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COMMENTARY

Do Not Keep Calm and Carry on: School-Based Mindfulness Programmes Should Test Making Mindfulness Practice Available in the School Day

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Abstract
Recently, the largest test of a school-based mindfulness programme to date, the My Resilience In Adolescence (MYRIAD) trial, found that participating in weekly mindfulness lessons did not improve students' well-being compared to teaching as usual, with low uptake of recommended home mindfulness practice. One potential explanation for the null result and low uptake is that adolescents might be unlikely to adhere to home mindfulness practice recommendations when choosing between mindfulness and their graded homework or more stimulating activities. Indeed, many studies of school-based mindfulness programmes have reported low adherence to home practice recommendations. Home practice recommendations also create equity issues, as many students may find it difficult to make the time for home mindfulness practice, a factor that is more likely to affect students who are disadvantaged. As such, we argue in this article that research needs to test whether school-based mindfulness programmes that make mindfulness practice time available in the school day result in higher adherence to mindfulness practice recommendations, and whether these programmes are effective at improving student mental health. Unfortunately, very little research has examined how much mindfulness practice is required to obtain meaningful effects. We summarise the small volume of mindfulness dose-response literature to provide guidelines for how much school-based mindfulness practice might be sufficient and provide suggestions for further testing. While making mindfulness practice time available in the school day may be difficult to implement, its efficacy is currently untested. Youth mental health remains a critical issue, providing strong justification for testing whether mindfulness practice made available in the school day results in better outcomes, despite the challenges posed in pursuing this research avenue.

Keywords Mindfulness · School-based · Adolescence · Dose · Universal

Mindfulness has become increasingly popular in recent decades as a method to improve mental health and provide a range of other benefits (for a scoping review of topics in mindfulness research, see Kee et al., 2019). Given the success of mindfulness in adult populations, mindfulness programmes have also been increasingly implemented in schools. Last year, Kuyken et al. (2022a) published the results of the largest ever study of universal school-based mindfulness training (My Resilience in Adolescence; MYRIAD). The MYRIAD trial included 8376 participants, aged 10–14 years, from 84 schools across the UK (Kuyken et al., 2022a). The premise of the study was that a universal school-based mindfulness programme may have the potential to improve population-wide mental health in a cost-effective way. The MYRIAD study was tightly controlled and included pre-registration of methods and analyses, a cluster-randomised trial design, a UK population representative sample of adolescents, and pre-determination that the study had sufficient power to detect effects. Participants were either randomised to school-based mindfulness training taught via an established and manualised programme that caters mindfulness lessons for school-aged students (the .b mindfulness programme), or teaching as usual. The mindfulness programme included ten mindfulness lessons

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across the course of one term, taught by the students' usual teacher (who was extensively trained in how to teach mindfulness), with each lesson lasting 30–50 min, and students attending 90% of lessons on average (Kuyken et al., 2022a). Outside of these lessons, no practice time was specifically made available at school, but students were recommended to practise in their own time and provided with guided audio recordings (Kuyken et al., 2022a). With its very large sample size and rigorous study design, MYRIAD can be viewed as a definitive test of school-based mindfulness programmes, implemented as per the study protocol.

Unexpectedly, the results showed no evidence that participating in the mindfulness programme was more helpful for adolescents than teaching as usual (Kuyken et al., 2022a). Indeed, confidence intervals indicated there was no possibility of any important effects in reductions to the risk of depression or anxiety and no improvements in social-emotional-behavioural function, executive functioning, or well-being (Kuyken et al., 2022a). Moreover, results suggested that the students in the mindfulness condition reported marginally higher risk of depression, hyperactivity/inattention, panic disorder, and obsessive-compulsive scores (Kuyken et al., 2022a). Finally, the students in the mindfulness condition even reported lower mindfulness scores after the mindfulness programme (Kuyken et al., 2022a). This final point is not just an isolated finding — the lack of an improvement in mindfulness scores is a consistent finding across studies of the .b programme (Mettler et al., 2023). The lack of change in mindfulness scores is perhaps a good demonstration that the .b programme did not achieve its intended effect — a primary aim of most mindfulness programmes is to increase the mindful state in participants, with theoretical perspectives suggesting that increases in the mindful state enable decreased rumination and reactivity to stressors, as well as increases in emotional regulation (Perestelo-Perez et al., 2017; van der Velden et al., 2015; Wolkin, 2015). Indeed, the MYRIAD team's own scoping review suggested that an increase in mindfulness skills is a strong contender for a mechanism of action by which mindfulness programmes cause improvements in well-being (Tudor et al., 2022).

