Case Study 1: An Evidence-Based Practice Review Report

Theme: School (setting) based interventions for children with special educational needs (SEN)

How effective are mindfulness-based interventions for reducing ADHD symptoms in children and young people?

1:Summary

Within the literature, there has been an increase in attention on the role of mindfulness as a treatment for the symptomology of Attention Deficit Hyperactivity Disorder (ADHD) in children. Mindfulness can be understood as having two parts, the first being the self-regulation of attention and the second being open and accepting orientation towards new experiences (Bishop et al., 2004). There has been an emerging interest in investigating the impact of parallel child and parent mindfulness-based interventions on ADHD symptomology in children and young people with ADHD. This systematic literature review aims to investigate the effectiveness of family-based mindfulness interventions on child ADHD symptoms. Five studies met inclusion criteria, all delivering the MYmind intervention (Bögels et al., 2021; Haydicky et al., 2015; Siebelink et al., 2021; Valero et al., 2021; Zhang et al., 2017. The within-group effect sizes ranged from small (Bögels et al., 2021) to large (Valero et al., 2021). The between-group effect sizes ranged from small (Siebelink et al.,2021) to medium (Valero et al., 2021) for certain symptoms of ADHD. The findings of this review suggest that family mindfulness interventions, specifically MYmind, can be effective at reducing both inattention and hyperactivity/impulsivity both at post-test and follow-up in children and young people. However, due to the variation in effect sizes, this should be understood with caution. Further, due to the limited number of randomised control trials and further limitations

within this review, these findings need to be treated with caution when reflecting upon their application and relevance to the UK education system.

Introduction

2.1 Mindfulness

Mindfulness has been defined as "the awareness that emerges through paying attention on purpose, in the present moment, and non-judgmentally to the unfolding of experience moment by moment" (Kabat-Zinn, 2003). Mindfulness practices can be traced back to a Buddhist tradition of mindfulness being a core stance that underlies different types of Buddhist meditative practices (Kabat-Zinn, 2003 p.145). In recent years, there has been a rapid increase in mindfulness practices being incorporated into community healthcare interventions, moving away from its religious origins (Baer, 2003). When utilised in a clinical setting, mindfulness practices can vary; with a focus on different techniques such as: meditation exercises, practicing awareness of moment-to-moment bodily thoughts sensations and emotions or asking individuals to focus on environmental stimuli (Baer, 2003). Within this review, mindfulness-based interventions have been understood as interventions that support individuals to pay deliberate attention to the present moment and be non-judgmental about their conscious experience.

2.2 Mindfulness-based interventions for Children with ADHD

The prevalence of ADHD is vast, affecting 4-12% of school-age children within the United States (APA, 2013) and 3-5% of children in the UK (Cheetham et al., 2015). The core symptoms of ADHD referred to within this review are taken from the Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (DSM-5), these being: inattention, hyperactivity and impulsivity (APA, 2013). Historically, medication

was the dominant approach to treatment, appearing in international guidelines (Bögels et al., 2021). However, medication had been found to reduce symptoms of ADHD in only 70% of children (Shaw et al., 2012). Furthermore, medication has been found to have side effects or if stopped the original symptoms may return (Bögels et al., 2021). Moreover, adherence to medication drops around 70% during adolescence (Wolraich et al., 2005). Therefore, while it is the prominent treatment approach it has disadvantages; thus there is a need to look for alternative treatment options, as reflected in current NICE guidance. Specifically, these guidelines suggest a more varied approach that includes: psycho-education, pharmacotherapy and/or cognitive-behavioural treatments (NICE, 2018).

Mindfulness-based interventions have been offered as an alternative treatment for childhood ADHD as these types of interventions target the core symptoms of ADHD specifically hyperactivity, impulsivity and inattention. Within mindfulness interventions, individuals are asked to be still and aware of where their attention is going from one moment to the next. They are then asked to bring their attention back to a focus point which could be in the mind or the body instead of allowing themselves to follow their impulses (Bögels et al., 2021). There has been an emergence in research reviewing the effectiveness of this treatment approach. Specifically, a recent meta-analysis has supported the use of mindfulness-based interventions for children with ADHD, finding a reduction in hyperactivity and impulsivity (Cairncross & Miller, 2020).

2.3 Mindfulness-based interventions for parents of children with ADHD

While there is some emerging evidence for the effectiveness of mindfulness-based intervention for reducing symptoms of ADHD in children, there has also been an

emergence of evidence supporting the use of mindfulness-based approaches to help parents support their children with ADHD. The rationale behind parenting mindfulness-based interventions is twofold: firstly, ADHD has a strong hereditary component whereby around 60% of children that have a parent with ADHD will develop ADHD symptoms themselves (Minde et al., 2003). Thus, offering mindfulness parenting interventions may teach methods to parents to manage their ADHD symptomology. Further, parents of children with ADHD have reported higher levels of stress than those with children who do not have ADHD, and the severity of stress is associated with the severity of ADHD symptoms (Theule et al., 2010). It has been found that this stress can harm parents' feelings of competency and negatively impact family life; with parents reporting reduced warmness towards their children (Bögels et al., 2010). Additionally, it has been found that family dynamics can either exacerbate inattentive, impulsive and hyperactive behaviours in children or they can support the development of self-regulation and can attune with children's ADHD symptoms (Johnston & Mash, 2001).

Given the dynamic nature of parenting and the genetic nature of ADHD, the impact of mindfulness parenting interventions was investigated by Singh et al. (2010) who found that providing parenting mindfulness training of ADHD children leads to a reduction in parental stress and an increase in child compliance (Singh et al., 2010). While the research by Singh et al. (2010) includes only parents in their mindfulness intervention, more recently there has been research into parallel parent and child mindfulness interventions. These have been brought together in a meta-review investigating the effectiveness of family-based mindfulness intervention for children with ADHD and their parents (Tercelli & Ferreira, 2019). They found that there was a reduction in attention difficulties across all studies, a reduction in parental stress, and

an increase in family wellbeing. However, there were conflicting results found for the impact of mindfulness interventions on measures of hyperactivity (Tercelli & Ferreira, 2019). Importantly, this study was conducted in 2019 yet it only contained studies from before 2014. In recent years there has been an increase in research in this area thus it appeared important to update this prior meta-review. Furthermore, while Tercelli and Ferreira (2019) investigated symptoms of ADHD they included wider outcome measures such as externalising symptoms, executive functioning, and family wellbeing. This review, however, shall be focusing on the core symptoms of ADHD: inattention, hyperactivity, and impulsivity.

