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Abstract

Mindfulness has a growing evidence for supporting the well-being of older children in schools; less is known about the effects in early years schooling. This study aimed to test the feasibility and acceptability of a programme of mindfulness-based activities to a non-clinical sample of young children within a school setting. In addition, the impact of the programme on measures of attention, inhibition, well-being and mindfulness were assessed. A four-week programme of mindfulness-based activities was delivered within the classroom of 26 children aged 6-7 years. The programme was feasible to implement, and acceptable to the majority of participants. Outcomes assessed at four time points (baseline, pre-, post-intervention and follow-up) demonstrated mixed effects. Sustained attention significantly increased post-intervention and inhibition increased significantly during the baseline and intervention period. There was no change in well-being and mindfulness. Limitations on measurements are considered in light of the findings; appropriate measures of mindfulness and well-being need to be developed for this age group.

Keywords: Mindfulness – Children – Executive Function – Well-being – School

Emotional and behavioural problems are common in childhood, with 10% of children aged 5-16 years diagnosed with a mental health difficulty (Green, McGinnity, Meltzer, Ford, & Goodman, 2004). Child well-being is strongly associated with their academic success (Berger, Alcalay, Torretti, & Milicic, 2011; Valentine, DuBois, & Cooper, 2004), and offers protection against future mental health difficulties (Joseph & Wood, 2010). Consequently, well-being is now high on the education agenda, with early intervention and preventative approaches in schools aiming to reduce the likelihood of later mental ill-health (Wood & Tarrier, 2010). The relevance of mindfulness programmes for schools is gaining specific interest in recent research (see review by Waters, Barsky, Ridd & Allen, 2014). This paper presents findings relating to the feasibility and acceptability of delivering a mindfulness-based school program with young children; we relate the potential for the program within an understanding of mindfulness and self-regulation.

Mindfulness practices encourage the individual to attend to their present moment experience, to cultivate a particular quality of awareness, commonly defined as “paying attention in a particular way, on purpose, in the present moment and non-judgmentally” (Kabat-Zinn, 1994, p. 2). The body of research which explores the effectiveness of mindfulness with children with a range of difficulties, including emotional, behavioural and developmental is growing; interventions are being implemented both directly with young people, and indirectly through parent-based mindfulness programs. A number of reviews have confirmed the feasibility of mindfulness-based approaches with children and highlighted positive effects on psychological, physical, behavioural and cognitive outcomes in clinical and nonclinical populations (e.g. Black, Milam & Sussman, 2009; Burke, 2010; Greenberg & Harris, 2012; Harnett & Dawe, 2012; Rempel, 2012). Studies have reported improvements in coping, anxiety, rumination, self-regulation and self-esteem after participation in a mindfulness intervention (Semple, Lee, Rosa,

& Miller, 2010; Sibinga et al., 2013; White, 2012). Furthermore, studies exploring the effectiveness of mindfulness-based interventions with younger children aged between 4 and 6 years have reported benefits in self-regulation, pro-social behaviour, positive coping strategies, attention and concentration (Flook, Goldberg, Pinger, & Davidson, 2015; Tébar & Parra, 2015).

Mindfulness and Self-Regulation

The relationship between mindfulness and self-regulation has been explored in terms of the possible cognitive processes underlying them. Self-regulation, the management of thoughts, emotions and behaviour, has been consistently linked to positive well-being and mental health (e.g. Gross & Muñoz, 1995; Schutte, Manes & Malouff, 2009; Quidbach, Berry, Hansenne, & Mikolajczak, 2010; Simon & Durand-Bush, 2015). In childhood, self-regulation skills are key aspects of cognitive development, and contribute to school readiness and socio-emotional competence (Zelazo & Lyons, 2012). The Iterative Reprocessing Model (Cunningham et al., 2007) describes self-regulation as involving both top-down and bottom-up processes. Top-down processes are cognitive in nature and include components of executive functioning such as sustained attention, inhibition and cognitive flexibility: bottom-up processes are more reactive in nature and are closely connected to emotional responding. Zelazo and Lyons (2012) argue that mindfulness interventions can promote top-down processing, thus reducing the likelihood of automatic emotion-driven responses, and increasing the extent to which the child can purposefully regulate their own behaviour, resulting in greater emotional stability and well-being. In support of this notion, research within cognitive and neuropsychology suggests that mindfulness may offer a promising approach to promote these very skills by leading to changes in executive functions (Chiesa, Calati & Serretti, 2010). Furthermore, mindfulness intervention studies conducted with children in schools and care homes have reported positive effects on child

