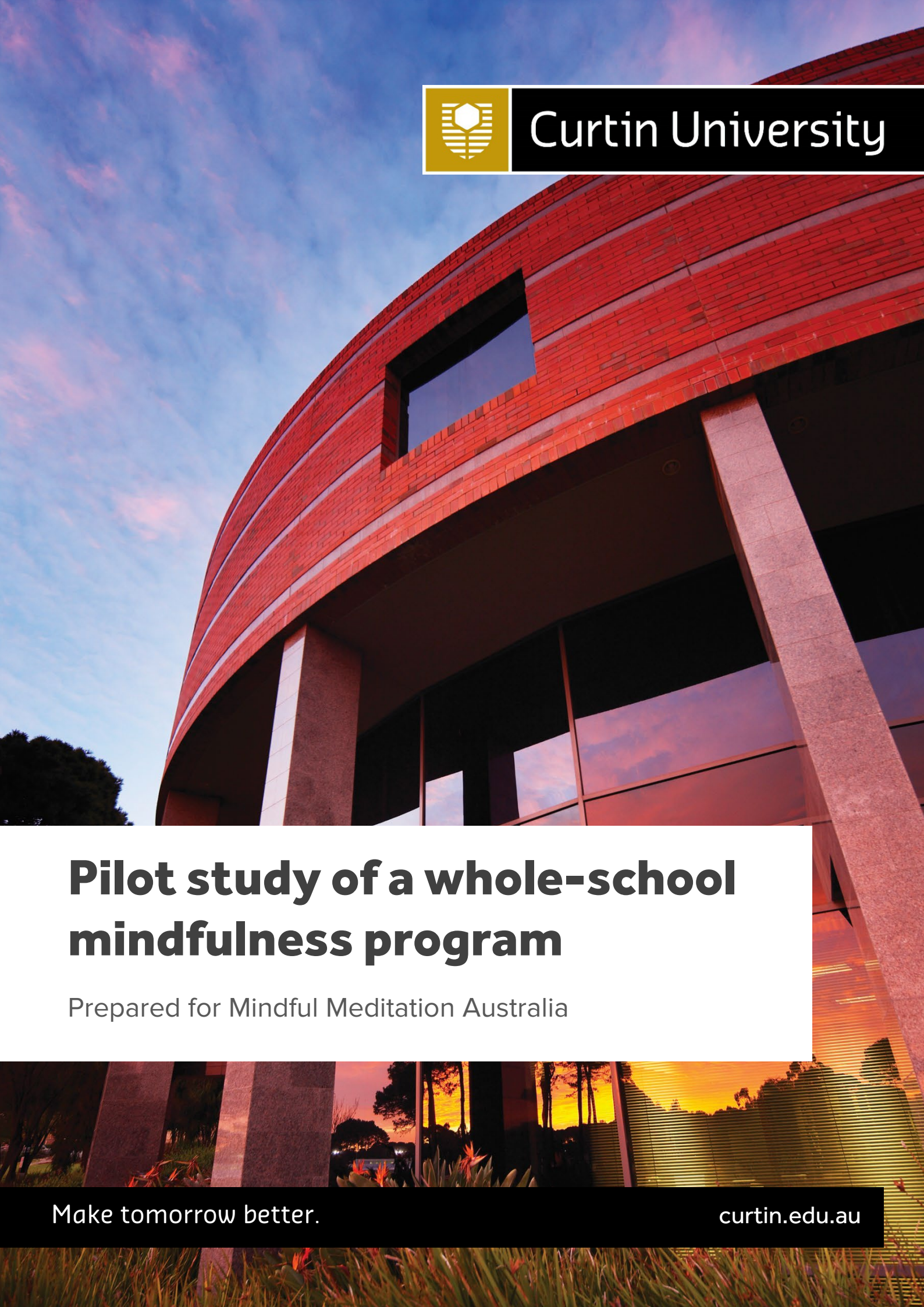

Curtin University

Pilot study of a whole-school mindfulness program

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Pilot study of a whole-school mindfulness program

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Executive summary

Curtin University has partnered with Mindful Meditation Australia (MMA) to study the impact of a mindfulness intervention, the MMA Mindful Education Program, in two Perth metropolitan primary schools. These schools implemented the Mindful Education pathway in Term 4, 2022. To preserve the confidentiality of participants in the study, these schools are referred to as School A and School B in this report. Both schools were in similar socio-economic areas (with close to average ICSEA values).

The study goals were to: (1) investigate whether the MMA Mindful Education program has a positive impact on students; and (2) demonstrate the feasibility of conducting a research study in schools which are using the MMA framework.

We assessed the impact of mindfulness on students' emotional regulation, connectedness/belongingness to school, positive mental wellbeing, strengths and difficulties, executive functioning, and daily reflections of focus and calmness. To support this quantitative data, we also conducted interviews and focus groups with school leadership, teachers, and students to investigate their perceptions and experiences of the Mindful Education pathway.

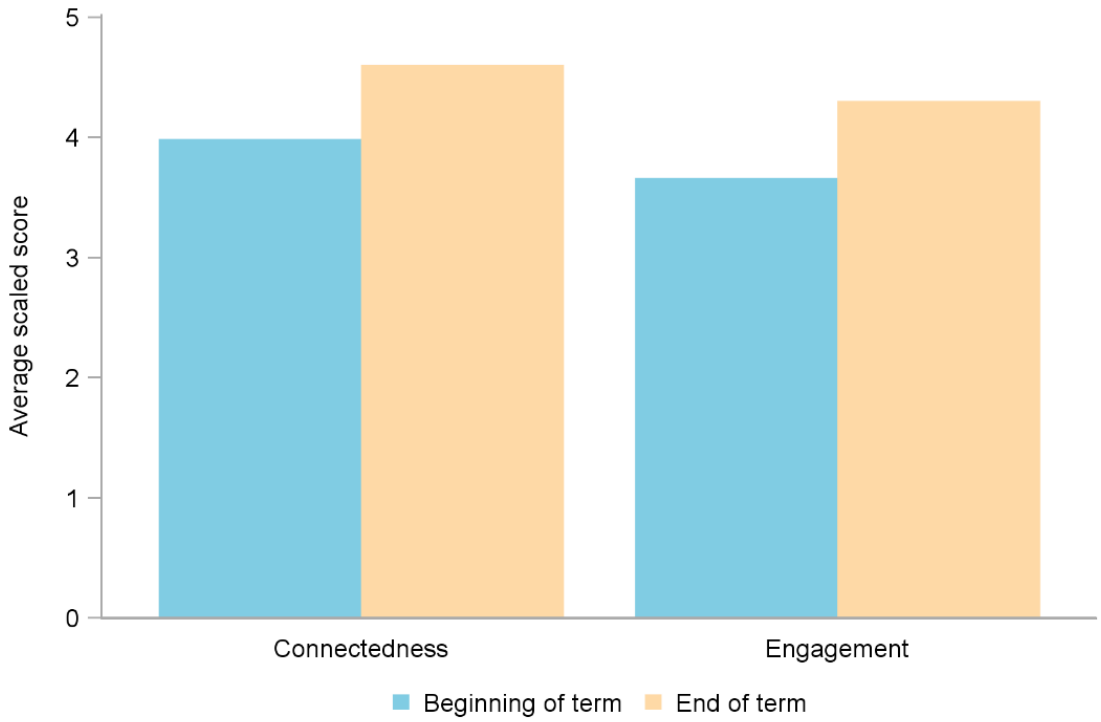
A total of 53 students, two members of school leadership and 24 teachers participated in the research study. Over the course of the term positive improvements were observed in emotional reappraisal; school belongingness, including connectedness and engagement; positive mental wellbeing; emotional, conduct, and peer problems; hyperactivity; prosocial behaviour; functional impact; inhibitory control and attention; and daily instances of focus and calmness. There were no negative effects observed across any of the factors measured in the study.

School belongingness

Belongingness was measured in two ways – connectedness to school (which represents the extent to which a student feels welcome and safe at school and has friends there) and engagement with schoolwork (which represents the extent to which students are interested in and value what they learn at school). Both concepts are measured on a scale

from 1 to 5 and statistically significant improvements were observed in both concepts from beginning to end of term.

School belongingness: Change in connectedness and engagement over the course of the term



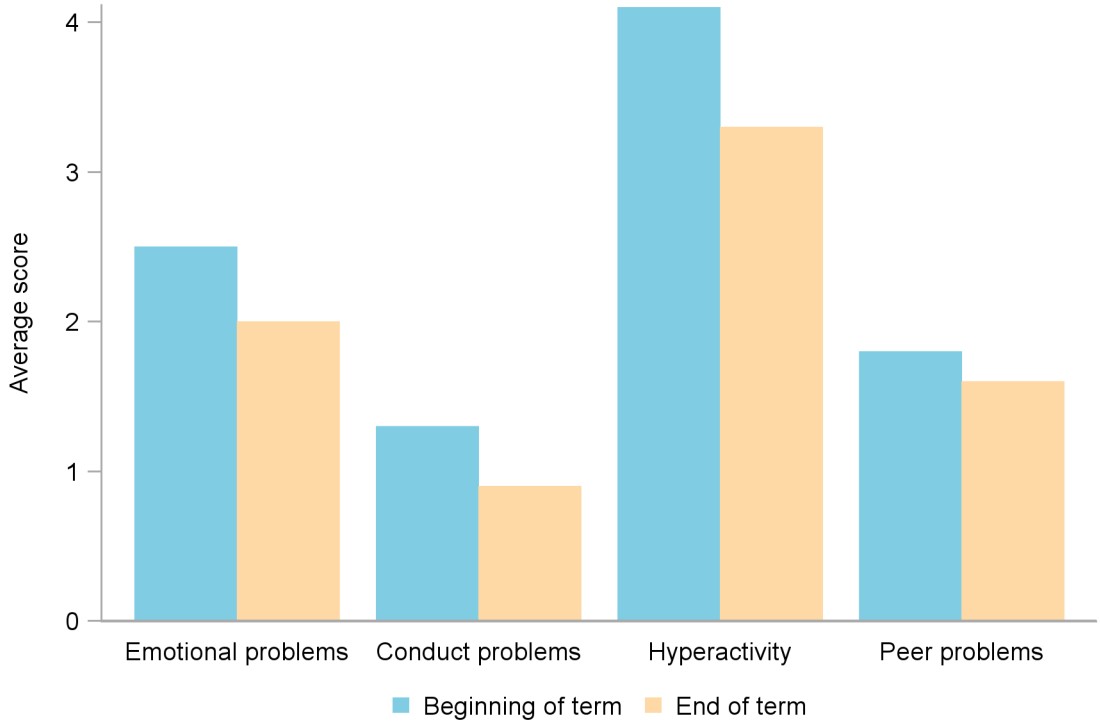
Mental health and wellbeing

The Strengths and Difficulties Questionnaire (SDQ) was used to assess mental health and wellbeing. It measures four main domains of mental health issues: emotional problems (such as anxiety or depression), conduct problems, hyperactivity, and peer problems. The SDQ has been designated by the Australian Institute of Health and Welfare as the primary measure of student wellbeing in Australia.

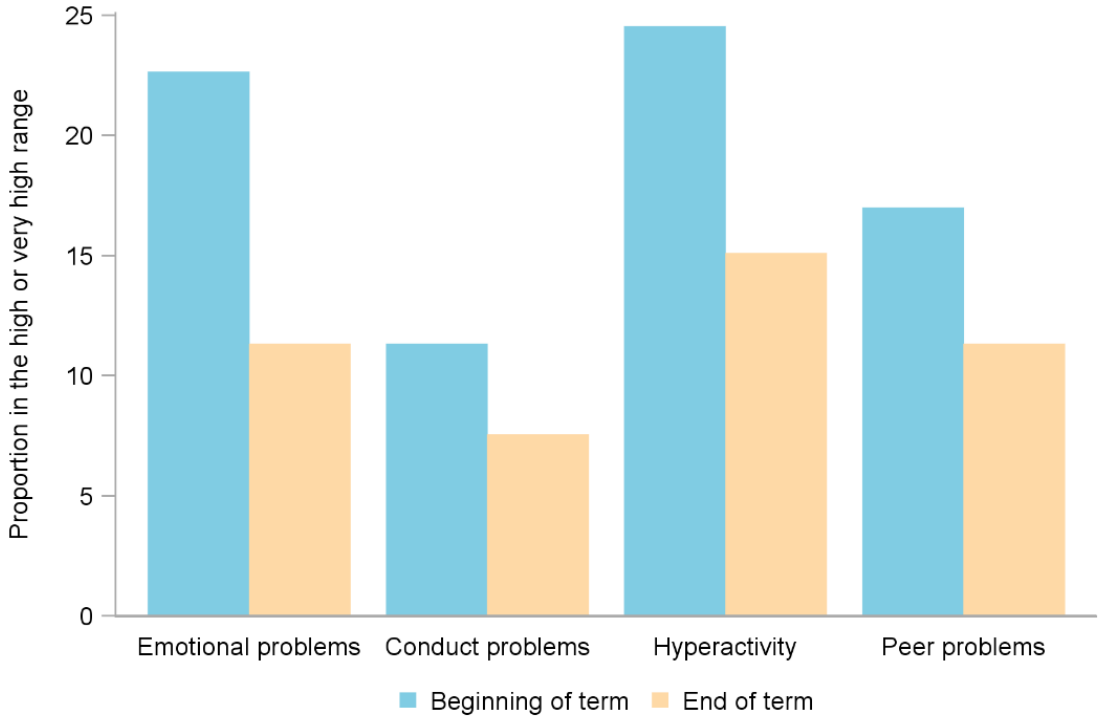
Students completed the SDQ at beginning and end of term, and teachers also rated each student at beginning and end of term. Significant improvements were seen in average SDQ score in each of the four domains, as reported by teachers, and in the proportion of students who were in the high or very high risk categories on the SDQ. High or very high risk is a useful indicator of whether a student may benefit from positive attention to their mental health and wellbeing.

Average SDQ scores were lower at end of term compared with beginning of term, indicating lower levels of mental health issues in all four domains. Similarly, the proportion of students in the high or very high risk categories was lower at the end of term compared with the beginning of term for all four domains.

Teacher reported SDQ: Change in mean score over the course of the term



Teacher reported SDQ: proportion of students in the high or very high risk categories at beginning and end of term



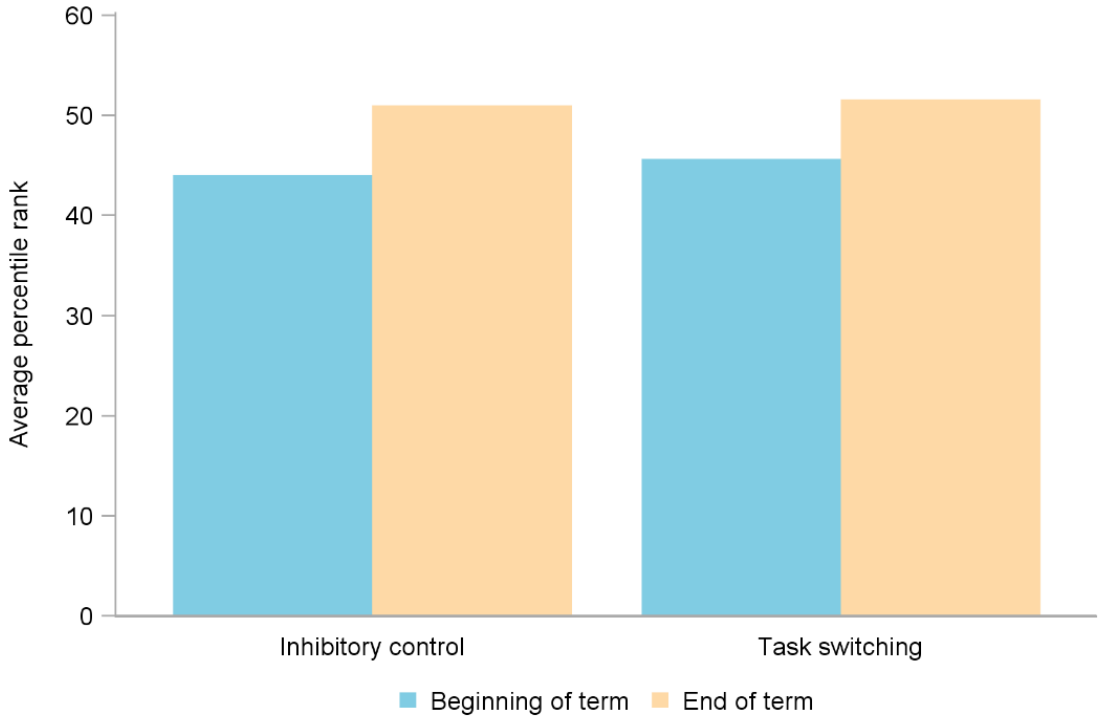
In contrast, no significant changes were observed in student-reported SDQ scores between beginning and end of term. While one might intuitively expect that teacher and student ratings on the SDQ should be similar, extensive research has identified this is rarely the case. Teacher ratings are considered to be good indicators of observable behaviours and distress shown by students. Teacher ratings are likely to be stronger indicators of conduct problems, hyperactivity and peer relationship problems, while it is possible that some students may mask internal feelings like anxiety and depression from adult observers. Student ratings reflect the degree to which a student may have insight into the way their behaviour and emotions affect them. Particularly for younger students, they may be less aware of the way in which their emotions and behaviours impacts them and those around them.

