

# **Preliminary Investigation of Whole-School Mindfulness in Education Programs and Children's Mindfulness-Based Coping Strategies**

Nimrod Sheinman; Linor, L. Hadar; Dalit Gafni; Michael Milman

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Correspondence: Nimrod Sheinman, [nimush123@gmail.com](mailto:nimush123@gmail.com)

N. Sheinman, Center for Mindfulness in Education, Israel [nimush123@gmail.com](mailto:nimush123@gmail.com)

L. L. Hadar, Faculty of Education, Beit-Berl College, Israel [linor@a-hadar.co.il](mailto:linor@a-hadar.co.il)

D. Gafni, College of Management Academic Studies, Israel [dalit@gafni.co.il](mailto:dalit@gafni.co.il)

M. Milman, Oranim College, Israel [milmanmichael@yahoo.com](mailto:milmanmichael@yahoo.com)

# **Preliminary Investigation of Whole-School Mindfulness in Education Programs and Children's Mindfulness-Based Coping Strategies**

## **Abstract**

Mindfulness is increasingly applied in schools, yet little is known about long-term whole-school approaches, in which mindfulness becomes integrated in the school's curriculum. Among the possible benefits of such an approach is its influence on children's coping strategies and their responses to everyday challenges. To examine this possibility, the study collected data from 646 students, 9-12 years old, from three Israeli public schools using mindfulness. One school had been implementing the whole school approach for 13 years, a second school for one year, and a third had no mindfulness implementation and thus served as a comparison. Data collection was based on a questionnaire asking students to openly describe how they coped in five challenging daily-life situations. The data were analyzed using qualitative thematic coding; then, the initial categories were coded into a quantitative mindfulness-based coping scoring system. The findings revealed a significant difference between schools with respect to students' disposition to use mindfulness-based coping strategies ( $P < .001$ ,  $R^2 = .13$ ). The regression model indicated that girls had a higher tendency to apply mindfulness-based strategies than boys, and 10-year-old children showed a greater disposition to apply mindfulness-based strategies than 9, 11 and 12-year-olds ( $P < .0001$ ,  $R^2 = .2$ ). The study adds to the growing body of evidence pointing to the contribution of long term whole-school mindfulness-based programs to elementary school children.

## **Keywords**

Mindfulness in education; mindfulness in schools; whole-school approach; coping strategies; mindfulness-based coping strategies.

## Introduction

Preparing children for life requires an educational approach that supports not only their mastery of academic skills but also their process of becoming responsible adults (Maynard, Solis, & Miller, 2015). Schools are not just places for learning; they are also settings to promote positive development. They can play an important role in protecting and promoting health, in cultivating wellbeing and competence, and in supporting children's ability to cope with life's stresses and challenges (European Network for Mental Health Promotion, 2009). Everyday hassles create stress, and this, in turn, can cause psychological and behavioral problems (Byrne, Thomas, Burchell, Olive & Mirabito, 2011). In a recent UK study, many children reported being unable to sleep as a result of stress, being stressed before exams, or feeling stress stemming from friendship concerns. Many said they felt worried or sad at least once a week (YouGov, 2013). These findings underscore the need to develop and implement interventions that enable children to recognize and cope with daily stressors (Costello & Lawler, 2014). Such training will serve them well in childhood and later in life as well (van de Weijer-Bergsma, Langenberg, Brandsma, Oort, & Bögels, 2014). In fact, childhood may be a crucial period for this type of learning because it is a time of significant vulnerability to life events (Sacks, Murphey, & Moore, 2014).

Mindfulness-based school pedagogies can teach children how to reduce many of their daily stressors, with benefits for both teachers and children (Zenner, Herrnleben-Kurz & Walach, 2014). The potential of mindfulness as a skill has been recognized in recent years, and training in mindfulness is now widely accepted in educational settings (Kabat-Zinn, 2004). Introducing mindfulness into schools is a practical possibility; children aged six to 18 spend six to eight hours in school each day, and initiatives can be brought directly to them as an integral part of their education process (Rempel, 2012; Zenner et al., 2014). The implementation of mindfulness programs in school settings is increasing and the number of publications on the topic is rapidly swelling (Schonert-Reichl & Roeser, 2016). As evident in the many programs described in the *Handbook of Mindfulness in Education* (Schonert-Reichl & Roeser, 2016), the field is rapidly growing.

The research on mindfulness in school programs points to its influence on children's social-emotional learning (e.g. Schonert-Reichl et al., 2015), mental health (e.g. Kuyken et al., 2013; Roeser et al., 2013; Weare, 2013, 2015), resiliency (e.g. Jennings, Frank, Snowberg, Coccia, & Greenberg, 2013; Jennings, Snowberg, Coccia, & Greenberg., 2011; Meiklejohn et al., 2012; Siegel, 2009), and contemplative learning (e.g. Brady, 2007). Despite a steady increase in empirical research on mindfulness programs in school settings, the research demonstrating the benefits of these programs continues to evolve (Greenberg & Harris, 2012; Roeser & Zelazo, 2012; Schonert-Reichl & Roeser, 2016). Thus, the implementation of mindfulness training in school settings requires more investigation before wholesale endorsement (Costello & Lawler, 2014).

As evident in the literature, mindfulness in education can take many forms, and programs apply a variety of styles and components to cultivate it (Semple, Drouman, & Reid, 2017; Zenner et al., 2014). One approach to mindfulness in education is the whole-school approach. This approach resonates with the Health Promoting Schools initiative of the World Health Organization (Sheinman & Hadar, 2017). Health promoting schools seek to enhance the emotional, social, physical and moral well-being of the school, with a positive impact on students, teachers and the larger social environment (World Health Organization, n.d.). A whole-school mindfulness in education (WSMED) model, when designed by these principles, implies a long-term integration of mindfulness in the school curriculum, engagement of school teachers, incorporation of parents, and introduction of a gradual long-term process to influence the school's climate.