self-regulation (Flook, Goldberg, Pinger, & Davidson, 2015; Pat-Horenczyk, Sim Wei Shi, Schramm-Yavin, Bar-Halpern, Tan, 2015).

Mindfulness in Schools

School is uniquely central to the lives of the majority of children, and offers a prime opportunity for the delivery of well-being programmes. Recent research on mindfulness-based programmes in schools have reported reductions in symptoms of depression (Joyce et al., 2010; Raes, Griffith, van der Gucht, & Williams; Kuyken et al., 2013) and stress (Kuyken et al., 2013) for adolescents (10-20 years). Furthermore, mindfulness-based programmes for adolescents have improved positive outcomes, such as well-being (Huppert & Johnson, 2010; Kuyken et al., 2013; Lau & Hue, 2011), optimism, and socio-emotional competence (Schonert-Reichl & Lawlor, 2010). Studies with samples of younger children have focused on the potential protective aspects of mindfulness. Two randomized controlled trials (Van de Weijer-Bergsma, et al., 2012; Gould, Dariotis, Mendelson, & Greenberg, 2012) have demonstrated preventative effects of mindfulness on stress and well-being for children aged 8-12 years.

Furthermore, classroom-based mindfulness interventions with children have led to positive changes in behaviour relating to executive functions. Black and Fernando (2013) reported improved teacher-rated outcomes for children aged 4-12 years on self-control and attention following a 5-week mindfulness programme. Additionally, studies with control group comparisons have demonstrated improvements in selective attention, and attention-related behaviour for children aged 6-9 years (Napoli, Krech, & Holley, 2005) and executive functions and working memory for children aged 4-13 years (Flook et al., 2008; Flook et al., 2010; Ricarte, Ros, Latorre, & Beltran, 2015). Ratings from parents support the generalisation of the observed

benefits of mindfulness practices in the classroom.

Previous research demonstrates the feasibility of applying mindfulness in school settings with older children and adolescents. There are relatively fewer studies with younger children, at the start of the education system. This age is of particular importance in the development of self-regulation skills, including executive functions, as they will ready the child for the competing social and emotional demands of school, and further influence their success as they progress through the education system. In the current paper, we build upon emerging research, by extending the application of mindfulness to the earliest formal school years in the UK (age 4-7 years). We aimed to ascertain the feasibility and acceptability of integrating mindfulness practices into the infant school classroom. Furthermore, a range of outcome measures assessed the potential benefits of mindfulness for young children: an objective measure of executive functioning (inhibition); subjective teacher reports on attention and behaviour; and child self-reported well-being and mindfulness. Based on previous literature, we hypothesised that the mindfulness practices delivered within the classroom setting would be feasible and acceptable, and have a positive effect on all outcomes.

Method

Design

A quasi-experimental design was adopted with time-interrupted series data collection: baseline (T1), pre-intervention (T2; 4 weeks after baseline), post-intervention (T3; 4 weeks after pre-intervention) and follow-up (T4; 6 weeks after post-intervention). T1 and T2 data provided an assumed trajectory without any intervention.

Participants

Twenty-six children with parental consent (14 girls), aged 6 years ($M = 6.6$, $SD = 0.3$) from a suburban primary school in Northern England participated as a whole class. The school was smaller than an average UK primary school (Ofsted report, 2013). The population of the school was mostly white British, but with an increasing proportion from minority ethnic backgrounds, particularly Eastern European. The proportion that spoke English as an additional language was below average. The proportion supported by school action, school action plus or with a statement of special educational needs was high, and the proportion of pupils known to be eligible for free school meals and receive pupil premium was also high. Within the participating class, the majority of children were White British with a small proportion from minority ethnic backgrounds. There were a number of additional needs within the sample: Autism Spectrum Disorder ($n = 1$), Down's syndrome ($n = 1$), physical disability ($n = 1$) and English as a second language ($n = 1$).