Executive functioning

In addition to ratings on the SDQ, aspects of students' focus and concentration were measured using assessments from the US National Institutes of Health Toolbox. Two assessments were used, measuring inhibitory control and task-switching. For each, students completed tasks on a tablet computer that assessed their level of focus and attention. *Inhibitory control* measures a student's ability to complete a focused task while not being distracted by extraneous stimuli, while *task switching* refers to a student's ability to complete tasks that require the ability to focus on multiple sources of information simultaneously. Test scores are converted to a percentile ranking for each student.

There was a statistically significant increase in average percentile rank for inhibitory control, and a non-significant increase in average percentile rank for task switching.

Executive functioning: Change in inhibitory control and task switching over the course of the term



Perceptions of the intervention from school leadership, teachers, and students yielded reflections and feedback regarding the training and preparation provided by MMA, the implementation of the intervention, its effectiveness, and students' construction of meaning surrounding mindfulness. These interviews and focus groups identified that school leaders, teachers and students all found positive value in regular mindfulness practice, that all participants intend to continue with regular mindfulness practice, and that clear benefits were seen by both students and teachers.

Consistent with previous case studies, school leadership and teaching staff identified positive impacts on students and the classroom alike, including reduced time on managing student behavioural issues, and more effective teaching time. They also found that mindfulness provided an effective tool for helping students transition between different types of activities, in particular helping students focus on quiet activities after an active session or returning from recess or lunch. Students reported positive improvements in focus, attention and wellbeing.

Conclusion

The study identified a range of benefits from implementing the MMA Mindful Education framework for one term. The study also demonstrated that a research study examining the MMA framework is feasible and can be easily implemented it is recommended that further research be conducted into the longer-term benefits of mindfulness with a randomised controlled trial with a larger number of schools over a period of at least one year. Such a study could also investigate the impact of mindfulness and meditation on learning outcomes, including NAPLAN performance. Additional recommendations are provided in this report regarding potential changes to the way mindfulness is incorporated into the school environment, and on the methods used in engaging with schools who wish to trial the MMA framework.

Introduction

Mindfulness and meditation are evidence-based strategies that promote wellbeing through improving focus and attention and developing the ability to manage negative or stressful thoughts. Mindful Meditation Australia (MMA) is a not-for-profit organisation whose goal is improving the mental, emotional and physical wellbeing of all, through evidence-informed mindfulness and meditation programs. Through their Mindful Education program, MMA helps improve the classroom experience, mental health and wellbeing of both students and teachers.

MMA is partnering with Curtin University to build an evidence base regarding the benefits of implementing mindfulness programs with children in a whole of school approach. The goal of the overall research program is to establish clear evidence of the short- and longer-term effectiveness of the whole-of-school mindfulness program on children's wellbeing, and learning outcomes. There is an emerging evidence base supporting its use in a range of situations, such as coping with anxiety, stress or addictions, particularly in adults. There is good theoretical reason for believing that mindfulness can benefit school aged students both in their wellbeing and their learning. Mindfulness includes attentional focus and awareness of thoughts and feelings. Mindfulness also relates directly to elements of the Australian Curriculum including building personal and social capability.

Previous research has undertaken case studies in two schools that have implemented the MMA Mindful Education program for several years. This research identified a range of benefits to students and schools from the implementation of the program. Both case study schools have continued to expand their mindfulness programs.

This report describes the outcome of a pilot test involving two schools new to the Mindful Education program, their experiences over the first school term in which they have implemented the program, and the benefits to students and the schools over the course of the term.

Research protocol

Aim of the pilot study

The overall aim of the study was to demonstrate the effectiveness of MMA's Mindful Education intervention by implementing their framework and curriculum in a Year 5/6 class in two Perth schools over Term 4, 2022. During this time, we assessed the impact of the program on children's:

- Emotional regulation
- Connectedness/belongness to school
- Positive mental wellbeing
- Strengths and difficulties
    - Emotional problems
    - Hyperactivity

    - Peer problems
    - Conduct problems
    - Prosocial behaviour
- Executive functioning
- Daily reflections of focus and calmness

Table 1 shows the goals, objectives, and planned outcomes in more detail.

Table 1: **Pilot study goals, objectives, and planned outcomes**

GOALS	OBJECTIVES	OUTCOMES
1) Demonstrate that the MMA framework has a positive impact on students in 2 schools.	Measure students' improvement in self-regulation, focus, and attention over the course of 1 term.	Change between end of term and beginning of term in level of: o Self-regulation o Focus o Attention o Wellbeing
2) Demonstrate the feasibility of conducting a research study in schools using the MMA framework.	Implement the program and study with minimal cost and clear benefits to schools	i) Time and cost to schools of implementing the program. ii) Improvement in teaching time Improvement in classroom management. iii) Teacher perspectives on the value of the program. iv) Student perspectives on the value of the program.

Pilot test research questions

Does regular brief mindfulness-based meditation, implemented as part of the daily primary school classroom routine over the course of one term:

i) improve students' self-regulation, focus and attention?
ii) improve on-task teaching time?
iii) reduce teaching time devoted to behaviour management?

Study design

Schools implemented the MMA Mindful Education curriculum via the recommended pathway including:

- Mindful Amygdala – full-day comprehensive workshop introducing basic neuroscience and practical mindfulness skills delivered to all staff in each school at a staff professional development day at the beginning of term.
- Mindful Education – an evidence-informed approach that helps schools develop and implement a whole-school mindfulness plan.

Schools were encouraged to implement mindfulness in all classes, but for the purposes of the research study, one class was chosen in each school (a Year 5/6 class) where students and teachers participated in assessments at the beginning and end of term for the purposes of evaluating change over the term.

An introduction to mindfulness was provided to students using MMA's curriculum at the beginning of the term. Teachers then implemented brief mindfulness exercises daily when it was suitable for the classroom routine.

The pilot study had an explanatory-sequential mixed methods design, meaning we first had a quantitative branch (i.e., use of numeric data collected through surveys of students and teachers, combined with student assessments), and then followed this with a qualitative branch (i.e., use of written/verbal data collected via interviews and focus groups with students, teachers, and school leadership staff).

Quantitative assessments

Both teachers and students participated in these assessments. Students self-reported their self-regulation, attention, and mental wellbeing at the beginning and end of term 4 via an online survey. As there will be no separate control group in this small-scale pilot study, students acted as their own controls, with student's average change in self-regulation from the beginning to the end of the term being used as the main indicator of outcomes. Teachers of the selected class also provided assessments of student's self-regulation, as well as improvements in classroom behaviour and effective teaching time.

The measures were chosen and developed in conjunction with MMA, addressing the main research questions of self-regulation, focus, and attention. See table 2.

Table 2: **Measures and the associated measured constructs**

CONSTRUCT	MEASURE	MODE	PARTICIPANTS	WHEN?
• **Emotional reappraisal** • **Emotional suppression**	Emotional Regulation Questionnaire (Gross & John, 2003), a 10-item scale.	Qualtrics.com; iPad	• Students	Beginning and end of term
• **School connectedness** • **School engagement**	School connectedness scale (Resnick, 1997), a 6-item scale.	Qualtrics.com; iPad	• Students	Beginning and end of term
• **Positive mental wellbeing**	Short Warwick Edinburgh Mental Wellbeing Scale (Stewart-Brown, et al., 2009), a 7-item scale.	Qualtrics.com; iPad	• Students	Beginning and end of term
• **Emotional problems** • **Hyperactivity** • **Peer problems** • **Conduct problems** • **Prosocial behaviour**	Strengths and Difficulties Questionnaire (student-report and teacher-reported; Goodman, 1997), a 25-item scale.	Qualtrics.com; iPad	• Students • Teachers	Beginning and end of term
• **Executive functioning** • **Inhibitory control** • **Task switching**	National Institute of Health Toolbox Cognition Battery (Akshoomoff et al., 2014).	NIH Toolbox; iPad	• Students	Beginning and end of term
• **Focus** • **Calmness**	Daily thermometer scale.	Paper	• Students	Everyday

Qualitative analysis

In addition to these quantitative assessments, we conducted separate school leadership and teacher interviews, as well as student focus groups of 4-5 students at the conclusion of the term. The purpose of these was to obtain perspectives on the benefits of the program,

as well as to gain feedback on the program so that improvements can be incorporated into future studies.

- For school leadership, we asked why they decided to participate in the intervention, and the overall school involvement with mindfulness.
- For teachers of the research class, we asked what changes they observed in classroom behaviour, students' attention, and whether the program impacted on productive learning time in the classroom.
- For students, we asked what the program meant to them and what they felt they gained from it.

Our over-arching research question was:

> *"What are the perceptions and experiences of MMA's mindfulness intervention by school leadership, teachers, and students?"*

Interviews and focus groups were audio recorded with the consent of participants, and were complemented by detailed field notes written during and immediately after the interviews. The data was then analysed using thematic analysis, a technique that allows for the identification of groupings of connected spoken or written statements into themes and sub-themes. Although most of the initial thematic coding was done while the interviews were taking place, we used the audio recording to help us fine-tune the themes we identified.

Ethical approvals

We originally designed this study at the University of Western Australia (UWA) and applied to the Human Research Ethics Committee for ethical approval. Original approval was provided in 2020 by the UWA HREC (RA/4/20/5979). Approval was also required from the WA Department of Education, a process that took almost two years, which unfortunately resulted in substantial delays commencing the project. Departmental approval was granted in February 2022 (D22/0042088). The principal researcher, David Lawrence, relocated to Curtin University at the beginning of 2022 and the research study and team relocated to Curtin as well. Ethics approval was subsequently transferred to Curtin University (HRE2022-0321). The research study was completed by Professor David Lawrence, principal researcher, and Khaiden Dow, research project officer.

Methodological issues

1. When conducting the pre-testing phase of the behavioural testing, we encountered several disruptions and distractions which may have impacted students' performance on the test. We specified in the participant information sheets that a quiet location is needed to conduct the behavioural testing. However, being a school environment, noisy disruptions are prevalent and sometimes unavoidable.
2. One of the schools was undergoing some construction work, and as a result, classrooms needed to be shared and free space was limited. The research team did have to move testing rooms several times to make space for classes, so

unfortunately, the testing environment did not remain constant at one of the schools.

3. Unfortunately, it proved difficult for teachers to estimate the proportion of time they were spending on effective teaching, compared with class behaviour management and other non-learning time. As a result, we removed these quantitative data from the final study. However, the qualitative data did shed light onto changes in behaviour management and effective teaching time. Direct observation of teaching is recommended for future research.

Results

A note on research terminology

Findings reported in this study have been evaluated both in terms of statistical significance and practical significance.

Statistical significance

Statistical significance refers to the extent to which a difference may be due to the intervention intervention or due to random chance. We use an error margin threshold of .05 when calculating statistical significance, which allows for a maximum 5% chance that a difference is due to chance, and a minimum 95% chance that the difference is due to the intervention itself. Statistical significance uses a *p*-value to express this percentage.

For example, if we have found that connectedness to school has increased after the intervention, with a corresponding *p*-value of .05 (i.e., $p < .05$), we can say that the increase is statistically significant, and most likely not due to chance. As such, we could conclude that the intervention may improve connectedness to school. The same applies to *p*-values of .01, .001 (i.e., $p < .01$, $p < .001$), and so on, which also indicates statistical significance and at higher degrees of certainty that the increase is due to the intervention.

In contrast, if the *p*-value is larger than the .05 threshold, we can conclude that a difference is statistically non-significant, and may have been due to random chance. For example, if we have found that engagement with schoolwork has increased after the intervention, but with a corresponding *p*-value of .10 (i.e., $p = .10$), we can say that the increase is statistically non-significant, and possibly due to chance. As such, we could conclude that the intervention may not improve engagement with schoolwork.

We use the terms *statistically significant* or *significant,* as well as *statistically non-significant* or *non-significant* to comment on this kind of significance. We also denote statistically significant findings by an asterisk (*) in the tables and figures.

Practical significance

While statistical significance refers to the extent to which we can be sure that a difference is due to the intervention, *practical significance* refers to the magnitude of an observed difference (i.e., how large the difference is). As such, practical significance focuses on how meaningful a difference is. Depending on the analysis we use, the magnitude of a difference can be measured in various ways, and we express this magnitude via an *effect*

size. Throughout the report, we mainly use the statistic, Cohen's *d,* as an effect size of the difference between pre-testing scores and post-testing scores. Regarding the daily reflection of calmness and focus during the mindfulness activities, we also use Cohen's *d* as an effect size of the difference between pre-activity and post-activity scores. Cohen's *d* can be interpreted as the following: negligible ($d < 0.2$); small ($0.2 \leq d < 0.5$); medium ($0.5 \leq d < 0.8$); and large ($d \geq 0.8$).

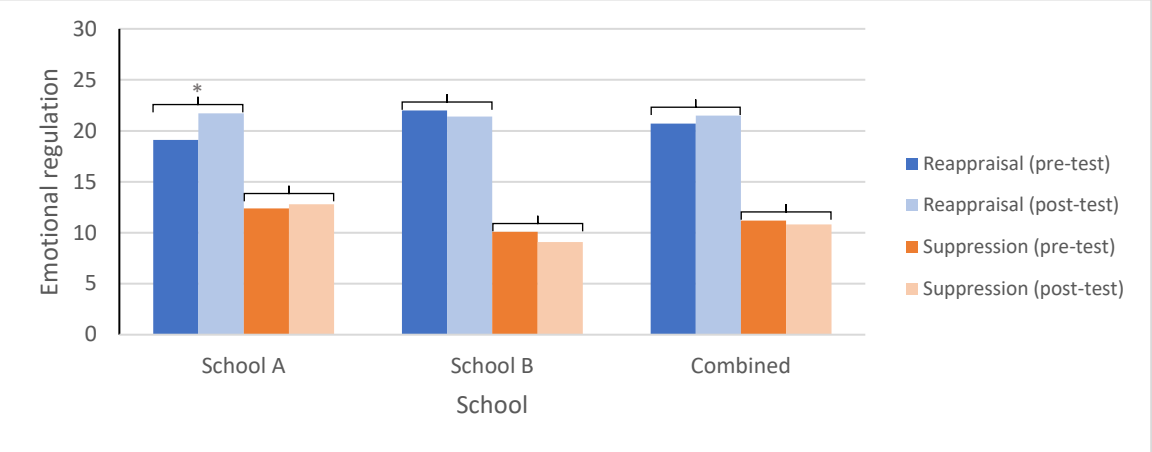
Descriptive information

The total sample size was 53 students (23 in the School A class and 30 in the School B class), with an average age of 10.96 years. The total teacher sample size was 24 (6 at School A and 18 at School B). Most of the teachers have 21-30 years teaching experience. Nine teachers had not implemented any previous mindfulness in their classes, whereas 14 teachers have already implemented some form of mindfulness at some stage, with most practicing once a day, 1-2 days a week. See appendix (table A1) for more detail.

