, regression analyses were run separately for mothers and fathers. Missing data points were accounted for through maximum likelihood estimation with an unstructured covariance structure. Analyses of parents' outcome scores across the four domains were conducted by running multilevel modelling (mixed models) to test interaction or treatment type across time; with pre-test as the reference category. Analyses investigating correlations between 'mindfulness dosage' and changes in parents' outcomes within the mindfulness group were conducted by looking at correlations between three measures of self-reported mindfulness practice on a weekly basis (classes attended, home sessions and minutes of meditation) and change scores (calculated from pre- to 2-months follow-up for all 15 outcomes from the four domains. Parents that completed both pre-test and 2-months follow-up for each measure of interest were included in the analysis. Only parents in the mindfulness group who took part in the mindfulness training were included in the analysis. With a medium effect size and an alpha of 0.05 the power to detect group differences for fathers was 0.55 and for mothers 0.89.

Results

Parental Stress

Overall the hypothesis that the decrease in parental stress would be larger for parents in the mindfulness group was confirmed by the following measures. Mothers in the mindfulness group showed a significantly larger reduction of over-reactivity (PS subscale Over-Reactivity) at 4-months (small ES) than those in the medication group. However, mothers in the mindfulness condition also had significantly higher levels on this subscale at pre-test (small ES). For fathers, the only between groups differences were found for parental stress (PSOC total score) with higher levels of improvement for the mindfulness group at 2-months (medium ES) and 4-months (small ES). Fathers in the mindfulness group however had lower levels of parental stress (PSS total score) at pre-test (medium ES). For details of the stress descriptives and parameter estimates, please see Tables 3 and 4 and Fig. 1.

Parental Mindfulness and Self-compassion

Overall the hypothesis that parents in the mindfulness group would show a larger increase in parental mindfulness was confirmed by the following measures. We found significant between group differences where improvements in the mindfulness group were bigger than those in the medication group: for mothers on self-compassion (SCS total score) at 2-months (small ES) and for fathers on mindful parenting (IM-P total score) at 4-months (medium ES) and self-compassion (SCS total score) at 2-months and 4-months (both medium ES). For details of the mindfulness descriptives and parameter estimates, please see Tables 5 and 6 and Fig. 1.

Parental ADHD

The hypothesis that symptoms of parental ADHD would decrease more in the mindfulness group was not confirmed: Parents in the mindfulness group did not differ on improvements of their own ADHD symptoms compared to parents in the medication group on both subscales of the SQAH. However, all parents reported reduced ADHD symptoms in themselves over time, e.g. at the 10-months measurement: In the mindfulness group 0.0% of mothers and 0.0% of fathers scored above the clinical thresholds on the subscales Attention Problems and Hyperactivity/Impulsivity. In the medication group 2.7% of mothers and 0.0% of fathers scored above the clinical threshold on the subscale Attention Problems; for the subscale Hyperactivity/Impulsivity this was 0.0 and 0.0% respectively. For further details of parental ADHD measures' descriptives and parameter estimates, please see Tables 7 and 8.

Parental Well-being

Overall the hypothesis that parents in the mindfulness group would improve more on well-being was confirmed by the following measures. Sleep quality (PSQI) improved more for mothers in the mindfulness group as compared to the medication group at 10-months (medium ES). Fathers in the mindfulness group reported larger reductions on the subscale Internalizing Problems at 2-months (small ES) and on the subscale Attention Problems at 4-months (medium ES), as compared to fathers whose children took medication. For details of the parental well-being domain measures' descriptives and parameter estimates, please see Tables 9 and 10 and Fig. 1.

Correlations between Meditation and Outcomes

The hypothesis of a higher amount of meditation practice would be positively related to improved outcomes was only confirmed for mothers. For fathers no significant correlations were found. For mothers, medium positive correlations were found between number of classes attended and the subscale Insomnia (HSDQ) and between minutes of meditation and worse sleep quality (PSQI). Another medium positive correlation was found for mothers between number of meditation sessions at home and improved general mindfulness (FFMQ total score). Finally, medium positive correlations were found for mothers between sense of parental competence (PSOC total score) and number of sessions at home and minutes of meditation practice. See Table 11 for details.

Additional Treatment between 4- and 10-months Follow-up

After 4 months of adherence to the assigned treatment, families had a free choice of treatment period until the long-term measurement. In this period almost half (46.5%) of the families originally assigned to the mindfulness group sought medication for their child. About a third (35%) of the parents chose to add psychosocial treatment (e.g., CBT, behavior parent training). Of the families originally assigned to the medication group, almost a quarter of the children (23.7%) stopped taking medication in the long-term. Further, about a third (34.6%) sought mindfulness-related contacts, and almost a quarter (22.9%) of the families followed additional psychosocial treatment, which did not differ significantly from those parents in the mindfulness group. More precise information about the intensity of these additional treatments was unavailable, we therefore did not further explore these patterns.