It should be noted that the validity of mindfulness measures at assessing change from mindfulness programmes is debated (Goldberg et al., 2019; Van Dam et al., 2010, 2012). Some research has indicated that after a mindfulness intervention, participants interpret the questions from mindfulness scales differently, demonstrating a *response shift* (Bartos et al., 2023). However, other research has indicated this response shift is only minor (Krägeloh et al., 2018). As such, it may be that other measures are more appropriate for assessing the mechanisms of action of mindfulness interventions. However, regardless of whether changes in mindfulness reflect the mechanism of action or not, the small decrease in mindfulness as a result of the MYRIAD study suggests the mindfulness programme did not achieve its intended effect of increasing mindfulness in the students. Similarly, a follow-up study by the MYRIAD team did not find that change in trait mindfulness was a significant mechanism of action for the programme (Dunning et al., 2022). Assuming that increases in trait mindfulness are an important mechanism of action of effective mindfulness programmes as research has suggested (Alsubaie et al., 2017; Gu et al., 2015; Tudor et al., 2022), then the lack of engagement of this mechanism may be a proximal explanation for the lack of improved well-being from MYRIAD's mindfulness programme. While other potential mechanisms were not assessed, we suspect it is likely that they would similarly have shown little change from the mindfulness programme.

Furthermore, in addition to the lack of overall effect, one argument for universal programmes is that although the majority may not benefit, an at-risk minority may benefit and be reached when they would not be reached otherwise (Tudor et al., 2022). Unfortunately, the MYRIAD data indicated that high-risk students in the mindfulness condition reported detrimental effects to both their risk of depression and their well-being, suggesting universal school-based mindfulness programmes with weekly mindfulness lessons and recommended home practice are not effective at improving mental health for high-risk individuals (Montero-Marin et al., 2022).

Reactions to the MYRIAD study and its implications for school-based mindfulness programmes have varied. One perspective was that the overall evidence shows that school-based mindfulness programmes still hold promise as an effective method to improve adolescent mental health, but results depend on how it is taught, by whom, and how well programmes are designed to engage young people (Burrows, 2022; Roeser et al., 2023; Weare, 2023). A contrasting perspective is that the existing evidence and theory did not justify the application of school-based mindfulness programmes even before the MYRIAD study, and that school-based mindfulness programmes may do harm; therefore, applications of these programmes do not work and should be completely ceased (Farias, 2022). One perspective even further along this critical side of the spectrum is that universal interventions in schools in general (including non-mindfulness interventions) may not work (Cuijpers, 2022). We would add one further serious issue — that the time and funds devoted to ineffective school-based mindfulness programmes currently being implemented reflect a considerable opportunity cost, where the time and funding could have been used more productively.

One of the reasons for the null result suggested by the authors of the MYRIAD trial was that the mindfulness curriculum might not have engaged enough mindfulness practice in the students, with students largely not practising

mindfulness at home (Kuyken et al., 2022a; Montero-Marin et al., 2022). In fact, participants reported an average frequency of practice of 1.16 on a scale of 0 (never) to 5 (almost every day) (Kuyken et al., 2022a). This value was even lower at follow-up, with an average of 0.83 (Kuyken et al., 2022a). In other words, students reported that they were practising mindfulness just slightly more than *never*. This corresponds with most school-based mindfulness programmes, where although attempts are made to increase engagement in mindfulness practice, home practice is still typically low (Tudor et al., 2022).

We suspect the lack of home practice time undertaken by the MYRIAD study participants is due to the many important competing demands on the spare time of high school students, many of which are externally dictated and outside of their control (Chadwick & Gelbar, 2016). These demands are likely to include homework and study for exams, domestic chores, and in some cases part-time jobs. This is in addition to preferred activities like interacting with their friends and engaging in hobbies and sports. Adolescents are also well-known to lack the same level of planning and self-control skills that adults possess (Casey et al., 2005; Steinberg, 2008), and as such may be less able to self-regulate their behaviour (Montero-Marin et al., 2022). Therefore, there is good reason to suspect many adolescents are likely to be less able than adults to devote time of their own according to a mindfulness practice.

Although students in the MYRIAD study were informed the practice will promote their mental health, the practice typically does not yield any immediate rewards and is not obviously related to tangible school-related results through improved grades (Bailey et al., 2018). Mindfulness practice also comes at an opportunity cost of other activities that might enhance their mental health (for example spending time with friends or playing sports) and is much less stimulating than many common pastimes such as social media (De Leyn et al., 2022). As such, in the context of students' own time being the only time made available for mindfulness practice, we suggest it is unsurprising that the mindfulness practice amounts reported in the study were so low. We suspect the addition of another time-cost to a student's day without removing something else from their schedule may add a potential burden that students might not be able to adhere to. This has previously been found in qualitative research with adult healthcare staff participants, where the commitment to daily mindfulness practices of up to an hour per practice session was seen as a barrier to engaging with mindfulness, resulting in participants ceasing practice altogether (Banerjee et al., 2017). The burden of mindfulness practice recommendations may prevent students from practising mindfulness, or even more troubling, the addition of the expectation to practise mindfulness simply creates another stressor without students having the capacity to practise a sufficient amount of mindfulness to obtain the putative benefits (Bailey et al., 2018).