The possible benefits of a long-term school-based mindfulness program include its influence on children's coping habits and its contribution to their ability to respond to everyday stressors, challenges, and difficulties. Within this framework, mindfulness-based skills (such as mindful breathing or mindfulness to sounds) can be considered behavioral processes that can be activated (by the child) for the purpose of achieving beneficial results (Renshaw & Cook, 2017). It is reasonable to assume a correlation between the on-going regularity of mindfulness in a WSMED program and children's disposition to apply these new resources towards better coping.

In this context, coping is behavioral, referring to a wide set of skills and purposeful responses to stress or to efforts to manage specific external and/or internal demands that may tax or exceed one's resources (Lazarus & Folkman, 1984). Studies have linked children's coping strategies with higher self-efficacy, higher psychological wellbeing, less depression, less problematic behavior, and better academic outcomes (Gutman & Schoon, 2013).

Evaluating school-based applications of mindfulness among school-age children is challenging, however (Eklund, O'Malley, & Meyer, 2017). Self-report measures have potential response biases, and many have been found inadequate for assessing mindfulness-based interventions in schools (Zenner et al. 2014). Even in studies with positive outcomes, the long-term effects are unknown (Felver, Celis-de Hoyos, Tezanos, & Singh 2016). There is also a marked discrepancy between the relatively small measured effects found in many studies (Zoogman, Goldberg, Hoyt, & Miller, 2014), and the rich and exciting empirical information obtained in the narrative responses of students to open-ended questions (e.g. Ager, Albrecht, & Cohen, 2015; Dariotis et al., 2016; Viafora, Mathiesen, & Unsworth, 2015). This suggests a need for more sensitive assessment protocols.

As noted in systematic reviews of the literature (e.g. Felver et al., 2016; Zenner et al., 2014; Zoogman et al., 2014), most studies of the outcomes of mindfulness use self-report methods related to the cognitive, emotional, and wellbeing domains. The behavioral application of mindfulness by children has been discussed in a few qualitative studies, but only in the context of children's practice during intervention (e.g. Ager et al., 2015; Dariotis et al., 2016). In addition, one non-randomized controlled feasibility study asked whether children practiced mindfulness in a three-month period after the intervention (Kuyken et al., 2013). It did not specifically refer to the influence of age and gender on children's disposition to use and apply mindfulness-based strategies. Further, most of the mindfulness in school programs have adopted relatively short-term protocols, eight weeks on average, making their likelihood of influencing children's coping habits relatively small (Zenner et al., 2014). Some studies have made efforts to enhance this by motivating children to execute daily practices, but have met with limited success (Broderick & Metz, 2009; Huppert & Johnson, 2010; Kuyken et al., 2013; White, 2012).

This study investigated an existing WSMED program named “Mindful Language”, which has been integrated in Israel’s schools since 1999 (Semple, Droutman, & Reid, 2017). The study aimed to explore whether children participating in the program are more likely to apply mindfulness-based coping strategies in their daily lives. Specifically, three primary schools, differing in the number of years of their WSMED integration, were compared. The study hypothesized that (a) children in a school that had integrated the Mindful Language program for many years would apply more mindfulness-based coping strategies in their daily lives than children from a school which had integrated the Mindful Language program for only one year, and more than children in a school that did not include the program; (b) children in a school that had integrated the Mindful Language program for one year would apply more mindfulness-based coping strategies than children from a school that did not integrate the program at all. Within this context, the study also investigated age and gender differences.

## **Method**

### **Participants**

The Mindful Language program is implemented in about 20 elementary schools in Israel. The schools vary in the number of years the program is implemented. The study included 646 participants (boys and girls) in the 3<sup>rd</sup>-6<sup>th</sup> grades (aged nine to 12), from three primary schools. All three schools were Hebrew-speaking urban public schools in central Israel, serving Jewish children from medium to high social-economic backgrounds. Two were implementing the WSMED program; one was not. The comparison school had expressed an interest in mindfulness but had not started a program. The principal agreed to serve as a comparator.

All schools were similar and comparable, according to ratings of Israel's Ministry of Education. The Ministry divides all schools in Israel into “groups of similar” (translation from Hebrew) - referring to schools with similar characteristics and student demographics. In all national assessments or measures, schools are compared to other schools belonging to the same “group of similar”. The three schools in this study belonged to the same “group of similar”, with similar socio-economic background (SES), curriculum, assessment, resources, and so forth. In

choosing the schools and in analyzing data, this study could not consider individual student level data (i.e. scores, demographics), as, by regulation, these are always anonymized and cannot be identified or incorporated into other data.

In one school (school A, n=218), the Mindful Language program had been implemented for the past 13 years, with mindfulness-based sessions taught from the 1<sup>st</sup> to the 6<sup>th</sup> grade. Teachers attended weekly sessions with their students; they participated in monthly mindfulness sessions and freely integrated mindfulness-based sessions into their practice. Many parents were involved in the program, as explained in supplement Table S1. At the time of the study, by the end of the 3<sup>rd</sup> grade, children had three years of mindfulness, and at the end of the 6<sup>th</sup> grade, six years. In the second school (school B, n=212), the program had completed its first year only. At the time of the study, all classes had only one year of mindfulness. Teachers attended weekly sessions with their students and participated in monthly mindfulness sessions but had not integrated mindfulness into their own teaching practice. The parents' involvement was in its early stages; they knew of and supported the program, were invited to an introductory evening, and received updates. The WSMED model was not yet fully assimilated. The third school (school C, n=216) had no mindfulness in education implementation and served as a comparison (Table 1). The study used power analysis to determine the sample size required to detect the effect of three independent variables (school, age, gender), with a power of .95; the required sample size was 85 participants.

