


Mindful awareness in early childhood education



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This study is a literature review, drawing mainly on the nine significant and good quality studies (i.e. published in peer-reviewed journals) that make up the evidence base for mindful awareness practices in early childhood. Mindful awareness practices in this context means an individual's awareness of her own body and her inner emotions or tensions. Increased awareness can decrease if individuals tend to impulsiveness or excessive stress. Self-regulation and mindful awareness skills are associated not only with stress regulation but also peer relationships and social skills. This systematic review attempts to look at the research of mindful awareness activities, programmes or interventions used as routine everyday activities. The second aim of this review is to examine the research design that has been used. The third aim of this study is to analyse the main themes and methods of these pieces of research.

Introduction

Children's everyday life contains many events in which regulation skills are required. A wide-range of desires, noise, transitions, large amounts of information and growing requirements burden children's stress systems. Their prefrontal neural connections – which take care of appropriate regulation of stress – are still maturing, and children's tolerance limits are narrower than those of adults (Sajaniemi *et al.* 2015). The developing brain is especially adaptable to the effects of risk factors during the first 5 years of life (Shonkoff *et al.* 2009). Children's inability to regulate stress jeopardises favourable advancements in social, emotional and cognitive development and increases the risk of social exclusion (Compas, Connor-Smith & Jaser 2004). Early childhood is a time of opportunity for interventions that reduce or moderate the effects of stress exposures. Reducing the toxic stress of children and intervening early to improve preschool practices has the potential for improving the life course of children, families and future generations (DeSocio 2015).

Constantly increasing (neuro)scientific research shows the benefits of training awareness, attention and calming skills, which have been shown to protect against the adverse effects of stress (e.g. Siegel 2009). Studies of those programmes have demonstrated a range of cognitive, social and psychological benefits to school students (Meiklejohn *et al.* 2012). Mindful awareness has also been shown to alter brain functions, mental activity and interpersonal relationships towards well-being (Siegel 2009).

Evidence for the benefits of mindful awareness training in adults has been shown in several reviews and meta-analyses (Baer *et al.* 2006; Grossman *et al.* 2004; Irving, Dobkin & Park 2009; Salmon *et al.* 2004). The interventions are usually delivered to adults in the form of mindfulness-based stress reduction (MBSR; Kabat-Zinn, Lipworth & Burney 1985) or mindfulness-based cognitive therapy (MBCT; Segal, Williams & Teasdale 2002). However, in the published literature, there has been scarce systematic evaluation of the effects of mindfulness training in children, particularly in preschool children. This systematic literature review is the first to focus on a longitudinal, randomised control study of mindful awareness and/or mindfulness practices in early childhood.

Mindful awareness, focused attention and self-regulation

Much of the interest in the applications of mindful awareness has been sparked by the introduction of Kabat-Zinn's MBSR. Siegel (2009) defines mindfulness as follows:

mindfulness is actually not only a form of attention training (which many investigators studied it as). And it is not only a form of affect regulation training (which some people were studying it as being as well). Maybe mindfulness is actually a relational process where you become your own best friend.

Mindfulness appears to change how we see ourselves in the world; our experience of the self changes with mindfulness (Siegel 2009).

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Mindful awareness traits have been described by Baer *et al.* (2006) as including the propensity in life to (1) act with awareness; (2) be less reactive; (3) be non-judgemental; (4) develop the ability to label and describe with words the internal world and (5) self-observe. Mindfulness is 'an integrative process that promotes well-being in body, mind and relationships' (Siegel 2009).

'Mindful awareness' contains attention focusing and includes behaviours such as intense looking at objects or scenes, careful examining, fingering and inspecting them with interest for details (Ruff *et al.* 1990; Ruff & Rothbart 1996). Focused attention is an effortful process of control because the child resists distractions, sustains attention and processes relevant information of the target in focus (Lawson & Ruff 2004).

Attention has been generally associated with academic achievement outcomes (Duncan *et al.* 2007). Mindful awareness skill is generally supposed to be a learned skill that enhances self-management of attention (Baer 2003; Bishop *et al.* 2006; Borkovec *et al.* 2004; Kabat-Zinn 1994; Kumar, Feldman & Hayes 2008; Segal *et al.* 2002). The aim of mindful awareness practices is to enhance self-management of attention, to promote concentration, to increase emotional self-regulation and to develop social-emotional resiliency. The key component is to practice mindful awareness throughout daily life, always being aware of where attention is focused while engaged in routine activities.