Intervention.

All children participated in a 4-week programme of mindfulness-based activities based on classical mindfulness practices, which have been adapted for children (see supplementary material for example session; Flook et al., 2010; Kaiser- Greenland, 2009; Willard, 2010). The programme aimed to cultivate awareness of self, others, and the environment; introspective practices, movement practices and cooperative practices all emphasized sensory awareness, attention regulation and awareness of thoughts and feelings. Following previous research with older children (Flook et al., 2010), each session was divided into three sub-sections. The children first participated in a 'hello' exercise; followed by a focused mindfulness activity; and finally a

‘thank you’ exercise. The programme was delivered by the first author (trainee clinical psychologist with mindfulness training and established home practice) within the classroom during regular school hours. Two 30-minute sessions were delivered each week over a 4-week period. The classroom teacher participated in all but one session.

Measures

Observed attention and behaviour.

The Conners Teacher Rating Scale – Short form (CTRS-SF, Conners, 1997). Twenty-eight items assess oppositional behaviours, cognitive problems, inattention, and hyperactivity in children aged 3 to 17 years. Each item is rated on a 4- point scale indicating how true each statement has been over the past week (not at all - very much true). The CTRS-SF has a normative sample of 3,400 children and young people across North America. Test-retest reliability (Cronbach’s $\alpha = .71 - .98$) and internal consistency (coefficients = $.77$ to $.97$) are good. Inter-rater reliability is acceptable (coefficients = $.52 - .94$).

Executive function and attention.

Luria’s Hand Game (Hughes, 1996). A brief executive function task provides an objective measure of inhibition. Children are asked to imitate the experimenter’s hand shape for a series of 12 trials (which are not scored) with two different hand shapes (a ‘fist’ shape and a ‘point’, where the hand is in a fist shape with the index finger extended), they are then asked to switch to making the opposite hand shape to the experimenter for a further 12 “conflict” trials. A positive score is given for each correct conflict trial, with a possible total score of 12. Whilst this is a frequently used measure no validity or reliability data is yet available. The Luria Hand Game has

been utilized in previous research to assess inhibition in young children (e.g. 4 year olds, Flynn, 2007; 4-7 years, Pellicano, 2007) with sensitivity to change over time (Flynn, 2007).

Test of Everyday Attention for Children (TEA-Ch; Manly et al., 2001): Score! and Walk-Don't-Walk (WDW). The TEA-Ch is a standardised battery of nine objective subtests of attentional capacity for children aged 6-16 years old. Two forms (A and B) allowed administration at T2 and T3 only. Score! (test-retest reliability, $\alpha = .64$) requires children to keep a silent count of the number of sounds they hear on an audio recording over 10 trials. WDW (test-retest reliability, $\alpha = .73$) requires children to move along a path of 14 squares on A4 paper, following two sounds from an audio recording that respectively indicate whether the child can move or not. Following two demonstration and two practice trials, the child may obtain a score of correct responses out of 20 items. Higher score indicate better sustained attention.

Well-being.

Index of Children's Subjective Well-Being (ICSWB; Rees, Goswami, & Bradshaw, 2010). An adapted version was utilised. The original self-report measure explores different areas of a child's life including family, friends and school. For the purposes of this study, five statements measuring general well-being were used. Participants indicated their level of agreement with each statement on a five-point scale (strongly agree to strongly disagree), resulting in a total life satisfaction score. This measure also includes a 'don't know' option. The index has been validated with children aged 8-15 years in the UK, and has been shown to be a reliable and stable measure of life satisfaction (Cronbach's $\alpha = .83$).