2.4 Psychological Theory

The focus on family mindfulness interventions reflects the importance of the family environment for ADHD behaviours and draws upon Bandura's social learning theory (Bandura, 1977). According to social learning theory, children look to adults' behaviour as a guide for how they should behave and learn social rules (Bandura, 1977). Research has shown that parents both with and without ADHD often struggle to model calm parenting responses towards their child's behaviour (Johnston & Mash, 2001). At the same time, research has found that parents that engage in mindfulness feel more equipped to control their emotional responses (Waters, 2016).Therefore, by providing family-based mindfulness interventions for both children and parents they can learn techniques simultaneously. This means that parents will learn techniques to control their impulsivity, inattention and hyperactivity which in turn will enable them to respond more calmly to their children's behaviour. Consequently, this will support children in their learning of mindfulness techniques as they can observe their parents using them in the home.

2.5 Rationale and relevance to educational psychology

With the high prevalence of ADHD in children and young people, it is important that schools have an understanding of evidence-based interventions which can support children with these difficulties. Specifically, a report by the Department of Education reflected the need for educational psychologists to use their expertise to support students with Special Educational Needs and Disability (SEND) including ADHD (Kelly & Gray, 2000). Therefore, with the growing interest in mindfulness-based interventions, the evidence-base for these must be evaluated. In addition to schools being aware of evidence-based interventions, schools must facilitate evidence-based practice not only with individual children but with their whole families. Due to austerity policies there is a focus on schools becoming community hubs (Hanley et al., 2020) therefore, there is a need for schools to be able to support the needs of families in the local community, including those who need support with their families' experiences of ADHD. This could be seen practically in the allowing of external facilitation of mindfulness-based interventions within the school setting.

2.6 Review question

How effective are family mindfulness-based interventions for reducing ADHD symptoms in children and young people with ADHD?

3 Critical review of the evidence-base

3.1 Literature Search

In December 2021 a literature search was conducted to identify all relevant research papers for the research question. A search was run on the following databases: EBSCO, Psycinfo, and Web of Science.

Table 1

Search terms and results of database search

Database	Search terms	Results
Web of Science	ADHD or Attention Deficit Hyperactivity Disorder (All Fields) and "Mindfulness NEAR/ 4 Intervention" or "Mindfulness NEAR/ 4 CBT" or mdct or MBT or mcat or Mindfulness or **mbpg or " MindfulnessBased ParallelGroup"** and child or children* or adolesc* or young people or youth or young person* or pupil* or elementary age pupil or student and "family-based" or "family based," or parent* or caregiver* or "family-therap*" or "family therap*" or mother* or father* or guardian	71
ERIC	(ADHD or attention deficit hyperactivity disorder) AND (mindfulness or mindfulness-based intervention or mbi or mindfulness-based stress reduction or mbsr or mbct or MBPG or mindfulness based parallel group) AND (child or youth or adolescents or children or "young- people" or "young people" or youth or student or pupil or "elementary aged pupil") AND (parental or parent or caregiver or famil* or mother* or father* or guardian or "family-based" or "family based"	9
Psycinfo	ADHD.mp. or exp Attention Deficit Disorder with Hyperactivity/ ("Mindfulness adj 4 Intervention" or "Mindfulness adj 4 CBT" or MBCT or MBT or MCBT or mindfulness or MBPG or mindfulness based parallel group (child or children* or adolesc* or young people or youth or young person or pupil or elementary age pupil or student) ("family-based" or "family based," or parent* or caregiver* or "family- therap*" or "family therap*" or mother* or father* or guardian*	56

The total number of papers found was 137 including one found through manual searching.

Once duplicates were removed the total number of papers was 104. The screening process

undertaken can be seen in Figure.1.The rationale for one study being excluded after deep reading can be found in Appendix F.

Table 2

Inclusion and Exclusion Criteria

Criteria	Inclusion	Exclusion	Rationale
1 Publication Date	Post-2014	Pre 2014	A previous systematic review of mindfulness-based interventions for children and young people with ADHD and their parents
2 Study Design	Studies that follow experimental or quasi-experimental designs	Non-experimental designs	This review is focusing on the causal relationship between intervention and ADHD symptomology
3 Publication Type	Peer-Reviewed Journal	The study was not included in a peer-reviewed journal	Peer journals provide a level of academic rigour
4 Intervention Type	Parallel Mindfulness-based interventions with children and family – delivered to both	Only child or parent singular interventions	This review is looking at the effectiveness of parent and child parallel mindfulness intervention

Criteria	Inclusion	Exclusion	Rationale
5 Participants	Children aged between 0-18 with a diagnosis of ADHD and their parents	Children without a diagnosis of ADHD and any individuals with ADHD over 18	This review is looking at the effectiveness of mindfulness-based interventions for children reducing ADHD symptoms in children with ADHD
6 Language	Studies written in the English language	Studies written in a non-English language	The reviewer can only understand English
7 Outcome Measures	Outcome measures specifically measure Hyperactivity, Impulsivity and Inattention	Other outcome measures that do not specify changes in attention, hyperactivity and or impulsivity	This review is focused on the effectiveness of Mindfulness-Based Interventions on the symptoms of ADHD