Self-regulation contains the regulation of emotions, behaviours and cognitions (Bronson 2000). Early childhood is the time when the child's self-regulatory mechanisms evolve rapidly and lay the foundation for later development. Good self-regulation helps the child in challenging social situations, such as disputes and bullying. As children enter the preschool period, they increasingly use effortful forms of regulation developed through interactions with the caregiving environment (Posner & Rothbart 2009): the immature brain born into the world requires the more mature brain of the caregiver to allow its social, regulatory circuitry to develop (Siegel 2009). The infant uses social connections to develop regulatory ability. Even the smallest child can be taught in ways that will help in difficult situations (Poikkeus 2011).

Stress in early childhood

Physiological responses to stress are well defined. Stress responses include activation of a variety of hormone and neurochemical systems throughout the body. If the body fails to shut off the (stress hormone) cortisol release or experiences chronic stress, longer term effects can include suppression of immune functions and contributions to memory impairment, metabolic syndrome, bone mineral loss and muscle atrophy (Sapolsky, Romero & Munck 2000).

Three distinct types of stress responses can be identified in young children: positive, tolerable and toxic. Positive stress response refers to a physiologic state that is brief and mild to

moderate in magnitude (Shonkoff *et al.* 2009). Toxic stress in young children can lead to less outwardly visible yet permanent changes in brain structure and function. Toxic stress can also result from strong, frequent or prolonged activation of the body's stress response systems (McEwen & Gianaros 2011; Shonkoff *et al.* 2009)

Aim of this study

This literature review contemplates the research of mindful awareness programmes or interventions used in preschools. The first aim of this review is to analyse what kind of MAP programmes have been used with young children and the theoretical backgrounds of these programmes. Another aim is to analyse the main themes and research design of previous studies. There is also a focus on the disciplines and methods of these pieces of research. The aim is to explore in particular any problems, contradictions or gaps in researching mind awareness practices.

It was already known that this area has become an increasingly popular subject to investigation in recent years. Defining and, in particular, measuring mind awareness skills and their benefits are still scientifically inconsistent and unsettled. Research needs to continue on early childhood interventions targeted at improving sustained core skills, resiliency and calming skills. Mindful awareness practices offer a promising avenue for exploration.

Previous literature overviews and systematic literature reviews

Literature overview and systematic literature review

A literature overview is an assessment of a body of research that addresses a research question. It is a 'critical analysis of a segment of a published body of knowledge through summary, classification, and comparison of prior research studies, reviews of literature, and theoretical articles' (University of Wisconsin Writing Center). The research questions are more generous than those in the systematic review.

A systematic literature review aims to identify and then summarise all relevant research evidence on a particular question, which fulfils certain criteria that are clearly described at the outset, following a transparent research protocol:

High-quality systematic reviews take great care to find all relevant studies published and unpublished, assess each study, synthesize the findings from individual studies in an unbiased way and present a balanced and impartial summary of the findings with due consideration of any flaws in the evidence. (Davies & Crombie 2001)

Two systematic literature reviews have been made of mindfulness-based intervention (MBI) programmes for children aged 3–10 in 2005–2015 (Burke 2010; Zenner, Herrnleben-Kurz & Walach 2014). Three literature overviews were found as well (Greenberg & Harris 2012; Rempel 2012; Weare 2013), and they are included in order to survey the

research field widely and with high-quality. Quantitative statistical methods were used in only one of the systematic reviews (Zenner *et al.* 2014). This might be because of the phenomenon and the studies being ill-suited for this purpose.

Overviews

Greenberg and Harris (2012) present the current state of research on contemplative practices with children and youth, but their review does not meet the criteria of a systematic literature review. The programmes the researchers found varied widely from single sessions to daily practice over weeks or months. Greenberg and Harris suggest that repetition and practice may play a key role in interventions to alter neural activity and create healthy habits of mind and body. With sustained practice, these habits may become routine at neural or mental levels to subsequently regulate behaviour in relatively automatic ways. Greenberg and Harris suggest longer term follow-up lasting at least 6 months. Active control groups could help to further differentiate the key components of interventions.

Rempel (2012) made a review of literature with an argument for school-based implementation. According to Rempel, it is important to develop assessment tools specifically for children and test their reliability and validity. Rempel mentions that the only measure for mindfulness skills that has been normed and adapted for use with children is the Child and Adolescent Mindfulness Measure (Thompson & Gauntlett-Gilbert 2008). According to Rempel, researchers also suggest that teachers of mindfulness-based activities should have a regular, personal and mindfulness-based practice in order to speak with any authority and answer questions posed by students.