We suggest that if the lack of home practice is a good explanation for the null results of the MYRIAD trial, it is still possible that school-based mindfulness programmes that elicit a sufficient amount of mindfulness practice could obtain positive effects for mental health. We suspect that the reason students barely practised mindfulness is due to the expectation that they would undertake self-motivated practice at home, sacrificing leisure time or time for the study of graded material. We propose that a more effective solution might be to provide a dedicated time and space where mindfulness *practice* is available *within* the school day for students who choose to undertake that practice (in addition to the weekly lessons). To avoid the same issues that may cause the low home practice adherence, these mindfulness practice times should not be scheduled to compete with a preferred activity (for example, during students free time at lunch). Rather, they should be scheduled at the same time as an alternative curriculum activity (for example, social and emotional learning lessons). This approach would enable students to practice, taking away the difficult choice between a preferred activity and mindfulness practice, and replacing it with a choice between two lower preference options (making the mindfulness practice more likely).

This approach would remove the need for students to take responsibility for remembering or prioritising mindfulness practice and create a systematic and equitable way to support a more robust development of mindfulness skills. This approach would also provide regular opportunities to support individuals in actively pursuing well-being, in the context of a youth well-being crisis, where some form of systematic change is arguably critical. The suggestion that mindfulness practice embedded in the school day is required for a successful school-based mindfulness programme has previously been proposed (Bailey et al., 2018), following a similar null result from a similar implementation of a school-based mindfulness programme (Johnson et al., 2017). However, making mindfulness practice time available in the school day has not yet been explicitly tested.

The lack of explicit tests of school-based mindfulness programmes that make practice time available in the school day may be due to the challenges implicit in doing so. One of the challenges of incorporating mindfulness practice in the school day is that school curriculums are already overburdened, so there is simply not space for mindfulness practice in the school day (Easthope & Easthope, 2000; Majoni, 2017). As such, the majority of school-based mindfulness programmes do not include space for mindfulness practice in the school day (Johnson et al., 2017; Kuyken et al., 2013; Tudor et al., 2022). Instead, the most common approach is to have one lesson a week for mindfulness for mental health, with the

expectation that adolescents will take responsibility for the practice themselves, in addition to their usual curriculum-based homework. This results in an approach to providing school-based mindfulness programmes that attempt to be *minimally intrusive* to typical school function. Unfortunately, given the size of the MYRIAD study, we must admit that programmes which place the responsibility on students to practise mindfulness at home (to minimise interruption to typical school function) do not work. As such, the majority of school-based mindfulness programmes are likely ineffective.

In this context, it is not yet certain why many previous studies (and meta-analyses) of mindfulness in schools have reported positive results in contrast to the negative result reported by the MYRIAD study. One potential (at least partial) explanation may be that most of these studies examined multiple outcome metrics and may have often reported any significant results as the primary outcome measure, a practice associated with false positives. Indeed, at least one meta-analysis has reported a positive result bias for studies of mindfulness programmes provided to children (Dunning et al., 2019). Recent work has also suggested that meta-analyses of low-quality studies do not address the risks of false positives from these studies, and can still result in false positive conclusions as a result of low study quality (Simonsohn et al., 2022). Other alternative explanations are that the parameters of these programmes may have differed from MYRIAD (including having external mindfulness teachers teach the lessons rather than typical classroom teachers), or that adherence to practice recommendations may have been higher. However, we note that results of studies of mindfulness programmes in schools have not been ubiquitously positive with the exception of the MYRIAD study, with some other null result studies citing lack of adherence to practice recommendations as a reason for the null result (Johnson et al., 2016, 2017). Nonetheless, given the results of the MYRIAD study, research should explore the parameters involved in a successful mindfulness in schools programme, and embedding practice in the school day is a likely candidate.

Additionally, research has noted that the practical implications of approaches that require students to practise at home are ethically dubious. These programmes have been suggested to convey an implicit message that mental health is the individual's responsibility which is not externally supported or prioritised, and so any potential poor mental health that arises is the individual's own fault (O'Donnell, 2015). Mindfulness programmes that are minimally intrusive to school function and require home practice are also likely to lead to inequality in both opportunities and outcomes — students in lower socio-economic circumstances are less likely to have the support around them that enables them to practise, and might be more busy with other responsibilities, compared to students in well-off families and well-resourced schools (Bailey et al., 2018).

Given these points, we think the MYRIAD study should signal the end of school-based mindfulness programmes that only make mindfulness practice times available in one lesson per week and recommend all other practice as homework (in order to be minimally intrusive to typical school function), rather than making a set practice time available in each school day. However, unfortunately, adolescent mental health is still a pressing issue, without effective solutions, so an alternative is necessary. Therefore, it is important to test an approach which embeds mindfulness practice in the school day, which might enable students to undertake a sufficient amount of mindfulness practice to result in improved student mental health. This may be a more difficult research path, but is a research path that is critically necessary to test in the absence of other universal solutions to student mental health issues.