Due to the lack of validation studies with the age group of the current study, the ICSWB was

adapted during a two-stage pilot study with eight children (five boys; all White British), aged 5-6 years, from a separate school in Northern England. Qualitative feedback on the original questionnaire from four children confirmed some difficulty in understanding items and the concept of time. Consequently, after consultation with clinical psychologists working in child mental health services and child-focused research, some of the questions were re-phrased through making the language simpler and more concrete, and visual aids were developed to support the Likert scale in the questionnaire. A further four children provided feedback on the adapted ICSWB, and reported a good level of understanding on this version.

Cantril's ladder (Cantril, 1965) is a visual approach to measuring general well-being, using a ladder with steps numbered 0-10. Participants were asked to rate how they felt in that moment, if the bottom of the ladder represented the worst possible life and the top represented the best possible life.

Overall happiness (Abdallah, Steuer, Marks, & Page, 2008). Participants were asked to rate how happy they were with life (school, friends and home) using a five-point scale of faces that ranged from 'really happy' to 'really not happy'.

Mindfulness.

The Child and Adolescent Mindfulness Measure (CAMM; Greco, Baer, & Smith, 2011) is a 10-item questionnaire, which measures trait mindfulness and acceptance. Respondents were asked to rate each item on a five-point scale ranging from never true to always true. A total score was calculated from all 10 responses, with a lower score indicating greater mindfulness. The CAMM has been validated with children aged 10 years and above, has good internal consistency (Cronbach's $\alpha = .87$) and good concurrent validity.

Due to the lack of validation with young children, the same protocol for adaptation of the ICSWB was followed for the CAMM. The phrasing of items was altered where necessary to aid understanding, without losing the meaning of the item, e.g. ‘I wish I had a different kind of life’ changed to ‘I wish my life was different’. The adapted CAMM was sent to the first author for consultation, who approved the changes.

Acceptability.

A brief acceptability questionnaire was designed for the purposes of this study. Participating children, their parents and teacher completed the questionnaire at T3. Questionnaire items included enjoyment and perceived benefits of participating in mindfulness. The class teacher and parents rated their agreement with statements on a 5-point scale (‘strongly disagree’ to ‘strongly agree’); participating children rated their answers on a 3-point scale (‘agree’ to ‘disagree’). In order to reduce response bias, the principal researcher (who facilitated the intervention) did not complete the acceptability questionnaires with the children.

Data analysis

Due to the exploratory nature of the study and the small sample size, outliers (3) were included in the analysis and pairwise deletion was used to deal with missing data (Tabachnick & Fidell, 2013). Means, standard deviations and uncontrolled effect sizes were calculated for all measures. Effect sizes were classified according to Cohen’s (1988) categories (0.2 = small, 0.5 = medium and 0.8 = large) and 95% confidence intervals (CI’s) were calculated.

In order to determine baseline stability, T1 and T2 scores were compared using paired samples t-tests where data were normally distributed (Related Samples Wilcoxon Signed Rank

test for non-normal distribution). No statistical difference between T1 and T2 mean scores indicated a stable baseline. Mean scores from each time point were compared to ascertain statistical differences and effect sizes. Mean change scores were also calculated for the baseline (T2-T1), intervention (T3-T2) and follow-up period (T4-T3). Change scores were compared to see whether any observed changes in the intervention and follow-up periods were greater than the baseline period.

Acceptability data is presented in descriptive format.

Results

The means and standard deviations for all measures at each time point are presented in Table 1.

[Insert Table 1 here]

Baseline stability

The baseline period was stable for all but two of the measures: inhibition and peer relations. There was a large effect size on the Luria handgame ($d = 0.83$, 95% CI = 0.16-1.51); a Related Sample Wilcoxon Signed Rank test confirmed a significant improvement from T1 to T2 ($Z = -2.151$, $p = .03$). There was a small effect size on the peer relations subscale of the CTRS-SF ($d = 0.24$, 95% CI = -0.82 - 0.34); a Related Sample Wilcoxon Signed Rank test confirmed a significant improvement from T1 to T2 ($Z = -2.319$, $p = .02$).