Weare (2013) reports on 20 or so significant studies in mindfulness-based programmes that deserve serious attention to widen and deepen the growing evidence base. Weare points out variation in the quality of studies as a reason for not making a systematic review. She also points out typical methodological problems in the studies, such as small numbers of participants, little use of control groups and random allocation of participants, no standardised measures, plenty of reliance on self-reporting and participants who volunteer rather than being chosen.

Systematic reviews

Burke (2009) is interested in MBSR and MBCT models. MBSR and MBCT are defined as experiential learning programmes that include weekly group sessions, regular home practice and a core curriculum of formal and informal mindfulness practices like body scan and sitting, movement and walking meditations and bringing mindful awareness to daily activities. Fifteen studies meeting these terms were located and reviewed.

Zenner, Herrnleben-Kurz and Walach (2014) systematically reviewed the effects of school-based mindfulness interventions on psychological outcomes, using a comprehensive search

strategy designed to locate both published and unpublished studies. Twenty-four studies were identified, of which 13 were published. In eight studies, mindfulness training was implemented at elementary school level, in grades 1–5.

Conclusion of previous systematic literature reviews and overviews

All the authors of these reviews find conclusive evidence that mindfulness-based practices benefit children and young people. The practices can be effective on a wide-range of outcomes, such as intellectual skills, improving sustained attention, visual-spatial memory, working memory and concentration, even physical health. What might be the best practice with preschool children? The studies point out that teaching mindfulness-based technique to children and young people has to be rather different to teaching them to adults, that is methods, materials and activities are generally more playful and convivial, with a focus on fun, and with shorter periods of silence.

In measuring outcomes, the researchers should not rely only on self-reported data and questionnaires in general; studies should use a mixed-methods approach to assess outcome and acceptability, adopting methods such as review sessions, teacher reports and individual interviews, observations of training sessions and student questionnaires and interviews. Some researchers point out long-term (at least 6 months) follow-up assessments to be important in determining whether the benefits of mindfulness training are sustained over time. Also, the amount of time spent in mindfulness practice might affect outcomes. All the studies emphasise active control groups, repetition and practice, large numbers of participants, active control groups, random allocation of participants (not only volunteers) and standardised, age-appropriate measures.

Methods

In this study, Fink's (2005:3) definition of a research literature review is adapted as the operative definition of a systematic literature review.

Search criteria

Search in a systematic review works best when its aims and research questions are clearly established and demarcated. In this study, the research questions were delimited and specified on the basis of the target group, intervention, outcome and survey design factors.

This systematic literature search was targeted at research aimed at longitudinal intervention and research carried out on mindful awareness practices programmes for children. The original aim was to chart programmes for children aged 3–6 years, but no studies in this age group were found. Thus, the age range had to be set at 3–10 years. Interest was focused on these programmes' impacts on children's social skills, self-regulation skills, school readiness skills and group dynamics.

At the beginning, a search of studies was carried out manually (manual systematic literature search) and supplemented later by references of other (systematic) reviews and meta-analyses (Burke 2005; Rempel 2012; Zenner *et al.* 2014) found using the *Related Articles* search mode.

The systematic literature search was carried out using *Ebsco*, *Web Of Science*, *Scopus*, *ERIC*, *PubMed* and *PsycINFO* databases. Later, these outcomes were completed using the *Google Scholar* search mode. English language articles published between 2005 and 2015 in peer-reviewed journals were reviewed, assuming that sufficiently high-quality studies made in these years could be found. Search terms included 'mindfulness-based', 'mindful awareness', 'interventions', 'children' and 'preschool'. In the first search, 74 studies were located, and 1090 with Google Scholar. A large proportion of the articles were the same in various searches.

Only the original articles were accepted in this review. As meditation and yoga are normative parts of Hindu culture and could have religious connotations for some people, it is possible that they arouse prejudices in other cultural settings. Thus, interventions consisting mainly of religious elements of some kind were decided to be excluded.

Studies were selected if the following criteria were met:

1. Interventions were mindful awareness or mindfulness-based.
2. Interventions that consist mainly of religious elements were excluded.
3. Participants were 3- to 10-year-old children in an educational context.