Table 3 Parental Stress: Means and Standard Deviations for Mothers and Fathers in the MYmind and Medication Group on the Perceived Stress Scale (PSS), Parenting Stress and Competence (PSOC), Parenting Scale – Over-Reactivity and Parenting Scale – Laxness (PS-OR and PS-LAX) at Pre-Test, 2-, 4- and 10-months Follow-up

	Pre-Test			2-Months			4-Months			10-Months		
	M	*SD*	*N*	*M*	*SD*	*N*	*M*	*SD*	*N*	*M*	*SD*	*N*
Perceived Stress Scale (PSS)												
Mothers												
MYmind group	0.23	0.78	35	−0.05	0.75	35	−0.22	0.78	34	−0.39	0.96	30
Medication group	0.35	1.19	35	−0.05	0.98	35	−0.07	1.22	32	−0.02	1.14	30
Fathers												
MYmind group	0.12	0.85	18	−0.22	0.84	18	−0.43	0.98	17	−0.09	1.14	17
Medication group	−0.01	0.83	11	−0.17	0.51	11	−0.30	0.59	11	−0.30	0.56	9
Parenting Stress and Competence (PSOC)												
Mothers												
MYmind group	−0.06	0.83	35	−0.14	0.94	35	0.00	0.89	34	0.08	1.12	30
Medication group	0.24	0.89	35	0.25	0.92	35	0.41	0.97	32	0.37	0.82	30
Fathers												
MYmind group	−0.60	0.78	18	−0.18	0.93	18	−0.07	0.96	17	−0.24	0.91	17
Medication group	0.09	0.75	11	−0.02	1.01	11	0.25	0.65	11	−0.13	0.97	9
Parenting Scale – Over-Reactivity (PS-OR)												
Mothers												
MYmind group	0.39	0.90	35	0.02	0.92	35	−0.06	0.83	34	−0.07	0.72	30
Medication group	−0.06	0.87	35	−0.11	1.03	35	−0.17	1.04	31	−0.30	0.95	30
Fathers												
MYmind group	0.23	1.21	18	−0.15	0.98	18	−0.14	0.98	17	−0.27	0.79	17
Medication group	0.34	1.35	11	0.03	1.11	11	0.15	1.27	11	0.31	1.09	9
Parenting Scale – Laxness (PS-LAX)												
Mothers												
MYmind group	−0.09	1.06	35	0.09	0.99	35	−0.22	1.00	34	−0.17	0.96	30
Medication group	0.11	0.93	35	0.11	1.08	35	0.00	0.87	31	−0.05	0.83	30
Fathers												
MYmind group	0.19	1.09	18	−0.10	1.06	18	0.19	0.83	17	0.06	1.01	17
Medication group	0.04	0.98	11	−0.21	0.85	11	−0.23	0.74	11	0.15	1.03	9

Discussion

In this paper, we examined the short, medium and long-term effects on parents of families with a child with ADHD being treated with a family mindfulness-based program (MYmind) versus child medication. Although not on all measures and on all measurement occasions, overall improvements for parents in the mindfulness condition were larger than for those in the medication condition for parental stress, parental mindfulness and self-compassion and parental well-being. This was not the case for parental ADHD.

Parental Stress

Parents in the mindfulness group experienced larger reductions in parental stress than parents whose children took medication (i.e. the medication group). In the medium long term mothers in the mindfulness group showed greater decreases in over-reactive parenting style in comparison to mothers whose children took medication. In line, fathers in the mindfulness group showed greater improvements on parental stress and parental sense of competence and efficacy at both short- and medium-term when compared to fathers whose children were taking medication. However, mean scores were not equal between groups, as mothers in the mindfulness group had significantly higher levels of over-reactive parenting style at pre-test and fathers in the mindfulness group had significantly lower levels of parental stress at pre-test. Even though the parents in the mindfulness group experienced greater improvements over time, they did not have better scores than the parents in the medication condition at the three follow-ups. The pre-test differences between groups could be attributed to chance, post-assignment rationalization or self-selection. Rationalization could have the form of cognitive dissonance: at pre-test parents might find themselves justifying why they need to take an 8-week mindfulness class because their child has ADHD. As with

Table 4 Outcomes comparing the 2-, 4- and 10-months Follow-up with Pretest, Within and Between the MYmind and Medication Group, for Parental Stress: Standard Parameter Estimates (p-values) of the Perceived Stress Scale (PSS), Parental Stress and Competence (PSOC), and the Parenting Styles – Over-Reactive and Lax Parenting (PS-OR and PS-LAX)

Mothers					Fathers			
	PSS (*PE; SE*)	PSOC (*PE; SE*)	PS-OR (*PE; SE*)	PS-LAX (*PE; SE*)	PSS (*PE; SE*)	PSOC (*PE; SE*)	PS-OR (*PE; SE*)	PS-LAX (*PE; SE*)
Parents from families in MYmind group								
2-months vs. pre-test	−0.28 (0.15)$^{+}$	−0.08 (0.10)	−0.36 (0.12) **	0.18 (0.12)	−0.35 (0.17)$^{+}$	0.41 (0.09) ***	−0.38 (0.19)$^{+}$	−0.29 (0.13) *
4-months vs. pre-test	−0.47 (0.14) **	0.06 (0.09)	−0.42 (0.12) ***	−0.12 (0.14)	−0.58 (0.21) *	0.57 (0.08) ***	−0.44 (0.13) **	−0.10 (0.14)
10-months vs. pre-test	−0.63 (0.20) **	0.17 (0.12)	−0.45 (0.12) ***	−0.08 (0.12)	−0.27 (0.18)	0.41 (0.15) **	−0.57 (0.22) *	−0.18 (0.19)
Parents from families in the Medication group								
2-months vs. pre-test	−0.40 (0.15) **	0.01 (0.10)	−0.05 (0.12)	0.00 (0.12)	−0.16 (0.22)	−0.10 (0.11)	−0.31 (0.24)	−0.26 (0.17)
4-months vs. pre-test	−0.28 (0.14) *	0.09 (0.10)	−0.08 (0.12)	0.00 (0.15)	−0.28 (0.27)	0.16 (0.10)	−0.19 (0.16)	−0.27 (0.18)
10-months vs. pre-test	−0.34 (0.20)$^{+}$	0.14 (0.12)	−0.25 (0.12) *	−0.12 (0.12)	−0.28 (0.24)	−0.06 (0.20)	−0.05 (0.28)	0.00 (0.25)
Interaction effects over time between groups								
MYmind vs. medication at pre-test	−0.12 (0.24)	−0.30 (0.20)	0.44 (0.21) *	−0.20 (0.24)	0.14 (0.31)	−0.68 (0.28) *	−0.12 (0.47)	0.15 (0.39)
MYmind vs. medication * 2-months vs. pre-test	0.11 (0.21)	−0.09 (0.14)	−0.31 (0.17)$^{+}$	0.17 (0.17)	−0.19 (0.28)	0.51 (0.14) **	−0.06 (0.31)	−0.04 (0.22)
MYmind vs. medication * 4-months vs. pre-test	−0.19 (0.20)	−0.03 (0.13)	−0.34 (0.17) *	−0.12 (0.20)	−0.29 (0.34)	0.41 (0.13) **	−0.25 (0.21)	0.16 (0.23)
MYmind vs. medication * 10-months vs. pre-test	−0.29 (0.28)	0.03 (0.17)	−0.20 (0.16)	0.04 (0.17)	0.01 (0.30)	0.46 (0.24)$^{+}$	−0.52 (0.36)	−0.18 (0.31)