Emotional regulation

Overall, there were no significant changes in emotional regulation post-intervention. However, at the class level, School A had a significant increase in emotional reappraisal (i.e., reflecting on emotions and recalibrating of emotional responses). There was also a slight increase in emotional suppression (i.e., the blocking and opposition of unpleasant emotions as to not consciously experience them), but this was non-significant. School B had decreases in emotional reappraisal and suppression, post-intervention, but these were non-significant. See figure 1.

Figure 1. **Changes in emotional regulation**



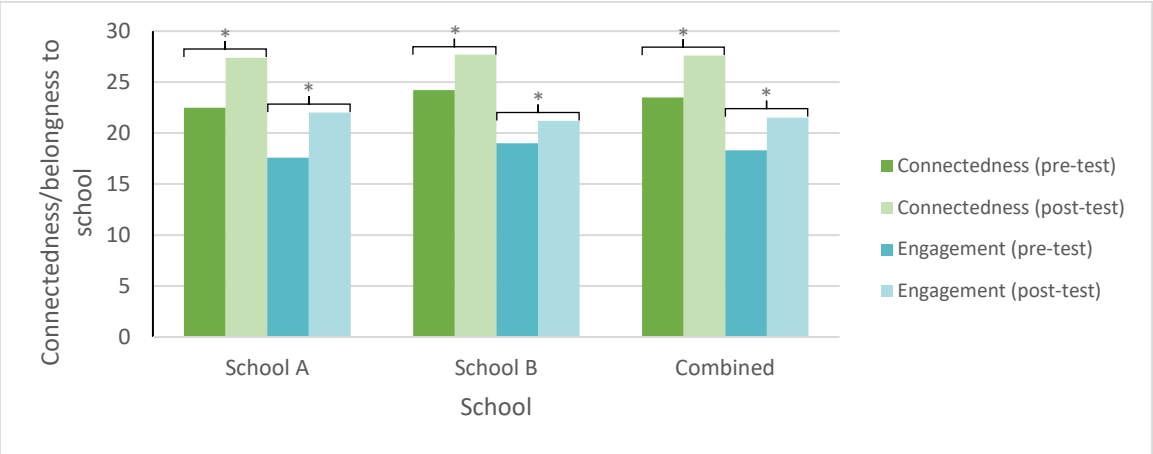
* $p < .05$

Connectedness/belongingness to school

Overall, there were significant and large increases in school connectedness (i.e., a feeling of belonging to the school environment and school engagement) and school engagement (i.e., active attempts to learn and participate in class), having been the largest improvement study-wide. At the class level, School A experienced a significant increase in school connectedness and school engagement which was their greatest degree of improvement.

Likewise, School B also had significant increases in connectedness and engagement with school and was similarly their greatest improvement. See figure 2.

Figure 2. **Changes in connectedness/belongingness to school**

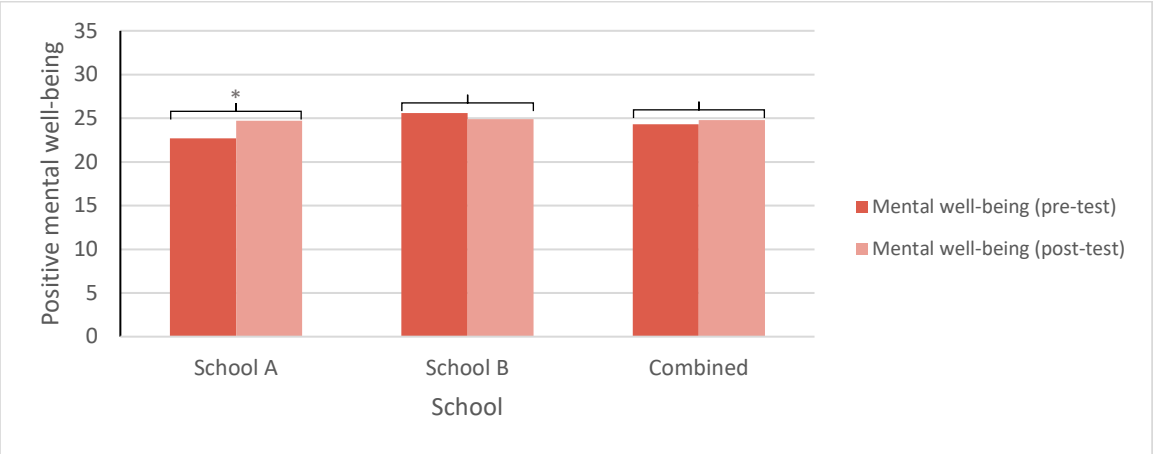


* $p < .05$

Positive mental wellbeing

Overall, there was a small increase in positive mental wellbeing post-intervention, but this was non-significant. At the class level, School A experienced a significant increase in mental wellbeing, whereas School B had a non-significant decrease. See figure 3.

Figure 3. **Changes in positive mental wellbeing**



* $p < .05$

Strengths and difficulties

When categorising the students according to their strengths and difficulties, most students in both schools scored within the “close to average” range, although there were several students within the “slightly raised” to “very high” range (See table A2 for more detail). Post-intervention, the frequencies of each category changed with a positively oriented skewness (i.e., more students were in the “close to average” category, and less students were in the “very high” category, post-intervention; see table A3 for more detail).

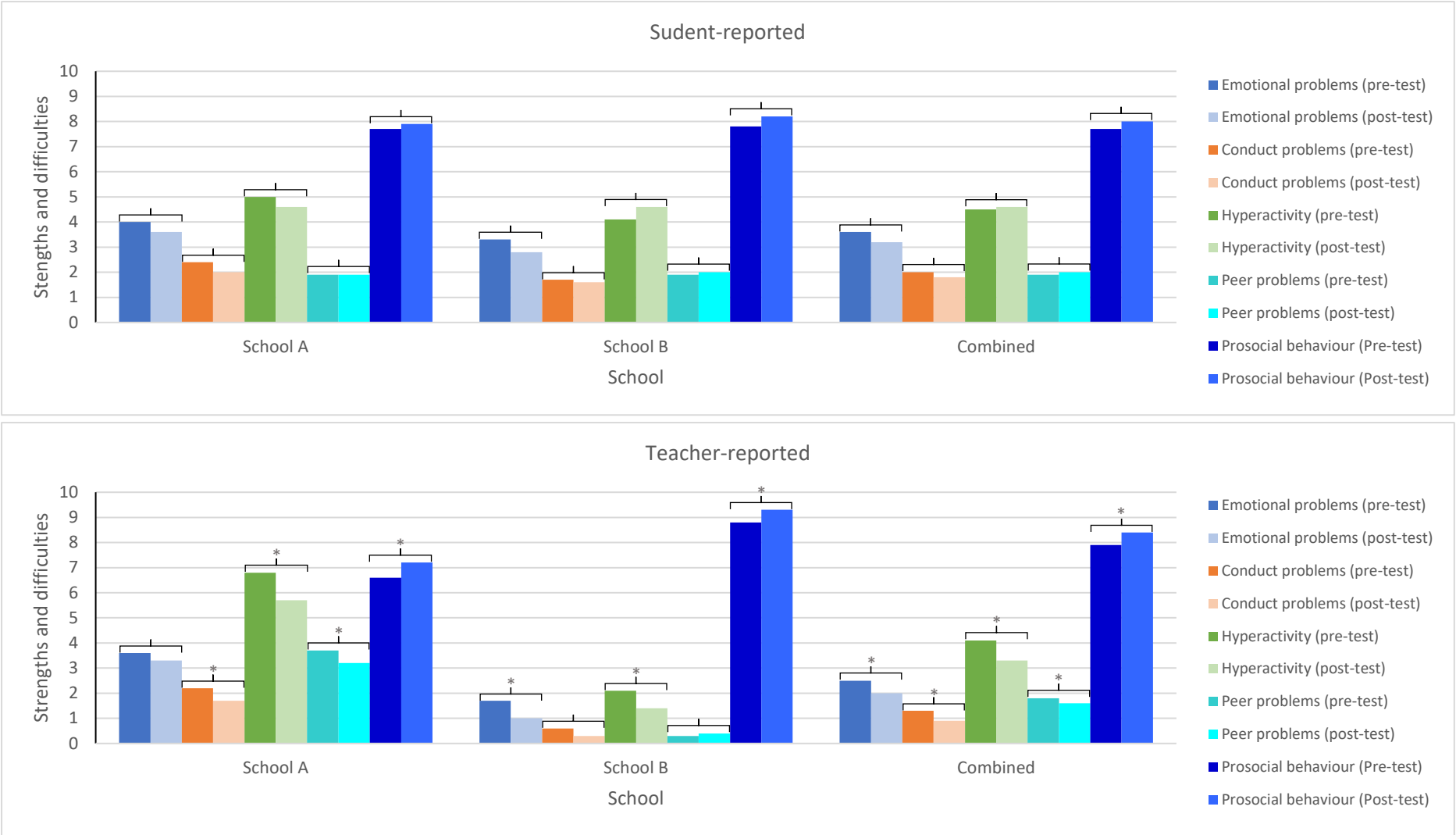
For student-reported strengths and difficulties, there were no significant differences between pre- and post-testing scores, overall and between schools (see figure 4). However, there were significant differences between pre- and post-testing scores when teachers reported on students' strengths and difficulties for both School A and School B. Overall, there were significant teacher-reported decreases in emotional problems, conduct problems, hyperactivity, peer problems, as well as a significant increase in prosocial behaviour (see figure 4). In addition, there was a significant teacher-reported decreases in functional impact, and total student difficulties (see figure 5).

- The School A class showed significant decreases in total difficulties, conduct problems, hyperactivity, peer problems, and functional impact, as well as a significant increase in prosocial behaviour. There were no significant changes in emotional problems.
- For the School B class, teachers indicated significant decreases in total difficulties, emotional problems, and hyperactivity, and an increase in prosocial behaviour. There were no significant changes (i.e., improvements) in conduct problems, peer problems, and functional impact, as the class had very low levels of these problems at the outset, so improvement could hardly be detected.

It is common to see substantial differences between student-report and teacher-reported strengths and difficulties. It is generally recognised that internalising difficulties including depression and anxiety are more easily identified by young people themselves than by others, while teachers may be better placed to identify issues of hyperactivity, inattentiveness and problem behaviours.

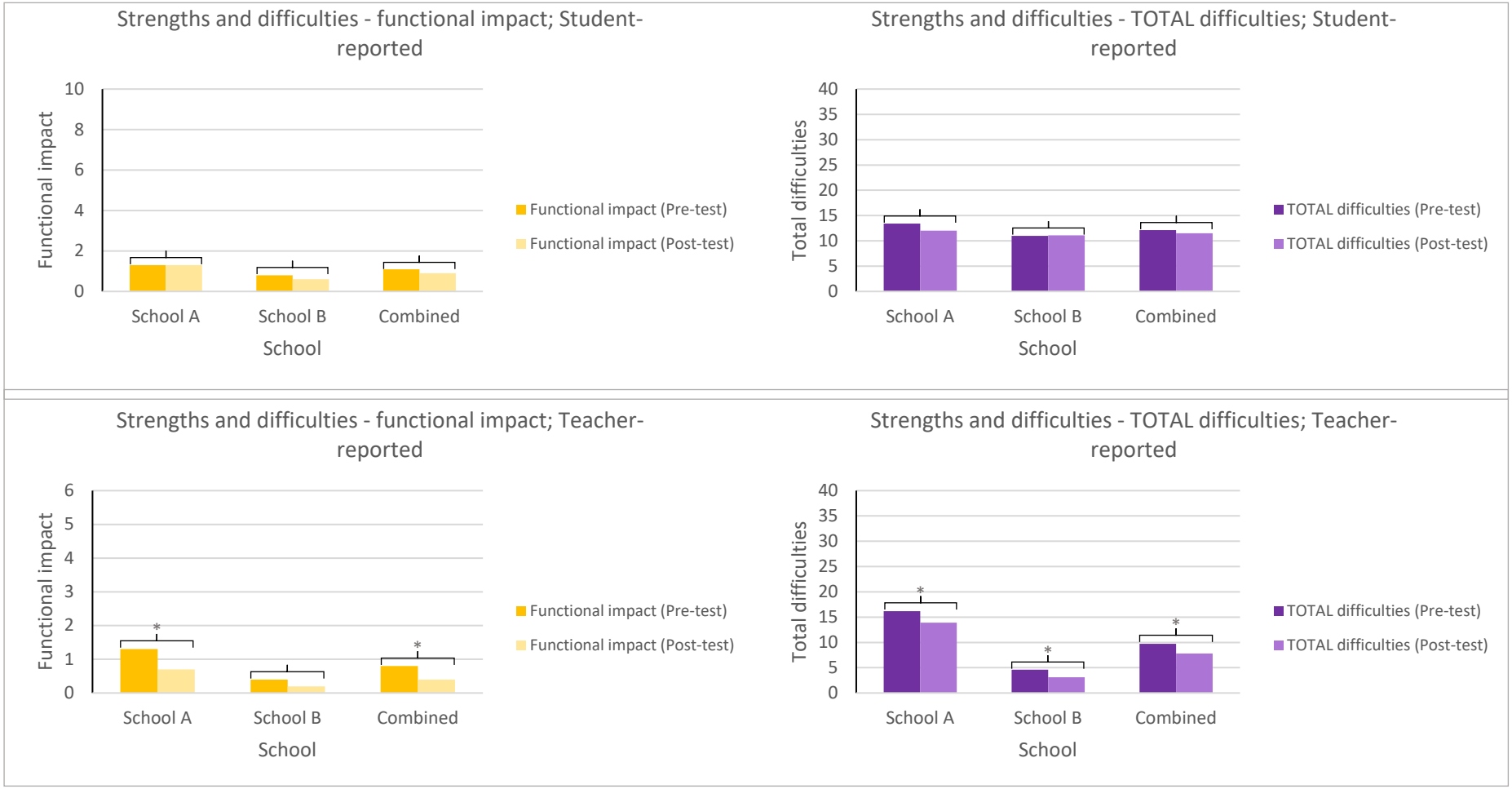
Children may lack the insight to be able to recognise their own problem behaviours and the impact they may be having on others. Given the relatively young age of the students in this study, it is not unreasonable to suggest that some students of this age may have difficulty reflecting on specific mental health symptoms and maladaptive behaviours such as emotional problems, hyperactivity, and peer problems.

Figure 4. **Student and teacher-reported changes in strengths and difficulties**



* $p < .05$

Figure 5. **Student and teacher-reported changes in functional impact and total difficulties**



* $p < .05$

Executive functioning

Students then completed two behavioural tests of executive functioning via the use of an iPad. The first was the Flanker Inhibitory Control and Attention Test (Flanker), and the second was the Dimensional Change Card Sort Test (Card Sort). For each class at the pre-testing stage, there was an average standard score (i.e., around 100) for both of these tests. This suggests that the students perform just as well as, or better than, around 50% of students their age. This is the national average (See table A4 for more detail).

Flanker Inhibitory Control and Attention Test

The Flanker test assessed a student's ability to pay attention to a specific stimulus, which in this case, was an arrow pointing left or right that was placed in the middle of the screen of the iPad. They were then asked to disregard the extraneous stimuli surrounding the middle arrow, which were another set of two arrows (i.e., the flankers). The middle arrow at times pointed in the same direction as these flankers (i.e., congruent), and sometimes the middle arrow pointed in the opposite direction of the flankers (i.e., incongruent). It was then their task to select which direction (i.e., left or right) the middle arrow was facing from a selection underneath the flankers. Students were assessed on their accuracy and reaction time, which resulted in a computed score ranging from 0 to 10, with 10 indicating greater inhibitory control and attention, and thus executive functioning.