Figure 1

Study Selection Process

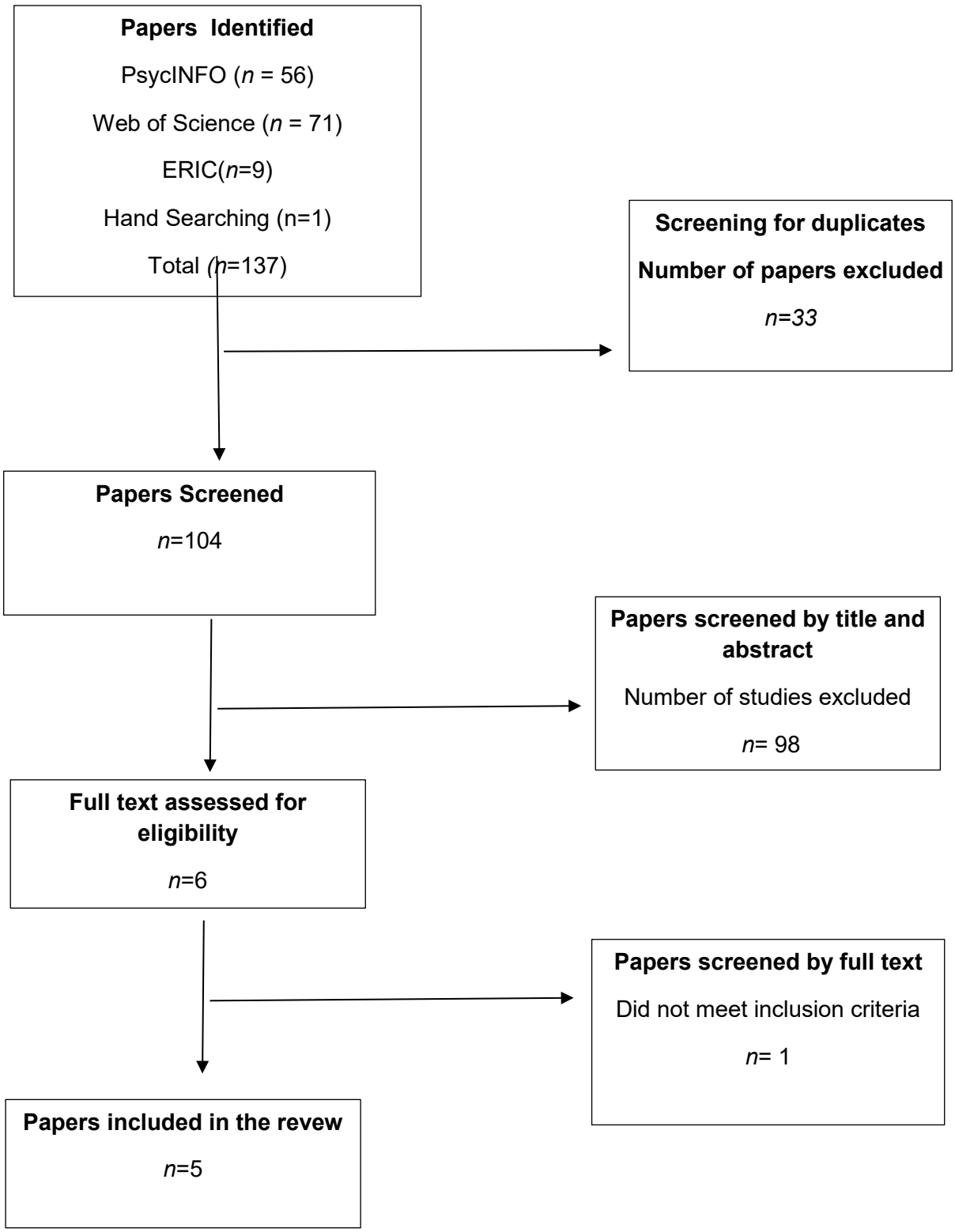

Table 3

Studies Included in the review

Studies Included
Bögels, S. M., Oort, F. J., Potharst, E., van Roosmalen, R., Williams, J. M. G., & de Bruin, E. I. (2021). Family Mindfulness Training for Childhood ADHD: Short- and Long-Term Effects on Children, Fathers and Mothers. *MINDFULNESS*, *12*(12),
Haydicky, J., Shecter, C., Wiener, J., & Ducharme, J. M. (2015). Evaluation of MBCT for Adolescents with ADHD and Their Parents: Impact on Individual and Family Functioning. *Journal of Child and Family Studies*, *24*(1), 76–94
. Siebelink N., Bögels S., Speckens A., Dammers J., Wolfers T.,Buitelaar J., & Greven C.(2021). A randomised controlled trial (MindChamp) of a mindfulness-based intervention for children with ADHD and their parents. *Journal of Child Psychology and Psychiatry*.
Valero, M., Cebolla, A., & Colomer, C. (2021). Mindfulness Training for Children with ADHD and Their Parents: A Randomized Control Trial. *Journal of Attention Disorders*, 10870547211027636.
Zhang, D. X., Chan, S. K. C., Lo, H. H. M., Chan, C. Y. H., Chan, J. C. Y., Ting, K. T., Gao, T. T., Lai, K. Y. C., Bögels, S. M., & Wong, S. Y. S. (2017). Mindfulness-Based Intervention for Chinese Children with ADHD and Their Parents: a Pilot Mixed-Method Study. *Mindfulness*, *8*(4), 859–872.

3.2 Weight of Evidence

To appraise the five selected studies, the Gough Weight of Evidence (WoE) framework was utilised (Gough, 2007). This enabled appraisal across three dimensions WoE A, B, and C. WoE A evaluates the methodological quality across the different studies (Gough, 2007). In order to evaluate this Gersten et al.'s protocol was used as this is deemed appropriate for experimental and quasi-experimental group designs (Gersten et al., 2005). WoE B refers to the relevance of the study design in relation to the review question (Gough, 2007). This was rated following Petticrew and Roberts typology of evidence (Petticrew & Roberts, 2003). WoE C

refers to how relevant the topic of each research paper is to the review question (Gough, 2007). Judgements within WoE C were averaged to provide an overall WoE C score. The average scores across these three domains were used to calculate the overall WoE D score. These were sorted into categories low (1.4 and below), medium (1.5-2.4) and high (over 2.4). WoE A, B, C and D scores are listed in the table below. There is further information regarding appraisal criteria for each dimension and coding protocols provided in Appendix B.

Table 4

WoE scores for included studies

Study	WoE A	WoE B	WoE C	WoE D
Haydicky et al. (2015)	1(Low)	1 (Low)	2 (Medium)	1.33 (Low)
Zhang et al. (2017)	1(Low)	1 (Low)	1.66 (Medium)	1.22 (Low)
Bögels et al. (2021)	3 (High)	2 (Medium)	2 (Medium)	2.33 (Medium)
Valero et al. (2021)	3 (High)	3(High)	1.66(Medium)	2.55 (High)
Siebelink et al. (2021)	3 (High)	3 (High)	2.33 (Medium)	2.77 (High)

Note: <1.4 (low), 1.5-2.4 (medium) and >2.4 (high)

3.21 Participants

Across all the studies included in the review, 309 parents and children received mindfulness-based interventions, all of which were the MYmind intervention. The ages of the child participants ranged from 8 to 19, while the average age was 11.8 years old. The gender balance of the sample was predominantly male (66.6%) and female (34.4%). In all five studies, all the child participants had a diagnosis of ADHD. This strength for all studies was evident in WoE A. The difference in participant numbers was notable across the studies with Bögels et al. (2021) having 169 children and both parents taking part while Zhang et al. (2017) included 11 children and their parents.

Two of the studies utilised randomised control groups to ensure that relevant characteristics of participants in the sample were comparable across conditions such as medication use (Siebelink et al., 2021; Valero et al., 2021). Valero et al. (2021) conducted a randomised control trial where 10 of the children (66%) on the wait list were on medication in comparison to seven children (46.6%) of the intervention group (Valero et al., 2021). In the randomised control trial conducted by Siebelink et al. (2021) the intervention and care as the usual group had 45 children (82%) on medication while the care as usual control had 38 children (79%) on medication (Siebelink et al., 2021). This contributed to a strong WoE A rating.

