

## RESEARCH ARTICLE OPEN ACCESS

# The Healthy Learning Mind Project: Does a Universal Mindfulness Programme Reduce Stress Symptoms and Increase Self-Kindness Among Adolescents in Schools?

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## ABSTRACT

Chronic and increased levels of stress during adolescence are associated with academic performance, school dropout, and mental health challenges. This study investigated the effectiveness of the universal mindfulness-based intervention (MBI) on adolescents' stress symptoms in schools through a cluster randomised controlled trial (cRCT) design. In addition, we examined the effectiveness of MBI on self-kindness. Finally, we explored how age, gender, and an independent mindfulness practice moderated the effects on outcomes. A total of 3519 Finnish students aged 12–15 were randomised to a MBI group ( $n = 1646$ ), an active relaxation control group ( $n = 1488$ ), and an inactive control group that followed a routine school curriculum ( $n = 385$ ). Outcomes were measured at baseline (T0), 9 weeks post-intervention (T9), and 26 weeks following the intervention (T26). Overall, those belonging to the MBI group reported a greater reduction in stress symptoms compared with the active control group at T9 and T26. Furthermore, students in the MBI group who carried out their mindfulness home practice regularly showed a greater decrease in stress symptoms compared with those who practiced less regularly. There were no MBI effects on self-kindness. These results indicate that a universal MBI in schools may potentially support stress management among students.

People feel stress in demanding situations that seem to exceed their resources, whether those resources are personal, psychological, or social (Lazarus 1966). Chronic or severe stress risks individuals' health and well-being beginning in childhood (Manosso et al. 2022). Adolescence is a time of rapid psychosocial and physiological changes leading to increased stress sensitivity (Kaplan et al. 2005). Therefore, chronic stress is remarkably harmful in adolescents. It may lead to maladjusted coping strategies and hamper adolescents' capacity to deal with

negative emotions and affective experiences well (Perry-Parrish et al. 2016), potentially increasing mental health problems like depression and anxiety symptoms (Dupéré et al. 2015). Moreover, excessive stress weakens academic performance and increases school dropout rates (Oldehinkel et al. 2011). Because stress causes severe risks to adolescents' well-being and abilities to manage in school and life, it is essential to explore new and more effective ways to promote stress management, mental health, and well-being in schools.

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## Summary

- A universal, school-based mindfulness programme reduced stress symptoms in adolescents compared to a relaxation programme.
- Students who engaged in regular practice showed the greatest benefit from mindfulness training.
- Mindfulness training did not significantly improve self-kindness.

Several intervention programmes relying on different approaches have been developed to protect adolescents from increased stress levels, some designed to reduce stress directly, others indirectly. The majority of these interventions include either mindfulness, relaxation exercises, or cognitive-behavioural techniques (Rew et al. 2014). One important question is whether universal school-based interventions are sufficiently effective to reduce stress symptoms. A meta-analysis by Kraag et al. (2006) demonstrated that universal school-based interventions among children and adolescents can effectively (with a large effect size) lower stress symptoms when involved both psychological and physiological measures of stress. However, a more recent meta-analysis by van Loon et al. (2020), which focused on the effectiveness of school-based interventions on adolescents, demonstrated only a moderate overall effect on self-reported psychological stress symptoms. More specifically, only among selected student samples were significant effects found. They concluded that further studies are needed on the effectiveness of a universal school intervention on adolescent psychological stress symptoms employing sound study designs (van Loon et al. 2020). In this study, we investigated the effectiveness of a universal mindfulness-based intervention (MBI) on self-assessed stress symptoms in a large cluster randomised controlled trial (cRCT).

## 1 | Mindfulness in Stress Reduction

Kabat-Zinn (2005) describes mindfulness as the psychological capacity to stay willingly present with one's experiences, with a non-judging, accepting, and curious attitude. According to theory, mindfulness improves the self-regulation of emotions, behaviour, and cognitive processes (Hölzel et al. 2011). An improved self-regulation is the outcome of increased acceptance and self-awareness, such as noting unpleasant emotions and distress as experiences that can be accepted instead of impulsively reacted to, ruminated over, or chronically avoided (Baer 2003; Kabat-Zinn 2005). An improved ability to accept one's internal experiences is thought to mitigate suffering and distress in stressful situations (Hayes et al. 1999). Thus, mindfulness training may reduce stress symptoms by strengthening self-regulation, promoting cognitive change, and increasing psychological acceptance (Baer 2003; Perry-Parrish et al. 2016).

Childhood and adolescence may be an optimal time for practicing mindfulness given that cognitive and emotional capacities, such as emotion regulation and executive functioning, undergo significant development during this time (Blakemore and Choudhury 2006). Supporting this idea, previous studies have found that MBIs can reduce self-reported stress as well as

stress-related symptoms in children and adolescents (Kuyken et al. 2013; Sibinga et al. 2013; Sibinga et al. 2016; Van der Gucht et al. 2018). However, the evidence on the effectiveness of MBIs is not consistent. For example, the largest population-based RCT to date—the My Resilience in Adolescence (MYRIAD) project—observed no significant effects of MBIs on several mental health and well-being outcomes, including depressive symptoms, socio-emotional and behavioural functioning, well-being, anxiety, and mindfulness (Kuyken et al. 2022a). However, it is important to note that this study did not directly assess stress symptoms, which may be a particularly relevant target for MBIs in adolescents. Meta-analyses have further highlighted the mixed nature of the evidence. Dunning et al. (2022) found that MBIs significantly improved anxiety/stress, social behaviour, executive functions, attention, and negative behaviour compared to inactive control groups. Relative to active controls, MBIs were more effective in reducing anxiety/stress and improving mindfulness. However, these effects did not persist in studies that included follow-up measurements. Consistently, a meta-analysis focused on specifically school-based MBIs reported significant improvements in stress symptoms but showed no effects for depression or anxiety (Fulambarkar et al. 2023). Moreover, no significant effects were observed when school-based MBIs were compared to active controls. These results were preliminary due to substantial levels of heterogeneity across studies and a limited number of school-based RCTs with follow-up data. Taken together, these findings highlight the importance of conducting further adequately powered research that focuses specifically on stress-related outcomes. In particular, more RCTs with long-term follow-up is essential to assess the potential of MBIs to deliver sustained benefits in adolescence.

## 2 | Self-Compassion as a Mechanism of Change

One potential mechanism underlying the effect of mindfulness training on stress symptoms is self-compassion. Self-compassion represents a compassionate, kind, and caring attitude toward the self in painful life events, adversities, or personal failures (Neff 2003b). Theoretically, a compassionate/kind attitude toward oneself in moments of stress or even during a failure could act as a buffer against psychologically experienced stress (Perry-Parrish et al. 2016). Self-compassion comprises three primary components, each including both a positive and a negative pole: self-kindness versus self-judgment/self-coldness, a sense of common humanity versus isolation, and mindfulness versus over-identification (Neff 2003b). These three components are theorised as conceptually distinct, whilst simultaneously interacting with each other (Neff 2003b). Previous studies have shown that the six factors that measure the negative and positive poles of the components of self-compassion have a moderate to high degree of intercorrelation (Neff 2003a; Neff et al. 2017) and mutually enhance one another (Dreisoerner et al. 2021). Empirical studies in adolescents have indicated that MBIs increase self-compassion and self-acceptance (Broderick and Metz 2009; Kang et al. 2018; Razza et al. 2025). In turn, a few preliminary studies have demonstrated that increases in self-compassion or its subcomponents may predict improvements in emotional well-being. For example, an experimental study involving adolescents who

participated in an intensive, 5-day MBI found that increases in self-compassion were associated with reductions in stress symptoms, rumination, negative affect, and depressive symptoms (Galla 2016). Another study, that was conducted in a school setting, showed that an MBI was effective in reducing self-coldness (a subcomponent of self-compassion) compared to an inactive control group, which further mediated the intervention effect on symptoms of stress, depression, and anxiety (Van der Gucht et al. 2018). However, no increases in self-compassion or its self-kindness subcomponent were observed.

To the best of our knowledge, no previous studies among adolescents have examined the effects of MBI on self-compassion or its sub-components in large-scale RCTs with both active and inactive control groups. Including both inactive and active control groups in the design is essential for a clearer understanding of what works and why. For instance, MBIs are commonly compared to relaxation programmes, as they share many similarities but are also distinctly different, such as the former aim to teach acceptance of present-moment internal experiences and the latter focus on strategies to change internal experiences (Luberto et al. 2020). Understanding the specific mechanisms of mindfulness facilitates designing effective and targeted interventions to decrease stress symptoms.

### 3 | Gender, Age, and Practice Intensity as Potential Moderators of MBIs

Although research suggests that MBIs can reduce stress symptoms and enhance self-kindness and compassion, less is known about how individual differences shape these effects. Tentatively, individual factors such as gender, age, and the intensity of mindfulness training have been identified as potential moderators (Tudor et al. 2022). However, their role in influencing the effects of MBIs on stress symptoms remains inconclusive.

With respect to gender, studies have consistently suggested that girls benefit more from MBIs than boys. Girls show greater benefits in reducing depressive and anxiety symptoms (Galvez Tan and Alampay 2022; Volanen et al. 2020) and in improving resilience and well-being (Kang et al. 2018; Volanen et al. 2020) compared to control groups. By contrast, these studies reported no positive effects on mental health and emotion-related outcomes among boys. One explanation is that girls may be more receptive to learn self-compassion and an accepting attitude towards their inner experiences during MBIs, which in turn may support their mental health (Galvez Tan and Alampay 2022; Kang et al. 2018; Rojiani et al. 2017).

Findings regarding age and the intensity of home practice are more mixed. Some meta-analyses suggest that MBIs are particularly effective on mental health outcomes during late adolescence (Carsley et al. 2018; Mettler et al. 2023), while others report stronger effects among primary school children (Dunning et al. 2022; Phillips and Mychailyszyn 2022). Likewise, while some studies associate higher intensity of home practice with greater reductions in stress symptoms and mental health issues (Kuyken et al. 2013; Volanen et al. 2020), others find no such relationship (Johnson et al. 2016, 2017). Notably, one study even reported that higher intensity of home practice

predicted negative outcomes in socio-emotional-behavioral functioning and well-being at post-intervention (Montero-Marín et al. 2022). These findings highlight the need for further research to better understand what works, for whom, and through which mechanisms.