Search implementation and results

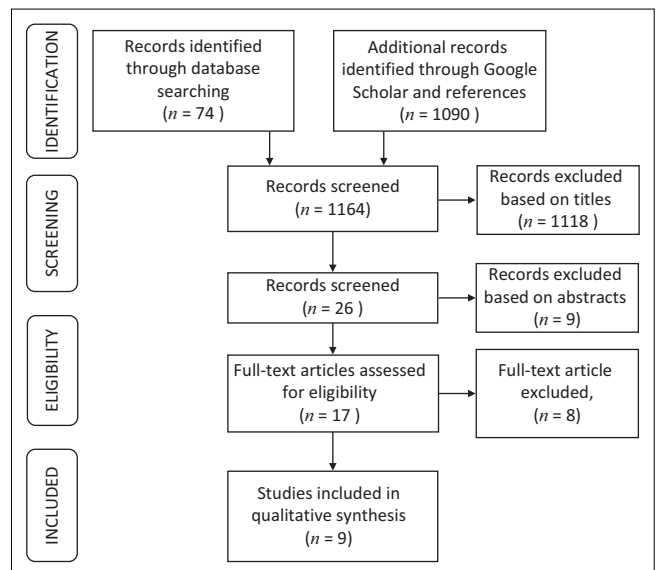
The retrieved articles were assessed initially on the basis of the summaries. Most of the studies were excluded because the intervention was implemented in a setting other than regular school life.

(Pre-)School-based programmes for 3- to 10-year-old children and based on mindfulness or mindful awareness skills were investigated, and studies and programmes with no religious elements were picked for further assessment. The summaries of nine studies met the criteria. The entire articles were read through, and all of them were adopted in the final research literature review.

Studies that did not meet the criteria of the research design but were remarkable and interesting per se were categorised as *general* and used later as background material of this review. Previous literature reviews and meta-analyses were also used to describe and give background to the phenomenon (Figure 1).

Approved studies

Studies considering mind awareness or mindfulness skills in childhood have mainly been intervention studies. In this review, the aim is to analyse what kind of interventions has



Source: Nieminen 2016

FIGURE 1: Flow diagram for the systematic review of mindful awareness practices programmes for children aged 3–10, 2005–2015.

been used with young children, so other kinds of studies were excluded. The following sections describe the studies approved in the literature in chronological order, from previous to the most recent.

Napoli, Krech and Holley (2005) report on a project, which integrated mindfulness and relaxation work with 228 children aged 5–8. The project included twelve 45-minute sessions of mindfulness and relaxation, designed and intended to help students learn to focus and pay attention. The 24-week training contained exercises like breathing, body scan, movement and sensory motor awareness activities. The teachers were external and were very conversant: they have been professionally trained as mindfulness training instructors and have facilitated mindfulness for years. The main research question was whether participation in a mindfulness training programme (Attention Academy Programme [AAP]) affected students' outcomes on measures of attention.

Students were chosen at random to be placed either in the experimental group or control group. A total of 194 students completed the programme. One moment of training included breathing exercises, a body scan visualisation application, a body movement-based task and a post-session de-briefing or sharing of instructor feedback with the class. Results showed significant differences between those who did and did not participate in the AAP training.

Sample, Reid and Miller (2005) delivered a modified and manualised MBCT course taught by trained, experienced mindfulness teachers in a school-based setting. The course lasted 6 weeks, for 45 minutes a week. The participants were 5 children aged 7–9 years and suffering from anxiety in an urban elementary school. Techniques were adapted from two adult programmes, MBSR and MBCT. Participants were also encouraged to discover their own ways to practice

mindfulness at home. Some improvements were reported for all the children in at least one area (academic functioning, internalising/externalising problems).

Schonert-Reichl and Lawlor (2010) in their earlier research conducted a study of 12 elementary classrooms, where students were aged 9–14. Six classrooms were randomised to receive the programme and six to waitlist control. The intervention included 10 lessons and 3 times daily practice of mindfulness meditation, including quieting the mind and focusing on breathing, mindful attention, managing negative emotions and negative thinking and acknowledgment of the self and others. The main research question was whether participation in a mindfulness training programme (Mindfulness Education [ME]) affected students' optimism, self-concept, positive affect and social-emotional functioning in school. The findings show that students exposed to the ME programme evidenced significant improvements in social and emotional competence: Attention and Concentration, and Social Emotional Competence.

Flook *et al.* (2010) report on a randomised control study of 64 children aged 7–9 years. The programme contained classical mindfulness training with age-appropriate exercises and games. Each class session took 30 minutes; they were delivered twice per week, for 8 weeks, and contained sitting meditation, body scan, exercises, and activities and games, which involve interactions among students and between students and the instructor. The purpose of the study was to evaluate whether participation in the programme has impacts on children's executive functions (EF) processes are neurocognitive processes like inhibition, set shifting, working memory, planning and fluency; Willcut *et al.* 2005). The findings reveal improvements in behavioural regulation, meta-cognition, overall EF.