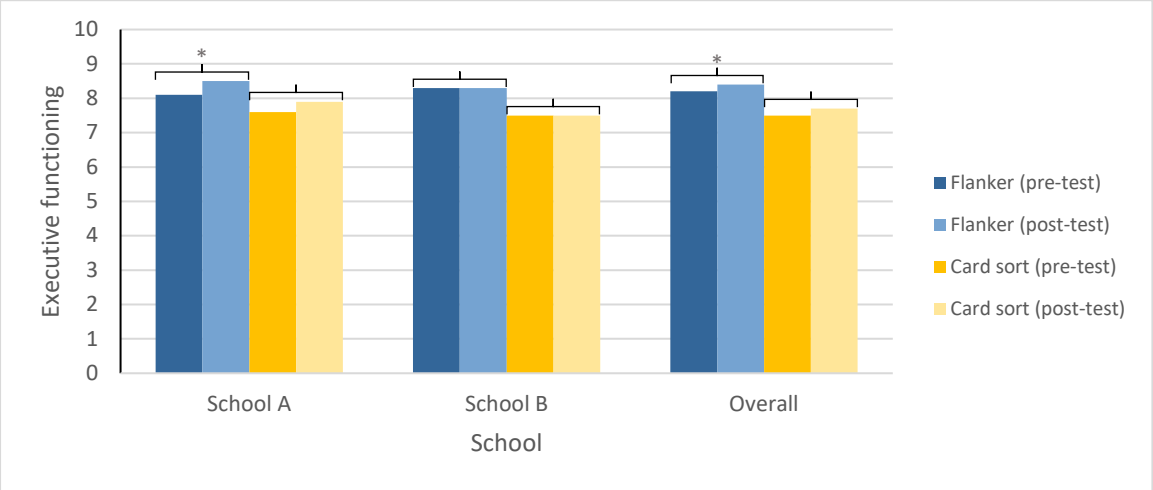
Overall, there was a significant and small-sized increase in inhibitory control. This suggests that student's ability to disregard extraneous stimuli (i.e., the flankers) has become more efficient post-intervention. At the class level, only School A had a significant increase in inhibitory control. See figure 6.

Dimensional Change Card Sort Test

The Card Sort test assessed a student's ability of task-switching by selecting a stimulus in a goal-directed manner. Students were presented with a picture (i.e., a card) at the top of their iPad screen, which featured a white/brown rabbit, or a red/blue truck. They were then asked to select the matching card at the bottom of the screen depending on whether the task asked to match based on colour or shape. For example, the top card may feature a brown rabbit. If the task asks to match based on shape, then students should select the bottom card that features a rabbit instead of a truck. Alternatively, if the tasks ask to match based on colour, then the student should select the bottom card that is brown instead of white. These tasks alternate to encourage the student to task-switch. Students were assessed on their accuracy and reaction time, which resulted in a computed score ranging from 0 to 10, with 10 indicating greater task switching ability, and thus executive functioning.

Overall, there was small-sized increase in task switching ability, post-intervention, but this was non-significant. At the class level, School A and School B had increases in task-switching ability, but these were non-significant as well (see figure 6). However, there was a significant and medium-sized increase in overall test accuracy, post-intervention.

Figure 6. **Changes in executive functioning (computed score)**



* $p < .05$

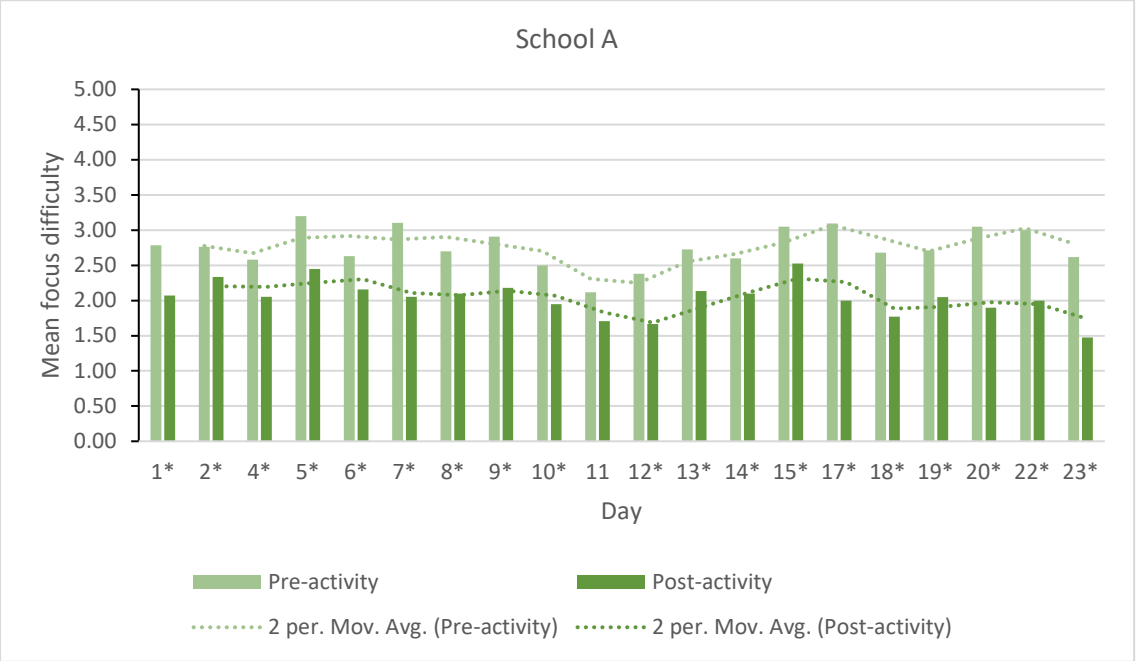
Daily thermometer scales

Throughout the intervention, we asked students to complete a daily thermometer scale immediately before and after the mindfulness exercise to assess the trajectory of student focus and calmness. Students filled out page 1 first which asked them to rate their focus and calmness before they did a mindfulness activity, and then filled out page 2 which asked to rate their focus and calmness after a mindfulness activity. See figure A1 for the scale.

Although teachers and students aimed to complete these scales every day, there were some deviations. School A completed these scales over a 23-day period, having missed 3 days, and School B completed them over a 29-day period, having missed 12 days. Mostly, the scales were not completed only on days when the class did not do a mindfulness activity. Both schools were receptive to the use of the scales and helped the teacher get a sense of the early impact of the intervention on students via class discussion.

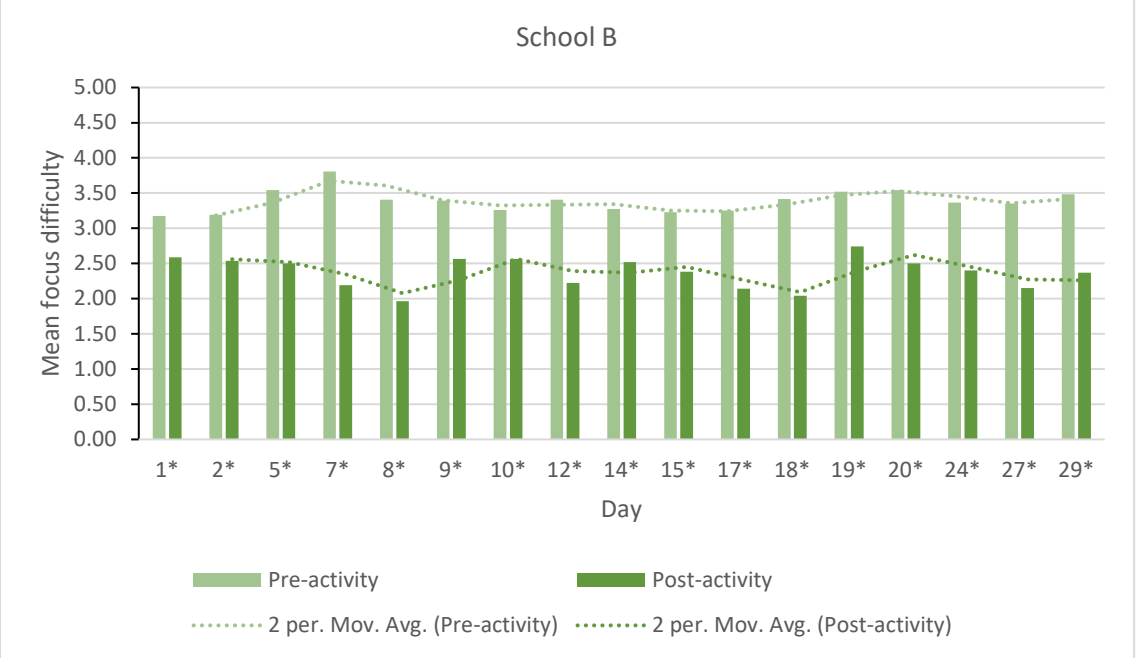
There were significant increases in both focus (see figures 7 and 8) and calmness (see figures 9 and 10) immediately after every mindfulness exercise in both schools. The only exception was day 11 at School A, were there was no significant difference in focus between pre-mindfulness and post-mindfulness activity (see figure 7). This was most likely due to School A conducting the activity early in the morning when the students were already focused, which is supported by students' and teachers' preference to practice mindfulness in the afternoon (see qualitative section). For focus, there were 4 days with small increases, 16 days with medium increases, and 17 days large increases for the whole class across both schools (see table A5). For calm, there was 1 day with a small increase, 11 days with medium increases, and 25 days with large increases for the whole class across both schools (see table A6). Therefore, the mindfulness intervention is greatly beneficial to improve both focus and calmness but is especially more powerful to improve calmness. Furthermore, both schools favoured the body scan and body breathing exercises, as they elicited continuous medium to large increases in focus and calmness.

Figure 7. **Changes in focus over the mindfulness intervention for School A**



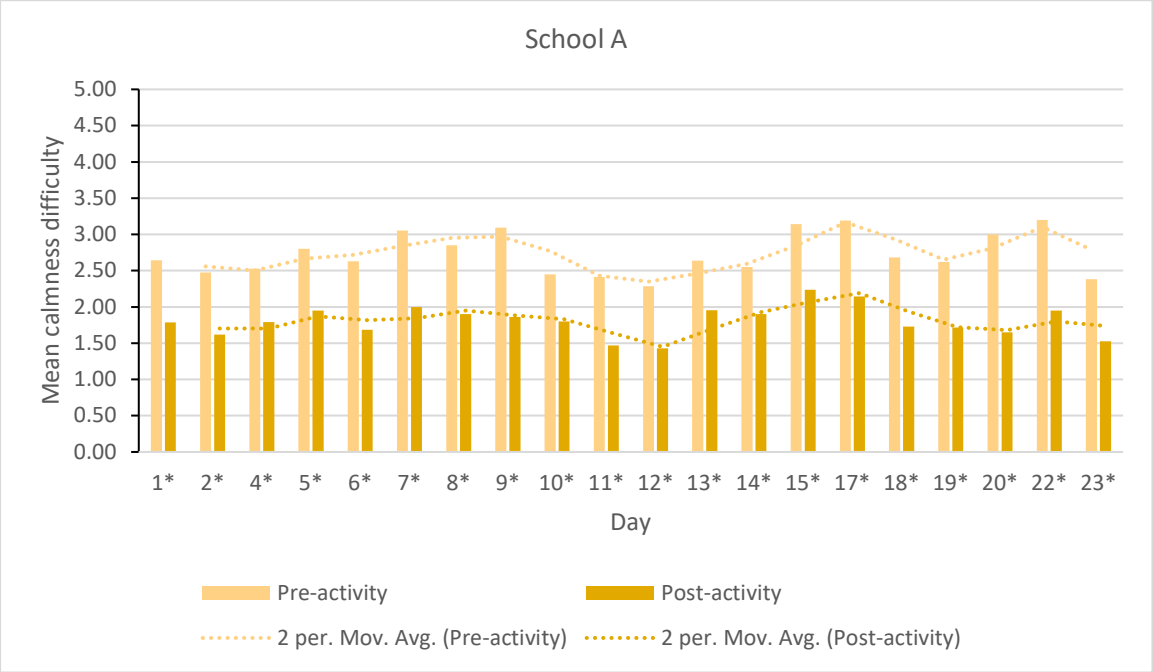
Note. Higher values indicate higher difficulties (i.e., distractibility), lower values indicate lower difficulties (i.e., focus).
* $p < .05$

Figure 8. **Changes in focus over the mindfulness intervention for School B**



Note. Higher values indicate higher difficulties (i.e., distractibility), lower values indicate lower difficulties (i.e., focus).
* $p < .05$

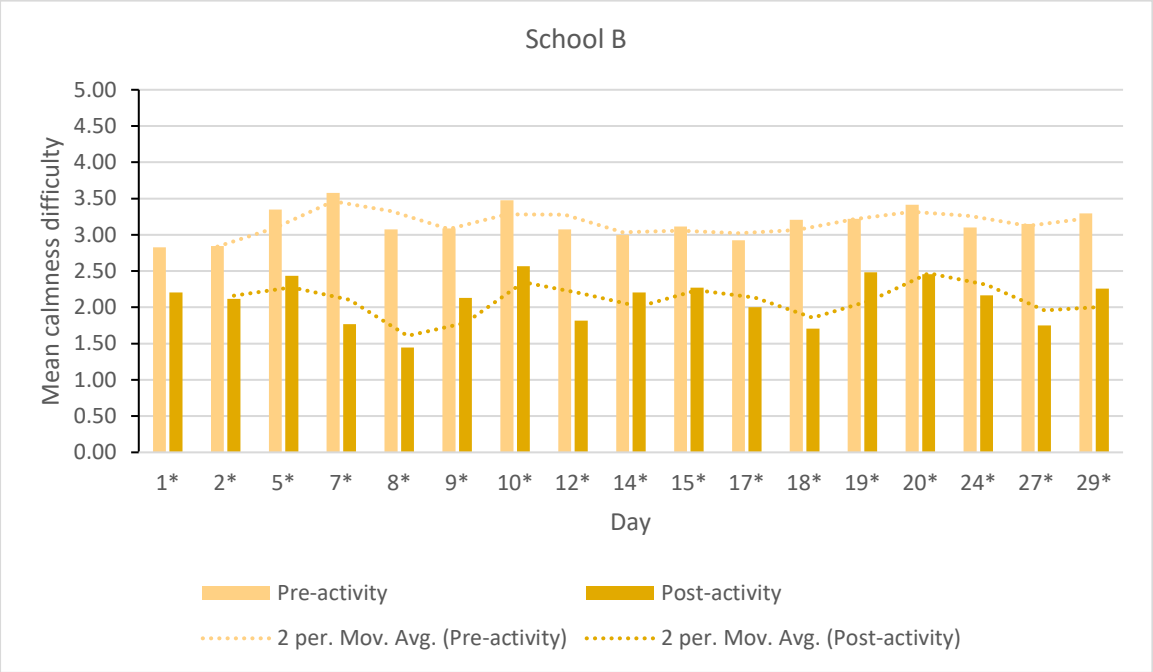
Figure 9. **Changes in calmness over the mindfulness intervention for School A**



Note. Higher values indicate higher difficulties (i.e., tenseness), lower values indicate lower difficulties (i.e., calmness)

* $p < .05$

Figure 10. **Changes in calmness over the mindfulness intervention for School B**



Note. Higher values indicate higher difficulties (i.e., tenseness), lower values indicate lower difficulties (i.e., calmness)

* p < .05

While there were clear improvements from pre-activity to post-activity every day, showing the immediate benefit of mindfulness meditation activities, the data do not show any substantial change in the long-term trend. It has been hypothesised that regular practice of mindfulness via meditation not only improves focus, attention, and wellbeing in the short-term, but through regular practice the skill can become automatically applied in everyday life. For instance, it is thought that regular meditation practice can build the skill to consciously control anxious and distracting thoughts. It is not currently known how much mindfulness practice is required to reach a point where these skills become embedded in daily life. The results from the daily focus and calmness thermometers suggest that students may require more than 6-8 weeks regular meditation practice before these skills become ingrained, which might be observed in a gradual improvement in focus and calmness at pre-activity time each day.

It is recommended that mindfulness continue to be implemented in the schools and further research be conducted to evaluate the long-term benefits of consistent mindfulness practice by students.