## 4 | The Present Study

The present study is part of the Healthy Learning Mind (HLM) research project, which involved Finnish students ( $N = 3519$ ) aged 12–15 (Volanen et al. 2016). The HLM is a large-scale RCT that evaluates the specific effects of a standard 9-week school-based universal MBI (.b), comparing it to both a relaxation programme (Relax)—matched for duration and comparable didactic and experiential content—and teaching as usual. The results of the primary outcomes (resilience, socio-emotional functioning, depressive symptoms) are reported in an earlier publication (Volanen et al. 2020).

The primary aim of this study was to examine the effects of the MBI, compared to both control groups, on stress symptoms at 9 weeks post-intervention and at 6 months (26 weeks) from baseline. We hypothesised that participation in the MBI would be associated with reduced stress symptoms. A secondary aim was to determine for whom and under what circumstances the MBI is most effective. To explore this, the study evaluated whether gender, age (as school grade), and mindfulness home practice intensity within the intervention group moderated the effects on stress symptoms. We expected that girls would benefit the most from the practice (e.g., Kang et al. 2018; Volanen et al. 2020), while making no assumptions about practice intensity or age as moderators. In addition, to understand potential mechanisms of mindfulness training, the study examined whether self-kindness mediates the effect between mindfulness and stress. We expected that the MBI would increase self-kindness which would in turn mediate the intervention's effect on stress symptoms (e.g., Galla 2016; Razza et al. 2025). The focus was placed on self-kindness, a subcomponent of self-compassion, due to the lack of validated self-compassion measures for younger adolescents (aged 11–15) at the time of data collection (see review of the measures: Hubbard et al. 2025). The full self-compassion scale included abstract concepts that were considered developmentally inappropriate for this age group (Neff 2003a; Neff et al. 2021).

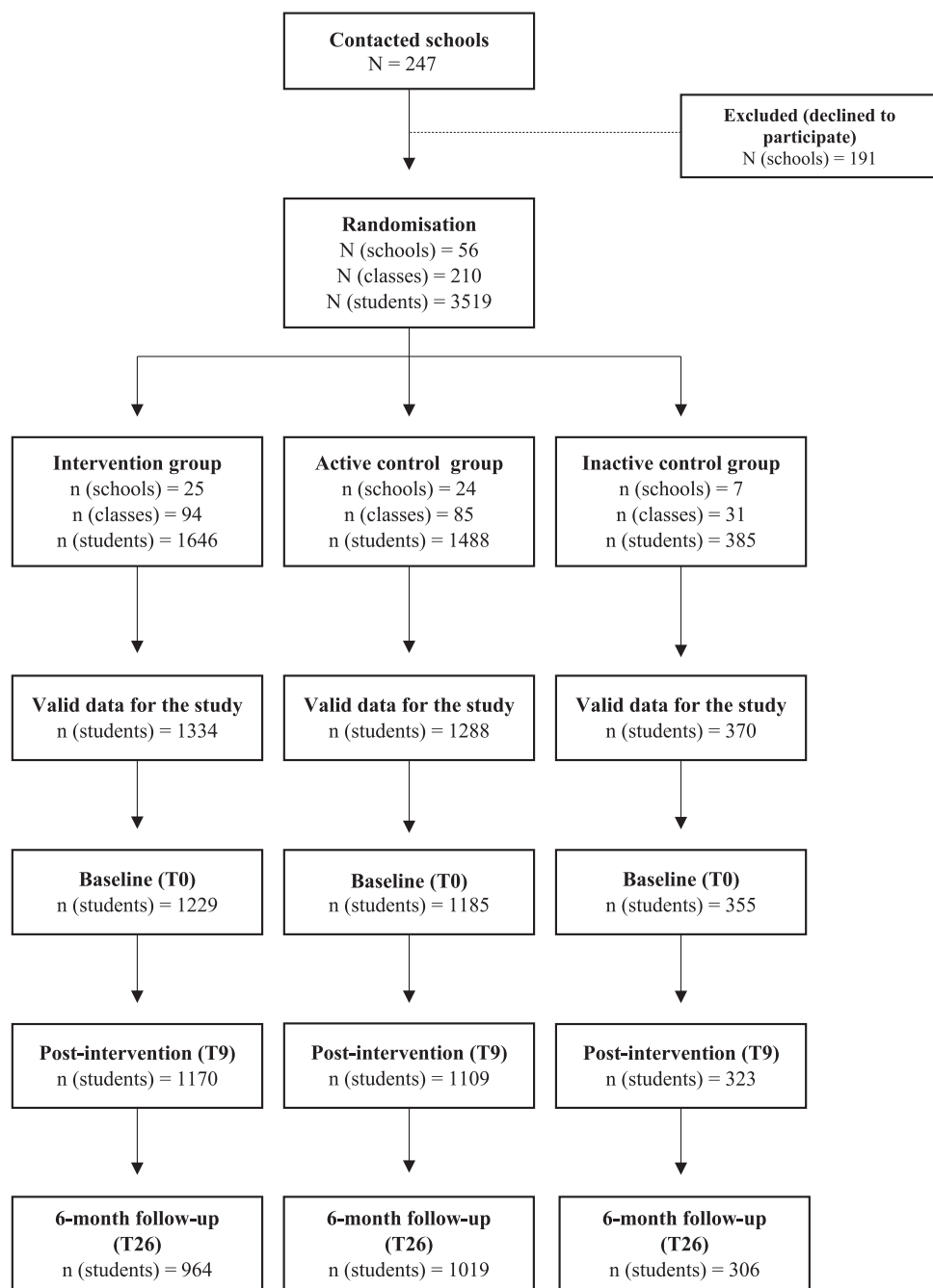
## 5 | Method

### 5.1 | Research Design and Procedure

This study employed a cluster RCT design with three groups: a MBI group, an active control group (a relaxation programme), and an inactive control group (teaching as usual). School classes were randomised as clusters. As a part of the HLM project, recruitment began in 2013 by contacting 247 schools from 14 municipalities/cities in southern Finland. From those 247 schools, 56 (24% of the institutions contacted), participated in the study. The main reasons for nonparticipation included: (1) the principal was unavailable (25%), (2) the school was already involved in other research or development initiatives (23%),

(3) insufficient interest among teachers at the school (18%), and (4) other (11%). The school system in Finland is exceptionally homogeneous, particularly given that all schools follow a national curriculum, and pupils usually attend the nearest school. After recruitment, we aimed to obtain an equal number of MBI and control classes in each municipality. In the selection of these pairs, the schools were first divided into three socioeconomic groups based on their location and the average price per square metre of apartments in their vicinity. Within each of these groups, the total number of schools and classes varied. The schools were then further divided into three subgroups, each containing approximately the same number of classes. In some cases, multiple schools were combined into a single subgroup to

achieve as equal a distribution as possible. Random assignment of these subgroups to MBI (25 schools, 94 classes,  $n = 1646$ ), active control (24 schools, 85 classes,  $n = 1488$ ), inactive control (seven schools, 31 classes,  $n = 385$ ) arms was then carried out (Figure 1). For practical reasons, the number of groups used in randomisation varied depending on the year. In spring 2014 and autumn 2015, schools were divided into two arms (MBI and active control), while in spring 2015 and spring 2016, they were allocated into three arms (MBI, active control, and inactive control). Classes in both the MBI and the active control groups were notified about their involvement in a 9-week programme titled “Skills for Well-Being.” A written informed consent form was requested from all participating students and their parents.



**FIGURE 1** | Flowchart of participants.

Data collection took place between March 2014 and December 2016 during four academic terms. This consisted of four baseline assessment points: spring term 2014, autumn term 2014, spring term 2015, and spring term 2016. Data from the inactive control group were collected only during two academic terms (spring term 2015 and spring term 2016). In addition to the baseline assessment points (T0), outcome data were collected after the 9-week MBI and the active control programme (T9), and at follow-up at 26 weeks from baseline (T26). All three groups completed the outcome measures during the same period (T0, T9, and T26). Before data analysis, any personal details that could identify participants were removed from the dataset. For further details on this procedure, see the HLM protocol (Volanen et al. 2016).

## 5.2 | Participants

A total of 3519 Finnish pupils (1646 in the MBI group, 1488 in the active control group, and 385 in the inactive control group) participated in the study. Among these students, 15% ( $n = 527$ ) did not complete the outcome measures at any point during assessment and were excluded from further analysis. Figure 1 illustrates the allocation of participants. The MBI group consisted of 1334 pupils, the active control group included 1288 pupils, and the inactive control group included 370 pupils. Pupils were from the sixth, seventh, and eighth grades (ages 12–15 years). Half of the final sample were girls (50.6%). The majority of pupils spoke Finnish as their mother tongue (80.6%) and were in the eighth grade (45.3%). See Table S1 for the participant demographic information.

To determine the sample size, a power analysis indicated that 1200 students were needed in the MBI and active control groups and 540 students in the inactive control group (10% dropout rate). Our analysis aimed to identify a mean difference of 0.2 standard deviation units (Cohen's  $d = 0.2$ ) between the MBI group and the active control group and 0.3 standard deviation units (Cohen's  $d = 0.3$ ) between the MBI group and the inactive control group on the primary outcomes of the HLM project, with 80% power and a two-tailed significance level of 5% (Volanen et al. 2016). The target sample size for the inactive control group was smaller, given that greater differences were expected in comparisons with the MBI group than in comparisons between the MBI and active control groups.

