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Results of a Mindfulness-Based Social-Emotional Learning Program on Portuguese Elementary Students and Teachers: a Quasi-Experimental Study

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Abstract Recently, mindfulness-based social-emotional learning (SEL) approaches have been taught to children in some schools. Due to deficient methodological consistency observed in most studies, their results should be interpreted with caution. Moreover, research on how mindfulness-based SEL approaches benefit teachers is scarce, and the majority of these studies have been conducted in English-speaking countries; therefore, it is uncertain whether these approaches are suited to other cultural backgrounds. The aim of the present study was to evaluate the efficacy of the MindUp curriculum, an SEL program through mindfulness practice for Portuguese students and teachers. Participants included 454 3rd and 4th grade students and 20 teachers from state schools. A quasi-experimental (pre- and post-test) study compared outcomes for an experimental group with a waitlist control group. Data were collected from teachers and children through self-report measures. Results showed that over 50 % of the children who participated in the MindUp program scored above the control group mean in their ability to regulate emotions, to experience more positive affect, and to be more self-compassionate, and over 50 % scored lower in negative affect. In the group of teachers, over 80 % scored above the control group mean in observing, in personal accomplishment, and in self-kindness. Our results contribute to the recent research on the potential added value of mindfulness practices to a SEL program and strengthen the importance for teachers and students of adding to the academic curriculum a SEL program through mindfulness practices.

Keywords Social and emotional skills · Mindfulness · Children · Teachers · Schools

Introduction

According to international reports, at least 20 % of young people present one mental health problem before the age of 18, and the onset of major mental illness may occur as early as 7 to 11 years of age (Kessler et al. 2005). In Portugal, the results of the health behavior in school-aged children study have indicated that since 2010, a global decrease in mental and physical health among adolescents has been observed (Gaspar de Matos et al. 2015). Hence, there is clearly an increasing number of young people at schools who experience emotional and mental health problems, which in turn, affect a wide range of outcomes, including academic performance, obesity, and risk behaviors (e.g., substance use and violence; Institute of Medicine and National Research Council 2009).

As children spend many hours in schools, the latter are thought to be a crucial context for the development of social and emotional skills along with academic competencies. Jones et al. (2013) suggested that schools should incorporate the teaching and reinforcement of these skills into their daily interactions with children in order to promote children's and youths' mental health and well-being. Several decades of research have shown that the promising and potential lifetime benefits of preventing mental, emotional, and behavioral (MEB) disorders are enhanced by focusing on young people and that early interventions, such as social-emotional learning (SEL), can be effective in delaying or preventing the onset of such disorders (Helliwell et al. 2015). For instance, the

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Institute of Medicine and National Research Council (2009) argued that social-emotional learning programs promote positive youth development while preventing mental health problems as well as substance abuse, violence, and other antisocial behaviors. Through explicit instruction and student-centered learning approaches, children and youths may develop fundamental skills such as: self-awareness, self-management, social awareness, relationship skills, and responsible decision-making (CASEL 2013).

There is a body of evidence revealing that social and emotional skills correlate positively with good adjustment outcomes (e.g., health and wealth) and negatively with a diversity of problems (e.g., crime; e.g., Moffitt et al. 2011). More specifically, recent literature reviews have indicated that SEL interventions foster social and emotional skills with the largest average significant effect sizes in relation to other interventions' outcomes (e.g., Payton et al. 2008; Weare and Nind 2011; Wilson and Lipsey 2007). With regard to self-esteem and self-confidence, results have also shown a positive moderate impact (Payton et al. 2008). Additionally, reviews have indicated that SEL programs improved positive attitudes towards school and enhanced school achievement (e.g., Durlak et al. 2011; Payton et al. 2008; Wilson and Lipsey 2007). As far as mental health problems and problematic behavior are concerned, research has pointed to SEL interventions having a positive effect on the reduction of anxiety, depression, and emotional distress; on the prevention of behavioral problems, such as drug abuse; and on the prevention of aggressive and antisocial behavior (Durlak et al. 2011; Wilson and Lipsey 2007). Two recent meta-analyses have replicated these results (Durlak et al. 2011; Sklad et al. 2012) and Durlak et al. (2011), in particular, based on the analysis of 213 studies. They concluded that SEL programs led to an improvement of 25 % in social and emotional skills, of 11 % in achievement tests, and to a decrease of 10 % in classroom misbehavior, anxiety, and depression, which were sustained for at least 6 months after the intervention. Additionally, other studies suggested that the ability to regulate emotions through the active and positive participation of children in a social context may promote the development of social skills, such as cooperation and assertiveness, and the improvement of positive emotions enhances cognitive functioning (flexible thinking) and self-regulation and facilitates positive psychosocial functioning, which in turn, can contribute to flourishing mental health (Blair et al. 2015; Davis and Suveg 2014). Furthermore, students with more positive affect have shown higher academic scores than those who have negative affect (Lyubomirsky et al. 2011).