Thematic analysis

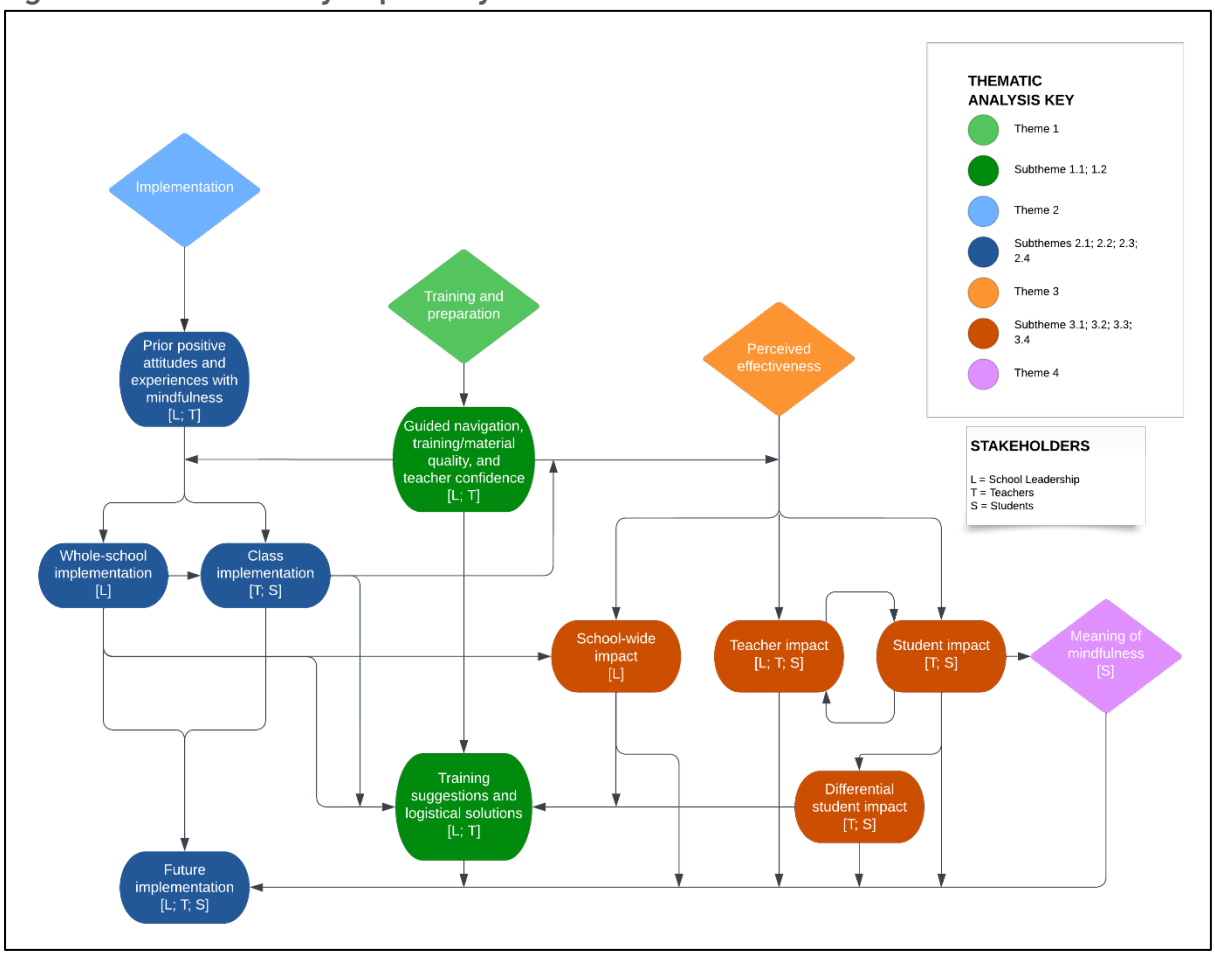
To complement the quantitative assessments, we also conducted interviews and focus groups with school leadership, teachers and students to obtain their qualitative assessments of the program. As school leadership, teachers, and students differed in terms of authority, age, and life experience, there were multiple interpretations of the program, emerging as differences in the themes we identified. However, we did notice an overall convergence in themes between the three stakeholders with one student-specific theme. We identified four primary themes accounting for several sub-themes (see table 3).

Table 3. **Themes and subthemes**

THEME		SUBTHEME	
1	**Training and preparation**	1.1	Guided navigation, training/material quality, and teacher confidence
		1.2	Training suggestions and logistical solutions
2	**Implementation**	2.1	Prior positive attitudes and experiences with mindfulness
		2.2	Whole-school implementation
		2.3	Class implementation
		2.4	Future implementation
3	**Perceived effectiveness**	3.1	Whole-school impact
		3.2	Student impact
		3.3	Differential student impact
		3.4	Teacher impact
4	**Meaning of mindfulness**		

Although we aimed to highlight themes that were relatively distinct from one another, they were not mutually exclusive of one another. In addition, we noticed that themes tended to inform each other, accumulating into future implementation of mindfulness. See figure 11 for pathway diagram.

Figure 11. **Thematic analysis pathway**



Theme 1: Training and preparation

This theme detailed the processes and training provided by MMA, and the perception of its quality via the extent to which stakeholders had guided navigation, followed by any training suggestions, and associated logistical solutions.

Sub-theme 1.1: Guided navigation, training/material quality, and teacher confidence

This sub-theme details the perception of the level of guidance and navigation that MMA has provided to school leadership and teachers throughout the training stage, and the resulting confidence to implement the program. Furthermore, we discuss the perceptions of training quality as well as the quality of materials (e.g., scripts) that were introduced within the training and used throughout the implementation.

Overall, the training was received very well by school leadership and teachers, having commended the structure of the sessions, particularly Mindful Amygdala.

School leadership – "I found the first full day we did [Mindful Amygdala] was really good, I thought that was fantastic…I don't think everyone knew what it meant going into it, but they were willing to go to that first training session, and I got a lot of positive feedback from the staff after that session, because everyone was feeling pretty run down this year and pretty out of sorts. It's been

a really tough year with staffing and collapsing classes because people are away and we couldn't get relief, so we were juggling all the time. So, I think when we all stopped and took a breath and did mindful activities and that day, everyone went 'I feel so much better'... really positive overall, I feel the staff have a got a lot out of the professional learning and training".

School leadership – "My staff said that they really enjoyed the first training session, so it was great, it was really positive I think...two staff members did the Mindful Me professional development (PD), and they said best PD ever, they were so enthusiastic".

Teacher – "I really enjoyed the professional development (PD), and I thought the PD was very well set out, and there was the right balance of information plus practical...we were conscious of wanting to do the right thing by the university but also having the time constraints of the school, and knowing what was coming with that, so that was a bit messy, but as far as the MMA stuff goes, I think we are pretty happy with how it is all structured".

Teacher – "The first training session was interesting, I really enjoyed that...and the off-school training was really nice actually. We should have more of that".

And although the training was noted to change staff's attitudes towards mindfulness, it is worth noting that teachers and school leadership generally anticipated the sense of being overwhelmed when being presented with new information to fit into the curriculum. This might be expected with any alteration to the curriculum, yet the benefits of the program would later combat this initial thought.

Teacher – "The training changed staff's perceptions of mindfulness to a certain extent, not a lot though, because for us teachers anything new becomes overwhelming, and then you say, 'this is something to put in, something on top', so teachers generally think 'oh how am I going to fit this in', that is their first question".

School leadership – "I was aware that not everybody would necessarily be enthusiastic about the idea, maybe because it wasn't something they knew much about, but also because of what we were juggling at the time, and I knew that that could be a concern for staff, because my approach is mostly to protect staff from overload if there is too much going on, but I knew this had the potential to support us in that space".

Unfortunately, there was some confusion further navigating the Mindful Education session and what that means as a whole-school initiative, particularly from School A. This resulted in limited confidence to initially implement the training into the

classroom. However, the concept was eventually grasped and readily implemented in their schools after clarification with MMA.

School leadership – "I feel like there was some confusion with our training when we did the Mindful Education session, because I was told to book two staff meetings, and then they did Mindful Education in one staff meeting, and they said that they had to rush through it. So, I don't know whether they got mixed up and that they were supposed to split it over two and only did it over one, so I am not sure, but we got it in the end".

Teacher – "We had one [Mindful Education] session, but then we didn't plan or do anything in terms of our school and direction, that was the gap. So, after the first training, the next one was to plan as a whole staff on how are we going to implement in the whole school, but that didn't happen for whatever reason…The thing was with the missing gap, I was thinking 'what am I doing?, 'how am I going to do this?', but once I figured it out, I just got the book and picked some stuff in my year level, and once I got it, I did it once, and the kids said 'can we do some more?', and I said 'sure'. After that it was just like riding a bike".

Despite these difficulties, there were encouraging comments about the utility of the provided scripts and its appropriateness for the corresponding lesson.

Teacher – "I think the lessons aligned really well with the particular meditation script. I remember, after I had done Mindful Me PD, I talked to the kids about why they yawn after they have done a meditation, and in that same lesson, we were talking about meditation before you go to bed".

Teacher – "I do like the fact that in some of the scripts, it does say that if your mind is wandering or if you can't concentrate, come back, so I like the way it does that, because you can see kids go 'oh I'll come back'".

Sub-theme 1.2: Training suggestions and logistical solutions

This sub-theme is characterised by teacher and school leadership suggestions to combat the few difficulties experienced during the navigation of the training. Throughout implementation, teachers also noticed what techniques worked and what didn't for particular students, which resulted in the suggestion of a few logistical solutions. They also considered logistical solutions to practical issues.

Specific training suggestions include:

Teacher – "The training gave you a basis, but I myself could have probably done with a bit more training…I would have liked a little bit more prep time just

before we started as well, maybe it was on me that I should have known a little more about what was I was going to be going, because we were given out the books and curriculum, so we went away and had a look at it, and I think I probably needed a bit more time to go through that and actually process some of that"

Teacher – "The hand-brain analogy in the year 5 curriculum was in week 3 or 4, and I actually think the hand-brain stuff needs to come first, because if they understand about the hand-brain and how your brain is actually functioning, and why you get anxious in the first place, then they can almost appreciate better why the meditation is going to work. So, I did move the hand-brain stuff a bit earlier because I read the whole curriculum before we started…I think if we were doing [mindfulness] with each other, and we were practicing with each other I think staff would be ok with [welcoming the opportunity to practice meditation before implementing it in classes]. Maybe if you could do a small group, and each have a turn…I felt like that Professional Development (PD) was quite rushed and I don't know whether it was just because we fitting it into a staff meeting, but I sort of almost feel like if we did the Mindful Amygdala on a school development day when we are all fresh at the beginning of term, I think that both those PDs need to be on that kind of day rather than after school. I don't think after school is a good time to incorporate mindfulness with teachers.

Logistical solutions were then raised regarding students with special needs,

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Teacher – "[For autistic kids] I think that it is better one-on-one or in a smaller group [than a whole class], just because they can find it very difficult to focus especially when there is stuff going on".

…as well as some logistical solutions to school-wide implementation concerns.

School leadership – "The Mindful Education was done at our staff meetings, I think it achieved the outcomes it was designed for, I think most professionals would be better to do during the day rather than after school, but these are the practicalities".

School leadership – Two staff members [did the Mindful Me intervention] …I think it is more effective in the sense of getting everybody in the same space at the same time. I think a concept like mindfulness, if you train one person at the school, and ask them to bring it back and explain it everyone else, I don't think it would be as powerful, which is often a model that schools will try to take because it saves money…everyone needs to have the training for it to be effective, so I guess the benefit of being offsite is that you're in a completely different space to your normal working environment, the disadvantage is some

teachers live around here or further north from here so that is a long way to travel which adds stress to people's lives. It's all relative".

Teacher – "I really think it's a great initiative, but in terms of the direction for the school, I know some schools were saying they had to add it on to their health lessons, and it's a big thing to do that, so unless MMA can come up with something [to accommodate this], that's the real challenge".

Theme 2: Implementation

This theme details the eagerness to implement the mindfulness program during the initial and later stages as a school-wide intervention, as a contained class intervention, and as a future endeavour, having been driven by prior positive experiences with mindfulness. It should be noted that school leadership, teachers, and students differed in their methods of implementation due to the level of power that their position grants them within the school.

Sub-theme 2.1: Prior positive attitudes and experiences with mindfulness

This sub-theme details prior experiences and attitudes towards mindfulness and meditation from both teachers and school leadership, and any previous implementation of mindfulness in their personal lives or in the school before the mindfulness intervention. Both teachers and school leaders exhibited these positive attitudes and behaviours, though the intensity and frequency of mindfulness in their lives varied. Even so, we believe these experiences acted as a catalyst for their eagerness and curiosity to implement the mindfulness intervention in their schools.

School leadership – "Having done a little of mindfulness in my personal life, I think it was just wanting to help the kids get that feeling of calmness and clarity that you can get from the practice. We have kids from a lot of different background at this school; we have a lot of kids with trauma, so it was just wanting to give them some strategies, that would be amazing, but I wasn't really sure, overall, what that would actually look like".

School leadership – "Once you are aware of the idea that you can choose your thoughts, you can't unlearn that stuff. It is just the first step on a journey, and you might move slowly, and you might go off track, but I believe you will always come back, so I saw this as an opportunity to introduce that, I just made an executive decision…I thought this was meant to be….Anyone can read about the brain, but until you have had the experienced of mindfulness, of feeling your body slow down, then you understand the effect".

Teacher – "I had done a little bit of mindfulness, not a lot, I know that it is important but probably didn't think about its impact on students or on children, and also didn't think it would be something the school would possibly take on because we were already so busy with everything else we were doing…We had a staff meeting and the school leadership started the staff meeting with a

meditation session, and I think there was a lot of staff that actually felt the difference before and after".

Teacher – "I always planned to do it, and I knew it would be valuable, but it was the thing I never had time to do".

Teacher – "Before we had mindfulness at the school, I started doing mindfulness and meditation. Probably a month or so, before we started the intervention, so not long. I had been doing yoga at first, and then started trying meditation, but just in brief little bits, so it was new for me when we did the course, but I thought I was on the right track. I felt good…I expected it to work, because I experienced it myself, so I expected it to have some effect on the kids as well".

Sub-theme 2.2: Whole-school implementation

This sub-theme relates to the steps taken to implement the mindfulness intervention in the wider school environment. The stakeholders that elicited the emergence of this sub-theme was school leadership, who detailed what initial and later implementation looked like, along with any thoughts and feelings that arose during this stage.

School leadership implemented the program understanding the interactions between these microsystems (i.e., multiple classes), and broadly distributed information about the mindfulness intervention through various modes of communication.

School leadership – "We had it put in the newsletter and Connect Messages, and I spoke about it a couple of times at the assemblies, and at the P&C and school council, so that would probably be where I got the most feedback, they were all really supportive and liked the idea. They just loved when I spoke at the P&C, they were saying, 'that sounds really good, we are really interested', they were interested to see how the research went, and their kids had been going home and talking about it…We have a high percentage of EALD (English as an additional language or dialect) families, so we made sure that they understood what we are trying to communicate, but they are really engaged".

School leadership – "I communicated verbally, initially, via my reports and at meetings with the P&C and with the board. We did share a parent letter via Connect and our website, and I have probably referenced the Mindful Schools program a couple of times in the P&C, just bringing them up to date with that.

School leadership were also cognisant of the level of integration into the classes and the school as a whole.

School leadership – "I know some staff have had a little go at bits and pieces in their classes. Obviously, the research class has taken it as far as they can,

but we probably haven't done as much this term as we would like, because we haven't started any of the interventions, but we have done the training…I know other teachers had done mindfulness exercises in their classes but I don't know of anyone having picked up and done the actual lessons out of the [mindfulness] book, but I think probably 50% have been doing little sessions with the kids".

School leadership – "I don't think that we have given it a fair crack in terms of a proper, whole-school structured approach, and I even feel like in the first year for a new program, it is just the teacher playing and learning how to use the program and it takes a couple of years to see the impact of that program".

School leadership – "No [there were not any negatives associated with the mindfulness program], honestly no, I know the teachers mentioned they had kids that maybe wanted to opt out, and they just left it as an opt-out process so there was no pressure, but they weren't disruptive to anyone else joining in. And no parents came in saying they were upset or worried or anything like that, and none of the teachers did either".

School leadership – "I wanted everyone try something, but we all have different capacities, so I don't ever try to presume where people are at one point in time…so try something and we will go from there, and everyone has tried something, and most people have really gotten into it".

School leadership – "We now do the mindfulness practice at the beginning of every staff meeting, and I ask the staff who wants to run it. I have only done one, since I put it out to staff, because I don't want it to just be me".