None of the studies included participants from the UK. Participants were from the Netherlands, Spain, Canada (Bögels et al., 2021; Haydicky et al., 2015; Siebelink et al., 2021; Valero et al., 2021), while one study included participants from Hong Kong (Zhang et al., 2021). It seemed likely that studies from the Netherlands, Spain and Canada would more closely reflect the cultural and educational context of the UK

education system and therefore they received a higher WoE C, as can be seen in Table 1.

3.22 Study Design

Haydicky et al. (2015) used a single group experimental design; they took baseline, pre-intervention, post-intervention, and follow-up measures to use the baseline measures as a type of control (Haydicky et al., 2015). However, as these were not from a separate control group, this study received a lower WoE B for methodological relevance. Similarly, Zhang et al. (2017) used a pre/post-intervention design with no control group; they collected measures pre and post-intervention but had no follow-up. Therefore, similarly to Haydicky et al. (2015) they scored lower on WoE B for methodological quality. The lack of follow-up resulted in an overall lower WoE A. Bögels et al. (2021) used a pragmatic quasi-experimental waitlist design where children and families were not randomised into treatment and waitlist groups. Therefore, they received a lower WoE B for methodological quality. However, this study included both an eight-week and year follow-up which increased the overall WoE A score. Two studies used a Randomised Control Design- Siebelink et al. (2021) and Valero et al. (2021). The use of randomisation to put people into either the control group or the treatment group increased the internal validity of the studies and ensured that the effects can be attributed as a direct result of the intervention as opposed to the participant's characteristics. Therefore, these studies received a high WoE A for methodological relevance. Furthermore, both of these studies included follow-up information with Valero et al. (2021) including 6 months follow-up information and Siebelink et al. (2021) including a 2 month and 6 months follow- up which further strengthened their WoE A rating.

3.23 Intervention

All interventions completed the MYmind programme devised by Bögels et al. (2013). The programme consists of eight weekly 90 minute sessions running simultaneously for adults and children. Four of the studies within the review followed the protocol laid out by the MYmind programme (Bögels et al., 2021; Haydicky et al., 2015; Siebelink et al., 2021; Zhang et al., 2017). This ensured that parent and child sessions ran simultaneously over the 8 weeks, with group facilitators who were trained in the mindfulness intervention and sessions that were 90 minutes long (Bögels et al., 2021; Haydicky et al., 2015; Siebelink et al., 2021; Zhang et al., 2017). Therefore, all four studies received a high rating within this criterion of WoE C in regards to relevance for the review question. Valero et al. (2021) did not deliver this simultaneously to adult and child groups as they were carried out consecutively. Therefore, this received a lower score on this criterion for WoE C.

With regards to the quality of implementation, three of the studies assessed this throughout the intervention (Bögels et al., 2021; Haydicky et al., 2015; Siebelink et al., 2015) . Siebelink et al. (2015) used an independent rater to measure mindfulness teacher competence and protocol adherence. Bögels et al. (2021) ensured facilitators took part in monthly supervision with mindfulness teachers, having the option to request extra supervision while group sessions were taped. In the study conducted by Haydicky et al. (2015) supervision was provided during sessions and in weekly debriefing meetings with two registered clinical child psychologists. This led to an increase in desirability criteria for these studies in WoE A.

3.24 Measures

Three studies (Haydicky et al.,2015; Siebelink et al.,2021; Valero et al.,2021) used the Conner's Rating Scale (Conners et al., 2011). This is the most commonly associated scale used to measure problems associated with ADHD. Valero et al. (2021) reported internal consistency as α = .70 to .93, while Haydicky et al. (2015) reported this to be .77 to .97. Additionally, Siebelink et al. (2021) used the Conner's parent rating scale measure which included 9 items measuring inattentiveness α = .82 and hyperactivity/impulsivity α =.86. The inclusion of a strong internal reliability coefficient strengthened these studies WoE A.

Bögels et al. (2021) utilised the Disruptive Behaviours Disorders Rating Scale (Pelham et al.,1992) and reported high internal consistency for parent ratings of child inattention α = 0.82 and hyperactivity/impulsivity 0.87 increasing WoE A criteria.

Zhang et al. (2017) utilised differing measures to measure inattention and impulsivity which had reduced the internal reliability coefficient. The Conner's Continuous Performance Test of Everyday Attention (CPT3) (Conners et al., 2018) had an internal consistency α =.50 baseline and α =.71 post-intervention. This was used in addition to Test (TEA-Ch) (Heaton et al., 2001) with internal consistency in the recorded α =.80 (baseline) and α= .66 (post-intervention). The behaviour rating of executive functioning was used to measure impulsivity (BRIEF), α= .69–.81 (baseline) and α=.63–.86 (Gioia et al., 2000). This led to a reduced WoE A.

Finally, Valero et al. (2021) did not report internal consistency for all their measures. They utilised the Conner's Scale Third Edition and found good internal consistency α =.77 and α =.97. However, they did not record internal consistency coefficients for The Inhibition subtest of the NEPSY-II. This resulted in a lower WoE A.

All studies utilised parent self-report data and four of the studies utilised child measures (Bögels et al., 2021; Haydicky et al., 2015; Valero et al., 2021; Zhang et al., 2015). Only one study collected measures from an external person from those receiving the intervention (Siebelink et al., 2021). Therefore, this received a higher WoE C rating.

Only one study (Zhang et al.,2017) did not collect follow-up data which resulted in a lower WoE A score. While the remaining four studies collected follow-up data, two studies gathered it at two different time points (Bögels et al., 2021; Siebelink et al, 2021). Bögels et al. (2021) collected data at 8 weeks and 1 year follow-up. Similarly, Siebelink et al. (2021) collected data at 2 months and 6 months. This repeated data collection was reflected in a higher WoE A score.

3.25 Findings and Effect Sizes

Table 5

Descriptor of Cohen's d effect sizes

Cohen's d	Descriptor
0.2	Small
0.5	Medium
0.8	Large

All studies used Cohen's d to measure their effect size, therefore, for comparison within this review Cohen's d will be used for comparison. Table 5 demonstrates the descriptors for different Cohen's d effect sizes. I extracted the effect sizes for all studies included in this review. These are reported in Table 6 for the outcome measures within the different studies. All studies included in this review measured within- group effect sizes. Between- group effect sizes were recorded for two studies (Valero et al ,2021, Siebelink et al, 2021). Siebelink et al. (2021) used partial eta squared to measure the between-group effects. This was translated into Cohen's d using the online pyshcometrica tool for the transformation of effect sizes (Lenhard, W. & Lenhard, A., 2016).