Advantages of Embedding the Opportunity for Mindfulness Practice in the School Day

Testing or implementing a school-based mindfulness programme that enables a sufficient amount of mindfulness practice would involve making dedicated time in the school curriculum which could be used for mindfulness practice. We suggest that daily sessions are likely to be optimal, but this will require testing. This enabling approach would provide students with the opportunity to practise without competing demands, which could enable the potential to practise a sufficient amount of mindfulness to engage the mechanisms of action of the mindfulness programme, making an effective school-based mindfulness programme more likely. This approach would also remove the potentially ethically dubious aspects of the *practice at home* approach, as the *practice in the school day* approach conveys the implicit message that space ***will*** be made for their mental health. Making mindfulness practice times available in the school day would also address equity issues, as all students will be provided the opportunity to practice.

The extra space in the school day may also ensure students can be supported if issues arise from the mindfulness practice and are able to ask questions where they are uncertain about aspects of practice, whereas this would not be possible in the same way when mindfulness practices only take place at home. This opportunity for support during the practice is an important factor considering the increased awareness of potential adverse reactions to mindfulness programmes (Aizik-Reebs et al., 2021; Britton et al., 2021). Further, dedicated practice within the school day is likely to increase the potential effects of mindfulness programmes on school culture, cited to be one mechanism by which

school-based mindfulness programmes have their positive effects and another factor that relates to student well-being (Kuyken et al., 2022b; Tudor et al., 2022). These non-specific factors would also likely be enhanced by the mindfulness lessons, along with other non-specific benefits of mindfulness programmes (Canby et al., 2021). As such, we note here that we are not arguing that mindfulness practice in the school day should replace mindfulness lessons, but rather that making mindfulness practice times available in the school day will significantly augment them. Finally, the opportunity to practise mindfulness in the school day and the implicit message that space will be made for students' mental health might also contribute to a pushback against an implicit but unfortunately pervasive *neoliberally derived* educational philosophy, which places a burden on children to prepare for being productive members of our global economy. This burden has been argued to have adverse effects for both students and teachers (Acton & Glasgow, 2015; Macdonald et al., 2020), and its reduction alone might help improve mental health outcomes.

More Research is Needed to Determine How Much Mindfulness Practice is Beneficial

Surprisingly, it is not yet clear how much mindfulness is required to obtain positive effects. For adults, the gold standard mindfulness programmes to improve mental health (mindfulness-based cognitive therapy and mindfulness-based stress reduction) both recommend 45 min per day of practice, 6 days per week, for 8 weeks (Kabat-Zinn, 1982; Segal et al., 2018). However, there is limited evidence to support the recommendation of such an intensive amount of practice. A large-scale meta-regression of different mindfulness-based programmes for adults (203 RCT studies, n = 15,971) found that while total actual use of a mindfulness programme (including in-session content and practices as well as home practices and exercises) was associated with an increase in mindfulness, no such dose-response relationships were found for psychological distress outcomes for both general population and clinical samples (Strohmaier, 2020). Similarly, one meta-regression examining mindfulness in young people (76 studies, n = 6121, median age in study <18) showed no association between overall recommended mindfulness dose (including all planned mindfulness lessons and recommended practices in minutes) and overall positive effects (Klingbeil et al., 2017). In contrast, a meta-analysis focused only on healthy adults undertaking MBSR courses (29 studies, n = 2668) indicated that longer recommended practice times positively moderated better outcomes (Khoury et al., 2015), and a meta-analysis focused on MBCT and MBSR programmes (28 studies, n = 898) showed a small positive association between self-reported home practice times and mindfulness programme outcomes (Parsons et al., 2017).

However, it is worth noting that with the exception of Strohmaier (2020), the above meta-analyses only included MBSR and MBCT programmes, and as such did not include lower-dose mindfulness-based programmes. With regard to mindfulness in young people, the largest meta-analysis of school-based mindfulness programmes (66 studies, n = 20,168) suggested that higher in-class mindfulness lesson times across all studies were associated with fewer negative behaviours post study (Dunning et al., 2022). However, lower mindfulness lesson times were associated with higher well-being only within studies including passive control conditions, and no relationships were detected between mindfulness dose and trait mindfulness, depression, anxiety, or stress outcomes (Dunning et al., 2022). At follow-up, higher mindfulness lesson times were also associated with larger reductions in negative behaviours, anxiety, and age-moderated reductions in depression and mindfulness (Dunning et al., 2022). However, the meta-analysis by Dunning et al. (2022) focused on in-class mindfulness lessons, not mindfulness practice, so these results may not be informative about relationships between isolated mindfulness practice time and well-being.