More recently, growing interest in another educational approach to promote students' social and emotional skills—contemplative education—has been noted. Roeser and Peck (2009, p. 127) defined contemplative education as "a set of pedagogical practices designed to cultivate the potentials of mindful awareness and volition in an ethical-relational context in which the values of personal growth, learning, moral living, and caring for others are also nurtured." Some authors argued that introducing these practices in educational settings might yield twofold benefits. Firstly, the regular repetition of these practices can produce changes in the brain circuits and complex cognitive functions (Klingberg 2010). Consequently, researchers are now beginning to explore these potential benefits of contemplative practices for children, adolescents, and their caregivers (Black et al. 2009; Roeser and Peck 2009). Secondly, these practices may improve teachers' professional development by nurturing their social and emotional skills and pro-social dispositions such as empathy and compassion. Furthermore, according to Jennings and Greenberg (2009), the development of these skills in teachers may help them to create a caring and cooperative classroom learning environment. These practices may vary in nature; however, they share a focus on sharpening concentration and attention: yoga, tai chi, mindfulness mediation, guided imagination, telling stories, music, art, and literature (Lantieri and Nambiar 2012; Roeser and Peck 2009).

Even though implementation of these practices is fairly recent, one of the most studied contemplative practices in an educational context is mindfulness (e.g., Greenberg and Harris 2011; Zelazo and Lyons 2012). The practice of mindfulness involves the reflexive contemplation of one's experience—body sensations, feelings, states of mind, and experiential phenomena—and a close repetitive observation of the object (Bodhi 2011). Zen Master Thich Nhat Hanh (Hanh 1987) referred to mindfulness as keeping one's consciousness alive to be aware and awake at every moment of daily life and to be present and at one with those around you. Among Western researchers, the definition proposed by Kabat-Zinn (2003) is one of the most commonly used among researchers in this domain. Kabat-Zinn (2003) described mindfulness as "the awareness that emerges through paying attention on purpose, in the present moment, and nonjudgmentally to the unfolding of experience moment by moment" (2003, p. 144). An affectionate attitude of non-harming (loving kindness, compassion, sympathetic joy, and equanimity) towards others and ourselves is also inherent to the definition of mindfulness (Cullen 2011).

Educational settings may be a fundamental context for the introduction of mindfulness approaches in order to teach children and youths how to pay attention and cultivate attitudes such as kindness, curiosity, and non-judgment (Weare 2014). Therefore, mindfulness-based interventions have recently started to be implemented in school settings, both through the adaptations of adult programs and through the development of specific interventions for children and teachers. Some of the interventions for children and youths were adapted from the MBSR program for adults. Examples of these programs are: the MBSR-T for adolescents, tested on youths aged between 14 and 18 years (Biegel et al. 2009); the mindfulness in

schools project, for children and youths aged between 7 and 17 years (Kuyken et al. 2013); and the mindful schools for children and youth, aged between 5 and 17 years (Fernando 2013). In terms of the mindfulness practice, teachers and clinical practitioners have introduced a number of adaptations such as simplifying instructions, shortening its duration, making it less abstract (often by introducing physical props and using vivid metaphors and images), and utilizing more movement-based activities to enhance children and youths' understanding of the goals of mindfulness exercises (Zelazo and Lyons 2012). Children also need a balance between silent practices and inquiry and interactive classroom strategies, such as pair or group work, games, and role play.