Parameter Estimates can be interpreted as Cohen's d effect size

$^{+}p < 0.10$, $*p < 0.05$, $**p < 0.01$, $***p < 0.001$

[a]Not measured

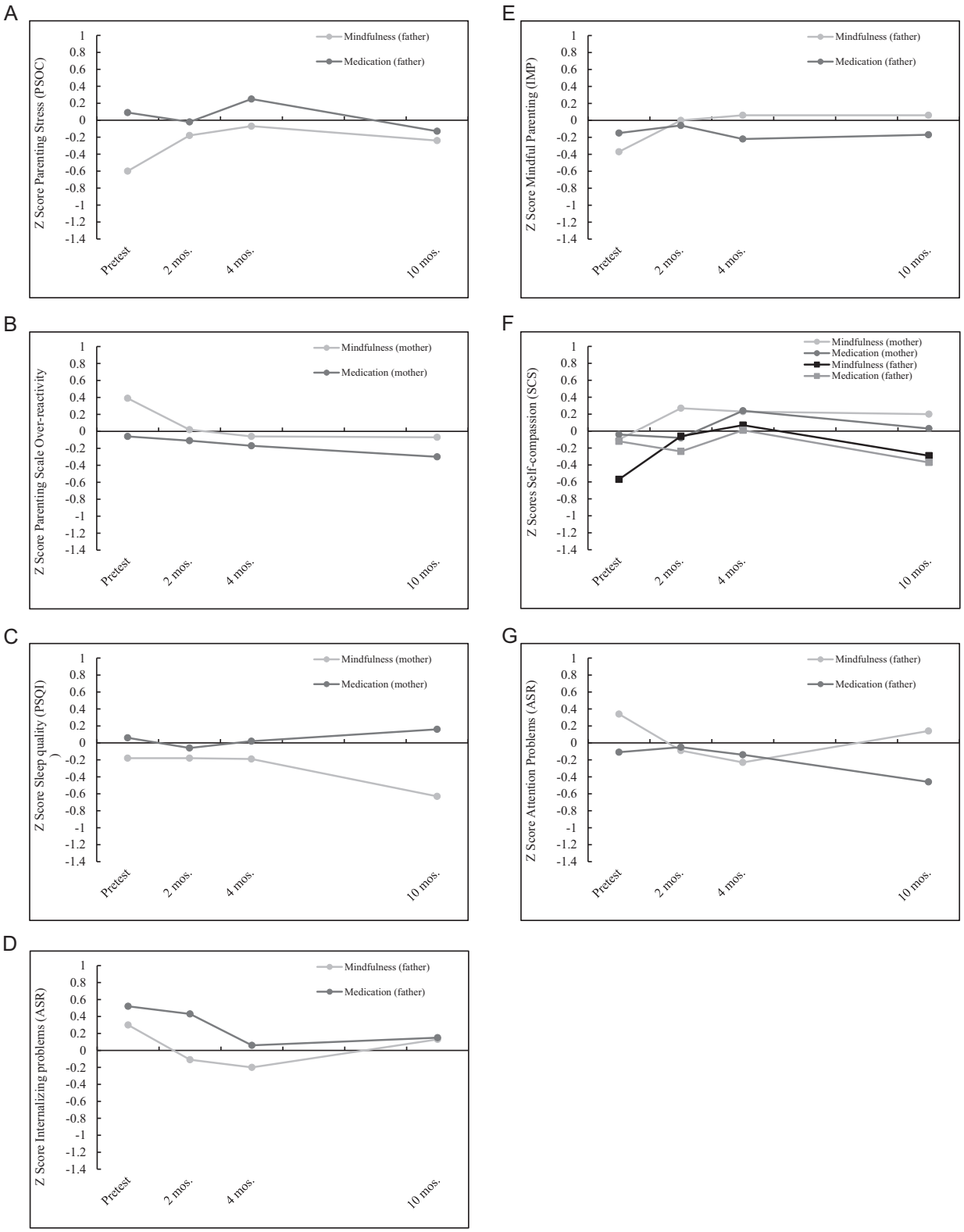

Fig. 1 **A**–**G**. Effects of Mindfulness versus Medication Treatment on the Outcome Measures Parenting Stress and Sense of Competence (PSOC) for Fathers, Parenting Scale Over-reactivity (PS-OR) for Mothers, Mindful Parenting (IMP) for Fathers, Self-compassion (SCS) for Fathers and Mothers, Sleep Quality (PSQI) for Mothers, Internalizing Problems (ASR) for Fathers and Attention Problems (ASR) for Fathers