## 5.3 | The .b Mindfulness Intervention

The .b programme is a standardised, 9-week, school-based mindfulness intervention aimed at enhancing emotional awareness, and attentional, behavioural, and emotional regulation (Huppert and Johnson 2010). It represents a universal classroom-based programme focused on enhancing the well-being of children and adolescents (see: Mindfulness in Schools Project 2021). The .b programme consisted of nine 45-min group sessions (one per week) and short home practices (the recommended frequency for independent home practice: 5–6 times per week, 3–15 min each time). Each group session is designed to teach a different mindfulness skill. The weekly session outline was brief as follows: (1) introducing what

mindfulness is, (2) playing attention and training the muscle of the mind, (3) mind states and anchoring attention to the body, (4) recognising worry, (5) how to respond rather than react, (6) moving mindfully, (7) how we relate to our thoughts, (8) dealing with difficult emotions, and (9) key techniques and future inspirations. Students received their own .b student diaries for sessions, which they could also use for home practices. They were also provided with audio files to practice mindfulness exercises at home. The amount of home training was not monitored during the programme. At the follow-up, students were asked to complete a questionnaire that measured their home practice intensity following the intervention (see details in Measures section). During school hours, nine experienced MBI facilitators delivered the mindfulness intervention. All facilitators had previously attended an 8-week mindfulness-based stress reduction course (Kabat-Zinn 2003) and received training in delivering the .b programme. The training included that each facilitator delivered a randomly selected .b lesson, which was evaluated both quantitatively and qualitatively by members of the research team. Most facilitators had backgrounds in education or health and welfare. Additionally, to ensure all facilitators delivered the MBI as intended, they used self-assessments to monitor their own performance (e.g., intention, attitude, ability to be mindful, and conduct the lesson with kindness) and adherence to core programme elements. They also assessed students' engagement in the group sessions. Overall, 90% of students participated in 7–9 group lessons, 5% in six lessons, and 5% in 1–5 lessons.

## 5.4 | The Relax Control Intervention and the Inactive Control Group

Students in the inactive control group followed the school's regular curriculum, while those in the active control group took part in a standardised relaxation programme aimed at improving relaxation skills and overall well-being. The Relax programme was developed in cooperation with Folkhälsan Förbundet. Similar to the MBI, it consisted of 9 weekly 45-min group sessions and home practices, with a recommended frequency of five to six times per week. Each group session included relaxation techniques such as progressive muscle relaxation, breathing exercises, visualisation, or a short break to recharge. Additionally, group discussions were held on various topics, including stress, sleep, screen time, and relaxation practices. All Relax facilitators were part of our research project and consisted of either trained schoolteachers or experienced leaders of well-being groups in this age group. Specific attention ensured that mindfulness elements were kept distinct from the relaxation programme.

## 5.5 | Measures

Stress symptoms were measured using the Stress in Children questionnaire (SiC) (Osika et al. 2007). SiC is a short self-rated screening instrument used to identify perceived stress in schoolchildren, designed to assess the overall stress level using different constructs including physical, emotional, and symptomatic elements of stress as well as those related to coping and social support. The measure has acceptable psychometric



qualities among children aged 9–12 (Osika et al. 2007) as well as up to 18 years of age (Caqueo-Urizar et al. 2014). SiC includes 20 items (originally 21 items, but due to human error we missed the question “When I have a hard time, being with my friends helps”) scored on a four-point scale from 1 to 4 (never, sometimes, often, very often). The SiC mean score was calculated by summing the scores for all 20 items and then dividing by the number of items answered. Two missing answers were accepted. A higher SiC score indicated a higher number of stress symptoms. The Cronbach’s alpha for the SiC score at baseline was 0.85.

Self-kindness was measured using the self-kindness subscale of the Self-Compassion Scale (SCS) (Neff 2003a, 2003b). SCS is a valid and psychometrically sound measurement of self-compassion and its subcomponents (self-kindness vs. self-judgment, common humanity vs. isolation, and mindfulness vs. over-identification), all of which have strong inter-correlations (Neff 2003a, 2016). The self-kindness subscale includes five items scored on a five-point scale from 1 to 5 (almost never/never, not very often, sometimes, very often, always/almost always). The self-kindness mean score was calculated by summing scores on all five items and then dividing by the number of items answered. Two missing answers were accepted. A higher self-kindness score indicated a greater level of self-kindness. The Cronbach’s alpha for the self-kindness score at baseline was 0.87.

The mindfulness home practice intensity was measured at 26 weeks following the intervention. Students in the MBI group were asked about the amount of mindfulness home practice using four questions regarding how often they continued training during the last 6 months after the intervention. The questions included five answer options: not once, a few times, once or twice a month, at least once a week, and every day or almost every day. Based on the responses, students were divided into four different mindfulness practice groups: students who practiced mindfulness no more than a few times, once or twice a month, at least once a week, or almost every day.

## 5.6 | Data Analyses

The SAS System version 9.4 for Windows (SAS Institute Inc., Cary, NC, USA) was used for all statistical analyses. The intention-to-treat approach was adopted to estimate the treatment effects on stress and self-kindness. Linear mixed models (LMMs) were employed in the analyses, as they account for intra-group dependencies and are well-suited for analysing nested data (e.g., Hox 1998). Maximum likelihood estimation was used in LMMs to obtain unbiased parameter estimates for data with partially missing values. Consequently, all participants for whom data was available from at least one measurement point were included in the analyses. Analyses were secondary in nature and based on data from the HLM project (Volanen et al. 2016).

In the LMMs, the group was entered as a between-subject factor, time as a repeated factor, and random intercepts accounted for individual-, class-, and school-level variances. To estimate the repeated effect of time, first-order autoregressive, unstructured,

compound symmetry, and heterogeneous compound symmetry covariance matrices were tested as options for the residual error covariance, with the final model selected based on Schwarz’s Bayesian Criterion (BIC). Intra-class correlations (ICCs) were calculated to analyse the intra-class correlations between students, school classes, and schools. The ICCs for stress symptoms at the school level were 0.02, 0.04 at the classroom level, and 0.62 at the student level; for self-kindness, the ICCs were 0.01, 0.01, and 0.53, respectively. The ICCs at the student, school, and classroom levels were significant for the stress outcome ( $p < 0.05$ ). The ICCs at the school and classroom levels were not significant for self-kindness but were included in all analyses. We adjusted for gender and grade in our analyses. The LMM consisted of the main effects of group, time, gender, and grade, and the time  $\times$  group interaction effect. The intervention effects were estimated from the interaction terms between group (intervention vs. active control and intervention vs. inactive control) and time (9 weeks vs. baseline and 26 weeks vs. baseline). Bonferroni adjustments were used in the between-group and the within-group pairwise comparisons. Analyses were conducted for all students. Before the analyses of the intervention effects, the baseline differences in outcomes were analysed from the same models by comparing the MBI group with the control groups at T0 in all students, girls, boys, and by grade.

In addition, LMMs were used to investigate gender, grade, and the amount of independent mindfulness home practice as a moderator on the outcomes of stress and self-kindness, and a change in self-kindness as a mediator on stress outcome. To analyse the modifying effect of gender and grade, the interaction term (group  $\times$  time  $\times$  gender or group  $\times$  time  $\times$  grade) was added to the LMM model. In addition, further subgroup analyses were performed separately in boys and girls and by grades. Intervention effects modified by the mindfulness home practice were analysed using the four different mindfulness practice groups, which were compared to all pupils in the active control group and to all pupils in the inactive control group (group  $\times$  time interactions). Moreover, to understand if self-kindness acted as a mediator between MBI and stress outcome, significant differences in the effects of the MBI and control conditions on self-kindness were first required. If these conditions were met, Sobel’s test was then used to assess the mediated effect. Cohen’s  $d$  was used to measure the effect sizes. These were calculated by dividing the intervention effects of the LMM models (group  $\times$  T9 or group  $\times$  T26) by the unadjusted pooled standard deviations at baseline. Negative effect sizes for stress and positive effect sizes for self-kindness indicated a positive intervention effect. Cohen’s  $d = 0.2$  was considered a small effect size,  $d = 0.5$  a medium effect size, and  $d = 0.8$  a large effect size (Sullivan and Feinn 2012).

## 6 | Results

### 6.1 | Baseline Comparisons

Table 1 summarises the descriptive statistics of the outcome variables for all students, and by gender and grade. We identified no baseline differences between the MBI and control groups in the levels of stress symptoms or self-kindness among all students ( $p > 0.13$ , Table S2). This was also true across the subgroups of gender and grade ( $p > 0.27$ ).

**TABLE 1** | Descriptive statistics for the outcome variables at baseline (T0), post-intervention (T9), and 6-month follow-up (T26).

	MBI group						Active control group						Inactive control group					
	T0		T9		T26		T0		T9		T26		T0		T9		T26	
	Mean (SD)	n	Mean (SD)	n	Mean (SD)	n	Mean (SD)	n	Mean (SD)	n	Mean (SD)	n	Mean (SD)	n	Mean (SD)	n	Mean (SD)	n
All students																		
Stress	2.10 (0.36)	1187	2.09 (0.37)	1149	2.06 (0.38)	941	2.09 (0.37)	1165	2.11 (0.39)	1080	2.08 (0.39)	995	2.10 (0.35)	347	2.10 (0.38)	318	2.06 (0.37)	303
Self-kindness	3.30 (0.90)	1229	3.28 (0.95)	1170	3.35 (0.95)	964	3.31 (0.91)	1185	3.28 (0.97)	1109	3.38 (0.99)	1019	3.22 (0.88)	355	3.20 (0.99)	323	3.28 (0.94)	306
Girls																		
Stress	2.11 (0.36)	593	2.08 (0.36)	594	2.04 (0.36)	482	2.09 (0.37)	611	2.08 (0.38)	579	2.07 (0.38)	524	2.13 (0.37)	180	2.13 (0.38)	166	2.08 (0.37)	153
Self-kindness	3.25 (0.91)	612	3.23 (0.93)	602	3.29 (0.93)	495	3.26 (0.92)	622	3.30 (0.94)	587	3.35 (1.00)	532	3.16 (0.92)	183	3.13 (1.01)	169	3.27 (1.01)	155
Boys																		
Stress	2.09 (0.35)	594	2.10 (0.38)	554	2.08 (0.40)	459	2.09 (0.36)	554	2.14 (0.39)	500	2.09 (0.39)	471	2.07 (0.32)	167	2.07 (0.37)	152	2.04 (0.36)	149
Self-kindness	3.35 (0.88)	617	3.33 (0.96)	567	3.40 (0.98)	469	3.35 (0.90)	563	3.26 (0.99)	521	3.42 (0.97)	487	3.29 (0.82)	172	3.28 (0.96)	154	3.29 (0.87)	150
6th grade																		
Stress	2.04 (0.35)	468	2.05 (0.36)	458	2.00 (0.39)	370	2.06 (0.38)	417	2.06 (0.39)	409	2.04 (0.40)	356	2.07 (0.35)	108	2.12 (0.38)	87	2.08 (0.37)	72
Self-kindness	3.42 (0.87)	487	3.30 (0.96)	468	3.44 (0.96)	377	3.40 (0.88)	429	3.32 (0.96)	471	3.38 (0.99)	361	3.32 (0.83)	113	3.20 (0.98)	88	3.40 (0.91)	73
7th grade																		
Stress	2.13 (0.39)	157	2.05 (0.41)	148	2.02 (0.43)	87	2.04 (0.33)	185	2.07 (0.37)	161	1.99 (0.37)	172	2.13 (0.33)	147	2.10 (0.37)	141	2.05 (0.35)	140
Self-kindness	3.30 (0.92)	163	3.45 (0.99)	150	3.44 (0.88)	93	3.36 (0.91)	189	3.41 (0.97)	164	3.55 (0.98)	175	3.21 (0.87)	149	3.23 (0.91)	145	3.31 (0.94)	139
8th grade																		
Stress	2.15 (0.35)	562	2.14 (0.36)	543	2.12 (0.36)	484	2.12 (0.37)	563	2.16 (0.38)	510	2.14 (0.38)	467	2.09 (0.37)	92	2.08 (0.39)	90	2.07 (0.38)	91
Self-kindness	3.19 (0.90)	579	3.21 (0.92)	552	3.25 (0.95)	494	3.22 (0.92)	567	3.21 (0.97)	528	3.33 (0.98)	483	3.12 (0.94)	93	3.16 (1.13)	90	3.15 (0.96)	94