Behaviour

Each of the five subscales of the CTRS-SF produced a separate score where a reduction

indicated an improvement. All mean scores remained in the normal (non-clinical) range across all time points. There was a small effect size on the Hyperactivity/Impulsivity subscale between T2 and T3 ($d = 0.25$, 95% CI = -0.54 - 0.62), indicating a decrease in hyperactivity. A Related Samples Wilcoxon Signed Rank test confirmed that this post-intervention decrease was significant ($Z = -2.391$, $p = 0.02$). However, comparison of change over the baseline and intervention periods was not significant ($Z = -1.84$, $p = .07$). The significant improvement on the Peer Relations subscale in the baseline period was greater than change during the intervention period ($Z = -1.961$, $p = .05$). A medium effect size between T2 and T3 scores on the Defiance/Aggression subscale ($d = 0.46$, 95% CI = -0.12-1.04) indicated that participants became more defiant after the intervention. A Related Samples Wilcoxon Signed Rank test confirmed that this difference approached significance ($Z = -1.947$, $p = .051$); however, there was no significant difference between baseline and intervention change scores ($p = .27$), indicating that the increase was in line with expected trajectory.

All other differences from T2 to T3 were non-significant; comparisons of T3 and T4 were all non-significant ($p > .05$).

Executive functions

Sustained attention.

On both subtests of the TEA-Ch, a higher score indicated increased sustained attention. Comparison of T2 and T3 scores on the Score! subtest indicated a medium effect size ($d = 0.70$, 95% CI= 0.03-1.38); a Related Sample Wilcoxon Signed Rank confirmed a significant improvement from T2 to T3 ($Z = -2.838$, $p = .005$). Comparison of T2 and T3 scores on the WDW subtest indicated a large effect size ($d = 1.06$, 95% CI = 0.35-1.76). A paired samples t-

test confirmed a significant improvement from T2 to T3 ($Z = 3.132, p = .002$) indicating an increase in sustained attention.

Inhibition.

As outlined, the baseline period for the Luria hand game was not stable. A medium effect size ($d = 0.70, 95\% \text{ CI} = 0.02 - 1.38$) and significant difference between T2 and T3 scores ($Z = -2.790, p = .005$) indicated improvement in inhibition during both the baseline and intervention periods. However, a Related Sample Wilcoxon Signed Rank test confirmed that the difference between baseline and intervention change scores was not significant ($Z = -.257, p = .797$).

There was no significant difference between scores at T3 and T4 ($Z = -.74, p = .46$). However, there was a significant difference between the intervention and follow-up change scores ($Z = -2.277, p = .02$), with greater change occurring during the intervention phase. The difference between baseline and follow-up change scores approached significance ($Z = -1.909, p = .06$). As can be seen in Figure 1, the mean scores reached a peak at T3, remaining stable at T4.

[Insert Figure 1 here]

Well-being

The Index of Children's Subjective Well-Being.

Across all participants' responses to the five questions, 10.3% of the responses given were 'don't know' and 77% of participants responded 'don't know' to at least one question over the four time-points. This is much higher than the 1.5% reported in the original validation study.

Due to the high proportion of 'don't know' responses an overall life satisfaction score could

not be calculated for the majority of participants. However, five participants gave responses that could be scored across all four time-points. Mean scores remained stable over time with a slight trend towards improvement at follow-up, indicating a relatively high level of overall well-being in this sample. As this is such a small proportion of the overall sample, statistical analyses were not performed.

Cantril's ladder and overall happiness.

Data from 18 participants were included. Self-reported life satisfaction and happiness was high across all time points on both questions, with mean scores falling in the top 20%. Related samples Wilcoxon signed rank analysis confirmed no significant differences between the four timepoints, and no difference between baseline, intervention and follow-up periods on either of the questions (all p values $> .07$).

Mindfulness

Mindfulness scores remained relatively stable across time. A small effect size between T2 and T3 scores ($d = 0.28$, 95% CI = $-0.97 - 0.42$), indicated an increase in self-reported mindfulness; however, this difference was not significant ($t(15) = 1.146$, $p = .27$), and baseline and intervention change scores did not significantly differ ($t(15) = -.40$, $p = .69$).