Table 5 Mindfulness and Self-compassion: Means and Standard Deviations for Mothers and Fathers in the MYmind and Medication Group on the Five Facets Mindfulness Questionnaire (FFMQ), Interpersonal Mindful Parenting Scale (IM-P) and Self-Compassion Scale (SCS) at Pre-Test, 2-, 4- and 10-months Follow-up

	Pre-Test			2-Months			4-Months			10-Months		
	M	*SD*	*N*	*M*	*SD*	*N*	*M*	*SD*	*N*	*M*	*SD*	*N*
Five Facets Mindfulness Questionnaire (FFMQ)												
Mothers												
MYmind group	−0.25	0.93	35	−0.08	0.91	35	−0.08	0.93	34	0.10	1.00	30
Medication group	0.02	0.96	35	0.15	1.03	35	0.07	0.98	31	0.07	1.05	30
Fathers												
MYmind group	0.02	0.98	18	0.13	1.07	18	0.24	0.93	17	0.30	1.00	17
Medication group	0.08	0.78	11	0.10	0.74	11	0.28	1.22	11	0.28	0.98	9
Interpersonal Mindful Parenting Scale (IM-P)												
Mothers												
MYmind group	−0.25	0.71	35	−0.11	0.69	35	−0.06	0.67	34	0.02	0.69	29
Medication group	0.09	0.77	35	0.16	0.85	35	0.21	0.97	31	0.21	0.79	30
Fathers												
MYmind group	−0.37	0.87	18	0.00	0.80	18	0.06	0.72	17	0.06	0.68	17
Medication group	−0.15	0.76	11	−0.06	0.66	11	−0.22	0.74	11	−0.17	0.60	9
Self-Compassion Scale (SCS)												
Mothers												
MYmind group	−0.10	0.96	35	0.27	0.94	35	0.23	0.95	34	0.20	0.95	29
Medication group	−0.04	0.97	35	−0.08	1.11	35	0.24	1.21	31	0.03	1.14	30
Fathers												
MYmind group	−0.57	1.10	17	−0.06	0.91	17	0.07	1.01	17	−0.29	1.09	16
Medication group	−0.12	0.91	11	−0.24	0.57	11	0.01	0.79	11	−0.37	1.03	9

Table 6 Outcomes comparing the 2-, 4- and 10-months Follow-up with Pretest, Within and Between the MYmind and Medication Group, for Mindfulness: Standard Parameter Estimates (p-values) of the Five Facets of Mindfulness Questionnaire (FFMQ), Interpersonal Mindfulness in Parenting (IM-P) and the Self-Compassion Scale (SCS)

Mothers				Fathers		
	FFMQ (*PE; SE*)	IM-P (*PE; SE*)	SCS (*PE; SE*)	FFMQ (*PE; SE*)	IM-P (*PE; SE*)	SCS (*PE; SE*)
Parents from families in MYmind group						
2-months vs. pre-test	0.17 (0.11)	0.14 (0.08)$^{+}$	0.37 (0.12) **	0.12 (0.11)	0.38 (0.12) **	0.51 (0.17) **
4-months vs. pre-test	0.18 (0.11)	0.19 (0.10)$^{+}$	0.34 (0.13) **	0.35 (0.12) **	0.46 (0.12) ***	0.64 (0.14) ***
10-months vs. pre-test	0.39 (0.13) **	0.25 (0.09) **	0.31 (0.13) *	0.30 (0.15)$^{+}$	0.47 (0.15) **	0.32 (0.19)
Parents from families in the Medication group						
2-months vs. pre-test	0.13 (0.11)	0.07 (0.08)	-0.04 (0.12)	0.03 (0.15)	0.09 (0.15)	-0.11 (0.21)
4-months vs. pre-test	0.03 (0.11)	0.09 (0.10)	0.20 (0.13)	0.20 (0.16)	-0.07 (0.15)	0.13 (0.17)
10-months vs. pre-test	0.09 (0.13)	0.10 (0.09)	0.08 (0.13)	0.06 (0.20)	0.03 (0.20)	-0.20 (0.24)
Interaction effects over time between groups						
MYmind vs. medication at pre-test	-0.26 (0.22)	-0.34 (0.17)$^{+}$	-0.05 (0.23)	-0.06 (0.34)	-0.23 (0.31)	-0.45 (0.38)
MYmind vs. medication * 2-months vs. pre-test	0.04 (0.16)	0.07 (0.11)	0.41 (0.17) *	0.09 (0.19)	0.29 (0.19)	0.62 (0.27) *
MYmind vs. medication * 4-months vs. pre-test	0.16 (0.16)	0.09 (0.14)	0.14 (0.18)	0.15 (0.20)	0.53 (0.19) **	0.51 (0.22) *
MYmind vs. medication * 10-months vs. pre-test	0.30 (0.18)	0.16 (0.13)	0.22 (0.18)	0.24 (0.25)	0.45 (0.26)$^{+}$	0.52 (0.31)

Parameter Estimates can be interpreted as Cohen's d effect size

$^{+}p < 0.10$, $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$

[a]Not measured

Table 7 Parental ADHD: Means and Standard Deviations in the MYmind Group and Medication Group on the Self-Report Questionnaire Hyperactivity/Impulsivity (SQAH-HI) and Self-Report Questionnaire Attention Problems (SQAH-Att) at Pre-Test, 2-, 4- and 10-months Follow-up