Mendelson *et al.* (2010) delivered a pilot randomised controlled trial for 97 participants aged 9–10. The intervention developed in Holistic Life Foundation (HLF) combined a mindfulness and yoga programme. These intervention sessions were taught by an external instructor and scheduled during a period in which students engage in non-academic activities. Children's social, emotional and behavioural outcomes were assessed at baseline and immediately after the intervention by self-report checklists. Students were encouraged to practice the skills outside class as well. As a result, the programme had a positive impact on problematic responses to stress including rumination, intrusive thoughts and emotional arousal.

Van de Weijer-Bergsma *et al.* (2012) report on a research of 8- to 12-year-old children from three elementary schools, where classes were randomised to an intervention group or a control group. External trainers delivered 12 30-minute sessions in 6 weeks (two sessions per week). During sessions, children participate in secular and age-appropriate meditation practices focusing on non-judging awareness of sounds, bodily sensations, breathing, thoughts and emotions.

Children were also encouraged to practice mindfulness at home. The results showed the Mindful Kids-programme to reduce stress and stress-related mental health and behavioural problems.

Klatt *et al.* (2013) delivered a programme that can be defined as MBI for elementary school-aged children combining music, yoga and written and visual arts. The researchers used the theory of Appreciative Inquiry as well for encouraging participants to ask questions and to acknowledge their positive skills, support systems or coping mechanisms that are already present in their life. Move-Into-Learning was of 8-weeks duration, with one 45-minute session a week. Sessions with 8-year-old participants were delivered by an external trainer and the class teacher. The results showed decreases in students' disruptive behaviours, like an attention-deficit or attention-deficit/hyperactivity disorder (ADHD) index and in cognitive/inattentive behaviour.

Black and Fernando (2014) report on a 5-week mindfulness-based curriculum (Mindful Schools K-5 grade curriculum, [MS]) in a lower-income and ethnic minority elementary school, from kindergarten through sixth grade. The curriculum was delivered by two external mindfulness meditation teachers in 15-minute sessions, 3 times per week for 5 weeks. All classrooms were randomly assigned to receive the MS curriculum or MS plus additionally as once-a-week classes (MS+). As a result, the children were reportedly improved at paying attention, calming and self-control, participation in activities and caring/respect for others.

Schonert-Reichl *et al.* (2015) delivered an intervention called Mind UP programme in their research. It is a mindfulness-based SEL programme that consists of 12 lessons (taught by class teacher) once-a-week, with each lesson lasting 40–50 minutes. The programme contains 3-minute core mindfulness practice with focusing on breathing and attentive listening to a single resonant sound. The core programme was done three times a day, every day. Participants were aged 9–10 and totalled 99. Teachers were encouraged to generalise the curriculum-based skills throughout the school day. In this randomised controlled trial study, a control group was used, which received a 'business as usual' social responsibility programme. The purpose of the study was to examine whether the Mind UP programme would lead to improvements in EFs, stress regulation, social-emotional competence and school achievement (Table 1).

Taxonomy of results

Study designs and materials in the intervention studies did not differ significantly from each other. In assessing studies, particular attention should be paid to their methodological merit: definitions, methods, variables, durations and sample sizes. In this study, the theoretical framework, measurements, intervention components, duration times and intervention features are reviewed as well (see Table 2).

TABLE 1: Mindfulness-based interventions with children.