While these meta-analyses may provide suggestions of the relationship between mindfulness dose and potential benefits, the pooling of participants and mindfulness doses across studies may hide important signals within the variability in mindfulness practice times found within a study, since participant-level effects are not examined in meta-analytic reviews (Manigault et al., 2021). Additionally, the accuracy of estimations of actual practice time from studies included in these meta-analyses is questionable, since home practice amount was either not collected at all, or if it was, was usually recorded by participants themselves, resulting in social desirability and memory bias (Strohmaier, 2020). Most meta-analyses therefore examined the relationship between well-being and mindfulness lesson time or recommended mindfulness practice time rather than actual practice time due to the limited data reported in studies. One large cross-sectional examination of experienced meditators from the general population (n = 1668, median lifetime practice time = 266 hr) has been conducted (Bowles et al., 2022). This research suggested that more lifetime reported meditation practice time is associated with favourable psychological outcomes, and that the threshold for clinically meaningful benefits may be considerably higher than the practice times typically provided in mindfulness programmes (Bowles et al., 2022). However, this cross-sectional work cannot infer causation, and some research has found that low dose programmes can have positive effects, in particular for novice meditators (Berghoff et al., 2017; Ribeiro et al., 2018; Strohmaier et al., 2021).

Experimental work comparing different doses of mindfulness practice is therefore critical to answering the question of how much mindfulness practice is required across different populations. Unfortunately, very little experimental research has examined the dose-response relationship. In one randomised control trial of a brief (four-session) mindfulness programme, 5-min mindfulness practices have been associated with larger improvements in mindfulness and stress than 20-min practices (although both conditions resulted in significantly improved outcomes compared to controls) (Strohmaier et al., 2021). As such, it may be a case of *less is more* for novices with limited prior experience of mindfulness practice (with practice times increasing as participants become more experienced). However, the relative brevity of this four-session mindfulness programme and the focus on novices restricts potential conclusions about dose-responses to longer mindfulness programmes. More research is required to assess effects of different doses of mindfulness in longer mindfulness programmes where participants become more familiar with the practice (Bowles et al., 2022), or progressively increasing lengths of mindfulness practices over the course of a mindfulness programme (as suggested by Strohmaier et al., 2021).

We also note that the mechanisms of action of mindfulness programmes are suggested to be underpinned by neuroplastic change (Hölzel et al., 2011). Studies outside of the mindfulness field that examine neuroplastic change as a result of practising a skill often include months of daily training, with typical overall cumulative practice times in excess of 50 hr (Schlaug et al., 2009; Valkanova et al., 2014). Shorter cumulative practice times within neuroplasticity research are also cited as a potential explanation for studies showing null results, and larger and more durable effects provided by longer cumulative practice times (Schlaug et al., 2009; Valkanova et al., 2014). This perspective aligns with the common sense understanding of the effects of practising a skill — higher amounts of cumulative practice makes us better at that skill. It is not yet clear whether the effective cumulative amount of mindfulness practice required to obtain improved well-being could be reached via the *little and often* approach to practice (for example with 10-min daily practices), or whether longer single sessions are required. Given this uncertainty with regard to the mindfulness practice dose question, dedicated research is important to determine how much cumulative mindfulness practice time is sufficient to obtain positive effects, so this amount could be implemented in school-based mindfulness programmes. This would include the need for dose-response research for adolescent populations in school settings to ensure contextual effects on any dose-response relationship are relevant to programmes that implement mindfulness in schools. We discuss these points in more detail later in this article.

However, regardless of the answer to the question of *how much mindfulness practice is enough?*, one answer that should be obvious is that *no practice* is unlikely to be effective. To help illustrate our point, we consider the perspective of a drug trial instead of a mindfulness study. In this fictional trial, suppose that participants were administered the drug at a hospital weekly, and asked to take additional week-daily doses at home. However, at the end of the trial, the participants reported taking the drug at home just barely more than *never* despite the recommended nearly daily dose. Suppose also that during the study, the self-report data collected from participants indicated that the intervention did not engage the putative mechanisms of action. In this case, the study would almost certainly report a lack of adherence as the reason for the null result, rather than that the drug was not effective. In this context, it is worth noting that when the proposed mechanism of action of mindfulness programmes was improved (with enhanced executive functioning and mindfulness scores measured across both groups in the MYRIAD trial), these mechanisms did mediate improvements in depression risk, well-being, and social-emotional-behavioural functioning in the 1-year follow-up (Montero-Marin et al., 2022).

We note here that, taken at face value, one aspect of the secondary analysis of the MYRIAD data argues against our suggestion that making time in the school day for mindfulness practice would increase the amount of practice and result in a more positive outcome. The moderation analysis performed by Montero-Marin et al. (2022) indicated that greater home practice times were associated with decreased social-emotional-behavioural functioning after the mindfulness programme. However, it is unclear whether the data contained a sufficient range of mindfulness practice times to properly assess the effect of practice time, where the majority of participants practised just slightly more than *never*, and only 1.9 to 2.6% of students practising one of the recommended mindfulness practices every day (depending on the practice) (Montero-Marin et al., 2023).