	Pre-Test			2-Months			4-Months			10-Months		
	M	*SD*	*N*	*M*	*SD*	*N*	*M*	*SD*	*N*	*M*	*SD*	*N*
SQAH - Hyperactivity Impulsivity (SQAH-HI)												
Mothers												
MYmind group	0.35	0.81	37	0.01	0.88	37	−0.01	0.80	36	−0.01	0.84	31
Medication group	0.52	1.31	37	0.29	1.24	37	0.02	1.14	33	0.15	1.14	32
Fathers												
MYmind group	0.31	1.02	20	0.03	0.96	20	−0.31	0.75	20	−0.19	0.77	18
Medication group	0.01	1.01	33	−0.29	0.66	33	−0.23	0.98	32	−0.47	0.82	28
SQAH - Attention Problems (SQAH-Att)												
Mothers												
MYmind group	0.11	1.02	37	−0.10	0.83	37	−0.05	0.82	36	−0.15	0.76	31
Medication group	0.37	1.29	37	0.19	1.14	37	0.05	1.19	33	0.17	1.24	32
Fathers												
MYmind group	0.31	1.19	20	−0.02	1.06	20	−0.06	0.88	20	0.08	1.00	18
Medication group	0.16	1.13	33	−0.09	0.81	33	0.02	0.89	32	−0.20	0.83	28

Table 8 Outcomes comparing the 2-, 4- and 10-months Follow-up with Pretest, Within and Between the MYmind and Medication Group for Parental ADHD: Standard Parameter Estimates (p-values) of Self-Report Questionnaire Attention problems and Hyperactivity/Impulsivity (SQAH-HI and SQAH-Att)

Mothers			Fathers	
	SQAH–HI (*PE; SE*)	SQAH–Att (*PE; SE*)	SQAH-HI (*PE; SE*)	SQAH–Att (*PE; SE*)
Parents from families in MYmind group				
2-months vs. pre-test	−0.35 (0.12) **	−0.21 (0.11)$^{+}$	−0.29 (0.14)$^{+}$	−0.33 (0.15) *
4-months vs. pre-test	−0.39 (0.15) *	−0.19 (0.15)	−0.62 (0.17) ***	−0.37 (0.17) *
10-months vs. pre-test	−0.46 (0.12) ***	−0.28 (0.12) *	−0.51 (0.14) ***	−0.29 (0.14) *
Parents from families in the Medication group				
2-months vs. pre-test	−0.23 (0.12)$^{+}$	−0.18 (0.11)	−0.29 (0.11) *	−0.25 (0.12) *
4-months vs. pre-test	−0.47 (0.15) **	−0.28 (0.15)$^{+}$	−0.23 (0.13)$^{+}$	−0.15 (0.13)
10-months vs. pre-test	−0.31 (0.12) *	−0.15 (0.12)	−0.29 (0.11) *	−0.28 (0.11) *
Interaction effects over time between groups				
MYmind vs. medication at pre-test	−0.16 (0.25)	−0.26 (0.27)	0.31 (0.28)	0.15 (0.32)
MYmind vs. medication * 2-months vs. pre-test	−0.12 (0.16)	−0.03 (0.16)	0.00 (0.18)	−0.08 (0.19)
MYmind vs. medication * 4-months vs. pre-test	0.08 (0.21)	0.09 (0.21)	−0.40 (0.21)	−0.23 (0.21)
MYmind vs. medication * 10-months vs. pre-test	−0.14 (0.18)	−0.14 (0.17)	−0.22 (0.18)	−0.02 (0.17)

Parameter Estimates can be interpreted as Cohen's d effect size

$^{+}p < 0.10$, $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$

[a]Not measured

chance or rationalization, self-selection is an equally likely candidate in that only one parent needed to participate in filling out surveys and taking the mindful parenting classes, although they were welcome to both participate. It could be that those who felt they had a high stress level were more inclined to participate in the mindfulness intervention. These findings are in line with previous studies showing reductions in parenting stress after parents take part in for instance an MBSR, MBCT or Mindful Parenting training (e.g., Liu et al., 2021). The child alone taking medication might be helpful in alleviating the core ADHD symptoms (e.g., Meppelink et al., 2024) and also has a positive effect on some measures of stress for parents, but this study adds that the effects of parents taking a mindfulness course seems to spread much wider: not only do they experience decreased stress, decreased overreactivity and laxness in parenting but they also report an increased sense of competence in their parenting role.

Table 9 Parental Well-being: Means and Standard Deviations in the MYmind and the Medication Group on the World Health Organization Well-being Index (WHO), ASR Internalizing Scale (ASR-Int), ASR Externalizing Scale (ASR-Ext), ASR Attention Problems Scale (ASR-Att), Pittsburg Sleep Quality Index (PSQI) and Holland Sleep Disorders Questionnaire (HSDQ) at Pre-Test, 2-, 4- and 10-months Follow-up