Table 1: Study participants and years of mindfulness implementation

Age	School A		School B		School C	
	Boy	Girl	Boy	Girl	Boy	Girl
Age 9	28	29	21	21	33	30
	3 years of mindfulness		1 year of mindfulness		No mindfulness	
Age 10	31	38	12 <sup>a</sup>	7 <sup>a</sup>	22	14

	4 years of mindfulness		1 year of mindfulness		No mindfulness	
Age 11	18	26	39	37	39	42
	5 years of mindfulness		1 year of mindfulness		No mindfulness	
Age 12	23	25	40	35	24	12
	6 years of mindfulness		1 year of mindfulness		No mindfulness	
Total	218		212		216	

*Note.* <sup>a</sup> Due to school activity, only 19 questionnaires could be collected.

## Procedure

The Mindful Language program was designed according to the WSMED model. In the Mindful Language program, mindfulness is regarded as deliberate gathered attention, enabling our moment-to-moment awareness of the mind-body process, with a friendly willingness to realize what is going on in and around us. It is understood as an “awareness spotlight” which can be directed to highlight the objects on which it is trained. Mindfulness involves the cultivation of attentiveness, awareness, and presence, directed both inwardly and outwardly. It can be directed to our body, breath, emotions, movements and images, or toward the outside world – to sounds, sights or people. To children, mindfulness is presented as meaningful, playful, and useful, with emphasis on reaping the benefits of the insights and competencies gained and applying them in encounters with various aspects of life.

Mindful Language classes integrate mindfulness-based practices, mindful yoga-based movements and postures, and specific imagery-based processes. Students are guided to pay attention to posture, breath, sensations, body boundaries, movements, sounds, emotions, images, and self-talk. There is ample use of similes and metaphors to explain a concept (e.g. the breath as a wave; the body as a mountain; the heart opening like a bud; the arms soft like cooked spaghetti), explain a posture (e.g. become as tiny as a mouse; lie on your side as straight as a ruler; stand as tall and rooted as a tree), or describe a movement (e.g. a moon walk). The sessions include specific imagery-based scripts to enhance mindfulness-based outcomes, such as sense of safety (a “safe place” script), opening the heart (meeting an imaginary compassionate animal),

being aware of thoughts (noticing thoughts like watching soap bubbles), being aware of emotional charges (searching for an emotion and giving it an image), or finding insights (inviting and initiating dialogue with an imaginary wise figure) (see Table 2 for a sample class structure).

Table 2: The Mindful Language: a sample class structure

<b>Time</b>	<b>Mindfulness Activity</b>	<b>Description</b>
5 minutes	Entering “ritual”	Each child is greeted at the door. Children walk to their personal gym mattress and lie on their back.
5 minutes	Gathering attention	Guided meditation to body sensations, to today’s “inner story”, to sounds, and to the breath.
2-3 minutes	Small movements	Rubbing hands, massaging face, stretching in all directions.
1 minute	Transition to sitting	Mindful shifting from lying to sitting.
5 minutes	Inquiry	Reflection on the here and now; reflections on home applications since last week; reflections on a chosen topic.
5 minutes	Movement while sitting	Mindful yoga movements, posture awareness, breath awareness.
1 minute	Transition to standing	Gong-led gradual and conscious transition to standing.
5-10 minutes	Movements while standing	Mindful movement, posture awareness, breath awareness.
5 minutes	Playfulness	Mindfulness-based games; mindful work in pairs.
1 minute	Transition to lying	Gong-led conscious transition to lying on the back.
5 minutes	Mindfulness-based imagery	Awareness to the “inner story” at the end of class; guided imagery: finding a safe place, inviting a caring or loving figure, meeting a wise animal, and more.
1 minute	Reflections and Reminders	Guided reflection on today’s class: experiences, challenges, insights, and possible “take home” tools.
5 minutes	Entering “ritual”	Leaving the room one by one or row by row, mindfully walking out (and putting shoes on)

Mindfulness-based sessions last 45 minutes and are taught once a week to each class as a whole (25-35 children). The program is an on-going process, year after year, and becomes part of the school's culture. Sessions are taught by experienced mindfulness instructors and take place in a "mindfulness room", empty of chairs and desks and equipped with gym mattresses for each child. The children are asked to note experiences and insights in a "mindful journal". Homeroom teachers attend the sessions with their students. In addition, the school's faculty members participate in monthly mindfulness sessions and are trained to integrate mindfulness-based practices in their classes. Based on the teachers' motivation, after about one to two years, the in-class mindfulness "dose" can be enhanced by the inclusion of various mindfulness sessions, guided by the homeroom teacher. Finally, parents receive updates on the program, are invited to attend occasional short presentations or workshops, and are welcomed to visit the sessions (see supplement Table S1 for a detailed description of the WSMED framework).

## **Measures**

Two main issues informed this study's approach: first, the lack of instruments measuring the impact of mindfulness-based learning on children's coping habits; second, the rich information voiced by children when asked about their learning processes (e.g. Ager et al., 2015; Dariotis et al., 2016; Viafora et al., 2015). Past research on children's coping strategies has demonstrated the importance of attending to children's perspectives, perceptions and informed reports (Dickey & Henderson, 1989; Lewis, Siegel & Lewis, 1984; Ryan-Wenger, Sharrer, & Campbell, 2005; Sharer & Ryan-Wenger, 2002), so we opted for the pedagogy in practice perspective, in which students' expression is considered the most revelatory reflection of their learning experience (Hadar & Hotam, 2012).