Table 6

Study findings: within- group and between- group effect sizes and significance of mindfulness intervention on ADHD symptoms

Study	Measure	Post-test and Follow-up	Effect Size (Cohens d) Between-Group	Effect Size (Cohens d) Within- Group	WoE D
Haydicky et al. (2015)	**Child Measures** Conner's Third Edition -Adolescent, 11+ Self-report - hyperactivity/impulsivity -Subscale	Post Test	-	-	Low
Participants served as own control		Follow-up (6 Week)	-	0.16 (Minimal)	
Participants n=18 adolescents & 17 parents	inattentiveness - Subscale	Post Test	-	-	
		Follow- Up	-	0.12 (Minimal)	
	Parent Measures Conner's Third Edition - Parent Report hyperactivity/impulsivity - Subscale	Post Test	-	-	
		Follow-up (6 Week)	-	0.15 (Minimal)	

Study	Measure	Post-test and Follow-up	Effect Size (Cohens d) Between-Group	Effect Size (Cohens d) Within- Group	WoE D
	inattentiveness - Subscale	Post Test	-	0.62 (Medium)	
		Follow-up (6 Week)	-	0.20 (Small)	
Zhang et al. (2017)	**Child Measures** Test of Everyday Attention for Children (TEA-Ch)-attention score	Post Test	-	1.35** (Large)	
Participants n=11 children aged 8/12 and one parent	The Conner's' Continuous Performance Test 3rd Edition (CPT 3)- Omission(impulsivity)	Post Test	-	2.29** (Large)	Low
	Parent Measures The Behavior Rating Inventory of Executive Function (BRIEF)	Post Test	-	0.01 (Small)	
Bögels et al. (2021)	**Child Measures (for 11+)** Youth Self-Report 11+ Attention problems, internalizing ,externalising	Post Test	-	0.40* (Small)	
Participants n=167 children aged 7–19 and their parents		Follow-up (8 Week)	-	0.64** (Medium)	Medium
		Follow-up (1 Year)	-	0.85** (Large)	

Study	Measure	Post-test and Follow-up	Effect Size (Cohens d) Between-Group	Effect Size (Cohens d) Within- Group	WoE D
	Parent Measures DBDR- parent rated ADHD symptoms- hyperactivity impulsivity/ inattention	Post Test	-	0.48** (Small)	
		Follow-up (8 Week)	-	0.55** (Medium)	
		Follow-up (1 Year)	-	0.81** (Large)	
Valero et al. (2021) Participants n= 30 children aged 7–19 years and their parents	**Child Measures** The inhibition subtest of the NEPSY-II	Post Test	-	0.05 (Small)	
		Follow-up (6 Months)		0.31 (Small)	
	Parent Measures The Connors third edition Inattentiveness	Post Test	0.34 (Small)	0.91 (Large)	High
		Follow-up (6 Months)	0.91 (Large)	1.31 (Large)	
	hyperactivity/impulsivity	Post Test	0.57 (Medium)	0.83 (Large)	

Study	Measure	Post-test and Follow-up	Effect Size (Cohens d) Between-Group	Effect Size (Cohens d) Within- Group	WoE D
		Follow-up (6 Week)	0.68 (Medium)	0.99 (Large)	
Control Participants n=30 children aged 7–19 years and their parents	**Child Measures** The inhibition subtest of the NEPSY-II	Post Test		0.41 (Small)	
		Follow-up (6 Months)		0.21 (Small)	
	Parent Measures The Connors third edition Inattentiveness	Post Test	-	0.12 (Minimal)	
		Follow-up (6 Months)	-	0.19 (Minimal)	
	hyperactivity/impulsivity	Post Test	0.23 (Small)	0.23 (Small)	
		Follow-up (6 Week)	0.41 (Small)	0.41 (Small)	
Siebelink et al.(2021) Participants	**Parent Measures** Conner's' Parent Rating Scale inattentiveness	Post Test	0.32 (Small)	-	High
		Follow-up (3 month)	0.42 (Small)	-	

Study	Measure	Post-test and Follow-up	Effect Size (Cohens d) Between-Group	Effect Size (Cohens d) Within- Group	WoE D
n=55 and one of their parents		Follow-up (6 month)	0.19 (Minimal)	-	
	hyperactivity	Post Test	0.39 (Small)	-	
		Follow-up (3 month)	0.04 (Minimal)	-	
		Follow-up (6 month)	0.20 (Small)	-	
	Teacher Measures Conner's Teacher Rating Scale Inattentiveness	Post Test	-	0.24 (Small)	
		Follow-up (6 months)	-	0.22 (Small)	
	hyperactivity/impulsivity	Post Test	-	0.15 (Small)	
		Follow-up (6 months)	-	0.14 (Small)	

Note: *p < .05, **p < .001

Displayed positively when the effect is in support of the intervention, there is a reduction in symptomology

Outcomes: Within-Group

When considering the studies that investigated within-group effects, there was an effect of the intervention on ADHD symptomology. However, this should be treated with caution as the within- group study design can result in an increased power which could lead the effect size to be overemphasised (Dunlap et al., 1996).

Young Person outcome measures

One of the studies (Zhang et al., 2017) showed a very large effect of the intervention on attention but these effect sizes came from cognitive tasks. Therefore, the improvement in scores could be as a result of learning effects as opposed to the role of mindfulness techniques, as has been acknowledged within the study (Zhang et al., 2017). Bögels et al. (2021) shows a small but significant effect from the adolescent report on attention problems, where there was an effect of the intervention on participants scores. With regards to impulsivity, only one study reported child outcome measures (Valero et al.,2021). This showed a small effect of the intervention on inhibition scores.

Parent rated child outcomes- attention

Of the three studies that did not contain a control group (Bögels et al., 2021; Haydicky et al., 2015; Zhang et al., 2017) both Bögels et al. (2021) and Zhang et al. (2017) found positive within- group effects of the intervention upon inattention at post-test. Bögels et al. (2021) found a small significant effect of the intervention upon parent reported measures of child symptoms. Similarly, Zhang et al. (2017) found a large significant effect size of the intervention upon scores on attention measures specifically: subscales of the Test of Everyday Attention for Children and The Conner's' Continuous Performance Test 3rd Edition. However, given Zhang et al.

(2017) received a low overall WoE score D, less weight can be ascribed to their findings. Bögels et al. (2021) utilised an even larger sample size and found a significant positive within-group effect of the intervention upon ADHD symptoms; with the questionnaire including specific items to measure attention. As Bögels et al. (2021) met the criteria for a medium rating in their WoE D their findings may receive greater weight.