	Pre-Test			2-Months			4-Months			10-Months		
	M	*SD*	*N*	*M*	*SD*	*N*	*M*	*SD*	*N*	*M*	*SD*	*N*
World Health Organization Well-being Index (WHO)												
Mothers												
MYmind group	−0.10	0.87	35	−0.20	0.90	35	−0.10	0.76	34	−0.43	0.66	30
Medication group	0.20	0.90	35	0.01	1.07	35	−0.22	1.10	31	0.02	1.10	30
Fathers												
MYmind group	0.26	1.05	18	−0.03	1.01	18	−0.09	0.90	17	0.09	1.31	17
Medication group	0.63	1.13	11	0.27	1.24	11	−0.26	0.89	11	−0.10	0.84	9
ASR Internalizing Problems (ASR-Int)												
Mothers												
MYmind group	0.13	0.93	35	−0.24	0.97	35	−0.20	1.01	34	−0.08	0.97	29
Medication group	0.24	0.98	34	−0.19	1.11	34	−0.28	1.03	30	−0.17	1.04	29
Fathers												
MYmind group	0.30	0.96	18	−0.11	0.92	18	−0.20	0.98	18	0.13	1.06	17
Medication group	0.52	0.51	11	0.43	0.52	11	0.06	0.76	11	0.15	0.82	9
ASR Externalizing Problems (ASR-Ext)												
Mothers												
MYmind group	0.27	0.89	35	−0.02	0.98	35	−0.17	0.99	34	−0.07	0.90	29
Medication group	0.39	1.10	34	−0.08	1.06	34	−0.20	1.03	30	−0.06	1.09	29
Fathers												
MYmind group	0.23	1.00	18	−0.29	1.01	18	−0.36	1.03	18	−0.19	1.13	17
Medication group	0.18	0.82	11	0.07	0.79	11	0.06	0.72	11	−0.14	0.69	9
ASR Attention Problems (ASR-Att)												
Mothers												
MYmind group	0.06	1.05	35	−0.17	0.97	35	−0.09	0.99	34	−0.15	0.83	29
Medication group	0.25	1.09	34	0.06	0.98	34	−0.01	1.00	30	0.11	1.24	29
Fathers												
MYmind group	0.34	1.41	18	−0.09	0.97	18	−0.23	0.88	18	0.14	1.36	17
Medication group	−0.11	1.15	11	−0.05	0.74	11	−0.14	0.89	11	−0.46	0.61	9
Pittsburg Sleep Quality Index (PSQI)												
Mothers												
MYmind group	−0.18	0.95	35	−0.18	0.82	35	−0.19	0.66	34	−0.63	0.73	29
Medication group	0.06	0.99	35	−0.06	1.01	35	0.02	1.02	31	0.16	1.13	30
Fathers												
MYmind group	0.40	0.81	17	0.23	1.12	17	−0.36	0.99	17	0.24	1.03	16
Medication group	0.06	1.11	11	−0.07	1.01	11	−0.07	1.01	11	−0.10	1.12	9
Holland Sleep Disorders Questionnaire (HSDQ)												
Mothers												
MYmind group	−0.12	0.84	35	−0.22	0.81	35	−0.26	0.81	34	−0.36	0.79	29
Medication group	0.23	0.86	35	0.06	1.06	35	0.04	1.11	31	0.02	1.11	30
Fathers												
MYmind group	0.10	0.86	17	−0.03	0.86	17	−0.37	0.69	17	0.13	1.19	16
Medication group	0.03	0.60	11	−0.12	0.91	11	−0.36	0.82	11	-0.13	0.68	9

Table 10 Outcomes comparing the 2-, 4- and 10-months Follow-up with Pretest, Within and Between the MYmind and Medication Group, for Well-being: Parameter Estimates (p-values) of the World Health Organization Well-being Index (WHO), ASR Internalizing Scale (ASR-Int), ASR Externalizing Scale (ASR-Ext), ASR Attention Problems Scale (ASR-Att), Pittsburg Sleep Quality Index (PSQI) and Holland Sleep Disorders Questionnaire (HSDQ)

Mothers							Fathers					
	WHO (*PE; SE*)	ASR-Int (*PE; SE*)	ASR-Ext (*PE; SE*)	ASR-Att (*PE; SE*)	PSQI(*PE; SE*)	HSDQ (*PE; SE*)	WHO (*PE; SE*)	ASR-Int (*PE; SE*)	ASR-Ext (*PE; SE*)	ASR-Att (*PE; SE*)	PSQI (*PE; SE*)	HSDQ (*PE; SE*)
Parents from families in MYmind group												
2-months vs. pre-test	−0.10 (0.15)	−0.37 (0.13) **	−0.29 (0.13) *	−0.22 (0.09)*	0.00 (0.15)	−0.10 (0.12)	−0.29 (0.22)	−0.41(0.09) ***	−0.52 (0.19) *	-0.44 (0.16)*	−0.17 (0.23)	−0.14 (0.14)
4-months vs. pre-test	−0.04 (0.15)	−0.35 (0.11) **	−0.48 (0.17) **	−0.17 (0.10)$^{+}$	−0.02 (0.20)	−0.17 (0.14)	−0.38 (0.24)	−0.50 (0.14) **	−0.59 (0.14) ***	−0.57 (0.16) **	−0.76 (0.26) **	−0.47 (0.14) **
10-months vs. pre-test	−0.38 (0.17) *	−0.31 (0.11) **	−0.48 (0.15) **	−0.22 (0.11)*	−0.40 (0.19) *	−0.24 (0.16)	−0.24 (0.21)	−0.26 (0.15)$^{+}$	−0.50 (0.18) *	−0.26 (0.12)*	−0.16 (0.25)	−0.01 (0.20)
Parents from families in the Medication group												
2-months vs. pre-test	−0.19 (0.15)	−0.42 (0.13) **	−0.47 (0.13) ***	−0.19 (0.09)$^{+}$	−0.12 (0.15)	−0.17 (0.12)	−0.36 (0.28)	−0.09 (0.12)	−0.10 (0.24)	0.05 (0.20)	−0.13 (0.29)	−0.15 (0.18)
4-months vs. pre-test	−0.35 (0.16) *	−0.40 (0.12) **	−0.56 (0.17) **	−0.17 (0.11)	−0.02 (0.20)	−0.13 (0.15)	−0.89 (0.30) **	−0.46 (0.18) *	−0.11 (0.18)	−0.03 (0.20)	−0.13 (0.32)	−0.38 (0.17)*
10-months vs. pre-test	−0.12 (0.17) $^{+}$	−0.27 (0.11) *	−0.38 (0.15) *	−0.04 (0.11)	0.16 (0.19)	−0.13 (0.15)	−0.52 (0.28)	−0.32 (0.19)	−0.32 (0.24)	−0.15 (0.16)	−0.13 (0.33)	−0.09 (0.26)
Interaction effects over time between groups												
MYmind vs. medication at pre-test	−0.30 (0.21)	−0.10 (0.23)	−0.12 (0.24)	−0.19 (0.25)	−0.25 (0.23)	−0.35 (0.20)$^{+}$	−0.37 (0.40)	−0.22 (0.30)	0.05 (0.35)	0.45 (0.49)	0.34 (0.35)	0.07 (0.29)
MYmind vs. medication * 2-months vs. pre-test	0.09 (0.22)	0.05 (0.18)	0.18 (0.19)	−0.04 (0.13)	0.12 (0.21)	0.07 (0.18)	0.07 (0.36)	−0.32 (0.15) *	−0.41 (0.30)	−0.49 (0.26)$^{+}$	−0.04 (0.37)	0.01 (0.23)
MYmind vs. medication * 4-months vs. pre-test	0.31 (0.22)	0.05 (0.16)	0.08 (0.24)	0.00 (0.15)	0.00 (0.28)	−0.04 (0.20)	0.51 (0.38)	−0.04 (0.23)	−0.48 (0.23)$^{+}$	−0.54 (0.26)*	−0.63 (0.41)	−0.09 (0.22)
MYmind vs. medication * 10-months vs. pre-test	−0.26 (0.24)	−0.04 (0.16)	−0.10 (0.21)	−0.18 (0.15)	−0.56 (0.27) *	−0.11 (0.22)	0.28 (0.35)	0.05 (0.24)	−0.18 (0.30)	−0.11 (0.20)	−0.04 (0.42)	0.08 (0.33)