Furthermore, it is not certain whether the relationship between worse outcomes and more home practice in the MYRIAD study would apply if space for mindfulness practice was made in the school day. Firstly, it may be that those who choose to practise more mindfulness at home did so in an attempt to alleviate their increased stress or mental health issues. Additionally, if students did not engage in a sufficient amount of overall mindfulness practice to obtain positive effects to offset the costs of home practice, the time spent practising mindfulness may have been an added stressor instead of a helpful activity. Indeed, the MYRIAD team state that "low-intensity programmes may bring awareness to upsetting thoughts, feelings and mental health difficulties, but not provide sufficient support to enhance resilience, especially if such difficulties are social/societal"

(Montero-Marin et al., 2022, p. 123). Finally, it may be that more anxious students are generally more eager to fulfil their suggested homework, and so completed their mindfulness practices at home even though making the time to do so may have added to their stress load.

In contrast, some evidence suggests students who do practise mindfulness regularly do show improved well-being. This evidence comes from the second largest study of a school-based mindfulness programme, a cluster-randomised controlled trial including 56 Finnish schools and 2754 students, with a mindfulness condition following the .b programme ($N = 1220$) and both an active control group (relaxation, $N = 1181$) and inactive control group ($N = 353$) (Lassander et al., 2021). The results of this study showed that while the mindfulness programme only had an overall protective effect on resilience and health-related quality of life compared to the active control group (who showed decreases in these measures), the 4% of students who practised mindfulness nearly every day showed improved health-related quality of life and social-emotional functioning compared to the active control group, both after the 9-week programme and in the 26-week follow-up (Lassander et al., 2021; Volanen et al., 2020). Furthermore, at the week 26 follow-up timepoint, the students who practised mindfulness nearly every day also showed improved health related quality of life compared to the students who only practised a few times (Lassander et al., 2021; Volanen et al., 2020). As such, the authors provided a similar suggestion to our argument — that regular school-based mindfulness practice could boost the effectiveness of school-based mindfulness programmes (Lassander et al., 2021).

However, it is worth noting that this conclusion about everyday practice intensity being related to benefits from a mindfulness in schools programme suffers from the same limitation as the lack of a similar effect reported from the MYRIAD study — with only 4% of students practising mindfulness every day, the sample size available to draw the conclusion that daily practice is beneficial is limited. As such, further research is critical to test this effect more robustly, with an approach that makes mindfulness practice available in the school day being more likely to obtain a sufficient sample size of students who practise mindfulness every day, enabling a successful test of this effect.

Caveats and Challenges of Embedding the Opportunity for Mindfulness Practice in the School Day

Despite the aforementioned points, it is important to note that even if mindfulness practice is made available in the school day, many students may prefer not to practice. Indeed, an approach that *requires* participation should not be implemented, as doing so may worsen students' mental health (Kuyken et al., 2022a). Furthermore, given that mindfulness practice requires active engagement, it is not possible to enforce mindfulness practice (as students could simply sit quietly and daydream instead), and it is also unethical to enforce participation. Additionally, evidence suggests that mindfulness training for adolescents is beneficial only when they choose to engage (Chiodelli et al., 2022). As such, we recommend an alternative evidence-based mental health intervention (or multiple alternatives) should be made available at the same time, so students can choose the one they prefer to partake in, or the approach they believe would work for them (a similar suggestion has been provided by Roeser et al., 2023). One such alternative could be a social and emotional learning programme (Kuyken et al., 2022a). Additionally, using a co-design approach with the students who will receive the interventions is likely helpful. We also note that a multiple intervention approach is likely to be more resource-intensive to implement, and that sophisticated study design may be required to test the efficacy of each intervention (perhaps only including participants in analyses of each intervention if they attend more than a threshold number of sessions). However, these complications are necessary to overcome if we are to test potential solutions to the current pressing youth mental health issues.

A Pathway for Testing (and Potentially Implementing) an Embedded Mindfulness in Schools Approach

Despite its importance, a demonstration that school-based mindfulness programmes are effective if practice time is made available in the school day would likely face high barriers to implementation, since the school curriculum is already overburdened (Easthope & Easthope, 2000; Majoni, 2017). However, altering the core curriculum based on the mental health needs of students is not impossible, as evidenced by the commonly implemented social and emotional learning programmes, which include components such as social skills, identifying one's own and others' feelings, and behavioural coping skills (Lawson et al., 2019). However, before programmes are implemented, the evidence to support a change is required. Existing mindfulness in schools' programmes cannot and should not simply expect schools to alter their curriculums to make space for a daily mindfulness practice. Our suggested *mindfulness practice enabling* approach which includes practice times available in the school day first needs to be rigorously tested, considering the increased opportunity cost and the higher level of engagement required from schools (the time required for the mindfulness practice will compete with the current core curriculum instead of student's time outside of school).