Acceptability

Twenty-two children completed the acceptability questionnaires (missing data was due to pupil sickness absence). Seventy-seven per cent of children enjoyed the mindfulness sessions, 86% thought that their friends would enjoy the sessions and 91% wanted to participate in more

mindfulness sessions. Therefore, the mindfulness programme was acceptable to the majority of children.

Quantitative responses from the teacher indicated that they had enjoyed participating in the mindfulness activities; that mindfulness was a good way of meeting the children's social and emotional needs; that they would recommend it to colleagues and that the intervention had provided them with ideas and knowledge that they could use in future teaching sessions. Qualitatively, the teacher reported that the mindfulness intervention had helped the children to become more aware of what they noticed and to draw upon all of their senses. The teacher reported that the length of the programme could be increased beyond 4 weeks to give the children an opportunity to re-visit some of the activities.

Three parent acceptability questionnaires were returned (13% return rate) limiting the analysis that could be performed on this data.

Feasibility

Successful participant recruitment, engagement in the sessions and completion of the study confirms that it is feasible to incorporate adapted mindfulness activities within infant school classrooms. During the design and implementation of the intervention, a number of feasibility issues were considered. The additional needs of some participants (e.g. physical disability and developmental disorders) were taken into consideration in the selection of appropriate mindfulness practices. The classroom teacher and teaching assistants provided additional support to those that needed it during the mindfulness sessions; and clear and concrete instructions were provided before and during the mindfulness exercises to increase accessibility for different developmental levels.

Overall, it was feasible to complete child and teacher measures within a school setting. However, the researchers raised concerns regarding a small number of participants who did not understand questions on the CAMM; identified through systematic responding or the child selecting an answer before the question had been fully read out. Distributions of scores on the Cantril's ladder and overall happiness measures were significantly negatively skewed across all time points and the most frequent response was at the top end of each scale; participants often chose responses from the extreme ends of the scale. These two concerns highlight a general issue around the validity of self-report measures with children of this age, and a query about their ability to quantify their experiences.

The low return rate of parent measures highlights a feasibility issue of collecting parent data via sending questionnaires home to be returned to school.

The classroom teacher participated in all but one of the mindfulness sessions and was very effective in providing support with regards to discipline. It was feasible to implement the intervention in the classroom with little cost as all but one of the mindfulness sessions were facilitated in the classroom and required minimal props (singing bowl, wind-chime and raisins).

Discussion

This study demonstrated the feasibility and acceptability of embedding a programme of mindfulness-based activities into an infant school curriculum. Furthermore, the results indicate that mindfulness shows promise as a means of promoting the development of attention. Positive quantitative responses from the majority of children and the class teacher indicated acceptability of the mindfulness intervention. Whilst undertaking a group mindfulness intervention with children of infant school age was demonstrated to be feasible, a number of issues regarding the

completion of data collection were highlighted, including the validity of self-report measures for young children and engaging parents with data collection.

Data from well-being and mindfulness outcome measures indicated stability over time. Despite adaptation, some children had difficulty understanding all the items in the measures. The CAMM has been validated for children over the age of ten years (Greco, Baer, & Smith, 2011), but there is no reported data for younger children. The vast differences in cognitive and social development in these age groups could account for the difference in understanding of the CAMM items. Alternative methods of measuring mindfulness might be more appropriate for young children, such as an indirect behavioural measure or a teacher-observational report measure. When considering well-being questions, the children's answers were at the extreme end of the scale and appeared to be state-dependent. Again, this reflects the cognitive limitations of this age group and difficulties quantifying their experiences. Therefore, data generated through the use of self-report measures with children of this age needs to be treated with caution.