Study/year	N	Age	Participation description	Research design	Treatment group	Control group	Random assignment	Key words
Schonert-Reichl <i>et al.</i> (2015)	99	9–10	Elementary school Canada	Randomised controlled trial	MindUP, 1/week 40–50 minutes, core practice 3/day over 4 months	Business as usual social responsibility programme	Yes	Social and emotional learning, well-being, mindfulness, intervention, pro-sociality
Black and Fernando (2014)	409	5–10	Elementary school USA	Pre-test to post-test group	Mindful Schools (MS) 3/week 15 minutes over 5 week	No	No	Mindfulness, meditation, children, teachers, ethnically diverse, school-based
Klatt <i>et al.</i> (2013)	41	8–9	Elementary school USA	Pre-test to post-test group	Move-Into-Learning (MIL) 1/week 45 minutes over 8 weeks	No	No	Resiliency, coping skills, behavioural impact, mindfulness-based interventions, appreciative inquiry, creative arts-based activities
Van de Weijer-Bergsma <i>et al.</i> (2012)	208	8–12	Elementary school The Netherlands	Randomised controlled trial	MindfulKids 2/week 30 minutes over 6 weeks	Waitlist control	Yes	Mindfulness, attention training, elementary school, children, stress
Schonert-Reichl and Lawlor (2010)	246	9–14	Elementary school Canada	Quasi-experimental study	Mindfulness Education (ME) 1/week 40–50 minutes core practice 3/day over 10 weeks	Waitlist control	No	Mindfulness, adolescents, prevention, optimism, social competence
Flook <i>et al.</i> (2010)	64	7–9	Elementary school USA	Randomised controlled trial	Age-appropriate MAPs, 2/week over 8 weeks	Quiet activities (like silent reading)	Yes	Education, intervention, mindfulness, executive control, meta-cognition, behavioural regulation
Study/year	N	Age	Participant description	Research design	Treatment group	Control group	Random assignment	Key words
Mendelson <i>et al.</i> (2010)	97	9–10	Elementary schools USA	Randomised controlled trial	Holistic Life Foundation programme (HLF) 4/week 45 minutes over 12 weeks	Waitlist control	Yes	Mindfulness, yoga, prevention, school-based intervention, chronic stress
Napoli <i>et al.</i> (2005)	194	6–8	Elementary school USA	Randomised controlled trial	Attention Academy Programme (AAP) 45 minutes 2/month over 24 weeks	Quiet activities (like silent reading)	Yes	Stress, attention, wellness, curriculum, mindfulness
Semple <i>et al.</i> (2005)	5	7–8	Elementary school USA	Open clinical trial	Mindfulness training MACK CLUB age-appropriate 45 min 1/week over 6 weeks	No	No	Attention, anxiety, children, cognitive therapy, group treatment, psychotherapy, meditation, mindfulness, mindfulness-based cognitive therapy, stress

Source: Nieminen 2016

TABLE 2: General features of the studies.

Study	Theoretical framework	Intervention components	Measures	Duration weeks/hours	Intervention features
Schonert-Reichl <i>et al.</i> (2015)	Positive psychology (including SEL)	Core practice: Breathing awareness Attentive listening Lessons that promote EFs and self-regulation, social-emotional understanding, and positive mood Awareness of senses and practices of daily life Kindness practices	Presentation programme by Neurobehavioral Systems, Saliva test, Interpersonal Reactivity Index (IRI), Resiliency Inventory (RI), Self-Description Questionnaire (SDQ), Seattle Personality Questionnaire for Children, Mindful Attention Awareness Scale, Social Goals Questionnaire.	4 months (~17 weeks) 28 hours	Class by teacher
Black and Fernando (2014)	Mindfulness	Breathing Body scan Listening, seeing, etc. Slow walking Sending kind thoughts Group discussion	The Student Behavior Rubric by Kinder Associates.	5 weeks 3.75 hours	Class by external trainer
Klatt <i>et al.</i> (2013)	Mindfulness Appreciative Inquiry	Breathing, body awareness, music, rhythm, coordination, arts	The Connor's Teacher Rating Scale-Revised [Short form] (CTRS-R:S).	8 weeks 6 hours	Class by external trainer and teacher
Van de Weijer-Bergsma <i>et al.</i> (2012)	Mindfulness	Breathing Body scan Attentive listening Attention Home Practice	Non-Productive Thoughts Questionnaire for Children, Emotion Awareness Questionnaire, Sense of Coherence Questionnaire for Children, Subjective Happiness Scale, Screen for Child Anxiety Related Emotional Disorders, Social Competence and Behavior Evaluation, Sleep Disturbance Scale for Children School as a Caring Community Profile I.	6 weeks 6 hours	Class by external trainer
Schonert-Reichl and Lawlor <i>et al.</i> (2010)	Mindfulness Positive psychology	Core practice: Breathing awareness Attentive listening Lessons that promote social-emotional understanding and positive mood Awareness of senses and practices of daily life	Optimism subscale from the Resiliency Inventory (RI), Self-Description Questionnaire, Positive and Negative Affect Schedule (PANAS) Teachers' Rating Scale of Social Competence (TRSC).	10 weeks	Class by teacher
Flook <i>et al.</i> (2010)	Mindfulness	Sitting meditation Body scan Activities and games	Behavior Rating Inventory of Executive Function (BRIEF),	8 weeks -	Class by external trainer

Table 2 continues on the next page →

TABLE 2 (Continues...): General features of the studies.