Previous qualitative evaluations of the Mindful Language program (Sheinman, 2014; Katzin & Bar Shalom, 2015) provided some preliminary information on children's real-life application of the program, with specific attention to the main situations where children apply mindfulness-based learning: relaxing when stressed, concentrating when needed, being aware of emotions and/or regulating them, falling asleep, moderating reactive behaviors, alleviating

somatic/physical discomforts, improving interconnectedness, and excelling/winning. Based on these themes, we constructed a five-item open-ended “Situation Questionnaire” that presented children with five challenging scenarios based on daily life. Children were requested to reflect on and describe in their own language what they actually do in each. We estimated that by assessing children's responses, we would be able to identify mindfulness-based coping strategies versus non-mindfulness ones and quantify the real-life application of the program. The five scenarios were: feeling stressed before an upcoming exam; finding it difficult to fall asleep; encountering someone angry or annoying; needing to concentrate; and being disappointed in oneself. The scenarios can be divided into those more associated with school (stress before exams, concentration difficulties) and those less associated with school (difficulty falling asleep, annoyance with someone, disappointment in oneself). See supplement Table S2 for the questionnaire (translated from Hebrew).

In each school, questionnaires were delivered by the homeroom teacher during a regular school hour, towards the end of the academic year. To negate children's possible response biases, the mindfulness instructors were not present, children were naïve to any connection between the questionnaire and the WSMED program, and the questionnaires were anonymous. Students wrote freely on what they usually do in each situation, in spaces provided after each question.

### **Data Analysis**

First, children’s responses were analyzed using qualitative thematic coding (Braun & Clarke, 2006, 2012; Strauss & Corbin, 1994). Three researchers coded 20 questionnaires each and then met to compare, define, and refine them, resulting in a category list of 24 coping responses (Table 4). Next, two researchers received 40 identical questionnaires and coded students’ responses according to the category list. We computed the Kappa interrater reliability measure to determine how well the coding system functioned (Landis & Koch, 1977), discussing and resolving differences and variations in coding. An additional 30 questionnaires were coded, with the Kappa measure computed. This iterative procedure occurred a third time with an additional 30

questionnaires, achieving Kappa scores of .91-1.00. At this point, we divided all the questionnaires between the two coders, who coded them based on the category list.

Many students expressed two or three coping strategies per situation. Therefore, we applied a multiple response system to the data. First, a mindfulness index was assigned to each category, giving zero points to a category with no relationship to mindfulness (e.g. “I eat something sweet”) and two points to a category representing a “classical” mindfulness-based strategy (e.g. “I pay attention to my breath”). Some coping strategies were not formal mindfulness-based practices but were related to the mindset of a mindfulness-based approach (e.g. “I am thinking about positive things”). We assigned one point to these responses. This process resulted in an ordinary scale of zero to two (Table 3). Second, we computed a situation-based score for each student, consisting of the sum of his/her mindfulness points (represented in the multiple response system). This scoring resulted in one variable representing each student’s use of a mindfulness-based coping strategy per situation. The situation-based score ranged from zero (no use of mindfulness-based practices) to a maximum of six (three mindfulness-based practices, two points for each, in a given situation). No child provided three responses related to the mindset of a mindfulness-based approach (creating a score of three), hypothetically scoring higher than a child giving one strong mindfulness answer (a score of two). Moreover, 222 students provided one mindfulness-based response for at least one of the situations, 83 students provided two mindfulness-based responses for at least one of the situations, and 31 students gave three responses to at least one of the situations. Third, based on each student’s situation-based scores, we computed a mean score across the individual scores for all five situations. Each student’s mean score could range from zero (no use of any mindfulness-based practices across all five situations) to six (use of three mindfulness-based practices across all five situations). This mean score was defined as the student’s total mindfulness score; it represented the disposition of the student to use mindfulness-based coping strategies in real-life situations.

The multiple scoring system respects the multiplicity of students’ responses. However, it leads to creating scores which may seem low. For instance, a hypothetical student who may express two 1-point strategies and one 2-point strategy, in his answers to the five-situation

questionnaire, will receive a student mean score of 0.6. A rare “well learned” student, who may execute a mindfulness-based coping strategy for each of the five situations, will receive a student’s mean score of “only” two. Thus, the scores are diluted due to students’ multiple responses, and the application of the multiple response system to the data. Finally, we coded school, age, gender, and number of years with mindfulness pedagogy.

Table 3: Categories, student excerpts and mindfulness-based coping index

<b>Initial category</b>	<b>Student excerpts</b>	<b>Mindfulness-based Coping Index</b>
Using specific mindfulness-based skills	“I bring myself to a baby pose and listen to sounds” “I do the moon walk” (mindful walking) “I practice being like a cooked spaghetti” “I go into my inner-body and listen to the sound of silence”	2
Breath counting	“I attend to my breath and count my breath” “I close my eyes and count 10 breaths” “I take five breaths and all my tensions disappear”	2
Mindful breathing	“I listen to my breath” “I bring awareness to my inhale and exhale”	2
Yoga stretching and/or relaxation	“I do yoga stretches: the snake, the mountain and the warrior” “I lie down, relax my body and calm myself down”	2
Reflecting, realizing and understanding	“I think about ways I could choose to remedy the situation” “I ask myself what can I learn from the situation in order to improve” “I think about what I did right and what I did wrong”	1