## 6.2 | Intervention Effects Among All Students

The results of the LMM analyses for all students appear in Table 2, with the effect sizes shown in Table 3. Compared with the active control group, beneficial effects emerged in the MBI group at T9 and T26 on stress symptoms (overall group  $\times$  time interaction:  $F(4, 2376) = 3.35, p = 0.01$ ; T9:  $\beta = -0.04, d = -0.29, p < 0.01$ ; and T26:  $\beta = -0.04, d = -0.28, p = 0.02$ ). In the within-group pairwise comparisons at T9, stress symptoms remained at the baseline level in the MBI group and increased in the active control group. Moreover, at T26, symptoms decreased significantly in the MBI group and remained at the baseline level in the active control group. In a comparison between the MBI and inactive control groups, no significant intervention effects were found for stress symptoms (T9:  $\beta = -0.00, d = -0.01, p = 1.00$ ; T26:  $\beta = 0.00, d = 0.00, p = 1.00$ ). In addition, we detected no differences in the effects of the MBI and control conditions on self-kindness (overall group  $\times$  time interaction:  $F(4, 2484) = 0.06, p = 0.99$ ). Because we detected no observable effects on self-kindness, the necessary conditions for the mediation analysis were not achieved and further mediation analyses were not conducted.

## 6.3 | Gender, Grade, and the Amount of Independent Mindfulness Home Practice as Moderators

Neither gender (group  $\times$  time  $\times$  gender) nor grade (group  $\times$  time  $\times$  grade) moderated the intervention effects on stress (gender:  $F(4, 2379) = 0.81, p = 0.52$ ; grade:  $F(8, 2390) = 1.10, p = 0.36$ ) or self-kindness (gender:  $F(4, 2486) = 1.02, p = 0.39$ ; grade:  $F(8, 1) = 0.61, p = 0.77$ ). The LMM analyses conducted separately for gender and grade are shown in Tables S3 and S4. The impact of mindfulness home practices on the intervention effects appears in Table 4. Students who practiced regularly—that is, almost every day—showed a significant reduction in stress symptoms at T26 compared with both the active control group (overall group  $\times$  time:  $F(10, 2244) = 2.38, p < 0.01$ ; T26:  $\beta = -0.17, d = -0.42, p < 0.01$ ) and the inactive control group (T26:  $\beta = -0.13, d = -0.32, p = 0.05$ ). Moreover, students who practiced occasionally—that is, no more than a few times—also showed a decrease in stress symptoms at T9 compared with the active control group (T9:  $\beta = -0.04, d = -0.11, p = 0.03$ ), but this difference disappeared by the end of the follow-up period (T26:  $\beta = -0.03, d = -0.09, p = 0.15$ ).

In a comparison between four different mindfulness practice groups and the control groups, no overall group  $\times$  time interaction was found for self-kindness ( $F(10, 2338) = 1.53, p = 0.12$ ). We did, however, detect a trend for students who practiced at least once a week who reported an increase in self-kindness compared with the active control group (T9:  $\beta = 0.35, d = 0.37, p = 0.02$ ; T26:  $\beta = 0.32, d = 0.34, p = 0.06$ ) and the inactive control group (T9:  $\beta = 0.34, d = 0.36, p = 0.04$ ; T26:  $\beta = 0.32, d = 0.34, p = 0.10$ ).

## 7 | Discussion

In this large RCT among Finnish students from 56 schools, MBI seemed to protect adolescents from stress symptoms slightly

more effectively compared with the active control group. While the symptoms increased in the active control group at 9 weeks, they remained unchanged in the mindfulness group. At 26 weeks, the difference between these two groups increased whereby stress symptoms decreased significantly in the MBI group while remaining at the baseline level in the active control group. However, we detected no significant differences between the inactive control and MBI groups. Moreover, these results on stress symptoms did not differ by gender or age. Regarding self-kindness, no significant effects were found.

The results of our study agree with previous school-based studies, where MBIs have reduced stress symptoms (Sibinga et al. 2013; Sibinga et al. 2016; Van der Gucht et al. 2018) and shown positive effects on several different psychological measures, such as coping and resilience (Erdemir et al. 2024; Huppert and Johnson 2010; Kuyken et al. 2013; Li et al. 2025). This study is, to our knowledge, the first RCT to evaluate the effects of MBI in comparison to an active intervention with an equal dose and comparable didactic and experiential content. Because of this rigorous design, our findings suggest that the small effects observed were specific to mindfulness.

However, when comparing the MBI and inactive control groups, we found no systematic differences. The most likely explanation is that the inactive control group was nearly four times smaller than the intervention and active control groups, which diminished statistical power. Contextual factors may also have contributed to these null findings. Data for the inactive control group was collected only during two spring terms, whereas data collection in the MBI and active control groups occurred in three spring terms and in one autumn term. As a result, stress levels in the inactive control group may have been influenced partly differently by external factors (e.g., academic pressure) that were not fully controlled. In addition, universal school-based studies are susceptible to floor or ceiling effects (e.g., Johnson et al. 2016). Indeed, some school-based studies have found no significant effects on stress symptoms as measured by the SiC questionnaire, despite observing benefits after MBIs for other aspects of mental health and well-being (Laundy et al. 2021; Terjestam et al. 2016). In our study, the stress symptoms at baseline (Means = 2.09–2.10) were just above the SiC cutoff for a lack of stress (scores < 2, Stallknecht et al. 2017), suggesting that the potential for measurable improvement may have been minimal.

Regarding the moderator analyses, we found that students who completed their daily independent mindfulness practice almost every day at home experienced a greater decrease in stress symptoms after the follow-up (T26) compared with the control groups. This agrees with increasing evidence on the benefits of regular and sustained mindfulness home practice on students' mental health and well-being (see Tudor et al. 2022, for a detailed review). Although, some studies have reported also contradictory findings (Johnson et al. 2016, 2017). Additionally, a large meta-analysis of MBIs in children and adolescents (66 studies) found that a greater in-class dose of MBI was associated with a greater reduction in anxiety/stress at follow-up, though not immediately after interventions (Dunning et al. 2022). Thus, regular mindfulness training may be particularly important for improving stress management.



**TABLE 2** | The results of LMM analyses among all students on stress symptoms and self-kindness.

	MBI group			Active control group			Inactive control group			MBI group versus active control			MBI group versus inactive control		
	Mean values (SE)	Mean change from baseline (95% CI)	p	Mean values (SE)	Mean change from baseline (95% CI)	p	Mean values (SE)	Mean change from baseline (95% CI)	p	Mean difference (95% CI)	p	Mean difference (95% CI)	p	Group × time interaction effect p	
<b>Stress</b>															
T0	2.09 (0.02)			2.08 (0.02)			2.10 (0.03)							0.01	
T9	2.09 (0.02)	-0.01 (-0.03 to 0.01)	1.00	2.12 (0.02)	0.03 (0.01 to 0.05)	< 0.001	2.10 (0.03)	-0.00 (-0.04 to 0.03)	1.00			-0.04 (-0.07 to -0.01)	< 0.01	-0.00 (-0.04 to 0.04)	1.00
T26	2.06 (0.02)	-0.03 (-0.05 to -0.01)	0.01	2.09 (0.02)	0.01 (-0.01 to 0.03)	0.77	2.07 (0.03)	-0.03 (-0.07 to 0.01)	0.21			-0.04 (-0.07 to -0.01)	0.02	0.00 (-0.05 to 0.05)	1.00
<b>Self-kindness</b>															
T0	3.33 (0.03)			3.33 (0.03)			3.20 (0.06)							0.99	
T9	3.30 (0.03)	-0.02 (-0.08 to 0.03)	0.71	3.29 (0.03)	-0.03 (-0.09 to 0.03)	0.45	3.19 (0.06)	-0.02 (-0.13 to 0.09)	1.00			0.01 (-0.07 to 0.09)	1.00	-0.00 (-0.13 to 0.12)	1.00
T26	3.37 (0.04)	0.04 (-0.02 to 0.11)	0.29	3.38 (0.04)	0.05 (-0.01 to 0.12)	0.13	3.26 (0.06)	0.06 (-0.06 to 0.18)	0.53			-0.01 (-0.10 to 0.08)	1.00	-0.02 (-0.15 to 0.12)	1.00

Note: Mean values are the least square-mean estimates from linear mixed models with group included as a between-subject factor, time as a repeated factor, and random effects accounting for school class and school. The Bonferroni adjustment was used in between and within group comparisons. Gender and grade were adjusted for in the analyses.