Furthermore, considering studies with a high WoE A, Valero et al. (2021) measured within- group effect sizes from both the intervention group and the control group. They found a large effect size for the intervention on inattention within the intervention group. In comparison, the control group found a minimal effect at post-test on inattention and a small effect on hyperactivity. However, while this was a large effect size this was non-significant. The study sample size could have resulted in the lack of significant results.

Parent rated child outcomes- hyperactivity/impulsivity

Regarding hyperactivity, two studies (Bögels et al., 2021; Valero et al., 2021) found a within-group positive effect of the intervention on scores of hyperactivity/impulsivity within the intervention group. Specifically, Valero et al. (2021) found a large within-group effect size for hyperactivity/impulsivity. As Valero et al. (2021) scored highly in overall WoE D this finding should be given greater consideration. In comparison, a small effect size was found for the control group. Bögels et al. (2021) utilised a questionnaire which contained items specifically to measure all the core symptoms of ADHD, finding a small significant effect upon hyperactivity.

Teacher rated child outcomes

One study utilised teacher outcomes (Siebelink et al., 2021). They found a small within- group effect size of the intervention using the Conner's Teacher Rating on both inattention and hyperactivity/impulsivity. As Siebelink et al. (2021) scored the highest of all studies on WoE overall, this adds further strength to the parent and child outcomes which reported reductions in inattention, hyperactivity and impulsivity.

Outcomes: Between- Groups

In terms of between- group effects, Siebelink et al. (2021) found a small between-group effect of the intervention on parent rated scores hyperactivity and impulsivity. Similarly, Valero et al. (2021) found a small between-group effect of the intervention on parent rated child inattention. This was found in addition to a medium between-group effect on parent rated child hyperactivity/impulsivity. This data was in contrast to the high within-group effect found for the intervention on parent reported symptoms of child ADHD. Both Valero et al. (2021) and Siebelink et al. (2021) received a high overall WoE. Therefore, their findings should be given further consideration

Follow- up

Four of the studies provided follow-up data (Bögels et al., 2021; Haydicky et al., 2015; Siebelink et al., 2021; and Valero et al.,2021) which supported their WoE A rating. Two studies maintained their effect size (Siebelink et al., 2021; Valero et al., 2021). Specifically, Valero et al. (2021) maintained a high within-group effect size and Siebelink et al. (2021) maintained a small between-group effect size for parent-rated outcomes of inattention and hyperactivity/impulsivity. In addition, two of the studies showed an increased effect size (Bögels et al.,2021; Siebelink et al., 2021) . Bögels et al. (2021) found a within- group increase in effect size from a small to

medium effect size at 8 week follow-up. Furthermore, at one year follow -up Bögels et al. (2021) found a large within-group effect size. Siebelink et al. (2021) found a within- group effect size increase in teacher outcomes, with teachers reporting a small positive effect of the intervention at follow-up on inattention. However, Haydicky et al. (2015) reported a reduction in effect size for inattention to a low within- group effect size for the intervention group. They also had a low WoE rating for both the methodological quality and relevance of the study design to the question. This resulted in an overall low WoE D. Therefore, perhaps it would be important to give less weight to this finding.

4 Conclusion and Recommendations

4.1 Conclusion

Overall the studies within this review suggest that the MYmind mindfulness intervention is effective in reducing ADHD symptomology in children, an effect that has been found both within- groups (Bögels et al., 2021, Zhang et al., 2017, Haydicky et al., 2015; Valero et al., 2021) and between- groups (Valero et al., 2021 & Siebelink et al., 2021). While the review question focused upon mindfulness-based interventions they all implemented the MYmind intervention ,thus tentative conclusions can only be drawn regarding this intervention. The majority of findings were positive for the effectiveness of the intervention on attention, and hyperactivity/impulsivity at both post-test and follow- up both between- groups and within -groups. However, while there were positive within- group and between- group effects found there was a lack of significant results. Only two studies found significant results (Bögels et al., 2021; Zhang et al., 2017) Further ,Zhang et al.

(2017) received the lowest overall WoE score and therefore these findings should perhaps carry less weight.

Nonetheless, there were still large within- group effect sizes found in two studies (Valero et al, 2021; Bögels et al., 2021). While Bögels et al. (2021) received medium overall WoE rating, their findings are supported by Valero et al. (2021) whom received a high overall WoE. However, Siebelink et al. (2021) who received the highest overall WoE score found a small between- group effect size on both inattention and hyperactivity/impulsivity. While there was no effect size for attention at six months, the small effect size endured for hyperactivity. Therefore, while between- group effect seizes may be small they are present and for inattention to remain at follow-up. Furthermore, it is of note that Valero et al. (2021) found a small within – group effect which is in contrast to the large within- group effect that they found. Therefore, it will be important to not overinterpret the within-group the effect size. Nonetheless, while the between-group effect size was small, the existence of small effect upon symptoms of ADHD suggests the need to think about the application of the intervention within the UK. Specifically, considering the commonalities that existed within these studies which could have supported the findings of an effect.

It is of note that all studies followed the same program content and were facilitated by trained mindfulness teachers. Therefore, as the majority of studies found a positive effect of the intervention that is generally maintained at follow-up, this suggests that there appeared to be a positive effect of the mindfulness intervention on child ADHD symptoms. Therefore, this review suggests that there could be a benefit to linking with other agencies who could deliver this training within schools to enable parents and children to receive the MYmind intervention. Nonetheless, for

this to be applied to the UK there are some limitations and recommendations for future research.

4.2 Recommendations and Limitations

Only one study, Siebelink et al. (2021) included measures from an independent rater. Teachers reported smaller effect sizes for hyperactivity and impulsivity and for inattention reported a negative effect of the intervention, suggesting there was greater inattention at post-test. While this turned into a positive effect size at six months follow-up, it suggests that parents could be overly positive regarding the impact of the intervention. Therefore, the four studies that did not collect data from external individuals could have suffered from reporting bias. With that being said, four of the studies provided child measures to report ADHD symptomatology (Bögels et al.,2021; Haydicky et al.,2015; Valero, 2021; Zhang et al, 2017). Two of these used task- based measures (Valero et al., 2021; Zhang et al, 2017) which could have been free from reporting bias. However, there is always the possibility that training effects could have resulted in the change of scores. Therefore, future studies could ensure that there is a mix of parent reports, external reports, child reports and child tasks to get an in-depth picture of the changes to the child's ADHD symptoms.

Furthermore, in addition to the lack of external opinion, there were only two randomised control trials included within the review (Siebelink et al., 2021; Valero et al., 2021). Between the two randomised control trials, there were different effect sizes from parent-report measures. Within these studies, Valero et al. (2021) reported a high effect size while Siebelink et al. (2021) reported a small effect size. Further investigation could be helpful to understand the mediating variables that caused such a greater disparity in the effect sizes.