Recruiting positive thoughts	<p>“I close my eyes and imagine a peaceful and beautiful place”</p> <p>“I close my eyes and recall happy events”</p> <p>“I close my eyes and remember the love and support I receive from my family”</p>	1
Positive self-talk	<p>“I tell myself: I can, or I believe in myself”</p> <p>“I tell myself: it’s not too terrible, everyone can make a mistake”</p> <p>“I encourage myself and thank myself for caring”</p>	1
Never happened	<p>“It never happens to me”</p> <p>“I don’t experience that”</p>	0
Ignoring, avoiding, not relating to	<p>“I’m trying not to think about it”</p> <p>“I do nothing about it”</p> <p>“I ignore it and try to forget it”</p>	0
Routine associative response	<p>“I close my eyes” (to sleep)</p> <p>“I learn more” (stress before exam)</p> <p>“I hope to do better next time”</p>	0
Technology distraction	<p>“I play with my cell phone, tablet, or computer”</p> <p>“I turn my TV on and watch a favorite program”</p>	0
Non-technology distraction	<p>“I read a book”</p> <p>“I do a puzzle”</p> <p>“I play with a friend”</p>	0
Food or drink	<p>“I eat a chocolate bar or anything sweet”</p> <p>“I get myself a glass of water, juice or chocolate milk”</p> <p>“I eat something”</p>	0
Counting	<p>“I count backwards, from 100 down”</p> <p>“I count million years back in time”</p>	0
Determined action	<p>“I don’t give up. I keep on trying and trying”</p> <p>“I am always determined to try again, to try harder”</p>	0

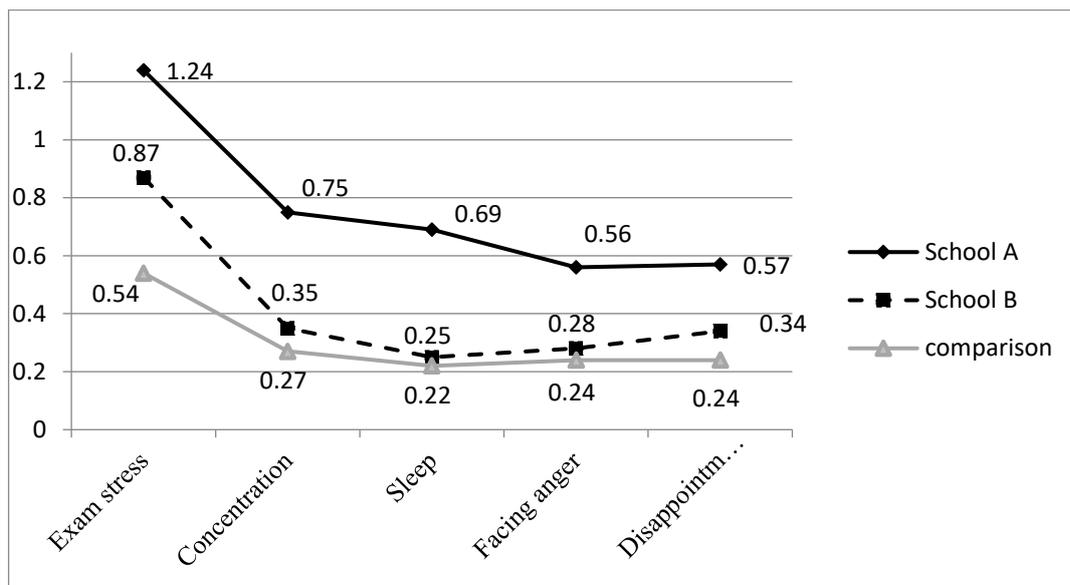
Distancing oneself from the situation	<p>“I go away... I walk away”</p> <p>“I distance myself away from the person”</p>	0
Reducing external distractions	<p>“I close my eyes and put my fingers in my ears”</p> <p>“I close the door and hide under the blanket”</p>	0
Accessing or recruiting an adult	<p>“I go to my Mom and she tells me what to do”</p> <p>“I tell my teacher about it”</p> <p>“I ask my Dad for a massage”</p>	0
Pro-social reflective or behavioral response	<p>“I say I’m sorry”</p> <p>“I recall how much we love each other”</p>	0
Emotional self-expression (i.e. crying, shouting)	<p>“I scream into my pillow”</p> <p>“I go to my room and cry”</p> <p>“I write and express my feelings in my journal”</p>	0
Thinking hostile thoughts	<p>“I curse them in my mind and heart”</p> <p>“I imagine myself hurting them”</p>	0
Reacting aggressively	<p>“I shout and yell and insult”</p> <p>“I hate and hit”</p>	0
Physical discharge	<p>“I go to play football, thinking nothing but football”</p> <p>“I jump and run, jump and run”</p> <p>“I shake my body and go for a short run”</p>	0
Resting	<p>“I go to my room, lie down and rest”</p> <p>“I go to bed and try to sleep”</p>	0

## Results

### School's Mindfulness-Based Coping Profiles and Gender and Age Descriptors

The mindfulness-based scores of each school and the distributions across the five situations are displayed in Figure 1. Students in school A had the highest disposition to use mindfulness-based coping strategies in each situation, higher than students in either school B or C. Compared to students in school C (no mindfulness), students from school B (one year of mindfulness) showed a greater propensity to use mindfulness-based coping strategies in “stress before exam”. In the four other situations, school B students had a small advantage over the comparison group (Figure1).