However, research in the field of mindfulness-based approaches for children and youths is still in its early stages, and therefore, presents some limitations such as few randomized control trials, small sample sizes, heterogeneity of intervention types, and measurement methods (e.g., Greenberg and Harris 2011; Kallapiran et al. 2015; Meiklejohn et al. 2012). For instance, with regard to the measurement of mindfulness, some authors argued that besides the availability of different scales (for adults) to assess mindfulness, none of these scales might be appropriately equipped to actually measure mindfulness (Bergomi et al. 2013). One of the reasons is the inclusion of items that may easily be misinterpreted, particularly by respondents who are not familiar with the concept. Therefore, if this happens with adults, it is even more likely it will also happen with children.

Nevertheless, a meta-analysis performed on 20 studies mainly conducted in schools showed an overall small effect size ($d = 0.227$) for universal mindfulness interventions and also an increase in mindfulness and attention ($d = 0.280$; Zoogman et al. 2014). Potential benefits of mindfulness approaches have been found for non-clinical (children in school settings) and clinical populations and include: a reduction of problematic behaviors, a reduction of anxiety and depression, a strengthening of self-regulation and impulse control, an enhancement of attention skills, physical and emotional well-being, cognitive skills, social and emotional competence, and self-esteem and self acceptance (Kallapiran et al. 2015; Meiklejohn et al. 2012; Weare 2013, 2014). The importance of these findings is related to the fact that low levels of emotion control and high levels of negative emotion are associated with externalizing problems (Kim et al. 2007). Contrary to adult populations, none of the afore-mentioned studies found significant effects of mindfulness-based interventions on children's self-compassion. Nevertheless, this might be an important skill to be promoted among children as, according to Welford and Langmead (2015), self-compassionate students were more adaptive in coping with academic failures and were more likely to use reflective, creative,

and planning skills to manage their life situations in a more helpful/positive way.

Considering the aims and results of SEL programs and of mindfulness-based interventions, one may observe that both approaches have similar goals, namely the promotion of emotional regulation, composure, compassion, and empathy (Baer 2006). In this sense, some authors considered that mindfulness practices might be complementary to the SEL approach, reducing stress in students and promoting/reinforcing their emotional and social skills and well-being (Lantieri and Nambiar 2012; Lawlor 2016; Weare 2014). While SEL interventions promote learning from the outside in, mindfulness-based interventions emphasize learning from the inside out. In SEL, the teacher teaches skills and time is given to the students to practice these skills. Mindfulness-based approaches help students to become aware and to experience the relationship between their emotions, thoughts, and physical sensations to regulate their emotions, which in turn, have an impact on their behavior, levels of stress, interpersonal relationships, and the ability to focus their attention. Regarding the intervention, the structure of SEL programs, often in the form of organized curriculum sessions implemented throughout the school year, is a framework where mindfulness practices can be easily integrated (Weare and Nind 2011). As evidence for the impact of mindfulness increases, work to link mainstream SEL with mindfulness is currently being developed; however, it is still insufficient (Lantieri and Nambiar 2012; Lawlor 2016). Nevertheless, MindUP is one of the two programs (The Hawn Foundation 2011) accredited by CASEL as an effective social and emotional learning program as shown in a randomized control trial with 99 fourth and fifth grade classes conducted by Schonert-Reichl et al. (2015). This study included self-report assessments of well-being, social and emotional competencies, school self-concept, mindful attention, and awareness. Additionally, this research integrated an evaluation of students' executive function and stress physiology (via diurnal salivary cortisol). The results indicated that, compared with the control group, students who participated in the MindUP program showed a significant increase in optimism, emotional control, empathy, perspective taking, pro-social goals, and mindful attention, in addition to a decrease in depressive symptoms. In terms of executive functions, they proved to be more attentive and capable of restraining or holding back distractions while performing computer tasks.