Finally, none of the studies were conducted within the UK (Bögels et al., 2021; Haydicky et al., 2015; Siebelink et al., 2021; Valero et al., 2021; Zhang et al., 2017). Zhang et al. (2017) conducted their study in Hong Kong where the culture and educational context is very different from the UK. The remaining studies were conducted in countries with education and cultural system with greater similarity to the UK. Whilst these are more aligned to the UK cultural and educational context these are not the same. Therefore, it is difficult to conclude that the benefits that have been seen within these studies will be generalisable to the UK. Future research would benefit from implementing the MYmind intervention within the UK to assess its effectiveness within the UK context.

This review examined the effectiveness of family-based mindfulness interventions on reducing ADHD symptomology in children and young people. Overall, there appeared to be a positive effect of the intervention on reducing primary symptoms of inattention, hyperactivity and impulsivity found at post-test. Specifically, this was found both within- groups and between- groups. However, larger effect sizes were found in within- group designs which have a greater power due to their design. Further, there are greater complexities for the effect sizes at follow- up. Therefore, the effectiveness of the MYmind intervention should not be overinterpreted (Dunlap, Cortina, Vaslow, & Burke, 1996). Nonetheless, its implementation in the UK could be explored.

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Appendixes

Appendix A :Coding Protocol for Weight of Evidence A

Coding protocol: Gersten, R., Fuchs, L. S., Compton, D., Coyne, M.,Greenwood, C, & Innocenti, M. (2004). Quality indicators for group experimental and quasi-experimental research in special education. Exceptional Children, 71, 149-164.

Table 1
Weight of Evidence A coding criteria Gersten et al. (2004)

WoE A	Criteria
High 3	1- Study meets at least 9 essential criteria 2- Study meets 4 or more desirable criteria
Medium 2	1-Study meets at least 9 essential criteria 2- Study meets 1 and less than 4 of the of the desirable criteria
Low 1	1 Study meets less than 9 essential criteria

Study: Siebelink et al.,2021

Essential Quality Indicators
Quality indicators for describing participants
Was sufficient information provided to determine/confirm whether the participants demonstrated the disability(ies) or difficulties
presented?
■ **Yes**
☐ No
☐ N/A
☐ Unknown/Unable to Code

Were appropriate procedures used to increase the likelihood that relevant characteristics of participants in the sample were comparable across conditions?
■ Yes
☐ No
☐ N/A
☐ Unknown/Unable to Code

Was sufficient information given characterizing the interventionists or teachers provided? Did it indicate whether they were comparable across conditions?
■ Yes
☐ No
☐ N/A
☐ Unknown/Unable to Code

Quality indicators for implementation of the Intervention and
Description of Comparison Conditions
Was the intervention clearly described and specified?
■ Yes
☐ No
☐ N/A
☐ Unknown/Unable to Code

Was the fidelity of implementation described and assessed?
■ Yes
☐ No
☐ N/A
☐ Unknown/Unable to Code

Was the nature of services provided in comparison conditions described?
■ Yes
☐ No

☐ N/A
☐ Unknown/Unable to Code

Quality indicators for outcome Measures

Were multiple measures used to provide an appropriate balance between measures closely aligned with the intervention and measures of generalised performance?
■ Yes
☐ No
☐ N/A
☐ Unknown/Unable to Code

Were outcomes for capturing the intervention's effect measured at theappropriate times?
■ Yes
☐ No
☐ N/A
☐ Unknown/Unable to Code

Quality indicators for data Analysis
Were the data analysis techniques appropriately linked to key research questions and hypotheses? Were they appropriately linked to the unit of analysis in the study?
■ Yes
☐ No
☐ N/A
☐ Unknown/Unable to Code

Did the research report include not only inferential statistics but also effect size calculations?
■ Yes
☐ No
☐ N/A
☐ Unknown/Unable to Code

Desirable Quality Indicators
Was data available on attrition rates among intervention samples? Was severe overall attrition documented? If so, is attrition comparable across samples? Is overall attrition less than 30%?
■ Yes
☐ No
☐ N/A
☐ Unknown/Unable to Code

Did the study provide not only internal consistency reliability but also test-retest reliability and interrater reliability (when appropriate) for outcome measures? Were data collectors and/or scorers blind to study conditions and equally (un)familiar to examinees across study conditions?

☐ Yes
■ No
☐ N/A
☐ Unknown/Unable to Code

Were outcomes for capturing the intervention's effect measured beyond an immediate post-test?

■ Yes
☐No
☐ N/A
☐ Unknown/Unable to Code

Was evidence of the criterion-related validity and construct validity of the measures provided?

☐Yes
■No
☐ N/A
☐ Unknown/Unable to Code

Did the research team assess not only surface features of fidelity implementation (e.g. number of minutes allocated to the intervention orteacher/interventionist following procedures specified), but also examine quality of implementation?

■Yes
☐ No
☐ N/A
☐ Unknown/Unable to Code

Was any documentation of the nature of instruction or series provided in comparison conditions?

☐ Yes
■ No
☐ N/A
☐ Unknown/Unable to Code

Did the research report include actual audio or videotape excerpts that capture the nature of the intervention?

☐ Yes
■No

☐ N/A
☐ Unknown/Unable to Code

Were results presented in a clear, coherent fashion?
■ Yes
☐ No
☐ N/A
☐ Unknown/Unable to Code
Overall Rating of Evidence: ■ 3 ☐ 2 ☐ 1

Table 2

Siebelink et al. (2021) WOE A rating

Study	Number of Essential Criteria	Number of Desirable Criteria	Woe A Rating
Siebelink et al. (2021)	10	4	High (3)

Appendix B : Weight of Evidence A (WoE A)

WoE A is used to judge the methodological quality of each of the studies to the. As all studies included in the review used a group-based design with a clinical population Gersten's protocol for experimental group designs was utilised. This protocol includes ten questions which are essential criteria and eight questions that measure desirable criteria. Essential criteria includes questions upon these criteria are related to information regarding the participants in the study , the quality of the implementation of the intervention and the description of the comparison group, the quality of outcome measures and data analysis. Desirable criteria focused upon attrition, reliability measures, the fidelity of implementation, the quality of implementation , the inclusion of audio or text exerts from the intervention and the presentation of results .Table 1 shows the classification criteria for WoE A according to Gersten et al'S (2005) criteria. To receive a high rating value the study must meet at least 9 essential criteria and 4 or more desirable criteria. To receive a medium rating value the study must meet 9 essential criteria. In addition they must meet at least 1 but less than 4 of the desirable criteria. To receive a low rating the study would meet less than 9 essential criteria .For each study the essential and desirable criteria were calculated and the study received and overall WoE A rating as shown in Table 2.