In interpreting some of our time-related findings, we note that the Finnish school term finishes at the end of May and just before Christmas. These dates precede an intensive 2–3-week period of exams, during which students' stress levels tend to peak. For practical reasons related to the length of the terms and holiday periods during them, the 9-week measurement took place just before the exam period began. This might explain the increasing stress scores in the active control group, and the unchanged scores and buffering role of mindfulness in the MBI group at 9 weeks. Additionally, the significant decrease in stress symptoms in the MBI group occurred only at 26 weeks, and not at 9 weeks. At 26 weeks, the adolescents had more time to internalise the psycho-educative elements and mindfulness practices that were taught during the .b programme (e.g., how to calm the automatic nervous system during stress; how to take one step back from stressful thoughts and monitor them as distant objectives instead of becoming subjectively and emotionally caught up with those thoughts, etc.). Becoming aware of how the body and mind react to stressful situations, and especially, becoming aware and calm yourself in those situations, may take some time to realise to better perceive stress management in practice.

The buffering role of MBIs against stress symptoms can explain through several possible mechanisms. The key process may be the cultivation of mindful awareness, which involves focusing on and observing one's experiences with attention and acceptance in a non-judgemental manner (Baer 2003). This conscious awareness grounds individuals in the present moment, enabling recognition of familiar thought processes, such as rumination, self-criticism, and catastrophising, without being controlled by them (Segal et al. 2002; Teasdale et al. 2002). In contrast, a lack of mindful awareness often results in operating on autopilot mode—that is, not being conscious of one's focus. Moreover, by focusing attention, individuals become more aware of how attention moves and develop the ability to shift and sustain it intentionally (Bishop 2004). This enhanced attentional control fosters cognitive flexibility, an ability to respond to different tasks in a way that is relevant and flexible, which may further contribute to mental well-being (Moore and Malinowski 2009).

Furthermore, mindfulness practice teaches students to observe situations and thoughts in a non-judgmental and accepting manner. This ability to cultivate mindful acceptance enables individuals to notice their own tendency to judge and to question those judgements rather than being driven by them (Kabat-Zinn 2009). Accepting one's own internal experiences with a kind and understanding attitude foster self-kindness, which is the opposite of self-criticism (Neff 2003b). Acceptance skills have been proposed as one key mechanism underlying the effects of MBIs on stress and stress-related health outcomes (Slutsky et al. 2017), as evidenced by mounting research (Chin et al. 2019; Galla 2016). Despite these promising findings, we unexpectedly found no differences in the effectiveness of MBI and control conditions on self-kindness. Therefore, and contrary to our original plans, we could not continue the mediation analyses.

A few possible explanations exist for this finding. As far as we know, only one study has examined the role of self-kindness or self-compassion in the effects of a school-based mindfulness

**TABLE 3** | Effects sizes (Cohen's *d*) for the MBI group versus the active and inactive control groups at T9 and T26.

Outcome		MBI versus active control		MBI versus inactive control	
		T9	T26	T9	T26
Stress	All	-0.11	-0.11	-0.01	0.00
	Girls	-0.10	-0.15	-0.06	-0.06
	Boys	-0.13	-0.07	0.05	0.06
	Grade 6	-0.02	-0.04	-0.08	-0.12
	Grade 7	-0.29	-0.28	-0.08	-0.16
	Grade 8	-0.13	-0.15	0.02	-0.01
	Int1	-0.11	-0.09	-0.00	0.01
	Int2	-0.11	-0.05	-0.01	0.06
	Int3	-0.31	-0.22	-0.19	-0.09
	Int4	-0.25	-0.42	-0.16	-0.32
Self-kindness	All	0.01	-0.01	-0.00	-0.02
	Girls	-0.04	-0.02	0.02	-0.06
	Boys	0.07	-0.01	-0.03	0.03
	Grade 6	-0.03	0.03	-0.05	-0.06
	Grade 7	0.14	0.09	0.16	0.17
	Grade 8	0.01	-0.04	-0.02	0.01
	Int1	-0.03	-0.05	-0.04	-0.05
	Int2	0.12	0.07	0.10	0.06
	Int3	0.37	0.34	0.36	0.34
	Int4	0.32	0.18	0.31	0.17

Note: Cohen's *d* = 0.2 is considered a "small" effect size, and *d* = 0.5 represents a "medium" effect size.

programme on stress symptoms (Van der Gucht et al. 2018). Consistent with our results, the study did not find a significant intervention effect on self-kindness or self-compassion. However, self-coldness—referring to self-critical thinking including self-judgment, isolation, and overidentification—mediated the effect of MBI on stress symptoms (Van der Gucht et al. 2018). The scholars suggested that before mindfulness training embrace positive components of self-compassion, the first step may involve reducing self-coldness. However, since the study used only an inactive control group, nonspecific factors may have also influenced the finding.

Thus, measurement limitations could potentially explain our results. We assessed only the self-kindness subscale rather than the full SCS and its six subcomponents, which are included in the original scale (Neff 2003a). The self-kindness subscale was chosen because of its developmental appropriateness for adolescents. In particular, in 2013, when we began data collection, existing research had only been conducted among adults and older adolescents, and no validated self-compassion measures were available for younger adolescents (aged 11–15) (Hubbard et al. 2025). Although the SCS was already widely used in adults (Neff 2003; Neff 2023), phrases referring to concepts used at that time in the measure were considered too abstract for this age group. The self-kindness subscale was deemed the least abstract subscale of SCS, and we were advised by the scale's developer to use this subscale (personal communication with Dr. K. Neff in 2013). Because the self-kindness subscale cannot capture the

full variation of self-compassion, it remains unclear whether use of the full SCS would have produced different results. Although similar results for self-kindness and overall self-compassion outcomes have been reported in adolescents (Van der Gucht et al. 2018), the narrower focus restricts interpretation and limits the generalizability of our findings. This highlights importance of replication in future studies with validated youth-specific measures such as the recently developed Self-Compassion Scale for Youth (SCS-Y) (Neff et al. 2021). Given its simpler and clearer item design, the youth version better reflects adolescents' cognitive development and allows a more accurate assessment of self-compassion and its subcomponents (Neff et al. 2021).

## 7.1 | Challenges of Implementing Universal MBIs in Schools

Like the British MYRIAD project (Kuyken et al. 2022b; Kuyken et al. 2022a), the Finnish HLM trial is also a fully powered RCT with a sound study design (Dunning et al. 2022; Volanen et al. 2016). However, unlike the MYRIAD study (Kuyken et al. 2022a), in Finland, the same short, universal .b programme has produced slight beneficial effects. In particular, compared with the active control group, the MBI has carried immediate intervention effect on resilience (Volanen et al. 2020) and health-related quality of life (Lassander et al. 2021). Moreover, those who continued an independent practice benefitted most at the 26-week

**TABLE 4** | The results of the LMM analyses of a mindfulness home practice on stress symptoms and self-kindness.

	Stress			Self-kindness		
	Mean Value (SE)	Mean change from baseline/Mean differences (95% CI)	<i>p</i>	Mean Value (SE)	Mean change from baseline/Mean differences (95% CI)	<i>p</i>
<b>Baseline</b>						
Int1	2.08 (0.02)			3.33 (0.04)		
Int2	2.09 (0.04)			3.30 (0.09)		
Int3	2.11 (0.05)			3.14 (0.13)		
Int4	2.11 (0.06)			3.42 (0.14)		
Act cont	2.09 (0.02)			3.31 (0.03)		
Inact cont	2.10 (0.03)			3.22 (0.06)		
<b>T9</b>						
Int1	2.08 (0.02)	-0.00 (0.01)	1.00	3.27 (0.04)	-0.056 (0.03)	0.20
Int2	2.08 (0.04)	-0.01 (0.03)	1.00	3.37 (0.01)	0.07 (0.09)	0.86
Int3	2.05 (0.05)	-0.06 (0.04)	0.30	3.46 (0.13)	0.32 (0.12)	0.02
Int4	2.04 (0.06)	-0.07 (0.05)	0.26	3.65 (0.15)	0.22 (0.14)	0.21
Act cont	2.12 (0.02)	0.03 (0.01)	< 0.001	3.27 (0.04)	-0.03 (0.03)	0.44
Inact cont	2.09 (0.03)	-0.003 (0.02)	1.000	3.20 (0.07)	-0.02 (0.05)	1.00
Int1 versus Act cont		-0.04 (0.01)	0.03		-0.02 (0.04)	1.00
Int2 versus Act cont		-0.04 (0.03)	0.73		0.10 (0.09)	1.00
Int3 versus Act cont		-0.09 (0.04)	0.11		0.35 (0.12)	0.02
Int4 versus Act cont		-0.10 (0.05)	0.10		0.26 (0.14)	0.27
Int1 versus Inact cont		-0.00 (0.02)	1.00		-0.04 (0.06)	1.00
Int2 versus Inact cont		-0.00 (0.03)	1.00		0.09 (0.10)	1.00
Int3 versus Inact cont		-0.06 (0.04)	0.80		0.34 (0.13)	0.04
Int4 versus Inact cont		-0.07 (0.05)	0.69		0.24 (0.15)	0.38
<b>T26</b>						
Int1	2.06 (0.02)	-0.02 (0.01)	0.09	3.34 (0.04)	0.01 (0.04)	1.00
Int2	2.08 (0.04)	-0.01 (0.03)	1.00	3.41 (0.10)	0.11 (0.10)	0.48

(Continues)

TABLE 4 | (Continued)

	Stress			Self-kindness		
	Mean Value (SE)	Mean change from baseline/Mean differences (95% CI)	<i>p</i>	Mean Value (SE)	Mean change from baseline/Mean differences (95% CI)	<i>p</i>
Int3	2.05 (0.05)	-0.06 (0.05)	0.43	3.52 (0.13)	0.38 (0.13)	0.01
Int4	1.94 (0.06)	-0.16 (0.05)	<0.01	3.61 (0.15)	0.19 (0.14)	0.37
Act cont	2.10 (0.02)	0.01 (0.01)	0.76	3.36 (0.04)	0.05 (0.03)	0.13
Inact cont	2.07 (0.03)	-0.04 (0.02)	0.21	3.28 (0.07)	0.06 (0.05)	0.54
Int1 versus Act cont		-0.03 (0.02)	0.15		-0.04 (0.05)	1.00
Int2 versus Act cont		-0.02 (0.03)	1.00		0.06 (0.10)	1.00
Int3 versus Act cont		-0.07 (0.05)	0.64		0.32 (0.13)	0.06
Int4 versus Act cont		-0.17 (0.05)	<0.01		0.14 (0.15)	1.00
Int1 versus Inact cont		0.01 (0.02)	1.00		-0.05 (0.06)	1.00
Int2 versus Inact cont		0.02 (0.04)	1.00		0.05 (0.11)	1.00
Int3 versus Inact cont		-0.03 (0.05)	1.00		0.32 (0.14)	0.10
Int4 versus Inact cont		-0.13 (0.05)	0.05		0.13 (0.15)	1.00