Parameter Estimates can be interpreted as Cohen's d effect size

$^{+}p < 0.10$, * $p < 0.05$, **$p < 0.01$, ***$p < 0.001$

[a]Not measured

Table 11 Correlations between Change Scores (pre-test vs. 2-months Follow up) on Outcomes and Meditation Dosage for Parents in the MYmind Group

Outcome	Mothers			Fathers		
	# Classes Attended	# Home Sessions	# Minutes Meditating	# Classes Attended	# Home Sessions	# Minutes Meditating
Parental stress						
PSS	−0.17	−0.05	−0.06	−0.21	0.05	0.05
PSOC	0.15	0.34*	0.34*	0.07	0.13	0.15
PS−OR	0.05	−0.15	0.20	−0.27	−0.19	−0.26
PS-LAX	0.14	0.08	0.25	−0.15	−0.25	−0.31
Parental mindfulness						
FFMQ	0.18	0.40*	−0.02	−0.04	0.09	0.35
IM-P	0.07	0.14	−0.07	0.08	0.12	0.31
SCS	0.08	0.04	0.04	0.28	0.39	0.48+
Parental ADHD						
SQAH-Att	0.16	−0.00	−0.20	0.11	0.16	0.01
SQAH-HI	0.17	0.17	0.12	−0.07	−0.03	−0.14
Parental wellbeing						
WHO	−0.05	−0.14	−0.12	−0.16	−0.13	0.11
ASR-Int	0.33+	0.38*	0.11	0.40	0.29	−0.13
ASR-Ext	0.16	0.25	0.13	0.22	0.26	0.10
ASR-Att	0.31^{+}	0.26	0.10	0.39	0.30	0.28
PSQI	0.17	0.28	0.36*	−0.03	−0.21	−0.24
HSDQ	0.38*	0.23	0.07	−0.12	−0.27	−0.37

$^{+}p < 0.10$, $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$.

Parental Mindfulness and Self-compassion

Parents in the mindfulness group reported greater increases in self-compassion and mindful parenting when compared to the parents in the medication group. This seems to be one of the strongest differences between the groups which was to be expected since the mindful parenting training is designed to improve mindful parenting and self-compassion. However, when children's behavior becomes more easy to parent because of medication, this can also make parents more mindful in their parenting and more self-compassionate, so the larger improvement on parental mindfulness measures in the mindfulness group are important findings. These findings are in line with other Mindful Parenting studies reporting increased mindful awareness, self-compassion or being more attentive to the child (e.g. Bögels et al., 2021; Potharst et al., 2019). Increased mindfulness in parenting is also known to predict a decrease in symptoms of the child, underlining the benefits of mindful parenting training even more (Meppelink et al., 2016).

Parental ADHD

For both groups positive effects were found on different aspects of parental ADHD, with treatment of the parents and the children through the family mindfulness program not differing in effectiveness from treatment of only the child with medication. With parents responding calmer, more attentive and less reactive after the Mindful Parenting training it is not hard to imagine that parental ADHD symptoms such as inattentiveness and hyperactivity/impulsivity reduce. Other studies of mindfulness-based programs for adults with ADHD also showed that MBCT as a supplement to treatment as usual is an effective approach in alleviating symptoms of ADHD and improving mindfulness and self-compassion skills, also at 6-months follow-up (Janssen et al., 2018). Interestingly, this also happened when the child took medication and the parent received no further treatment other than accompanying the child for the evaluation of the medication effects. A possible explanation could be co-regulation: children's and parent's ADHD symptoms are likely to exacerbate each other (Bögels et al., 2021): for example, if a child is restless the parent becomes restless too, or if a parent talks excessively the child does so too. So if children's ADHD symptoms are effectively reduced by medication, that may indirectly affect similar symptoms in their parents.

Parental Well-being

On the domain of well-being we saw greater improvements in the mindfulness group over the medication group on sleep quality, internalizing symptoms (e.g., depression and

anxiety) and attention problems. Benefits of mindfulness training on overall sleep quality have been shown before (Rusch et al., 2019), however since we found it only found in the long term when findings may have been confounded by other treatments, we need to interpret this with caution. Further, it is known that mindfulness-based programs effectively reduce anxiety and depression (e.g. Salari et al., 2024) which is what was also seen in this study. Thus, when parents of children with ADHD have attention and internalizing problems themselves it is more beneficial to them to take part in a family mindfulness program than for their child to take medication.