In terms of executive functioning, there were significant improvements on post-intervention measures of sustained attention and inhibition (demonstrating large and medium effect sizes). There was a significant improvement on the objective measure of sustained attention from pre- to post intervention, suggesting that the mindfulness programme had a significant impact on sustained attention. However, the results must be interpreted with caution as the relatively low test re-test reliability of the sustained attention subtest may account for some of this significance. Additionally, it was not possible to ascertain whether the post-intervention improvement is above and beyond what would have been seen due to normal development due to the limitation of repeated administration of the TEA-Ch. Where it was possible to compare change in the baseline and intervention periods (for the measure of inhibition), the results indicated that the

improvement from pre- to post intervention was not significantly greater than that seen in the baseline period. This demonstrates how rapid developmental changes can occur in this age group, highlighting the importance of taking into account the expected developmental trajectory when completing measures of cognitive functioning.

A decrease in teacher-reported hyperactivity (on the CTRS-SF) post-intervention, and a trend towards this decrease being greater than the change seen in the baseline period, was identified. It should be noted that the teacher report measure utilized is a clinical tool for identifying specific behavioural difficulties in children; therefore, the sensitivity amongst nonclinical samples is reduced. Future studies should therefore include a measure with greater sensitivity across a nonclinical range.

Limitations

The primary aim of this study was the exploration of feasibility and acceptability of a mindfulness programme with young children within a classroom setting. As such, a control group did not feature in the design. Two pre-intervention time points allowed a within-groups control to compare post-intervention changes with that of an expected trajectory. However, future studies should include a control group. In addition, it was not possible to explore whether those who scored lowest at baseline benefitted the most from the mindfulness intervention, as was reported in Flook et al. (2010). Therefore, future research with a larger sample size could explore whether this finding is replicable.

The wording of two of the measures used within the main study was modified. Although the aim of this was to increase simplicity and therefore understanding, the adapted questionnaires have not yet been validated.

Wider implications and future research

One issue to consider is whether mindfulness is suitable for any infant curriculum, and what cultural considerations might need to be considered when implementing such a programme within schools. As practices are experiential by their nature, language is not a barrier to engaging in mindfulness exercises. Although mindfulness has its roots within eastern Buddhist practice, the implementation of mindfulness within schools has tended towards the use of secular programmes, such as the Mindfulness in Schools Project. Moving away from the religious underpinnings of mindfulness has its pros and cons (Burnett, 2011); a significant advantage of secular mindfulness is that children of all faiths are able access it, without any potential conflict with their own religion.

Studies drawing upon populations from a wide range of cultural contexts such as the US, Australia, Asia and Europe, are reporting positive outcomes post-mindfulness intervention. Furthermore, the CAMM has been validated in several non-English speaking countries, including the Netherlands (de Bruin, Zijlstra, & Bögels, 2014) and Spain (Viñas, Malo, González, Navarro & Casas, 2014), and has been demonstrated to be a reliable and valid self-report measure of mindfulness in a non-clinical sample of young people. These developments suggest that mindfulness-based interventions could be applicable and measurable across a range of cultural contexts. This study has highlighted a number of areas for future research to further explore the impact of mindfulness on young children's psychological and emotional development. A key issue is to develop a valid and reliable measure of mindfulness for children of this age. This might involve further adaptation and validation of the CAMM for younger children, as some participants did demonstrate an understanding of the questions. An alternative approach could be the exploration of teacher and parent-report, perhaps through the development

of a questionnaire measuring observable characteristics of mindfulness such as acting with awareness. This is also relevant to the measurement of well-being: future research could incorporate alternative methods of rating well-being, such as teacher report.

The inclusion of a control group receiving school as usual would avoid the issue of being unable to attain baseline measurement on some measures, whilst accounting for normal development. This study highlighted that a mindfulness intervention was not acceptable to all of the children who participated; therefore it would be useful for future research to explore this further through the inclusion of qualitative questions to the acceptability measure and prompting a child for further information if they give a negative response to one of the questions.