A first step that may be important (but comes with limitations) is to determine whether students self-report that they would use mindfulness practice if it were embedded in the school day. A study to determine this would be simple to conduct, simply gathering self-report survey data from a large sample of students. However, conclusions from this sort of study would be limited by the lack of practical application — behavioural change research suggests that an individual's perspective on their potential behavioural changes is highly context dependent (Poon et al., 2014). As such, results of this sort of study may not provide an accurate perspective of the application of mindfulness practice embedded in the school day, where the rationale for mindfulness practice is provided by a mindfulness teacher and a supportive school environment, which would enable practice seeking behaviours. Concurrent with an assessment of whether students would use the opportunity to practise in the school day, the next step might be an assessment of whether there is a difference in well-being outcomes depending on whether participants in a mindfulness programme practice outside of the lessons or not. Based on current perspectives on mindfulness programmes, the answer to this might seem obvious — that practice is required for benefits to be obtained. However, experimental research on this point has not been conducted.

If the results of these two preliminary studies are positive, then medium-scale, rigorous, well-conducted, and well-reported studies will likely be necessary to provide the groundwork for larger scale studies (Baelen et al., 2023). Given the research that has already been conducted, these studies will not need to compare mindfulness programmes that make mindfulness practice time available in the school day to mindfulness programmes that are *minimally intrusive* to school function, as approaches that do not make mindfulness practice available in the school day have already been tested. A comparison between a programme that embeds mindfulness into the school day and a control condition will be adequate. We also recommend that researchers who complete studies examining mindfulness embedded in the school day clearly differentiate their methodology from programmes that are minimally intrusive to school function in the abstract of their publication, and ideally in the title. This will help future researchers specifically focus on these studies in reviews and meta-analyses to examine whether they indicate greater effects than an approach that requires students to practise mindfulness at home and is minimally intrusive to school function.

Unfortunately, many schools may have insufficient resources and time to enable their teachers to learn to teach mindfulness (Jennings, 2023). Following the MYRIAD study, schools may also be less likely to engage in mindfulness research. As such, grant funding will likely be needed to undertake the studies we suggest. However, obtaining grant funding to perform these studies may also be difficult following the MYRIAD study. We suggest that it will be useful to note in grant applications that while the MYRIAD study robustly demonstrated that school-based mindfulness programmes that are minimally intrusive to school function do not work, future research now needs to test other types of mindfulness programmes, such as approaches that make mindfulness practice available in the school day, as one possibility to address the unresolved pressing youth mental health issues. Once enough robust studies of programmes that embed mindfulness in the school day have been conducted, meta-analyses may provide evidence that these programmes are effective, as well as whether some programme designs or doses may be more effective than others. It will be critical for these studies to measure and report both recommended mindfulness practice times and actual mindfulness practice times (with as much fidelity and resolution in the measurement as possible), to help the field determine how much mindfulness practice is sufficient for positive effects, and whether a higher amount of cumulative mindfulness practice leads to larger improvements in mental health (Strohmaier, 2020).

Experimental studies that randomly allocate participants to different practice times (and a control condition) are also likely to be helpful, for example testing 10-, 20-, and 30-min conditions to provide the ability to make causal inferences (in contrast to meta-analytic or correlational research), a start of which has already been made with research involving adults (Berghoff et al., 2017; Strohmaier et al., 2021). Within this experimental approach, many students may still choose not to practise even if practice time is made available in the school day. However, the desired dose-response analyses could still be achieved by randomly allocating students to a practice time duration during their school day and comparing the different practice time recommendation conditions against each other. Additionally, practice adherence, and dose-response relationships only within students who practise more than a few times per week could be explored. Conducting an experimental study examining different mindfulness practice times within a mindfulness programme with university students as participants as a first step may be more feasible, and useful to draw conclusions about practice times that may translate to high school students.

It is also worth noting that 8-week mindfulness programmes may not be sufficient to obtain significant effects from a mindfulness programme (Bowles et al., 2022). Therefore, perhaps longer mindfulness programmes that provide mindfulness practice in the school day would be valuable, for instance a mindfulness programme that runs over a school term. This aligns with our proposal that we should test *mindfulness practice enabling* programmes rather than programmes that are minimally intrusive to school function. It may even be that despite the increased intensity of embedding mindfulness practice into the school day, testing

a programme that makes mindfulness practice available in the school day for efficacy may require fewer resources, as larger effect sizes require smaller sample sizes to detect.