Note: Least square-mean estimates from linear mixed models with group included as a between-subject factor, time as a repeated factor, and random effects accounting for school class and school-level variations. Gender was adjusted for in the analyses. Int1 = students who practiced mindfulness no more than a few times,  $n = 733$ . Int2 = students who practiced mindfulness once or twice a month,  $n = 104$ . Int3 = students who practiced mindfulness at least once a week,  $n = 55$ . Int4 = students who practiced mindfulness almost every day,  $n = 46$ . Act cont = active control group,  $n = 1288$ . Inact cont = inactive control group,  $n = 370$ .

follow-up measurement in both studies. Additionally, Lassander et al. (2022) showed that MBI may reduce physiological stress reactivity. Herein, we demonstrated that, compared with the active control group, the MBI was slightly more effective in protecting adolescents from stress symptoms, with those who practiced regularly at home gaining the greatest benefits.

It is important to note that Finnish and British school systems differ in several key aspects. Firstly, private schools are rare in Finland, and most students attend their local public school. Secondly, socioeconomic differences are minimal on a global scale. Thirdly, teachers in Finland are highly educated professionals. Due to these differences, and complementing the findings of the MYRIAD study, our research on mindfulness training in Finnish school culture further broadens the perspective on integrating MBIs into educational settings. Additionally, it provides substantive insights by examining practice intensity as a moderator.

Based on the findings of the HLM and MYRIAD projects, facilitators' personal experience with mindfulness training and the intensity of the students' mindfulness practice may be two crucial factors in determining the positive effects of MBIs in schools. In our project, we used experienced mindfulness facilitators (Volanen et al. 2016). Likewise, in a MYRIAD pilot study, the MBI has high acceptability and positive mental health impacts when taught by experienced facilitators (Kuyken et al. 2013). However, 8 years later, the same programme showed no impact in the main trial when delivered by novice teachers (Kuyken et al. 2022a). Additionally, Strohmaier and Bailey (2023) pointed out that one explanation for the null results and the low uptake may be explained by the low adherence to the home practice recommendation. This challenge also applies to the current HLM study and is likely reflected in our modest results. To reliably appraise the effects of universal MBIs on health-related outcomes among children and adolescents requires that mindfulness practices are regularly taught for students during school days by trained schoolteachers.

To support schools in this process, focus should be placed on teacher training and competence: these practices should be taught already to teacher students in universities and academies. Doing so not only promotes teachers' own well-being, but also eventually results in positive school climates, which again indirectly promotes the well-being of children and adolescents (Kuyken et al. 2022b). Moreover, this would ensure teacher competency in implementing MBIs in schools and as a regular practice during school days. As noted by Erdemir et al. (2024), students may prefer that mindfulness practices be integrated into the routine school curriculum rather than taught in separate courses. Further teaching and implementing mindfulness skills should begin lightly and playfully as early as possible. Presenting them for the first time during those turbulent years of rapid development in adolescence does seem challenging.

Beyond teacher training and competence, our findings highlight practical implications for school psychologists. In particular, these mental health professionals could guide teachers in selecting and adapting MBIs to the needs of the target setting and population, while also providing training, supervision, and fidelity monitoring for program delivery. This includes ensuring

that implementation proceeds consistently across classrooms rather than solely relying on individual teachers. Providing coaching and support to teachers may play a crucial role in the successful implementation of MBIs in practice (Doyle Fosco et al. 2025). With the help of school psychologists, universal MBIs can be embedded within multi-tiered system of support (Renshaw et al. 2017), or in Finnish education, within the Support for Learning and School Attendance system (Finnish National Agency for Education 2024), to protect against academic and psychosocial stress. Moreover, as our current results suggest that pupils who practiced regularly gained the most benefits, school psychologists could have a key role in promoting sustainability of mindfulness practices in schools as well as students' commitment outside the classroom. For example, in group or individual counselling sessions, school psychologists could emphasise the importance of regular practice and support students in integrating mindfulness into their daily routines. To reinforce engagement, they could introduce mindfulness home practice logs to monitor progress and provide positive feedback for consistent training.

## 7.2 | Limitations, Strengths, and Recommendations for Future Research

We must mention some limitations. The number of participants was lower than originally planned due to dropout (Figure 1 and Table S1). However, this was comparable to similar trials in the field. Furthermore, the inactive control group was smaller compared with the MBI and active control groups, reducing the statistical power and increasing the probability of type II errors. Regarding the inactive control group, the timing of the rating scales also represents a limitation of the study (data were collected only during two spring terms). Moreover, although this study was implemented following the study protocol (Volanen et al. 2016), there was one exception: we added separate analyses for the amount of independent practice. Finally, pupil baseline characteristics, such as age, gender, ethnicity, and socio-emotional vulnerability, may also influence students' engagement and the way MBIs are received in classroom settings (Tudor et al. 2022). Given that our study focused on Finnish students from primary and secondary schools (aged 12–15), the findings may not be directly generalisable to other age-groups, cultural contexts, or educational environments. Additionally, given that our sample was collected several years ago, and since then events such as the COVID-19 pandemic may have had long lasting negative effects on adolescents' mental health (Kiviruusu et al. 2024), it is important to replicate these findings using more recent samples. The need for the programmes designed to promote youth mental health could be even greater than in previous years. Finally, our reliance on the self-kindness subscale of the adult SCS limits the accuracy of assessment and the generalizability of the results. Future research using validated youth-specific measures of self-compassion and its subcomponents is therefore essential.

The current study also has several strengths and, alongside the MYRIAD study, methodologically represents the soundest research on MBIs in the context of schools (Dunning et al. 2022). This study is a school-based RCT including around 3500 students, including active and inactive control groups with



a follow-up of 26 weeks. We also included wide-ranging characteristics for students and school districts. The classroom and school effects have been statistically accounted for, and the trial utilises an existing manualised MBI (the .b), as well as two diverse outcomes both of which can be considered crucially important skills to possess and develop within this age group. Furthermore, professional mindfulness facilitators implemented the intervention. Finally, to avoid the contamination risk, randomisation was conducted at the school level.

To enhance the understanding of the effectiveness of universal MBIs in educational settings, future research should consider long-term follow-ups to evaluate the sustainability of their impacts. Future studies should also align measurement points closely between the MBI and control groups. In addition to self-assessments, combining both quantitative and qualitative components, such as interviews and measures of physiological stress, would provide more in-depth information on the effects of MBIs. Moreover, examining individual factors, such as age, gender, and socioeconomic status, and considering contextual factors can provide insights into how the effects might differ across different educational environments and subgroups of children and adolescents. Future studies should also examine possible moderating and mediating outcomes (such as self-compassion) to better understand the mechanisms of mindfulness on adolescents' well-being.

## 8 | Conclusions

The results of this large-scale RCT demonstrated that a universal MBI is slightly more effective in protecting against stress symptoms among students compared with the active control programme—that is, a relaxation programme. However, we found no clear evidence of the effects of MBI on self-kindness. We recommend that future RCT studies exploring the effects of a universal MBI on stress symptoms with both psychological and physiological measures.

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### Ethics Statement

This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by the ethical review board of the University of Helsinki (approval 1/2014).

### Consent

Informed consent was obtained from all individual participants included in the study and their parents (or legal guardians). Healthy Learning Mind -study protocol for a cluster randomized controlled trial (RCT) ISRCTN18642659 was preregistered on October 13, 2015. The full trial protocol can be accessed at <http://rdcu.be/t57S>.

### Data Availability Statement

The data that support the findings of this study are available from the authors upon reasonable request.