Table 1

WoE A rating criteria according to Gersten et al's (2004) protocol

WoE A Rating	Criteria
High 3	1- Study meets at least 9 essential criteria 2- Study meets 4 or more desirable criteria
Medium 2	1-Study meets at least 9 essential criteria 2- Study meets at least 1 and less than 4 of the of the desirable criteria
Low 1	1 Study meets less than 9 essential criteria

Table 2

Total WoE A rating for studies included in the review

Study	Number of Essential Criteria	Number of Desirable Criteria	Woe A Rating
Haydicky et al. (2015)	8	3	Low
Zhang et al. (2017)	6	2	Low
Bögels et al. (2021)	9	5	High
Valero et al. (2021)	10	5	High
Siebelink et al. (2021)	10	4	High

Appendix C :Weight of Evidence B (WoE B)

Methodological relevance to the question

WoE B was evaluated according to the methodological relevance of the study design to the review question . This was considered according Petticrew and Roberts hierarchy for effectiveness questions (Petticrew & Roberts, 2003)

Table 1

WoE B criteria and scoring

WoE B Rating	Study Methodology
High 3	RCT • random assignment to intervention or control group • Measures taken pre/post intervention
Medium 2	Quasi-experimental designs or cohort studies • Non-random assignment to intervention or control group • Measures taken pre/post intervention • For small number designs there is data collected at least three time points

WoE B Rating	Study Methodology
Low 1	Research collects qualitative data, surveys, non-experimental studies • No control group • Measures taken pre and post intervention • For small number designs there is data collected at less than three time points

Table 2

Total WoE B rating for studies included in the review

Author	WoE B score
Haydicky et al., 2015	1 Low
Zhang et al., 2017	1 Low

Author	WoE B score
Bögels et al., 2021	2 Medium
Verero et al., 2021	3 High
Siebelink et al., 2021	3 High

Appendix D: Weight of Evidence C (WoE C)

Topic relevance to the review question – This is a review specific criteria by which the studies were judged by how relevant they were to the review question

Table 1

WoE C criteria, rating and rationale that the review studies were judged against

Criteria	WoE rating and descriptor	Rationale
Mindfulness-based intervention Implementation	3. Mindfulness intervention that is delivered by a trained facilitator with relevant background characteristics, delivered in accordance to the protocol curriculum 2. Mindfulness intervention that is delivered by a trained professional with relevant background characteristics , delivered with adaptions to the protocol 1. The intervention is delivered by a non-trained facilitator without deviations from the intervention protocol	Good practice guidelines for delivering mindfulness interventions state that these interventions should be delivered by leader whom has had professional training in mindfulness approaches with a set curriculum.
The relevance of the study to the UK	3. Study was conducted in the UK 2. Study was conducted in a country that is culturally similar to the UK 1. Study was conducted in a country with no cultural similarity to the UK	Needs to be a country that is comparable to the UK in order to have relevant to the UK population.

Criteria	WoE rating and descriptor	Rationale
External rater	3. There was an external rater that was not known to the family 2. There was an external rater that was known to the family 1. There was no external rater used in the studies	Having an external rater might remove bias where they would want the intervention to work and therefore might rate the intervention more favourably and therefore would not be a true answer to the question of effectiveness

Table 2

WoE C score for studies included in the review

Study	Mindfulness-based intervention	Country of delivery	External Rater	Total WoE C
Haydicky at al . (2015)	3	2	1	2
Zhang et al. (2017)	3	1	1	1.66
Bögels et al. (2021)	3	2	1	2
Verero et al. (2021)	2	2	1	1.66
Siebelink et al. (2021)	3	2	2	2.33

Appendix E: Mapping the Field Table

Study	Participants	Type of Study	Control Group	Mindfulness based Intervention	Country	Pre/Post Test Measures	Who Delivered it	Follow -up
Zhang et al. (2017)	11 Children 11 Parents	Pilot Pre/post intervention study	None	MYmind	Hong Kong	Test of Everyday Attention for Children (TEA-Ch)-attention score The Connors' Continuous Performance Test 3rd Edition (CPT 3)- Omission BRIEF- Behaviour regulation index	Therapists with experience in caring for children with special needs and their families, and in providing mindfulness group interventions.	None
Valero et al. (2021)	60 Children and Parents (treatment)	Randomised Control Trial	60 Children and Parents (Wait List)	MYmind	Spain	Conners- 3rd edition parenting rating scale - CPRS The Inhibition subtest of the NEPSY-II	Professional certified in the MYmind program	6 months follow-up
Siebelink et al. (2021)	55 Children and one of their parents (Intervention)	Randomised control trial	48 children and one of their parents (Care as Uusal)	MYmind	Netherlands	Conner's' Parent Rating Scale -CPRS Conner's Teacher Rating Scale CTRS	Mindfulness teacher and a co-teacher;	3 months and 6 months follow-up

Study	Participants	Type of Study	Control Group	Mindfulness based Intervention	Country	Pre/Post Test Measures	Who Delivered it	Follow-up
Bögels et al. (2021)	167 Children aged 7-19 and both parents	pragmatic quasi-experimental waitlist design	107 children and their parents Wait List and treatment as usual	MYmind	Netherlands	Youth Self Report 11+ Attention problems, internalizing , externalising The Disruptive Behavior Disorders Rating Scale (DBDR)	Mindfulness teacher and child mental health professional trained in mindfulness course	8 week and 1 year Follow-up
Haydicky et al. (2015)	35 adolescents and one of their parents	Pre- post intervention study with baseline data collected	None	MYmind	Canada	Conners- 3rd edition parenting rating scale - CPRS Adolescent, 11+ Self-report - inattention /hyperactivity/impulsivity	doctoral students in clinical psychology trained in mindfulness course	6 week Folllow Up

Table 1

Mapping the Field Table for the studies included in the review

Appendix F – Excluded studies from Analysis

Table 1

Study excluded from the review

Study	Reason for Exclusion
Behbahani, M., Zargar, F., Assarian, F., & Akbari, H. (2018). Effects of Mindful Parenting Training on Clinical Symptoms in Children with Attention Deficit Hyperactivity Disorder and Parenting Stress: Randomized Controlled Trial. *IRANIAN JOURNAL OF MEDICAL SCIENCES*, *43*(6), 596–604	Does not contain direct measurement of specific symptomology- hyperacuity, impulsivity and inattention – Exclusion reason 7