Mindfulness Dosage

For mothers, all outcomes, apart from parental ADHD, were correlated to mindfulness dosage. The fact that none of these findings were found for fathers too could perhaps simply be explained by a much smaller sample size of fathers that took part in the family mindfulness program. Surprisingly, it was found that more minutes spent meditating was associated with poorer sleep quality and higher class attendance was associated with increased insomnia. The association with poorer sleep quality is in contrary with previous studies showing a positive relationship between more mindfulness practice and better sleep quality (e.g. Rusch et al., 2019). Perhaps this is related to the fact that in the current study sleep quality was measured by only one item, but apart from that we are unsure how to explain these findings. The negative relationship with insomnia can be understood in the light of previous studies somewhat better since items measuring insomnia partly cover amount of sleep per night. There is evidence from studies with experienced meditators (note: our sample concerned beginner meditators) of an interaction that takes place with larger amounts of meditation that lead to higher states of wakefulness and less sleeping hours (Britton et al., 2014).

Further, as expected, it was found that more meditation sessions at home were correlated with increased levels of general mindfulness, lower parental stress and lower internalizing symptoms; and more minutes spent meditating with an increased sense of competence in parenting. The findings of more home practice being associated with increased mindfulness outcomes are rather intuitive and support previous study findings of more frequent daily meditations to lead to more mindfulness responses to daily life events (Lacaille et al., 2018). Also, the association between more practice and less parental stress was shown before (e.g., Liu et al., 2021; Lo et al., 2020) as was the association between more mindfulness and a decrease in anxiety and depression (e.g., Parsons et al., 2017). However, we need to be aware that measurement of 'mindfulness dosage' was self-reported, retrospectively from memory by the participants, and therefore needs to be interpreted with some caution.

Clinical Implications

This study is supporting evidence to be optimistic about treating parental outcomes with mindfulness-based programs for families with children with ADHD, as a potential alternative to medicating the child. Since the same was shown for children's outcomes (Meppelink et al., 2024), it can be recommended when a family with a child with ADHD visits mental health care services, to offer the option of mindfulness training, as a complement to or prior to medication and behavioral parent/teacher training. Especially when it comes to issues such as over- reactive parenting, parental stress and sense of competence in parenting, comorbid attention and internalizing problems of the parents, mindfulness in parenting and self-compassion it may be worth considering this option. Mindfulness skills are learned for life, once integrated in a person's life they become internal qualities which may which may foster a sense of empowerment. A parent can rely on his/her own skills instead of an external agent like medication that also wears of once its usage stops. Further, the effects of mindfulness might spread throughout other domains of life, such as work or the work-private balance.

Limitations, Strengths and Suggestions for Future Research

Our study is limited by a couple of significant factors. The first is that of parental bias in self-selecting to participate in the mindfulness classes: when a family was randomized to the mindfulness group, it was compulsory for at least one parent to take part in the Mindful Parenting part of the MYmind program. However, parents could chose themselves which one of them, or both, wanted to participate in the actual meditations and home practices. Thus while this study was a methodologically strong RCT, it's plausible that parents with a positive view on mindfulness took part in the training, and those with a more negative view on mindfulness did not which therefore did not automatically guarantee randomness. A future study would benefit from a randomization of parents to participate. Since the family mindfulness program is quite intense with parents and children both taking part in groups and home practices, it would be interesting to see how effects on parents would compare of taking only a Mindful Parenting course versus the parallel parent and child courses. Our study is also limited by a confounding factor in which families were allowed to seek additional treatment between 4 and 10 months. While this was done for ethical reasons, it does add an element of complexity to the study in detangling

whether it is the mindfulness or the medication (or both) that impacts the long-term outcomes. Generalizability across countries and cultures is not possible with the current study's data since the sample consisted mainly of Western European, relatively highly educated participants only. Although similar findings were shown in samples of studies on MYmind in Hong Kong (Wong et al., 2023; Zhang et al., 2017) it is also known from intercultural studies that the same style of parenting may have different functions in different countries (e.g. Lansford et al., 2016).

Conclusion

To conclude, this study examined the effects on parental outcomes between families randomized for a family mindfulness program (MYmind) versus medication for children with ADHD. We found parents in the mindfulness-based family program to improve over parents whose children took medication for ADHD on parental over-reactivity, self-compassion, sleep quality, stress, mindful parenting, self-compassion, internalizing and attention problems. Findings suggest that family mindfulness has broader effects on the functioning of the whole family of a child with ADHD than medication.

Author contributions S.B., as principle investigator of the study, developed the MYmind training, trained and supervised the facilitators, and as the director of UvA minds at the time of study, made it feasible to conduct this study. E.B. wrote the grant application and supervised R.M. and B.K.Z. All authors contributed to the design and protocol of the study. B.K.Z. carried out the statistical analyses. R.M. collected the data. B.K.Z. drafted the paper and the paper was modified and supplemented by all other authors. All authors read and approved the final manuscript.

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Compliance with Ethical Standards

Conflict of Interest Brett Kosterman Zoller and Renee Meppelink have no conflict of interest. Susan M. Bögels owns shares in UvA minds, one of the participating treatment centres, and teaches professionals in MYmind, for which she earns a salary. Esther de Bruin is the director of UvA minds.

Ethical Approval The study was approved by the Medical Ethical Committee of the Amsterdam Medical Centre (no. 2013_383).

Informed Consent Written informed consent was obtained from all parents and children from the age of 12.

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