## References

- Baer, R. A. 2003. "Mindfulness Training as a Clinical Intervention: A Conceptual and Empirical Review." *Clinical Psychology: Science and Practice* 10, no. 2: 125–143. <https://doi.org/10.1093/clipsy.bpg015>.
- Bishop, S. R. 2004. "Mindfulness: A Proposed Operational Definition." *Clinical Psychology: Science and Practice* 11, no. 3: 230–241. <https://doi.org/10.1093/clipsy/bph077>.
- Blakemore, S. J., and S. Choudhury. 2006. "Development of the Adolescent Brain: Implications for Executive Function and Social Cognition." *Journal of Child Psychology and Psychiatry* 47, no. 3/4: 296–312. <https://doi.org/10.1111/j.1469-7610.2006.01611.x>.
- Broderick, P. C., and S. Metz. 2009. "Learning to BREATHE: A Pilot Trial of a Mindfulness Curriculum for Adolescents." *Advances in School Mental Health Promotion* 2, no. 1: 35–46. <https://doi.org/10.1080/1754730X.2009.9715696>.
- Caqueo-Urizar, A., A. Urzúa, and W. Osika. 2014. "Psychometric Properties of the Spanish Language Version of the Stress in Children Questionnaire (SIC)." *Psicologia: Reflexão e Crítica* 27: 81–89. <https://doi.org/10.1590/S0102-79722014000100010>.
- Carsley, D., B. Khoury, and N. L. Heath. 2018. "Effectiveness of Mindfulness Interventions for Mental Health in Schools: A Comprehensive Meta-Analysis." *Mindfulness* 9, no. 3: 693–707. <https://doi.org/10.1007/s12671-017-0839-2>.
- Chin, B., E. K. Lindsay, C. M. Greco, et al. 2019. "Psychological Mechanisms Driving Stress Resilience in Mindfulness Training: A Randomized Controlled Trial." *Health Psychology* 38, no. 8: 759–768. <https://doi.org/10.1037/hea0000763>.
- Doyle Fosco, S. L., D. L. Schussler, M. A. Brown, et al. 2025. "A Conceptual Framework for Whole-School Implementation of Mindfulness Programs and Practices: Wisdom From the Field." *Psychology in the Schools* 62, no. 7: 2096–2110. <https://doi.org/10.1002/pits.23453>.
- Dreisoerner, A., N. M. Junker, and R. van Dick. 2021. "The Relationship Among the Components of Self-Compassion: A Pilot Study Using a Compassionate Writing Intervention to Enhance Self-Kindness, Common Humanity, and Mindfulness." *Journal of Happiness Studies* 22, no. 1: 21–47. <https://doi.org/10.1007/s10902-019-00217-4>.
- Dunning, D., K. Tudor, L. Radley, et al. 2022. "Do Mindfulness-Based Programmes Improve the Cognitive Skills, Behaviour and Mental Health of Children and Adolescents? An Updated Meta-Analysis of Randomised Controlled Trials." *Evidence Based Mental Health* 25, no. 3: 135–142. <https://doi.org/10.1136/ebmental-2022-300464>.
- Dupéré, V., T. Leventhal, E. Dion, R. Crosnoe, I. Archambault, and M. Janosz. 2015. "Stressors and Turning Points in High School and Dropout: A Stress Process, Life Course Framework." *Review of Educational Research* 85, no. 4: 591–629. <https://doi.org/10.3102/0034654314559845>.
- Erdemir, N., F. Karanfil, and R. Şengül. 2024. "Enhancing Academic Resilience Through Mindfulness-Based Practices in the Schools: A Study on Vocational High School Students." *Psychology in the Schools* 61, no. 6: 2359–2375. <https://doi.org/10.1002/pits.23168>.
- Finnish National Agency for Education. 2024. Support to Learning and Pupil Welfare System. Retrieved 28.8.2025 from <https://www.oph.fi/en/education-and-qualifications/support-learning-and-pupil-welfare-system>.
- Fulambarkar, N., B. Seo, A. Testerman, M. Rees, K. Bausback, and E. Bunge. 2023. "Review: Meta-Analysis on Mindfulness-Based Interventions for Adolescents' Stress, Depression, and Anxiety in School Settings: A Cautionary Tale." *Child and Adolescent Mental Health* 28, no. 2: 307–317. <https://doi.org/10.1111/camh.12572>.
- Galla, B. M. 2016. "Within-Person Changes In Mindfulness and Self-Compassion Predict Enhanced Emotional Well-Being in Healthy, But Stressed Adolescents." *Journal of Adolescence* 49: 204–217. <https://doi.org/10.1016/j.adolescence.2016.03.016>.

- Galvez Tan, L. J. T., and L. P. Alampay. 2022. "Exploring Moderators of Intervention Effects of a Mindfulness Program for Filipino Children." *International Journal of School & Educational Psychology* 10, no. 3: 368–382. <https://doi.org/10.1080/21683603.2020.1856741>.
- Van der Gucht, K., K. Takano, F. Raes, and P. Kuppens. 2018. "Processes of Change in a School-Based Mindfulness Programme: Cognitive Reactivity and Self-Coldness as Mediators." *Cognition and Emotion* 32, no. 3: 658–665. <https://doi.org/10.1080/02699931.2017.1310716>.
- Hayes, S., K. Strosahl, and K. Wilson 1999. *Acceptance and Commitment Therapy: An Experiential Approach to Behavior Change* (Vol. 9). <https://doi.org/10.1007/978-0-387-23369-7>.
- Hölzel, B. K., S. W. Lazar, T. Gard, Z. Schuman-Olivier, D. R. Vago, and U. Ott. 2011. "How Does Mindfulness Meditation Work? Proposing Mechanisms of Action From a Conceptual and Neural Perspective." *Perspectives on Psychological Science* 6, no. 6: 537–559. <https://doi.org/10.1177/1745691611419671>.
- Hox, J. 1998. "Multilevel Modeling: When and Why." In *Classification, Data Analysis, and Data Highways*, 147–154. Springer.
- Hubbard, J., T. Leeuwrik, and C. Strauss. 2025. "A Systematic Review of Self-Report Measures Used to Assess Compassion in Children and Young People." *Mindfulness* 16, no. 6: 1454–1489. <https://doi.org/10.1007/s12671-025-02569-w>.
- Huppert, F. A., and D. M. Johnson. 2010. "A Controlled Trial of Mindfulness Training in Schools: The Importance of Practice for an Impact on Well-Being." *Journal of Positive Psychology* 5, no. 4: 264–274. <https://doi.org/10.1080/17439761003794148>.
- Johnson, C., C. Burke, S. Brinkman, and T. Wade. 2016. "Effectiveness of a School-Based Mindfulness Program for Transdiagnostic Prevention in Young Adolescents." *Behaviour Research and Therapy* 81: 1–11. <https://doi.org/10.1016/j.brat.2016.03.002>.
- Johnson, C., C. Burke, S. Brinkman, and T. Wade. 2017. "A Randomized Controlled Evaluation of a Secondary School Mindfulness Program for Early Adolescents: Do We Have the Recipe Right Yet?" *Behaviour Research and Therapy* 99: 37–46. <https://doi.org/10.1016/j.brat.2017.09.001>.
- Kabat-Zinn, J. 2003. "Mindfulness-Based Stress Reduction (MBSR)." *Constructivism in the Human Sciences* 8, no. 2: 73–83.
- Kabat-Zinn, J. 2005. *Full Catastrophe Living: Using the Wisdom of Your Body and Mind to Face Stress, Pain, and Illness (15th anniversary ed.)*. Delta Trade Paperback/Bantam Dell; US.
- Kabat-Zinn, J. 2009. *Wherever You Go, There You Are: Mindfulness Meditation in Everyday Life*. Hachette Books.
- Kang, Y., H. Rahrig, K. Eichel, et al. 2018. "Gender Differences in Response to a School-Based Mindfulness Training Intervention for Early Adolescents." *Journal of School Psychology* 68: 163–176. <https://doi.org/10.1016/j.jsp.2018.03.004>.
- Kaplan, D. S., R. X. Liu, and H. B. Kaplan. 2005. "School Related Stress in Early Adolescence and Academic Performance Three Years Later: The Conditional Influence of Self Expectations." *Social Psychology of Education* 8, no. 1: 3–17. <https://doi.org/10.1007/s11218-004-3129-5>.
- Kivuruusu, O., K. Ranta, M. Lindgren, et al. 2024. "Mental Health After the COVID-19 Pandemic Among Finnish Youth: A Repeated, Cross-Sectional, Population-Based Study." *Lancet Psychiatry* 11, no. 6: 451–460. [https://doi.org/10.1016/S2215-0366\(24\)00108-1](https://doi.org/10.1016/S2215-0366(24)00108-1).
- Kraag, G., M. P. Zeegers, G. Kok, C. Hosman, and H. H. Abu-Saad. 2006. "School Programs Targeting Stress Management in Children and Adolescents: A Meta-Analysis." *Journal of School Psychology* 44, no. 6: 449–472. <https://doi.org/10.1016/j.jsp.2006.07.001>.
- Kuyken, W., S. Ball, C. Crane, et al. 2022a. "Effectiveness and Cost-Effectiveness of Universal School-Based Mindfulness Training Compared With Normal School Provision in Reducing Risk of Mental Health Problems and Promoting Well-Being in Adolescence: The MYRIAD Cluster Randomised Controlled Trial." *Evidence Based Mental Health* 25, no. 3: 99–109. <https://doi.org/10.1136/ebmental-2021-300396>.
- Kuyken, W., S. Ball, C. Crane, et al. 2022b. "Effectiveness of Universal School-Based Mindfulness Training Compared With Normal School Provision on Teacher Mental Health and School Climate: Results of the MYRIAD Cluster Randomised Controlled Trial." *Evidence Based Mental Health* 25, no. 3: 125–134. <https://doi.org/10.1136/ebmental-2022-300424>.
- Kuyken, W., K. Weare, O. C. Ukoumunne, et al. 2013. "Effectiveness of the Mindfulness in Schools Programme: Non-Randomised Controlled Feasibility Study." *British Journal of Psychiatry* 203, no. 2: 126–131. <https://doi.org/10.1192/bjp.bp.113.126649>.
- Lassander, M., M. Hintsanen, N. Ravaja, et al. 2022. "Pilot Study on Students' Stress Reactivity After Mindfulness Intervention Compared to Relaxation Control Group." *International Journal of Stress Management* 29, no. 3: 306–317. <https://doi.org/10.1037/str0000246>.
- Lassander, M., M. Hintsanen, S. Suominen, S. Mullola, T. Vahlberg, and S.-M. Volanen. 2021. "Effects of School-Based Mindfulness Intervention on Health-Related Quality of Life: Moderating Effect of Gender, Grade, and Independent Practice in Cluster Randomized Controlled Trial." *Quality of Life Research* 30, no. 12: 3407–3419. <https://doi.org/10.1007/s11136-021-02868-4>.
- Laundy, K., P. Friberg, W. Osika, and Y. Chen. 2021. "Mindfulness-Based Intervention for Children With Mental Health Problems: A 2-Year Follow-Up Randomized Controlled Study." *Mindfulness* 12, no. 12: 3073–3085. <https://doi.org/10.1007/s12671-021-01771-w>.
- Lazarus, R. S. 1966. *Psychological Stress and the Coping Process*. McGraw-Hill.
- Li, T., D. Zhou, W. Zhang, and C. Ju. 2025. "The Relationship Between Mindfulness and Test Anxiety Among High School Students: The Chain Mediating Role of Emotion Regulation and Psychological Resilience." *Psychology in the Schools*, ahead of print, August 4: 1–11. <https://doi.org/10.1002/pits.70074>.
- van Loon, A. W. G., H. E. Creemers, W. Y. Beumer, et al. 2020. "Can Schools Reduce Adolescent Psychological Stress? A Multilevel Meta-Analysis of the Effectiveness of School-Based Intervention Programs." *Journal of Youth and Adolescence* 49, no. 6: 1127–1145. <https://doi.org/10.1007/s10964-020-01201-5>.
- Luberto, C. M., D. L. Hall, E. R. Park, A. Haramati, and S. Cotton. 2020. "A Perspective on the Similarities and Differences Between Mindfulness and Relaxation." *Global Advances in Health and Medicine* 9: 2164956120905597. <https://doi.org/10.1177/2164956120905597>.
- Manosso, L. M., C. R. Gasparini, G. Z. Réus, and Z. M. Pavlovic. 2022. "Definitions and Concepts of Stress." In *Glutamate and Neuropsychiatric Disorders: Current and Emerging Treatments*, edited by Z. M. Pavlovic, 27–63. Springer International Publishing. [https://doi.org/10.1007/978-3-030-87480-3\\_2](https://doi.org/10.1007/978-3-030-87480-3_2).
- Mettler, J., B. Khoury, S. Zito, I. Sadowski, and N. L. Heath. 2023. "Mindfulness-Based Programs and School Adjustment: A Systematic Review and Meta-Analysis." *Journal of School Psychology* 97: 43–62. <https://doi.org/10.1016/j.jsp.2022.10.007>.
- Mindfulness in Schools Project. 2021. *b Curriculum (Ages 11–18)*. Retrieved August 27, 2024 from <https://mindfulnessinschools.org/teach-dot-b/dot-b-curriculum/>.
- Montero-Marin, J., M. Allwood, S. Ball, et al. 2022. "School-Based Mindfulness Training in Early Adolescence: What Works, for Whom and How in the MYRIAD Trial?" *Evidence Based Mental Health* 25, no. 3: 117–124. <https://doi.org/10.1136/ebmental-2022-300439>.
- Moore, A., and P. Malinowski. 2009. "Meditation, Mindfulness and Cognitive Flexibility." *Consciousness and Cognition* 18, no. 1: 176–186. <https://doi.org/10.1016/j.concog.2008.12.008>.
- Neff, K. 2003a. "The Development and Validation of a Scale to Measure Self-Compassion." *Self and Identity* 2, no. 3: 223–250. <https://doi.org/10.1080/15298860309027>.