Study	Theoretical framework	Intervention components	Measures	Duration weeks/hours	Intervention features
Mendelson <i>et al.</i> 2010	Mindfulness	Breathing techniques Bending, stretching, Group discussion, Home practice	The Responses to Stress Questionnaire (RSQ) The Short Mood and Feelings Questionnaire—Child Version (SMFQ-C), The Emotion Profile Inventory (EP) and People in My Life (PIML).	12 weeks 36 h	Class by external trainer
Napoli <i>et al.</i> (2005)	Mindfulness	Breathing, Body scan, Movements, Sensor-motor awareness activities	The ADD-H Comprehensive Teacher Rating Scale (ACTeRS), Test of Everyday Attention for Children (TEA-Ch), Test Anxiety Scale (TAS).	24 weeks 48 hours	Class by external trainer
Semple <i>et al.</i> (2005)	Mindfulness	Breathing, walking, gustatory, visual, auditory, olfactory, and tactile exercises Home practice	The Child Behavior Checklist: Teacher Report Form (normed for children aged 5–18), The Multidimensional Anxiety Scale for Children (for 8–19 years) and The State Trait Anxiety Inventory for Children.	6 weeks 4.5 hours	Class by external trainer

Source: Nieminen 2016

Quality assessment

The comparability of this literature review of intervention studies is facilitated by the fact that the interventions made included quite similar components and they involved 3- to 15-year-old children in a school environment. Some of the evaluated intervention studies were not randomised or used small data sets, which undermined their probative value.

Randomisation can keep study groups as similar as possible at the outset, so that the researchers can isolate and quantify the effect of the interventions they are studying. No other study design gives the power to balance unknown prognostic factors at baseline. However, random allocation does not protect RCTs against other types of bias.

In general, it can be estimated that the intervention studies, which are not based on randomisation, tend to overestimate the effectiveness of the intervention. According to the literature, the overestimation is estimated to be up to 40% (Schulz *et al.* 1995). Interventions aimed at changing behaviour are complex as well. They have multiple related and inter-dependent components, for example practitioner behaviour, participant's behaviour, timing and frequency of behaviour, organisational issues, the setting and location, and local culture. Greenhalgh (2001) highlights the three most important evaluation criteria of randomised controlled trials: the sample size, duration of follow-up and completeness of *follow-up*.

According to previous reviews, overviews and studies, an intervention study of high-quality should meet the following criteria: main concepts are defined well and participants (over 200 in total) of the study should come from heterogeneous background, belong to a school-setting and be randomised into different groups. Measurement should be standardised adapting mixed-methods and not only self-reported data and questionnaires. The ideal study for the researcher is one in which the power is high, and higher power is achieved by increasing the sample size (Button *et al.* 2013). A sample size of 200–300 is sufficient when research focuses on comparing groups in a population. Lack of follow-up can greatly affect the strength of a trial's findings. So attrition rates, including

reasons for dropout, should be reported, because relevant information regarding implementation strategies, feasibility and contraindication might be extracted. A loss of 20% or more means that one should be concerned about the possibility of bias (Dumville *et al.* 2006).

Criteria for scoring intervention studies are shown in Table 3. Scoring on the basis of these criteria is presented in Table 4. Assessment of the methodological quality of the studies' scoring is directive and takes into account the qualitative differences between the studies. On the basis of this evaluation, studies cannot be directly put in order of preference.

Conclusion

Nine intervention studies meeting the criteria were found. When the methodological quality of the studies was assessed, only in two of the highest quality studies (score 11; Van de Weijer-Bergsma *et al.*, score 9; Black *et al.*) the research data was sufficient with over 200 participants. In the research of Van de Weijer-Bergsma and her colleagues, attention was paid also to children's sleep difficulties and the social climate in the classroom: perceptions of student respect, perceptions of student friendship and belonging and perceptions of students shaping their environment. In the research by Black *et al.*, the only measurement was for teacher-rated classroom behaviour, and the researchers delivered pre-test to post-test group, not a randomised controlled trial which would be the highest rated in GRADE (GRADE Working Group 2004).

TABLE 3: Criteria of methodological validity of intervention studies.