Sub-theme 2.3: Class implementation

This sub-theme specifies the processes of implementation within the setting of the selected research classes (i.e., a contained microsystem). Teachers and students prompted the emergence of this sub-theme, detailing their thoughts and feelings that arose during the initial and later stages, the techniques they used, and what time of the day they usually practiced mindfulness. Additionally, students implemented mindfulness under direct instruction within the class microsystem but exhibited some initiative to implement it within their home lives as well.

Teachers commented on the smoothness of initial implementation, and any thoughts and feelings that arose during this time, as well as how their practice has evolved over time.

Teacher – "It was a bit clunky to start with, and there were a couple of kids that were like 'what are we doing? Why are doing this?', but then once they got the activities, and sort of understood more about why they were doing it, they

were on board, and it was easier after that…I was probably a bit anxious [to start off with], but then it got easier. As I was getting more comfortable with it, because we were doing similar things, and then the kids got more comfortable with it as well, and it became second nature".

Teacher – "One of the things I reflected on is that not everybody has done this sort of thing before, the way that you deliver a meditation session, that is something that evolves with practice, the first time you are kind of reading it, but I feel like I have gotten better with more practice…This morning I ran one in the class without a book, as I had to go and sit in there for 5 minutes, and I thought 'well might as well do a meditation session'".

They also mentioned parents' receptiveness to the program,

Teacher – "I think it has been well received by the parents, I have had a lot of parents that were saying 'this is really great, can you tell me more about it', just in passing…We didn't really have any negative feedback from parents besides the incidental, 'oh, what is this about', certainly no negative feedback".

Teacher – "I think parents have heard this is kind of the new way, they have heard mindfulness and meditation before, and a lot of high schools are already doing that sort of thing, so they have heard about it, and they know this is the way, so they were pretty receptive".

…as well as students' comfort with the program and the student-teacher relationship building that took place.

Teacher – "I spoke to a couple of the kids prior to doing the first lesson, and I said 'you have let me know that you are anxious about something, could I bring that up as an example because then I can explain to the class how mindfulness could help that particular anxiety.' So, the kids were very open, and they were very willing to talk about what they are anxious about. And there was a lot of relationship building that went on with it".

Teacher – "I found that as time went on, I could read the kids better as well, and what they needed at the time".

Teachers and students also talked about *what* specific techniques they used during implementation, and their use of analogy to aid in students' understanding of mindfulness.

Teacher – "One of the things we did was talk about was their neural pathways, and how the whole idea behind meditation is that you are strengthening the prefrontal cortex and the neural pathways between that and the amygdala and hippocampus. I had the kids draw the neural pathways and explain, like they did in the Mindful Me, about how it is like a bush track and the more you walk over that track, the stronger the track becomes, and we can discourage the amygdala and hippocampus talking together by not using that [negative] track and having it all grow over. These kids live in the bush, they 100% understood that analogy, and that for me was a bit of a turning point with the kids I think. I think some of the boys were still a bit sceptical, and I think that when I actually broke it down, they were much more receptive after we had that conversation because it was from a logical point of view".

Teacher – "We started out with them in their desks just finding a comfortable space and then moving around. Then we progressed to them being on the floor and finding a comfortable space and lying down. We even did some outside sitting down under the shade, so it did move around. When we started, it was a bit more structured, and then it was looser, so it did change".

Teacher – "I have done Mindful Posture, Body Scan, Cloud Watcher, Fish Watcher, Car Watcher, we did Mindful Objects, and then I did the Hand-Brain model with them a couple of times, and we did Tricky Situations as well, and that is as far as I have got".

Teacher – "We had done rainbow breathing, we have been doing rainbow breathing after lunch".

Teacher – "The first couple of weeks have been learning about how to get in a mindful posture, and we do it before tests as well".

Teachers also mentioned *when* and *why* they implemented a mindfulness activity.

Teacher – "I did anything from 5 minutes to 15 minutes, sometimes in 5 minutes, they could actually get a lot out of it, so it wouldn't take a lot".

Teacher – "I did when we thought we needed it. So, it wasn't always first thing in the morning, sometimes on a Friday morning. Sometimes on a Thursday, I would do it in the morning after recess and after lunch, really depending on how the kids were. I always did one right before we did the mindfulness lesson in our health lesson, because I wanted to be able to talk to them about the feelings they were getting from the meditation. It just seemed to be most sensible thing to do. Sometimes we did it after their health lesson, depending on what particular script it was. We would think about and reflect on what we did in the session… So, I don't know if it is about the amount of time, I think it is

about reading your kids and seeing when they need their mindfulness, and like I said, it might be 3 times a day because that is the class of kids you have".

Teacher – "Normally after recess, after lunch sometimes. Because of research purposes, I did it every day, so I just timetabled it into my schedule. We had tests as well, and when we had discussions, the kids said, 'we would like to do it before testing, before challenging work'. So, before each test, we did a mindfulness activity to help them calm down, because a couple of them have test anxiety, so I hope that would have helped them".

Teacher – "We recently had our Year 5 speeches for the Year 6 captaincy roles, and that was one of the things that I took them through which was that if you're going to get nervous when you stand up on that podium when you deliver your speech, I'd say 'we know how to do this, we know how to calm those anxious nerves', and they did, and that is something I probably wouldn't have specifically taught them how to do, had we not have done mindfulness".

Student – "We usually do body scans, that's the main thing, it's probably the teachers' favourite, but my favourite was the one we did with the rock, the mindful exploration".

Student – "Last night for the graduation thing, before we went on, I was super nervous, so I just did some mindfulness, and did deep breaths".

Student – "At times we don't really need it, but sometimes we really need do, like if drama happens…No I don't find it too much, if I can control when to do it, I would do it after recess or lunch".

Student – "I use it before my soccer games, I just breathe to calm my thoughts down to get rid of the nerves…It helps me forget about everything, and to not care about the stakes, and just play".

Student – "I use it to go asleep, sometimes, I use it to clear my mind, so I am ready to go to sleep".

Sub-theme 2.4: Future implementation

This sub-theme details plans to implement the mindfulness program into school schedules, as well as general efforts to be more mindful. This sub-theme acted as the final phase of consideration for school leadership, teachers, and students, and was a converging point for previous school-wide and class implementations; training suggestions and logistical solutions; school-wide, teacher, class, and differential student impacts; as well as the development of the meaning of mindfulness.

School leadership and teachers evidenced eagerness to implement mindfulness in the future, whether that be the program offered by MMA or general attempts to practice mindfulness.

School leadership – "Yes absolutely, we are keen to implement it a bit more thoroughly, because it feels like we just had a play, and not everyone has had a play yet … we just don't feel like we have caught our breath to even sit down and have a proper conversation about what it looks like. We did the planning session with MMA, and I guess that was the big sort of brainstorm, and we just need to now narrow it down to 'what does this look like in our school next year?' Our plan is to follow what was recommended at the last training, which was to do a couple of lessons each term out of that program, but then you implement the mindful activities every day, the little five-minute vignettes, so our plan is to have that in our health scope and sequence".

School leadership – "Term one is sometimes better to wait and let everything settle, and start in term two, but it is always good to pick up something new at the start of year. But having said that, the way we have done it to get all the training in the back half of the year, means that at the beginning of next year, we can just pick it up and run with it, so there are some advantages even though it doesn't feel like it in the moment".

School leadership – "I think it is a good thing, I'd like to think that if you wanted to use us in the future, then we would be happy to be involved, because I think the information you get back would be very powerful".

School leadership – "We are hoping that we might even get, it might be ambitious, but we might get 80 kids through Mindful Me in a year, because if we can run two groups per term across 4 terms then it might work out".

School leadership – "Absolutely we will be continuing with mindfulness next year, so we have got the 0.2 FTE, so that's $25,000, because what I am aware of is that I won't be here forever, so it has to be embedded. What that means is that if you got FTE attached to it, if you have got in your business papers, if it's part of your priorities, then I can leave and hopefully new school leadership can say, 'I want to work at that school', so that is what I am hoping."

Teacher – "I am feeling confident about it now that I know how it goes and what to do, and what resources I can draw from. I look forward to doing it in the future. Even the kids got used to doing it, it just becomes part of your everyday".

Teacher – "The positive side of this is that I can start next year in my different class, and I can actually hit the ground running because I know what I am doing, and so it has given me the kick up the pants that nobody else has had".

Teacher – "Yes, we can [implement mindfulness next year]…the thing is that it shouldn't be boring, you have got to change up the activities, you can't keep doing the same thing and I found that after three or four days, I would change

to something else, so that I would give the students enough time to practice so it is familiar to them and then I switch it up, so you just got to have enough".

Furthermore, students generally noted that they would be willing to practice mindfulness in the future and share it with others. There was also an element of stigma attached to practicing mindfulness in the future by the School A group via the mentioning of secrecy surrounding the practice, though this was understated. Additionally, we noticed that the School A group was more enthusiastic about the potential of mindfulness than the School B group, possibly due to the School A class receiving a greater benefit with emotional regulation and positive mental wellbeing.

Student – "It will be good, I don't think everyone help be 'hurray' about it, but they were secretly excited, like secretly happy we are doing it again".

Student – "I would go to the class that does mindfulness every day, because that class would be well disciplined, well behaved and committed to do it every day".

Student – "I would like to share it with other people…I think breathing would be really good for future tests as well".

School leadership also commented on their openness to implement mindfulness during their assemblies and staff meetings.

School leadership – "I am open to the idea [of implementing mindfulness at school assemblies], but I am just not sure how it would work with that many people, I guess I could try and see what happens…I feel like it would be better to do mindfulness in the classroom first, and then bring it to a bigger space".

School leadership – "We haven't implemented it in assemblies yet, I don't want to rush things, but I like to think it will happen down the track".

School leadership – "We haven't implemented mindfulness in staff meetings yet, but we have talked about it, so we should".

Theme 3: Perceived effectiveness

This theme describes the school leadership's, teachers', and students' perceptions of the effectiveness of the mindfulness intervention, with reference to the impacts school-wide, on teachers and students, as well as specific types of students (e.g., students with special support needs).

Sub-theme 3.1: School-wide impact
This sub-theme details the impact of the mindfulness intervention at a school-wide level (i.e., via the implementation in multiple classes), and emerged via information provided by school leadership.

School leadership in both schools noted that they did not observe an apparent overall effect considering their leadership position within their schools, however, they did mention positive impacts in the contained environment of the selected classes.

School leadership – "I don't think I have specifically noticed a change overall, but I know [the selected teacher] has said they have noticed a huge difference in the classroom…The teachers said they noticed it helped the kids focus and work better, and they said that the kids liked it, and they were asking it do it. So, for the teachers that had been doing it, they all said that when the students came in after recess and lunch, they say 'oh can we do that'. But I can't think of an amazing success story just yet".

School leadership – "I would say no, I haven't seen a change in the kids' behaviour, from my perspective, the teachers will answer differently, only because my usual interactions with the children are pretty positive…it's probably too soon, but I think probably what I would see here over time is improvement of kids with low levels of anxiety and depression…perhaps not poor behaviour, because that is not a major issue here, so I think the Mindful Me would be amazing for it".

As school-wide implementation in both schools is preliminary and not at its maximum potential, this implementation would have almost certainly influenced the impact school-wide. School A and School B differed in terms of school-wide implementation, the school-wide impact is assumed to have differed as well between them, but we could not qualitatively capture this. Regardless, we tentatively assert that the school-wide impact is lacking due to preliminary school-wide implementation.

Sub-theme 3.2: Student impact
This sub-theme details the impact of the mindfulness intervention on students' wellbeing, with reference to improvements in work engagement/productivity, focus, calmness, effective teaching, and behaviour management. Teachers and students elicited the emergence of this sub-theme, although teachers better acted as an unbiased observer of the effects on students.

Teacher – "I noticed that the kids were more engaged after we had done mindfulness, and I think they noticed as well, because I had comments from kids saying, 'I feel so much better now, and we are ready to do work'. We would do spelling most days after a meditation and it was just so calm and quiet, it actually surprised me".

Teacher – "The students were a lot more focused; I think that is the key, and they were engaged in what they were doing. I think there was direct correlation there…I think our time was more productive, even though you might have to take out 10 minutes to do meditation, that 10 minutes meant that you added time to your actual learning and teaching time".

Teacher – "Behaviour management as lessened, considering at this time of the year, normally kids have gone off the rails, and me as well because when I don't practice, everything feels as if it is jumping at me, and then plus the kids are aware, so I try to use mindfulness as I am speaking, and I say, 'now are you mindful that you did that now? Are you present now? Or are you thinking about something that happened before, or what happened just now?', so I am using that language as I talk to them…I think on the whole, this is the best end-of-year I have had, I have had year 5/6 for three years now, and this is the best one so far as they are not off the rails, they are great for me".

Teacher – "What happens is that during transitions, when they come from somewhere, recess and lunch, that's the challenge, because something might have happened out there and that's where the problems are usually, so that's when I try to do mindfulness so that lessens the problem so that they can focus on the now, so it definitely has helped".

Teacher – "The kids are actually using it at home as well, when they have homework, and this was in week one itself, and I am getting back more homework".

Teacher – "The ones who were open to trying, I think by the third lesson/day, they were fine. Especially for boys, because boys are quite hyper, and for them, they actually enjoyed it, and they could feel things, they were feeling tightness in their legs and head, and their watches were telling them actually that their heart rate is lower, because some have smart watches as some are athletes, so that was great. And funnily enough, when I did the body scan, there was a short body scan, and there was a longer one, and was quite a few that said 'the longer one is better', I thought that this is so long that they would lose interest, but they actually said that was better because they had more time to relax, so I included that in the next few days. So, I would pick one activity and do it for the whole week or three or four days".

The subjective views from teachers on the improvement in student work engagement, focus, and calmness are supported by the quantitative data we collected previously. However, we were not able to quantitatively determine if behaviour management and effective teaching time has improved, as teachers found it difficult to accurately report the amount of time that they spent on effective teaching and on behaviour management. Irrespective of this, we provide subjective accounts of their improvement.

Students commented on the benefits they experienced, not just within the class setting, but at home as well. Mindfulness was stated to be good for concentration, temper management, mind-wandering, resolving interpersonal tension, sitting still, and relaxation. It should also be noted that the School A group was more responsive to the intervention and more willing to discuss any benefits of the mindfulness.

Student – "Yes, it has helped because I focus more, and I understand the sounds around me, and it helps me concentrate for tests and get into the zone to do the tests or start a lesson".

Student – "It helped not just in class but also out of class, like whenever I get mad, angry, or sad, I just breathe and use the techniques I learnt from mindfulness, and it helps me calm down".

Student – "After mindfulness, our teacher asks us a question when we were doing mindfulness if our brain wanders and thinks about something else, and we if get back on track and breathe, and my answer would always be yes because my brain always wanders but then I always found our teacher's voice to help me come back on track".

Student – "Mindfulness helps me to forget about the primary school dramas at lunch and getting me prepared for the next lesson ahead of me…It is preparing me by clearing my mind and giving me a fresh start".

Student – "It helps you to stay still…It gives you time to relax".

Student – "It helps concentration which then helps you work".

However, there were some students that experienced fatigue because of mindfulness, but this seemed to be tied to the Thought Watcher activity in particular. This should be considered in the context of being mentioned by only one student.

Student – "The only minor thing I have is that sometimes mindfulness makes you sleepy and not prepared".

Student – "It was the thought watcher that made me very tired…And the mindful posture at the very start tired also made me quite tired, but that was probably because we had no clue what we were doing at the start…For the mindful posture, in a good [sleepy] way, and the thought watcher in a bad [sleepy] way".

Students also mentioned that after recess or lunch, or after they have been running around was the most effective time to do mindfulness, instead of during the morning.

These comments support our previous finding that a mindfulness activity at 9:05am on day 11 at School A did not yield any significant improvements in focus.

Student – "After recess or lunch is the best time…Never the start of the day, not really in the morning…We are still focussed in the morning".

Student – "We are focussed from getting up and we are still ready, so there is no point doing mindfulness when we are ready to go, we are concentrated".

Student – "Mindfulness has really helped me, but it always depends on the time, when and how long".

Student – "Our focus improves in the afternoons, because we are all hot and sweaty and not focussed, and it just helps us".

Student – "I think mindfulness would be better after lunch because it is nearing the end of the day, and people are losing their steam".