Finally, we note that the conventional MBSR programmes were not designed with the intention that a participant would cease practising mindfulness after 8 weeks. Instead, they were intended to inspire a self-driven lifelong practice (Kabat-Zinn, 1982, 2011). Following this point, it might be the case that school-based mindfulness programmes can only provide meaningful improvements in well-being to the minority of students who might be inspired and committed to adhere to a mindfulness practice over the long term, and as a result end up accumulating hundreds of practice hours (Bowles et al., 2022). While this point, if true, may reduce the potential impact of mindfulness in schools, it is possible that even in this case, mindfulness in schools could still provide a cost-effective benefit as an introduction to mindfulness for students to continue on their own if they choose (particularly if the opportunity for a daily mindfulness practice were embedded into the core curriculum of high schools (Lassander et al., 2021)). As such, potential improvement to well-being in only students who maintain a reasonably long-term practice is a potential outcome that should be explored rather than avoided.

If the results of these *mindfulness practice enabling* studies are positive, then the implementation of this approach will also require more engagement from education boards and politicians. These interest groups will likely only be convinced by well-conducted large-scale research demonstrating positive results. It is worth noting that the results of the MYRIAD study did indicate reduced teacher burnout immediately after delivering the mindfulness programme (an effect likely to be related to the teachers' personal mindfulness practice as a result of the study), and teacher-reported improvements in the respectful school climate were present both after the mindfulness programme and at 1-year follow-up (Kuyken et al., 2022b). Meta-analyses also show that mindfulness programmes provide benefits for teachers (Klingbeil & Renshaw, 2018; Zarate et al., 2019). As such, if programmes that include mindfulness practice times made available in the school day are shown to be effective, it may be that embedding mindfulness in teacher training courses at universities would be a good place to start with large-scale implementation. This approach might enable positive downstream effects for students as more teachers become experienced in mindfulness practice and gain the potential to teach it to their students, which is a currently under-researched suggestion (Roeser et al., 2023). A similar effect has been demonstrated by Moir et al. (2016), where a peer-supported and peer-taught mindfulness programme was found to benefit mental health in medical students.

If an evidence base is established that shows mindfulness embedded in the school day improves mental health, then three arguments may be helpful in engaging teachers, schools, and education boards. Firstly, that teachers are likely to benefit from the mindfulness programmes. Secondly, that the curriculum is overburdened already, which may contribute to poorer mental health for both students and teachers. Although adding mindfulness could be seen as increasing this burden, if the change is made in a way that does not increase the overall burden (by removing less important content rather than simply adding mindfulness to existing content), then making mindfulness practice times available in the core curriculum might thus be useful to teachers not only to practise themselves, but also potentially to catch up on their other demands, easing their own stressors. This might convey the message that teacher mental health is important also, as well as contributing to overall school climate. Thirdly, the time-cost required by mindfulness practices might in fact be made up by more attentive students who may show enhanced executive function and positive behaviour, as meta-analyses have suggested mindfulness improves these two factors (Dunning et al., 2022; Sumantry & Stewart, 2021).

Interestingly, it may be that many mindfulness researchers and teachers may need to be convinced that practice time is important. In a recent Delphi consensus study, only 30% out of 33 mindfulness instructor and scientific experts endorsed "deliberate practice with effort/energy allocated to sustain practice" (Felver et al., 2023, p. 285) as a core programme component that is causally linked to an effective outcome from a mindfulness programme. As such, the perspective conveyed in this article may be in the minority. Despite this, we suggest there is a good reason to suspect this perspective is accurate — the proposed mechanisms of action — mindfulness skills and neuroplastic changes underpinning them are likely to take dedicated practice time to effectively learn. As such, research is required to establish whether a minimum amount of mindfulness practice is required to obtain positive benefits. Research should also test whether it is best to start with briefer practices which then gradually build up to longer practices over time — which previous research has suggested may be more acceptable and safer than starting with longer practice durations (Strohmaier et al., 2021). It may also be that even if positive results are obtained, only specific countries take up the opportunity to enable improved mental health that the results will represent. In this case, population-wide studies would ideally be implemented in these countries to refine the parameters of the mindfulness programmes and provide more evidence for researchers in other countries to make the case to their education boards and governments.

Finally, it is important to note that there are incentives to resist the arguments we have presented here. A wide range of mindfulness organisations have received and probably will still receive significant funding for school-based

mindfulness programmes, from both government bodies and schools. Many of the school-based mindfulness programmes provided by these organisations do not make mindfulness practice available in the school day. Without convincing evidence that the school-based mindfulness programmes provided by these organisations are effective (in contrast to the null result of the MYRIAD study), the funding provided for their school-based mindfulness programmes by schools and governments is not justified.

Instead, we recommend funders direct resources to developing and testing school-based mindfulness programmes which make mindfulness practice available in the school day, in order to test whether such programmes improve youth mental health. We also note that organisations currently providing school-based mindfulness programmes (and receiving funding for these programmes) could be key drivers of the testing of programmes that make mindfulness practice available in the school day, which would justify their continued funding.

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