Furthermore, there has been an increase in school-based preventative programmes, which aim to promote healthy psychological and emotional well-being in order to reduce the likelihood of later mental health difficulties (August, Bloomquist, Realmuto, & Hektner, 2003; Ialongo, Poduska, Werthamer, & Kellam, 2001; Lonczak, Abbott, Hawkins, Kosterman, & Catalano, 2002). Therefore, therapeutic approaches such as mindfulness could be embedded within existing school programmes focusing on improving social and emotional well-being.

Practice recommendations and implications

The findings reported in this study have implications for practitioners and educators in terms of potentially improving well-being, attendance and attainment. It is recommended that mindfulness be implemented as a whole-school approach in order to improve well-being for the pupils who attend the school. This can be facilitated by supporting the staff within the school to develop and maintain an understanding of mindfulness and how it can be applied within the school environment. Mindfulness can be incorporated into activities already carried out within

the school environment, such as mindful walking or during physical education lessons. Furthermore, mindfulness practices can be integrated into the daily classroom schedule, such as at the beginning and end of each period/session. The use of a singing bowl or chime could be used to signal this transition to the children. This can be supported through engagement with parents, perhaps through offering a mindfulness taster session.

There are many creative and interactive ways to explain the concept of mindfulness to young children, through the use of visual and audio clips and experiential practices. Utilising mindfulness practices which engage as many of the senses as possible helps to keep the children engaged and interested.

Conclusions

This study contributes to the limited research that has explored the use of mindfulness with young children. The findings suggest that facilitating a mindfulness-based programme with infant aged children within the school environment is both feasible and acceptable to the majority of participants. However, due to the issues highlighted around the use of self-report measures in this study, it was not possible to conclude whether increased mindfulness had a positive impact on well-being and executive functioning. Additionally due to mixed findings on measures of executive functioning, it remains unclear whether mindfulness had an impact on cognitive functioning above and beyond a normal developmental trajectory. As outlined, issues around valid and reliable measurement need to be addressed before future research can fully explore the relationship between mindfulness, well-being and cognitive functioning in children of infant school age, in order to have confidence in the validity of the results.

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Table 1

Mean scores (standard deviation) for all measures

	<i>n</i>	Pre-baseline		Post-baseline		Post-intervention		Follow-up	
Score!	18	-		5.83	(2.46)	7.56**	(2.38)	-	
Walk Don't Walk	18	-		10	(3.99)	13.9***	(2.94)	-	
Luria	16	8.39	(1.33)	9.50*	(1.89)	10.83**	(1.24)	10.56	(1.50)
Inattention ^a	23	51.43	(9.73)	51.82	(11.57)	50.96	(13.14)	50.09	(10.61)
Hyperactivity/ Impulsivity ^a	23	49.87	(12.4)	50.35	(9.88)	47.87	(9.60)	47.91	(7.73)
Learning Problems/ Executive Functioning ^a	23	46.43	(9.68)	47.13	(10.96)	45.26	(9.13)	46.26	(8.53)
Defiance/ aggression ^a	23	47.48	(5.69)	47.17	(3.8)	48.91	(5.81)	49.87	(7.28)
Peer	23	51.61	(14.47)	48.09*	(9.74)	49.74	(13.18)	49.17	(11.49)

	<i>n</i>	Pre-baseline	Post-baseline	Post-intervention	Follow-up
Relations^a					
Overall life satisfaction ^b	5	14 (2.7)	13.8 (3.3)	14.2 (2.95)	14.6 (5)
Overall satisfaction ^c	18	8.22 (2.24)	8.72 (2.37)	8.06 (1.95)	9.06 (1.73)
Overall happiness	18	4.61 (0.78)	4.28 (1.32)	4.17 (1.25)	4.56 (0.71)
CAMM		21.06 (7.98)	20.50 (5.22)	19.06 (5.76)	20.13 (6.39)

Note. a= CTRS-SF 3 subscales (Conners, 1997), b= Index of children's subjective well-being (Rees, Goswami & Bradshaw, 2010); c = Cantril's ladder (Cantril, 1965).

* $p < .05$; ** $p < .01$; *** $p < .001$: indicates a significant improvement between this mean score and the preceding data point

Figure 1: Mean inhibition scores and standard deviations