Student – "After lunch is a good time to do mindfulness…After you have been running around and need to relax".

Students also indicated that pre-existing fatigue, negative events within their family lives might influence the effectiveness of mindfulness in class. Furthermore, some asserted that mindfulness is mainly necessary when something negative is happening in their lives. Therefore, it could be understood that mindfulness is effective when there is a specific personal rationale to implement it.

Student – "60% of students like mindfulness, and 40% don't like mindfulness, but it changes from day-to-day, it depends on if some people are really tired, or maybe something has been going on in their families".

Student – "I found if something bad has happened, then it is easier to meditate, because then you have something to get out of your mind, you are just sitting there just thinking about random things".

Ultimately, students stated that mindfulness is effective overall, but it took one to two weeks to see an effect and commented on some techniques they found particularly helpful.

Student – "It took like three of four days for every day to get used to mindfulness, to get the hang of it, but not really changing it…but it takes about a week to two weeks to see a difference".

Student – "Sometimes when I have a bad thought, I get a book and a pen, and I walk around trying to find the positive of a thought and I write it down, and I think mindfulness has helped".

Student – "Belly/body breathing, really helped".

This sub-theme discusses the intended psychological benefits of mindfulness (e.g., improvement in focus), but we also considered the connection from this sub-theme to the construction of meaning surrounding mindfulness (see Theme 4).

Sub-theme 3.3: Differential student impact

This sub-theme accounts for the varying degrees of impact that the mindfulness intervention has on different types of students, particularly those with neurodevelopmental disorders such as autism spectrum disorder (ASD), and attention-deficit/hyperactivity disorder (ADHD). Teachers and students elicited the emergence of this sub-theme.

Teachers recollected the difficulties experienced by students with these disabilities, as well as significant anxiety and trauma-related problems.

Teacher – "I did have one who is an anxious child, who got quite emotional in response to the mindfulness. We would talk about feelings and anxiety and why we were doing this, and this particular child who has suffered from anxiety for quite some time did bring up, 'this is my life' and was quite emotional about that and ended up telling people a bit more about that…if that had continued I would probably have thought ' I don't know if this is worth them having this big emotional response', but that did improve. But no one else had a strong negative response to the mindfulness, however."

Teacher – "I feel I like this child is happier in themselves, and they got up and did a leadership speech. I don't know if they would have the confidence to do that at the beginning of the year, so whether that is a maturity thing or a mindfulness thing, or a bit of both, but I feel like they probably benefitted quite a lot from it".

Teacher – "There are two students who have had some sort of trauma in their lives…but yes, they can benefit from it 100%, if they can access it. There are other students in the school who have come from more traumatic backgrounds than these two, and it is hard getting them to engage in the mindfulness".

Teacher – "Particularly kids that have a hard time focussing, some of the ADHD kids that we have across the school, after they have done a session of mindfulness, what is coming back from teachers, is that their preparedness to learn is much higher and therefore it is not a loss of time, probably if anything, a gain in time…We have five kids who have ADHD and are being medicated,

along with kids with autism, they probably found it really hard to focus and really hard to engage with the mindfulness".

They then went on to mention that they saw an improvement within these students around week 7 or 8 of the intervention, particularly those with ADHD.

Teacher – "I think probably by week 7 or 8, it started to work in those with ADHD, it took them probably another 3 weeks again to be really involved, and there was one or two that didn't engage.

A student also evidenced a varying effect because of their disability.

Student – "I mean it hasn't helped me concentrate much for me, but it's probably because I am dyslexic. I think it would take longer to get the hang of mindfulness for different types of students".

And another student felt that boys received more of a benefit than the girls.

Student – "I think more boys have changed compared to the girls … the boys are just more calm and more ready to learn, and better at being quiet and respectful of other people wanting silence and to work … They deal with problems more calmly and easily compared to before, where they would just blow up and leave the room".

Sub-theme 3.4: Teacher impact

This sub-theme details the impact of the mindfulness intervention on teachers' wellbeing, calmness, and openness to mindful experiences. Teachers and students elicited the emergence of this sub-theme.

School leadership – "The job is huge, the job is absolutely enormous, and partly because their expectations are unrealistic and that comes from the community and the department, and teachers are their own worst enemies…and the system works on good will, because it wouldn't work otherwise, and I know good will only goes so far".

Teachers mentioned their experiences with mindfulness during the intervention and the benefits it has brought to their lives. They also commented on how this experience has exceeded their expectations.

Teacher – "I am actually surprised how much it has impacted my personal life, like a year ago I would never have thought 'I am going to get in the car and just sit there and do some breathing', whereas now I am doing that, so it has made a difference. It is something I have always had in my mind, and that it is something I want to pursue, and I know that it is useful, so I want to keep doing it, but life just gets in the way, and now I can come back to this [because of the mindfulness intervention], so it is kind of a reminder".

Teacher – "I really enjoyed it. It really made me want to put time aside to do that for myself, but I have to admit I haven't actually done that yet, however, when I say that, I mean I haven't done it at home yet, but there are times during the day where I will, it might just be when I walk over to the shops, I will make a conscious effort to go 'oh the sky is blue today, there is a nice breeze blowing,' so it was mindfulness without having to set aside time to be mindful".

Teacher – "I am much calmer, I am all for mindfulness and meditation, and being present, it definitely helps you to appreciate life and appreciate what is happening now".

Students also noticed this change within teachers and highlighted the reciprocal relationship between teacher and student impacts. As such, the benefits experienced by students are likely to positively benefit the teacher as well.

Student – "It also helps the teacher as well because it helps to calm us down, so she can explain things to us…She doesn't have to spend every second telling people not to do bad things".

Student – "It has helped our teacher a lot, she doesn't get cross at us as much because we are calm, well most of us".

Theme 4: Meaning of Mindfulness

This theme is student-specific, whereby students have commented on the development of meaning with reference to mindfulness. Compared to school leadership and teachers, students, overall, are less likely to be familiar with mindfulness and meditation, and the benefits that they bring. Therefore, this theme represents the social construction of mindfulness at an early age, stemming from their perception of its effectiveness.

When asking students what mindfulness means to them, they responded in the following ways:

Student – "Mindfulness means helping you relax and getting calm when I am angry".

Student – "I think mindfulness is about paying more attention to the surrounding world, and focusing on your mind, and keeping you mentally fit I think".

Student – "I think mindfulness trains your mental side of your body, so it helps you really focus to your surroundings, to other people, to different sounds, and I think it just helps your situation to relax and focus".

Student – "A good way to relax…A way to relieve stress and anxiety".

Student – "It helps release unneeded emotions and thoughts, like worrying thoughts such as worries over a test, stress, and anxiety in general".

By constructing this meaning at an early age, paired with the benefits that were felt by students, their receptiveness to mindfulness and the frequent engagement in the practice is likely to improve.

Suggestions and future research

While the overall results of the pilot test were positive in all respects, there were some areas where issues were identified, or suggestions were made that could improve future implementations of Mindful Education. Firstly, it is recognised that there were some specific circumstances that impacted this study that would not normally be expected to occur. A wave of COVID-19 infections impacted both teachers and trainers, with training schedules having to be amended with limited availability of trainers due to COVID-19 infections, and schools being impacted with some staff away with COVID-19 infections during training days. These are likely to have had an impact on students and the entire school community regardless of the Mindful Education intervention.

1. *Fitting training into school schedules*. Schools are limited by industrial agreements around the scheduling of professional development for school staff. Generally,

schools only have capacity for one professional development day per term. The first module in the Mindful Education pathway, Mindful Amygdala, was well received by both schools. The second module, Mindful Education, was more difficult to schedule, with lower levels of attendance and engagement of school staff.

While it is recognised that neither MMA nor individual schools have the capacity to alter these schedules, a suggestion has come forward that a staged implementation over two terms may have benefits. For consideration, Mindful Amygdala could be offered at the beginning of a term to the entire school staff. For the first term, teachers could have some flexibility to phase in the introduction of mindfulness to their classrooms, while a selected number of teachers are identified as mindfulness champions to begin the mindfulness implementation in selected classes. Mindful Education could then be conducted at the beginning of the subsequent term, at which stage, the school could embrace a school-wide adoption of mindfulness practice.

2. *Developing practical skills in mindfulness activities*. While the Mindful Amygdala training provided school staff with detailed knowledge of the neuroscience underpinning mindfulness and clear knowledge of the MMA curriculum, some teachers without prior experience of mindfulness and meditation would have benefitted from further professional development opportunities in how to conduct meditation activities with their classes. It is recommended that consideration be given to providing additional training opportunities for school staff to practice delivering mindfulness activities in a small group setting with other teachers prior to going into the classroom.

It is recommended that further research be considered to investigate the benefits of implementing mindfulness over a longer period, of at least one year, with a larger number of schools and students. It is recommended that a randomised controlled trial design is employed with a control or comparison group. Additional research over an extended period could also consider the benefits to students' learning and academic performance, including impact on NAPLAN test scores, as well as assessing whether mindfulness practice has a positive impact on teachers' own wellbeing. It is also beneficial to assess potential confounding variables related to the participant such as teacher's expectation bias, as well as student's self-reflective ability, reading ability, and social desirability.

Conclusions

We conclude that the pilot study is a successful and feasible attempt to investigate the effectiveness of MMA's Mindful Education framework in primary schools. The School A class, specifically, saw significant improvements in total difficulties, conduct problems, hyperactivity, peer problems, prosocial behaviour, functional impact, emotional suppression, school connectedness and engagement, positive mental wellbeing, inhibitory control and attention, as well as daily focus and calmness. School B also saw significant improvements, specifically in total difficulties, emotional problems, hyperactivity, prosocial behaviour, functional impact, school connectedness and engagement, as well as daily focus and calmness. And although both schools clearly benefited from the intervention, the School A class seemed to experience a larger positive impact, given that they had significantly higher difficulties, and emotional dysregulation, as well as lower positive mental wellbeing (See Table 4).

The training provided by MMA was well-received, but with a few setbacks, leading to training and logistical solutions by staff. Mindfulness was eagerly implemented within the class, having been driven by prior positive attitudes towards mindfulness by school leadership and teachers. However, school-wide implementation varied. Regardless, eagerness to implement the program in their schools in the future remained strong due to the perceived effectiveness of mindfulness as evidenced by school leadership, teachers, and students themselves. In addition, there was also evidence of a benefit to teachers' wellbeing, as well as differential impacts for different groups of students (e.g., those with ADHD). Lastly, we highlighted students' positive construction of meaning surrounding mindfulness.

Table 4. **Improvement in each measured variable**

ASSESSMENT	SCHOOL A	SCHOOL B	COMBINED
STRENGTHS AND DIFFICULTIES			
Emotional problems			
Teacher-reported		✓	✓
Student-reported			
Conduct problems			
Teacher-reported	✓		✓
Student-reported			
Hyperacitivty			
Teacher-reported	✓	✓	✓
Student-reported			
Peer problems			
Teacher-reported	✓		✓
Student-reported			
Prosocial behaviour			
Teacher-reported	✓	✓	✓
Student-reported			
Strengths and Difficulties TOTAL			
Teacher-reported	✓	✓	✓
Student-reported			
Functional impact			
Teacher-reported	✓		✓
Student-reported			
EMOTIONAL REGULATION			
Emotional reppraisal	✓		
Emotional suppression			
CONNECTEDNESS/BELONGINGNESS TO SCHOOL			
School connectedness	✓	✓	✓
School engagement	✓	✓	✓
MENTAL WELLBEING			
Positive mental wellbeing	✓		
EXECUTIVE FUNCTIONING			
Inhibitory control and attention	✓		✓
Goal-directed task-switching			
DAILY REFLECTION			
Focus	✓	✓	**n/a**
Calm	✓	✓	**n/a**

Appendices

Table A1: **Descriptive statistics of students and teachers participating in the pilot study**

Variable	School		
	School A	School B	Combined
Students			
Sample size	23	30	53
Age – average	11.2 years	10.8 years	11.0 years
10 year olds	5 (22%)	9 (30%)	14 (26%)
11 year olds	9 (39%)	18 (60%)	27 (51%)
12 year olds	9 (39%)	3 (10%)	12 (23%)
Teachers			
Sample size	6	18	24
Years teaching experience			
0-5	0 (0%)	1 (6)	1 (4%)
6-10	1 (17%)	3 (17%)	4 (17%)
11-20	1 (17%)	2 (11%)	3 (13%)
21-30	2 (33%)	8 (44%)	10 (42%)
31+	1 (17%)	4 (22%)	5 (21%)
Prior mindfulness implementation?			
No	1 (17%)	8 (44%)	9 (39%
Yes, 1-2 days a week (%)	3 (50%)	9 (50%)	12 (52%)
Yes, 3-4 days a week (%)	1 (17%)	1 (6%)	2 (8%)
Yes, everyday of the week (%)	0 (0%)	0 (0%)	0 (0%)
Time spent on prior mindfulness			
Once a day (%)	2 (50%)	10 (100%)	12 (86%)
More than once a day (%)	2 (50%)	0 (0%)	2 (14%)

Table A2: **Categorisation of students' strength and difficulties pre-intervention**

Variable	School					
	School A		School B		Combined	
	Teacher	Student	Teacher	Student	Teacher	Student
Emotional problems	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Close to average	14 (61)	14 (61)	24 (80)	21 (70)	38 (72)	35 (66)
Slightly raised	3 (13)	2 (9)	0 (0)	3 (10)	3 (6)	5 (9)
High	1 (4)	3 (13)	1 (3)	2 (7)	2 (4)	5 (9)
Very high	5 (22)	4 (17)	5 (17)	4 (13)	10 (19)	8 (15)
Conduct problems						
Close to average	12 (52)	17 (74)	28 (93)	24 (80)	40 (75)	41 (77)
Slightly raised	6 (26)	1 (4)	1 (3)	2 (7)	7 (13)	3 (6)
High	1 (4)	4 (17)	0 (0)	1 (3)	1 (2)	5 (9)
Very high	4 (17)	1 (4)	1 (3)	3 (10)	5 (9)	5 (8)
Hyperactivity						
Close to average	8 (35)	14 (61)	25 (83)	19 (63)	33 (62)	33 (62)
Slightly raised	5 (22)	4 (17)	2 (7)	2 (7)	7 (13)	6 (11)
High	10 (43)	2 (9)	3 (10)	5 (17)	13 (25)	7 (13)
Very high	0 (0)	3 (13)	0 (0)	4 (13)	0 (0)	7 (13)
Peer problems						
Close to average	6 (26)	16 (70)	29 (97)	20 (67)	35 (66)	36 (68)
Slightly raised	9 (39)	1 (4)	0 (0)	5 (17)	9 (17)	6 (11)
High	4 (17)	4 (17)	1 (3)	4 (13)	4 (8)	8 (15)
Very high	4 (17)	2 (9)	0 (0)	1 (3)	5 (9)	3 (6)
Prosocial behaviour						
Close to average	15 (65)	15 (65)	29 (97)	24 (80)	44 (57)	39 (74)
Slightly lowered	3 (13)	4 (17)	0 (0)	3 (10)	3 (6)	7 (13)
Low	2 (9)	3 (13)	0 (0)	3 (10)	2 (4)	6 (11)
Very Low	3 (13)	1 (4)	1 (3)	0 (0)	4 (8)	1 (2)
SDQ – TOTAL						
Close to average	6 (26)	14 (61)	26 (87)	23 (77)	32 (60)	37 (70)
Slightly raised	5 (22)	4 (17)	3 (10)	2 (7)	8 (15)	6 (11)
High	2 (9)	0 (0)	0 (0)	3 (10)	2 (4)	3 (6)
Very high	10 (43)	5 (22)	1 (3)	2 (7)	11 (21)	7 (13)
Functional impact						
Close to average	9 (39)	11 (48)	26 (87)	20 (67)	35 (66)	31 (58)
Slightly raised	6 (26)	4 (17)	1 (3)	3 (10)	7 (13)	7 (13)
High	5 (22)	2 (8)	2 (7)	1 (3)	7 (13)	3 (6)
Very high	3 (13)	5 (22)	1 (3)	3 (10)	4 (8)	8 (15)

Note. N = number of participants assigned to each category.