Figure 1: Schools' mindfulness-based coping profiles



Each school score and the scores for age and gender are presented in Table 4. The mean score of school A (0.76) was higher than school B (0.42) or school C (0.32). Interestingly, ten-year-old students showed the highest disposition to use mindfulness-based coping strategies, regardless of the degree of engagement in mindfulness practices, and nine-year-olds showed the

lowest; this was true across all three schools. In addition, girls showed a higher disposition to use mindfulness-based coping practices than boys.

Table 4: Mindfulness-based coping scores by school, grade and gender

<b>Variables</b>	<b>Mean Score</b>	<b>Std. Deviation</b>
School A (n=218)	.76	.60
School B (n=212)	.41	.41
School C (Comparison) (n=216)	.32	.39
12 Years old (n=159)	.49	.57
11 Years old (n=201)	.45	.42
10 Years old (n=124)	.73	.63
9 Years old (n=162)	.39	.38
Female (n=316)	.61	.57
Male (n=330)	.39	.42
Total (n=646)	.50	.51

### **Differences between Schools, Age Groups and Genders**

We employed a two-level regression model, with variables for each school entered in the first level and students' age and gender in the second. Categorical variables were coded as dummy variables. The analysis compared the total mindfulness score of schools A and B to school C (represented by the intercept) and the mindfulness total scores of each age group to the 12-year-old group (represented by the intercept). Girls' mindfulness scores were compared to boys' (represented by the intercept). The same regression model was employed for each of the situations separately (Table 5).

Table 5: Regression of mindfulness-based coping scores on school, age and gender at two levels<sup>d</sup>

Regression steps	Variable Entered	Mindfulness score		Exam stress	Concentration	Sleep	Facing anger	Disappointment
		I	II	II	II	II	II	II
		Regression model						
Intercept	$\beta^e$ (SE)	.32*** (.03)	.43*** (.05)	.59*** (.11)	.35*** (.09)	.37*** (.08)	.44*** (.08)	.39*** (.06)
Addition to Intercept School <sup>a</sup>	School A $\beta$ (SE)	.44*** (.04)	.39*** (.04)	.64*** (.10)	.44*** (.08)	.39*** (.06)	.27*** (.07)	.20*** (.05)
	School B $\beta$ (SE)	.95** (.04)	.09** (.04)	.34** (.10)	.08 (.08)	.03 (.06)	.08 (.07)	.00 (.05)
Addition to Intercept Age <sup>b</sup>	Age 9 $\beta$ (SE)		-.10* (.05)	-.06 (.11)	-.00 (.09)	-.18 (.08)	-.22** (.08)	-.02 (.06)
	Age 10 $\beta$ (SE)		.17*** (.05)	.37*** (.13)	.13 (.10)	.28*** (.08)	.02 (.09)	.04 (.07)
	Age 11 $\beta$ (SE)		-.00 (.04)	.21* (.11)	.01 (.09)	-.09 (.07)	.12 (.08)	-.04 (.06)
R <sup>2</sup> Effect size		.13	.20	.10	.07	.13	.06	.03
N		646	646	646	646	646	646	646

Notes. <sup>a</sup> Reference group—School C (comparison group). <sup>b</sup> Reference group—Age 12 years. <sup>c</sup> Reference group—Boys. <sup>d</sup> age\*gender\* school interactions and their sub variations were not significant, hence not entered in the final model. <sup>e</sup> \*p<0:05; \*\* p<0:01; \*\*\* p<0:001;

The null model showed significant variations in students' total mindfulness-based coping scores (intercept only). Model I added the average effect of each school (school C as the reference group). The coefficient of school A was the highest and was significant, indicating these students had the highest disposition to use mindfulness-based coping strategies. Students in school B showed less tendency to use mindfulness-based coping strategies than students in school A but more than students in school C. The effect size ( $R^2$ ) for this model was about 13%. Significant differences also appeared in the between-school contrasts; the effect size ( $R^2$ ) of these contrasts was 32% for school A and B, 39% for school A and C, and 11% for school B and C (Table 6).

Model II added age group (age 12 as reference) and gender (boys as reference) as a set. Ten-year-old students tended to use more mindfulness-based coping strategies than students in any other age group, and girls used more mindfulness-based coping strategies than boys. As in Model I, the coefficients for school A and B were significant. The effect size ( $R^2$ ) for this model was 20%. The analysis showed differences between schools and age groups but none between 11 and 12-year-old students (Table 7). The results for the regression of "stress before an exam" were similar to those for the regression of the total mindfulness score. In the regressions for the remaining four situations, the coefficients for school A were consistently significant (school C as reference). Students in school A showed a higher tendency to use mindfulness-based coping strategies than students in school C. Students in school B did not use more mindfulness-based coping strategies in the four situations than students in school C (Table 5). The comparison of school A and B showed that students in the former used more mindfulness-based coping strategies than students in the latter in each of the five situations, with effect sizes ( $R^2$ ) ranging from 15% to 27% (Table 6). Thus, the use of mindfulness based coping strategies in everyday situations was more apparent after more than one year of WSMED.