1. Concepts of 'mindful awareness' or 'mindfulness' were defined
2. The study has been made in an educational context
3. Participants were randomised into different groups
4. The demographic makeup was heterogeneous
5. Research data were sufficient ($n \geq 200$)
6. Measurements were wide-ranged, objective and age-appropriate
7. A small number of participants discontinued (< 20%)
8. Duration of follow-up at least 1 month
9. The intervention is described precisely and in detail
10. In pre-test the differences between classes were small
11. Data collection has been similar between the intervention and control groups
12. Points in total

Source: Nieminen 2016

TABLE 4: Methodological validity of the intervention studies.

Reference	1	2	3	4	5	6	7	8	9	10	11	12	Comments
Schonert-Reichl <i>et al.</i>	1	1	1	1	0	1	1	0	1	1	1	9	
Black <i>et al.</i>	1	1	0	1	1	0	1	1	1	1	1	9	
Klatt <i>et al.</i>	0	1	0	1	0	0	1	1	0	1	1	6	Arts-based
Weijer-Bergsma <i>et al.</i>	1	1	1	1	1	1	1	1	1	1	1	11	
Schonert-Reichl <i>et al.</i> 2010	1	1	0	1	0	1	1	0	1	1	1	8	
Flook <i>et al.</i>	0	1	1	1	0	0	1	0	0	1	1	6	
Mendelson <i>et al.</i>	0	1	1	1	0	1	1	0	0	1	1	7	Contained yoga
Napoli <i>et al.</i>	1	1	1	1	0	1	1	0	0	1	1	8	
Semple <i>et al.</i>	0	1	0	1	0	1	1	0	0	1	1	6	For only 5 anxious children

Source: Nieminen 2016

Schonert-Reichl *et al.* (2015) delivered an intervention trained by a teacher, not an external trainer.

The studies of the weakest methodological quality (score 6; Klatt *et al.*; Flook *et al.*; Semple *et al.*) were not as valid as they could be, and the researchers found some measurements to be not so appropriate for the youngest children. Generalisation of the results to the whole school population is difficult because of the small group size as well. It also seems difficult to find objective measurements of a wide range.

Mindfulness is appropriate to universal prevention programmes because it focuses on universal vulnerabilities in children (Bögels *et al.* 2008). It is a strength-based intervention that would involve the whole school. Mindfulness-based practices appeal to children and young people because they are self-management techniques and therefore allow them to play a key role in their own growth and development (Semple *et al.* 2005)

Mindfulness training seems to be an ideal way to begin teaching children at an early age how to deal with stress and anxiety and enhance focused attention. The research points out that ‘repetition is the mother of all learning’: repeating an exercise is key to actually developing mindfulness. We need to teach students reflective skills in schools. It is most effective to practice every day, preferably at home as well as at school. ‘Developing the reflective mind, nurturing the mind’s awareness of itself in the development of mindfulness, is what is needed to build this wider circle of compassion’ (Siegel 2009).

Dynamic growth and development of regulatory capacities from ages 10–15 suggests this is a favourable time to intervene (Windle *et al.* 2004). Another appropriate period could be preschool age: intervening at the start of this period would be particularly beneficial, because of the potential to enhance children’s capacities for responding to stress before the often stressful transition from preschool to elementary school. A growing body of research indicates that self-regulation is surprisingly malleable during the preschool years, when behavioural and neural plasticity may be particularly pronounced (Diamond & Lee 2011). Using age-appropriate activities to exercise children’s reflection on their moment-to-moment experiences may support the development of self-regulation by targeting top-down processes while lessening bottom-up influences (such as anxiety or stress) to create conditions conducive to reflection,

both during problem solving and in more playful, exploratory ways (Zelazo & Lyons 2012).

Conclusions based on this systematic literature review are:

1. New high-quality research of interventions particularly in early childhood is needed to demonstrate the benefits and effectiveness of mindful awareness practices.
2. High-quality research contains wide data sets, objective, age-appropriate and wide-range measures – validated behavioural (vs. self-reported or reported by others) measures administered by researchers who are blind to experimental conditions – and complete, long-term follow-up.
3. The most appropriate and effective intervention for small children might be strength-based involving the whole school, with everyday moments, movement-based activities and home practice.
4. Everyday practice is possible in teacher-taught interventions where the teachers are mindfulness experts themselves, teaching mindfully.

Some criticism has emerged as mindfulness-based practices have become more widespread. It is not so easy: we should understand that changes in mindful awareness cannot be a result of a specific course, but in mindfulness-based practices merged into ordinary everyday life, practiced everyday. The human mind is often not automatic, perfectly balanced and peaceful: an untrained mind wanders wherever it wants, but practicing broadens awareness.

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Competing interests

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Authors’ contributions

N.S. was the project leader; the review was performed by S.N.

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