- Neff, K. 2003b. "Self-Compassion: An Alternative Conceptualization of a Healthy Attitude Toward Oneself." *Self and Identity* 2, no. 2: 85–101. <https://doi.org/10.1080/15298860309032>.
- Neff, K. D. 2003. "The Development and Validation of a Scale to Measure Self-Compassion." *Self and Identity* 2: 223–250.
- Neff, K. D. 2016. "The Self-Compassion Scale Is a Valid and Theoretically Coherent Measure of Self-Compassion." *Mindfulness* 7, no. 1: 264–274. <https://doi.org/10.1007/s12671-015-0479-3>.
- Neff, K. D. 2023. "Self-Compassion: Theory, Method, Research, and Intervention." *Annual Review of Psychology* 74: 193–218. <https://doi.org/10.1146/annurev-psych-032420-031047>.
- Neff, K. D., K. Bluth, I. Tóth-Király, et al. 2021. "Development and Validation of the Self-Compassion Scale for Youth." *Journal of Personality Assessment* 103, no. 1: 92–105. <https://doi.org/10.1080/00223891.2020.1729774>.
- Neff, K. D., T. A. Whittaker, and A. Karl. 2017. "Examining the Factor Structure of the Self-Compassion Scale in Four Distinct Populations: Is the Use of a Total Scale Score Justified?" *Journal of Personality Assessment* 99, no. 6: 596–607. <https://doi.org/10.1080/00223891.2016.1269334>.
- Oldehinkel, A. J., J. Ormel, N. M. Bosch, et al. 2011. "Stressed Out? Associations Between Perceived and Physiological Stress Responses in Adolescents: The TRAILS Study." *Psychophysiology (Madison, WI)* 48, no. 4: 441–452. <https://doi.org/10.1111/j.1469-8986.2010.01118.x>.
- Osika, W., P. Friberg, and P. Wahrborg. 2007. "A New Short Self-Rating Questionnaire to Assess Stress in Children." *International Journal of Behavioral Medicine* 14, no. 2: 108–117. <https://doi.org/10.1007/bf03004176>.
- Perry-Parrish, C., N. Copeland-Linder, L. Webb, and E. M. S. Sibinga. 2016. "Mindfulness-Based Approaches for Children and Youth." *Current Problems in Pediatric and Adolescent Health Care* 46, no. 6: 172–178. <https://doi.org/10.1016/j.cppeds.2015.12.006>.
- Phillips, S., and M. Mychailyszyn. 2022. "The Effect of School-Based Mindfulness Interventions on Anxious and Depressive Symptoms: A Meta-Analysis." *School Mental Health* 14, no. 3: 455–469. <https://doi.org/10.1007/s12310-021-09492-0>.
- Razza, R., D. Bergen-Cico, S. Reid, and R. L. Uveges. 2025. "The Benefits of Mindfulness for Promoting Resilience Among At-Risk Adolescents: Results From the Inner Strength Teen Program." *ECNU Review of Education* 8, no. 1: 272–294. <https://doi.org/10.1177/2096531120982254>.
- Renshaw, T. L., A. J. Fischer, and D. A. Klingbeil. 2017. "Mindfulness-Based Intervention in School Psychology." *Contemporary School Psychology* 21, no. 4: 299–303. <https://doi.org/10.1007/s40688-017-0166-6>.
- Rew, L., K. Johnson, and C. Young. 2014. "A Systematic Review of Interventions to Reduce Stress in Adolescence." *Issues in Mental Health Nursing* 35, no. 11: 851–863. <https://doi.org/10.3109/01612840.2014.924044>.
- Rojiani, R., J. F. Santoyo, H. Rahrig, H. D. Roth, and W. B. Britton. 2017. "Women Benefit More Than Men in Response to College-Based Meditation Training." *Frontiers in Psychology* 8: 551. <https://doi.org/10.3389/fpsyg.2017.00551>.
- Segal, Z. V., J. D. Teasdale, J. M. Williams, and M. C. Gemar. 2002. "The Mindfulness-Based Cognitive Therapy Adherence Scale: Inter-Rater Reliability, Adherence to Protocol and Treatment Distinctiveness." *Clinical Psychology & Psychotherapy* 9, no. 2: 131–138. <https://doi.org/10.1002/cpp.320>.
- Sibinga, E. M. S., C. Perry-Parrish, S. Chung, S. B. Johnson, M. Smith, and J. M. Ellen. 2013. "School-Based Mindfulness Instruction for Urban Male Youth: A Small Randomized Controlled Trial." *Preventive Medicine* 57, no. 6: 799–801. <https://doi.org/10.1016/j.ypmed.2013.08.027>.
- Sibinga, E. M. S., L. Webb, S. R. Ghazarian, and J. M. Ellen. 2016. "School-Based Mindfulness Instruction: An RCT." *Pediatrics* 137, no. 1: e20152532. <https://doi.org/10.1542/peds.2015-2532>.
- Slutsky, J., H. Rahl, E. K. Lindsay, and J. D. Creswell. 2017. "Mindfulness, Emotion Regulation, and Social Threat." In *Mindfulness in Social Psychology*, 79–93. Routledge.
- Stallknecht, S. E., K. Strandberg-Larsen, L. Hestbæk, and A.-M. N. Andersen. 2017. "Spinal Pain and Co-Occurrence With Stress and General Well-Being Among Young Adolescents: A Study Within the Danish National Birth Cohort." *European Journal of Pediatrics* 176, no. 6: 807–814. <https://doi.org/10.1007/s00431-017-2915-y>.
- Strohmaier, S., and N. W. Bailey. 2023. "Do Not Keep Calm and Carry on: School-Based Mindfulness Programmes Should Test Making Mindfulness Practice Available in the School Day." *Mindfulness* 14, no. 12: 3086–3097. <https://doi.org/10.1007/s12671-023-02249-7>.
- Sullivan, G. M., and R. Feinn. 2012. "Using Effect Size-or Why the P Value Is Not Enough." *Journal of Graduate Medical Education* 4, no. 3: 279–282. <https://doi.org/10.4300/jgme-d-12-00156.1>.
- Teasdale, J. D., R. G. Moore, H. Hayhurst, M. Pope, S. Williams, and Z. V. Segal. 2002. "Metacognitive Awareness and Prevention of Relapse in Depression: Empirical Evidence." *Journal of Consulting and Clinical Psychology* 70, no. 2: 275–287. <https://doi.org/10.1037/0022-006X.70.2.275>.
- Terjestam, Y., H. Bengtsson, and A. Jansson. 2016. "Cultivating Awareness at School. Effects on Effortful Control, Peer Relations and Well-Being at School in Grades 5, 7, and 8." *School Psychology International* 37, no. 5: 456–469. <https://doi.org/10.1177/0143034316658321>.
- Tudor, K., S. Maloney, and A. Raja, et al., 2022. "Universal Mindfulness Training in Schools for Adolescents: A Scoping Review and Conceptual Model of Moderators, Mediators, and Implementation Factors." *Prevention Science* 23, no. 6: 934–953. <https://doi.org/10.1007/s1121-022-01361-9>.
- Volanen, S., M. Lassander, N. Hankonen, et al. 2016. "Healthy Learning Mind-A School-Based Mindfulness and Relaxation Program: A Study Protocol for a Cluster Randomized Controlled Trial." *BMC Psychology* 4, no. 1: 35. <https://doi.org/10.1186/s40359-016-0142-3>.
- Volanen, S.-M., M. Lassander, N. Hankonen, et al. 2020. "Healthy Learning Mind-Effectiveness of a Mindfulness Program on Mental Health Compared to a Relaxation Program and Teaching as Usual in Schools: A Cluster-Randomised Controlled Trial." *Journal of Affective Disorders* 260, no. 1: 660–669. <https://doi.org/10.1016/j.jad.2019.08.087>.

## Supporting Information

Additional supporting information can be found online in the Supporting Information section.

**Supplementary Table S1:** Demographic characteristics by groups at baseline. **Supplementary Table S2:** Baseline comparisons between the MBI and the control groups on the outcome measures. **Supplementary Table S3:** LMM analyses in girls and boys on stress symptoms and self-kindness. **Supplementary Table S4:** LMM analyses in 6th, 7th, and 8th graders on stress symptoms and self-kindness.