Table 6: Between-school comparisons

		Mindfulness score	Exam stress	Concentration	Sleep	Facing anger	Disappointment						
School <sup>a</sup>													
	Contrast parameters	B	C	B	C	B	C	B	C	B	C	B	C
School A	$\beta$ diff <sup>c</sup>	.34*** (.04)	.44*** (.04)	.30*** (.10)	.64*** (.10)	.35*** (.08)	.44*** (.08)	.31*** (.07)	.39*** (.06)	.25*** (.08)	.27*** (.07)	.20*** (.06)	.20*** (.05)
	SD	.32	.39	.15	.30	.21	.26	.25	.27	.16	.19	.17	.17
	R <sup>2b</sup>												
School B	$\beta$ diff		.09** (.04)		.34** (.10)		.08 (.08)		.03 (.06)		.01 (.07)		.001 (.05)
	SD												
	R <sup>2</sup>		.11		.16		.11						

Notes. <sup>a</sup> A=school A; B=school B; C= school C (comparison). <sup>b</sup> R<sup>2</sup>= Effect size <sup>c</sup> \*p<0:05; \*\* p<0:01; \*\*\* p<0:001

Table 7: Model 2 - between school and age comparison

Variable	Contrast parameters	School B	School C	Age 10	Age 11	Age 12
School A	$\beta$ diff <sup>a</sup>	.29***	.39***			
	SD	(.04)	(.0453)			
School B	$\beta$ diff		.09**			
	SD		(.04)			
Age 9	$\beta$ diff			-.27***	-.09*	-.10*
	SD			(.05)	(.04)	(.05)
Age 10	$\beta$ diff				.17***	.17***

	SD				(.05)	(.05)
Age 11	$\beta$ diff					-.004
	SD					(.04)

Note. <sup>a</sup> \*p<0:05; \*\* p<0:01; \*\*\* p<0:001

## Discussion

This study explored the contribution of a whole-school long-term mindfulness in education pedagogy and its influence on students' disposition to generate mindfulness-based coping strategies in real-life situations, drawing on three schools with over 600 students across a relatively wide age range. There were three major findings. First, the WSMED approach significantly contributed to students' disposition to use mindfulness-based coping strategies, with the number of years of engagement (as exemplified by the differences between school A and B) having a significant effect on students' disposition to apply these strategies. It seems the transfer of mindfulness-based strategies beyond the context of the intervention is more apparent after more than one year of intervention. Second, ten-year-old children showed a significantly higher disposition to use mindfulness-based coping strategies than nine, 11 or 12-year-olds, but there was no significant difference between 11 and 12-year-old children. Finally, girls had a higher tendency to apply mindfulness-based coping strategies than boys, regardless of their age or extent of engagement.

Further, as seen in the score of school C (the comparison group), some students used mindfulness-based coping strategies naturally. This study assumed there was a chance that children might discover mindfulness-based coping strategies without learning and experiencing them at school. They might invent them on their own, acquire them by observing parents, or learn them in an out of school activity. The use of mindfulness-based coping strategies by school C's children, although not as high as in school A and B, supports our suppositions.

Past studies of mindfulness in education have focused mostly on short-term interventions, using classroom-based approaches. A meta-analysis of these studies says the mindfulness-based interventions they discuss had more effect on reducing negative functioning than enhancing

positive functioning (Zoogman et al., 2014). As suggested by Zoogman et al. (2014), the limited effect on positive functioning could be attributed to the short-term nature of the interventions. In contrast, this study focused on a long-term approach; the findings show an enhancement in children's positive functioning, thus supporting Zoogman's (2014) proposition. They also support the hypothesis of a correlation between the amount of in-class practice, a significant aspect of the long-term whole-school approach, and children's disposition to apply mindfulness-based coping strategies in real-life situations.

One of the challenges of research on mindfulness in school is the issue of dose-response relationships and the quantity of mindfulness training needed to produce a given effect on children (Schonert-Reichl & Roeser, 2016). Greenberg and Harris (2012) have called for research on the “differential effects of dosage and intensity and how they may vary by age” (p. 165). Our study yielded insight into this issue by showing that the duration of engagement with the Mindful Language program had a significant effect on students' coping resources. Students in school A, who had practiced mindfulness for more than one year, showed a stronger tendency to implement mindfulness-based coping strategies in all five real-life situations. Students in school B showed this tendency only in one situation. Thus, the effect on positive functioning, in which mindfulness-based strategies were used beyond the context of the intervention, was more substantial after more than one year of WSMED. However, we could not control for the possibility that the effects might be attributed to changes in the teachers' approach, rather than to the number of years of practice. Further, there is no explanation of our finding that ten-year-old children recruited more mindfulness-based coping practices than any other age group. We found no prior data on the possible association between children's age and their response to mindfulness, and future work should explore this topic.

When examining the literature on mindfulness and children, we found no data on gender differences and their influence on mindfulness-based outcomes. In addition, past research on gender differences and children's coping strategies has mixed results (Compas, Connor-Smith, Saltzman, Thomsen, & Wadsworth, 2001). This study found significant gender differences, as girls consistently showed a higher disposition to generate mindfulness-based coping strategies,

regardless of their age or the school they attended (i.e. number of years of engagement with mindfulness in schools A, B, and C). As this is the first such investigation, future studies should address the issue of gender differences in relationship to mindfulness in education outcomes.

Children's mindfulness-based experiences can be transformed into various possible outcomes in the cognitive, emotional, physical and behavioral domains. Despite substantial growth in the field of mindfulness in education, few research initiatives have addressed children's mindfulness-based coping strategies, and existing work is mostly based on self-rated measures (Burke, 2010), changes in perceived stress, or self-report questionnaires (Felver et al., 2016; Zenner et al., 2014). This study looked at coping behaviors and used both qualitative data and quantitative analysis, thus following Zenner et al.'s (2014) suggestion to add qualitative data and behavioral measures and refrain from solely relying on self-report questionnaires.

From the standpoint of this study, one important aspect of a school's mindfulness in education program is its influence on children's ability to cope with life stresses and challenges. An effective program should introduce students to various mindfulness-based skills and help them realize they can recruit these skills on their own. As seen in this study's findings, coping styles could change, but perhaps more time and a higher "dose" of mindfulness are needed to facilitate it.