Table A3: **Categorisation of students' strength and difficulties post-intervention**

Variable	School					
	School A		School B		Combined	
	Teacher	Student	Teacher	Student	Teacher	Student
Emotional problems	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Close to average	16 (70)	13 (59)	27 (90)	23 (79)	43 (81)	36 (71)
Slightly raised	3 (13)	4 (18)	1 (3)	2 (7)	4 (8)	6 (12)
High	0 (0)	2 (9)	1 (3)	1 (3)	1 (2)	3 (6)
Very high	4 (17)	3 (14)	1 (3)	3 (10)	5 (9)	6 (12)
Conduct problems						
Close to average	17 (74)	18 (82)	29 (97)	25 (86)	46 (87)	43 (84)
Slightly raised	3 (13)	1 (5)	0 (0)	0 (0)	3 (6)	1 (2)
High	3 (13)	2 (9)	0 (0)	1 (3)	3 (6)	3 (6)
Very high	0 (0)	1 (5)	1 (3)	3 (10)	1 (2)	4 (8)
Hyperactivity						
Close to average	10 (44)	12 (55)	28 (93)	17 (59)	38 (72)	29 (57)
Slightly raised	6 (26)	3 (14)	1 (3)	5 (17)	7 (13)	8 (16)
High	2 (9)	4 (18)	0 (0)	1 (3)	2 (4)	5 (10)
Very high	5 (22)	3 (14)	1 (3)	6 (21)	6 (11)	9 (18)
Peer problems						
Close to average	9 (39)	15 (68)	28 (93)	19 (66)	37 (70)	34 (67)
Slightly raised	9 (39)	3 (14)	1 (3)	3 (10)	10 (19)	6 (12)
High	3 (13)	2 (9)	1 (3)	5 (17)	4 (8)	7 (14)
Very high	2 (9)	2 (9)	0 (0)	2 (7)	2 (4)	4 (8)
Prosocial behaviour						
Close to average	19 (83)	17 (77)	29 (97)	24 (83)	48 (91)	41 (80)
Slightly lowered	2 (9)	1 (5)	0 (0)	2 (7)	2 (4)	3 (6)
Low	1 (4)	3 (14)	1 (3)	2 (7)	2 (4)	5 (10)
Very Low	1 (4)	1 (5)	0 (0)	1 (3)	1 (2)	2 (4)
SDQ - TOTAL						
Close to average	10 (44)	13 (59)	29 (97)	19 (66)	39 (74)	32 (63)
Slightly raised	3 (13)	2 (9)	0 (0)	6 (21)	3 (6)	8 (16)
High	4 (17)	2 (9)	0 (0)	1 (3)	4 (8)	3 (6)
Very high	6 (26)	5 (23)	1 (3)	3 (10)	7 (13)	8 (16)
Functional impact						
Close to average	12 (52)	13 (59)	29 (97)	19 (68)	41 (77)	32 (64)
Slightly raised	5 (22)	4 (18)	0 (0)	4 (14)	5 (10)	8 (16)
High	6 (26)	1 (5)	0 (0)	2 (7)	6 (11)	3 (6)
Very high	0 (0)	4 (18)	1 (3)	3 (11)	1 (2)	7 (14)

Note. N = number of participants assigned to each category.

Table A4: **Scores on NIH Toolbox tests of executive functioning**

VARIABLE	SCHOOL A			SCHOOL B			COMBINED				
	Pre	Post	Difference	Pre	Post	Difference	Pre	Post	Difference	Effect size	
	M *(SD)*	M *(SD)*	↑↓	M *(SD)*	M *(SD)*	↑↓	M *(SD)*	M *(SD)*	↑↓	*d*	*d interpretation*
Flanker test – inhibitory control											
Average raw score (accuracy /20)	20.0 (0.2)	20.0 (0.0)	↑	19.8 (0.6)	19.8 (1.1)	-	19.9 (0.5)	19.9 (0.8)	↑	0.03	Negligible
Average reaction time (seconds)	0.8 *(0.2)*	0.7 *(0.2)*	↓	0.7 *(0.2)*	0.7 *(0.3)*	↑	0.7 *(0.2)*	0.7 *(0.2)*	↓	-0.07	Negligible
Average computed score	8.1 *(0.8)*	8.5 *(0.7)*	↑*	8.3 *(0.9)*	8.3 *(1.0)*	↑	8.2 *(0.9)*	8.4 *(0.9)*	↑*	**0.25**	**Small**
Average uncorrected standard score	98.5 *(8.4)*	102.1 *(7.4)*	↑*	100.2 *(9.5)*	100.2 *(9.9)*	↑	99.5 *(9.0)*	101.1 *(8.9)*	↑*	**0.24**	**Small**
Average age-corrected standard score	95.5 *(13.3)*	102.8 *(16.6)*	↑*	101.4 *(22.3)*	101.9 *(21.6)*	↑	98.9 *(19.0)*	102.3 *(19.5)*	↑*	**0.25**	**Small**
Average national percentile – age adjusted	40.2 *(26.4)*	52.5 *(29.9)*	↑*	46.9 *(35.1)*	49.8 *(35.2)*	↑	44.0 *(31.5)*	51.0 *(32.8)*	↑*	**0.28**	**Small**
Card sort test – task switching											
Average raw score (accuracy /30)	28.8 (1.1)	29.5 (0.7)	↑*	28.8 (1.1)	29.5 (0.7)	↑*	28.8 (1.1)	29.5 (0.7)	↑*	**0.61**	**Medium**
Average reaction time (seconds)	0.8 *(0.2)*	0.8 *(0.2)*	↓	0.8 *(0.3)*	0.9 *(0.3)*	↑	0.8 *(0.3)*	0.8 *(0.3)*	↑	0.03	Negligible
Average computed score	7.6 *(1.0)*	7.9 *(0.9)*	↑	7.5 *(1.1)*	7.5 *(1.1)*	↑	7.5 *(1.0)*	7.7 *(1.0)*	↑	0.21	Small
Average uncorrected standard score	98.7 *(8.6)*	101.4 *(8.2)*	↑	98.1 *(9.2)*	98.6 *(9.2)*	↑	98.3 *(8.9)*	99.8 *(8.8)*	↑	0.21	Small
Average age-corrected standard score	99.0 *(17.6)*	105.5 *(18.0)*	↑*	100.5 *(19.2)*	100.9 *(20.2)*	↑	99.9 *(18.4)*	102.9 *(19.2)*	↑	0.20	Small
Average national percentile – age adjusted	43.7 *(29.2)*	58.1 *(32.8)*	↑*	47.1 *(32.0)*	46.4 *(33.0)*	↓	45.6 *(30.6)*	51.6 *(33.1)*	↑	0.19	Small

Note. M = mean; SD = standard deviation; ↑ = increase in variable (post - pre); ↓ = decrease in variable (post - pre); *d* = Cohen's d (Hedge's correction)

* $p < .05$

Figure A1: Daily thermometer scale

Please write today's date here:

_____

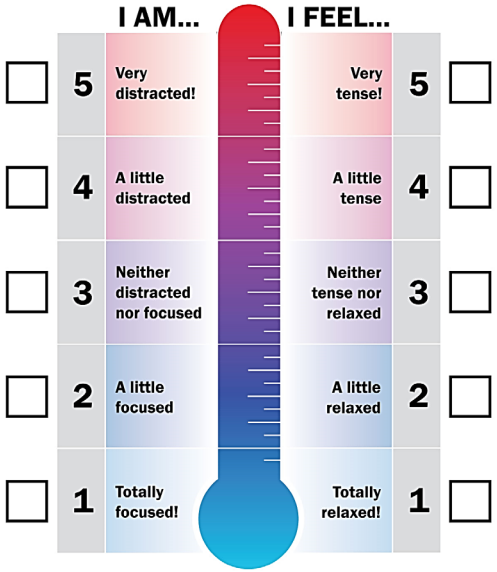
To keep track of your thoughts and feelings, we need you to write your student ID. The teacher will provide you with your ID that you can write below.

Please write your code here:

_____

We would like to know how you are going today.

We are interested in how focused you are and how calm you feel before you do some mindfulness activities in your class. Please tick **ONE** box on **BOTH** sides of the thermometer.



Now, please turn over this sheet.

Now, we are interested in how focused you are and how calm you feel after you have done some mindfulness activities in your class. Please tick **ONE** box on **BOTH** sides of the thermometer.

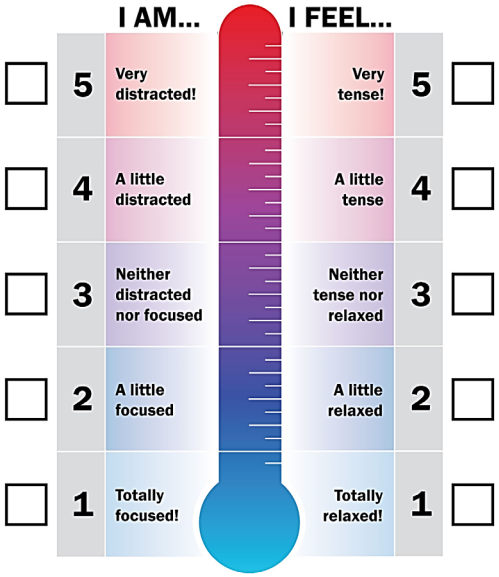


Table A5: **Daily thermometer scale – Focus**

Day	SCHOOL A						SCHOOL B					
	N	Activity	Mins	*t*	Effect size		*N*	Activity	Mins	*t*	Effect size	
					d	*d* interpret.					*d*	*d* interpret.
1	14	Mindful posture	5	3.68*	.93	Large↑	29	Mindful posture + body breathing	10	2.91*	.53	Medium↑
2	21	Mindful posture	5	2.01*	.42	Small↑	26	Body breathing	10	3.94*	.75	Medium↑
3	-	-	-	-	-	-	-	-	-	-	-	-
4	19	About our brain	20	2.54*	.56	Medium↑	-	-	-	-	-	-
5	20	Body breathing	10	3.29*	.71	Medium↑	24	Mindful vs unmindful + body breathing	15	4.14*	.82	Large↑
6	19	Body breathing	5	2.28*	.50	Medium↑	-	-	-	-	-	-
7	19	Body breathing	5	3.90*	.86	Large↑	26	Body scan script	25	7.50*	1.43	Large↑
8	20	Body scan	10	3.27*	.70	Medium↑	27	Gratitude Meditation script	15	5.08*	.95	Large↑
9	22	Body scan	10	4.45*	.91	Large↑	23	Body scan script + discussion	15	2.96*	.60	Medium↑
10	20	Body scan	7	2.77*	.60	Medium↑	23	Body scan script	15	2.34*	.47	Small↑
11	17	Body breathing	5	1.51	.35	Small↑	-	-	-	-	-	-
12	21	Body breathing	10	2.97*	.62	Medium↑	27	Rainbow meditation script	16	4.53*	.85	Large↑
13	22	Body scan	10	2.52*	.52	Medium↑	-	-	-	-	-	-
14	20	Body scan	8	2.94*	.63	Medium↑	29	Body breathing + emotional awareness	15	3.86*	.70	Medium↑
15	21	Mindful seeing + Thought watcher	17	2.23*	.47	Small↑	26	Body scan + emotional awareness activity	10	4.28*	.81	Large↑
16	-	-	-	-	-	-	-	-	-	-	-	-
17	21	Thought watcher	5	5.65*	1.18	Large↑	28	Mindful listening	5	4.55*	.84	Large↑
18	22	Thought watcher	5	5.26*	1.08	Large↑	24	Longer body scan	15	4.12*	.81	Large↑
19	21	Thought watcher	5	3.16*	.66	Medium↑	27	Body scan + Buddies – Mindful breathing	20	3.02*	.56	Medium↑
20	20	Longer body scan	10	5.51*	1.18	Large↑	24	Mindful listening + thought watcher script	10	4.03*	.79	Medium↑
21	-	-	-	-	-	-	-	-	-	-	-	-
22	20	Cloud watcher	10	4.87*	1.05	Large↑	-	-	-	-	-	-
23	21	Cloud watcher	10	7.20*	1.51	Large↑	-	Body scan	10	-	-	-
24	-	-	-	-	-	-	30	Body breathing + happy memory script	15	4.57*	.81	Large↑
25	-	-	-	-	-	-	-	-	-	-	-	-
26	-	-	-	-	-	-	-	-	-	-	-	-
27		-	-	-	-	-	20	Gratitude meditation script	10	3.94*	.85	Large↑
28	-	-	-	-	-	-	-	-	-	-	-	-
29	-	-	-	-	-	-	27	?	?	3.98*	.74	Medium↑

Note. ↑ denotes an increase in focus; *N* = number of students participating in the activity; *t* = t-test statistic; *d* = Cohen's d (Hedge's correction)

* $p < .05$

Table A6: **Daily thermometer scale – Calm**

Day	SCHOOL A						SCHOOL B					
	N	Activity	Mins	*t*	Effect size		*N*	Activity	Mins	*t*	Effect size	
					d	*d* interpretation					*d*	*d* interpretation
1	14	Mindful posture	5	2.60*	.65	Medium↑	29	Mindful posture + body breathing	10	3.41*	.62	Medium↑
2	21	Mindful posture	5	4.08*	.86	Large↑	26	Body breathing	10	3.58*	.68	Medium↑
3	-	-	-	-	-	-	-	-	-	-	-	-
4	19	About our brain	20	2.93*	.64	Medium↑	-	-	-	-	-	-
5	20	Body breathing	10	4.07*	.87	Large↑	23	Mindful vs unmindful + body breathing	15	3.53*	.71	Medium↑
6	19	Body breathing	5	4.26*	.93	Large↑	-	-	-	-	-	-
7	19	Body breathing	5	4.06*	.89	Large↑	26	Body scan script	25	7.28*	1.39	Large↑
8	20	Body scan	10	4.50*	.97	Large↑	27	Gratitude Meditation script	15	8.12*	1.52	Large↑
9	22	Body scan	10	5.19*	1.07	Large↑	23	Body scan script + discussion	15	3.54*	.71	Medium↑
10	20	Body scan	7	3.32*	.71	Medium↑	23	Body scan script	15	3.34*	.67	Medium↑
11	17	Body breathing	5	3.57*	.82	Large↑	-	-	-	-	-	-
12	21	Body breathing	10	3.87*	.81	Large↑	27	Rainbow meditation script	16	6.65*	1.24	Large↑
13	22	Body scan	10	2.10*	.43	Small↑	-	-	-	-	-	-
14	20	Body scan	8	3.32*	.71	Medium↑	29	Body breathing + emotional awareness	15	3.63*	.66	Medium↑
15	21	Mindful seeing + Thought watcher	17	4.39*	.92	Large↑	26	Body scan + emotional awareness activity	10	5.17*	.98	Large↑
16	-	-	-	-	-	-	-	-	-	-	-	-
17	21	Thought watcher	5	5.21*	1.09	Large↑	27	Mindful listening	5	4.65*	.87	Large↑
18	22	Thought watcher	5	5.70*	1.17	Large↑	24	Longer body scan	15	6.43*	1.27	Large↑
19	21	Thought watcher	5	4.99*	1.05	Large↑	27	Body scan + Buddies – Mindful breathing	20	4.73*	.88	Large↑
20	20	Longer body scan	10	5.81*	1.25	Large↑	24	Mindful listening + thought watcher script	10	4.18*	.83	Large↑
21	-	-	-	-	-	-	-	-	-	-	-	-
22	20	Cloud watcher	10	5.48*	1.18	Large↑	-	-	-	-	-	-
23	21	Cloud watcher	10	6.00*	1.26	Large↑	-	Body scan	10	-	-	-
24	-	-	-	-	-	-	30	Body breathing + happy memory script	15	4.60*	.82	Large↑
25	-	-	-	-	-	-	-	-	-	-	-	-
26	-	-	-	-	-	-	-	-	-	-	-	-
27		-	-	-	-	-	20	Gratitude meditation script	10	5.48*	1.18	Large↑
28	-	-	-	-	-	-	-	-	-	-	-	-
29	-	-	-	-	-	-	27	?	?	3.64*	.68	Medium↑

Note. ↑ denotes an increase in calm; *N* = number of students participating in the activity; *t* = t-test statistic; *d* = Cohen's d (Hedge's correction)

* $p < .05$

CRICOS Provider Code 00301J.