### **Limitations and Future Study**

This study researched schools in which WSMED programs were already in place, thus eliminating the possibility of randomization, or pre-post measures, or the use of a wait-list control group. Although the findings were supported by the large number of children involved, there is a small likelihood that some factors beside the introduction of mindfulness could have influenced them.

The data collection and analyses, based on a situation questionnaire, are unique and, as such, might have been problematic. The study's approach turned out to be productive, however, as it could quantify children's mindfulness-based coping strategies in a way that existing taxonomies couldn't. The literature on children's coping proposes a wide variety of subtypes of

children's (and adolescents') coping styles (Zimmer-Gembeck & Skinner, 2011), but none adequately capture the ways mindfulness may contribute to children's stress management and emotional regulation. Further exploration and refinement of this instrument is suggested, so that it may evolve into a practical and productive measure for mindfulness-based outcomes. Such a measure could be used to evaluate school-based programs and even become relevant for health care providers in their assessments of children.

It is important to note that this study and its scoring system did not intend to map children's coping profiles, evaluate children's adaptive or maladaptive styles, or measure their coping capacities. The study and coding system simply assessed whether the WSMED training could influence children's coping choices and motivate them to integrate more mindfulness-based strategies into their lives. Accordingly, the quantitative and qualitative analyses estimated the add-on amount of mindfulness-based coping that was integrated into their lives and explored the possible influence of years of exposure.

Another limitation is that the data were based on children's written responses and, thus, might be influenced by their writing abilities or expressive tendencies. The written responses enabled us to collect data from a large sample, producing reliable results, but more and richer data might be obtained through personal interviewing techniques.

Inherent to the whole-school approach is the multi-level nature of its implementation. For instance, it's hard to determine if the high mindfulness-based coping scores in school A were related solely to the high dose of mindfulness-based classes or were partially influenced by the climate that the long-term approach had already cultivated in the school, or even by individual differences. Moreover, multiple components are integrated into the Mindful Language intervention, and it is difficult to identify which specific component(s) contributed to the outcomes shown in our study.

The whole-school approach requires further investigation, including, for example, a comparison of its outcomes with other approaches, longitudinal assessments including base-line data, studies in different socio-economic backgrounds, etc. The outcome of mindfulness was viewed through a specific lens, and the whole-school approach to mindfulness would certainly

benefit from multi-perspective investigations, addressing different outcomes, collecting and analyzing data using various methodologies, and including teachers' and parents' perspectives.

Finally, contextual aspects such as the local culture, language, and educational system should be considered if the findings are to be generalized. Nevertheless, our findings show the WSMED approach has promise. This study calls for more implementation of and studies on this approach in other contexts.

### **Author contributions**

A1: designed and executed the study, assisted with the data analysis and wrote the paper. A2: designed and executed the study, analyzed the data and wrote the paper. A3: collaborated with the data analysis. A4: collaborated in the coding of the data.

### **Compliance with Ethical Standards:**

**Conflict of Interest:** Author A declares that he/she has no conflict of interest. Author B declares that he/she has no conflict of interest. Author C declares that he/she has no conflict of interest. Author D declares that he/she has no conflict of interest.

**Ethical approval:** All procedures performed in this study were in accordance with the ethical standards of Beit-Berl College, Israel and the Israeli ministry of education guidelines and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

**Informed consent:** Informed consent was obtained from all individual participants included in the study.

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### Supplementary Materials

Table S1: Mindful Language through the WSMED framework

School's curriculum	Weekly mindfulness-based sessions, integral part of each grade curriculum, are offered to all classes on a weekly basis, year after year.
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	<p>Sessions are taught by a mindfulness facilitator, with each class's homeroom teacher present.</p> <p>Experiential learning is enhanced by inquiry, mindful journal and class discussions. Students are coached to apply mindfulness-based skills during school time as well as in real-life situations.</p>
School's culture	<p>A special “mindful classroom” space is designated by each school, without chairs and desks, and with mattresses for each student.</p> <p>Each homeroom teacher is present in the weekly mindful sessions of their class.</p> <p>A monthly faculty meeting enhances teachers' gradual mindfulness-based teachings and learning.</p> <p>Mindfulness, led by teachers or students, is being added before exams, at the beginning or end of a week, or when needed.</p> <p>Mindfulness is being added to physical education classes, art classes, or as a short session at a beginning of a regular class.</p> <p>Mindfulness is being added to teachers meeting.</p>
Families	<p>Parents receive introductory information on the program.</p> <p>Parents receive updates on the mindfulness in school project.</p> <p>Parents are invited to an introductory evening.</p> <p>Parents are invited to short evening mindfulness-based workshops for parents.</p> <p>Mindfulness is being used as part of a school's gathering (of parents, children and teachers).</p> <p>Children are encouraged to introduce or teach mindfulness to their family members.</p>

Table S2: Situation Questionnaire

<b>SITUATION QUESTIONNAIRE - CHILDREN SURVEY</b>	
Boy/Girl (circle one)	Class...
<p>Sometimes we face a challenging situation.</p> <p>In order to cope with the situation or to overcome it, we do various things.</p> <p>Here's a list of a few situations.</p> <p><b>Please write what you do in each, in order to cope with it or in order to overcome it.</b></p>	
I feel tense and stressed about an exam (or a competition) which is coming soon...	

I want to fall asleep, and I can't...

Someone (a parent, brother/sister, friend, teacher) makes me annoyed and angry...

I try to focus and concentrate, and I can't...

I'm frustrated and disappointed at myself, because I've failed in something important...