Teachers, in addition to their academic teaching role, are expected to actively participate in the promotion of students' mental health and well-being (Weare 2014). Due to the difficult demands of their work, teachers feel increasingly stressed and teachers' stress and burnout can affect their health and well-being and may interfere in students' learning and engagement (Jennings and Greenberg 2009; Roeser et al. 2013). Even though there are few programs that have addressed this problem (Jennings et al. 2013), increased interest has also

recently been observed in using mindfulness-based interventions to help teachers improve their teaching skills, promoting their well-being, self-awareness, and self-regulation and to address job stress and burnout, for example, the cultivating awareness and resilience in education program (Jennings 2016; Jennings and Greenberg 2009; Jennings et al. 2013). Although studies on the effectiveness of mindfulness programs for teachers are scarce and lack methodological rigor, a review of three teacher programs has revealed some promising results such as significant improvement in mindfulness, mental well-being, self-efficacy, and also teachers' skills to manage the classroom effectively and to establish supportive relationships with students (Meiklejohn et al. 2012). Additionally, recent studies have observed an increase in self-compassion, reappraisal, self-efficacy, student engagement, sense of efficacy in instruction, personal accomplishment, mindfulness, and a significant decrease in stress and anxiety (Jennings 2014, 2016). However, as suggested by Schonert-Reichl et al. (2015) there is a need for research that explores the benefits for teachers that occur as a result of their implementation of a SEL program that includes mindfulness practices. Also, the majority of studies, both on children and teachers, have been conducted in English speaking countries, so it is uncertain whether these approaches are suitable for other children and teachers worldwide (Kallapiran et al. 2015).

Therefore, this study has two main objectives. Firstly, to evaluate the efficacy of MindUP, a classroom and evidence-based program incorporating mindfulness practices, in child outcomes. More specifically, we hypothesize that MindUP students, compared with a control group, will improve in positive affect, emotion regulation, self-compassion and mindfulness. Secondly, this study aims to explore how MindUP impacts on teachers' outcomes and hypothesizes that MindUP teachers, compared with the control group, improve in mindfulness, self-compassion, emotion regulation skills and burnout.

Method

Participants

The participants were from two different samples: sample one comprised children from elementary school and sample two comprised the teachers of these children. Sample 1 included 454 students with a mean age of 8.5 years (SD = 1.00), 51.5 % of whom were male. All the children attended elementary school, the majority of whom were in the 3rd (65.4 %) and 4th grade. Almost all the pupils were Portuguese (95 %) and distributed across 12 schools from three municipalities in the Lisbon District. The experimental group comprised 223 children with a mean age of 8.5

(SD = 0.97), 98 females and 122 males, and 167 were in the 3rd grade and 56 in the 4th grade. The control group included 231 children with a mean age of 8.5 (SD = 1.04), 115 females and 112 males, and 131 were in the 3rd grade and 100 were in the 4th grade.

Sample 2 was comprised of 20 Portuguese teachers, all of whom were female, which is the norm in Portuguese elementary schools, with ages ranging from 33 to 55 years (M = 40.37, SD = 6.30). All the teachers had over 10 years of teaching experience (M = 16.44, SD = 5.40) and 95 % had obtained a bachelor's degree in education. The experimental group consisted of 13 teachers with a mean of age 41.3 years (SD = 6.77), with a mean of 16 years of teaching experience (SD = 5.92) and 92 % had obtained a bachelor's degree. The control group included 7 teachers with a mean of age 38.7 years (SD = 5.47) with a mean of 17 years of teaching experience (SD = 4.62) and 100 % had obtained a bachelor's degree.

The national education system in Portugal is organized geographically in school clusters from kindergarten up to high school. A convenience sampling approach was used to select twelve schools from four clusters across three suburban municipalities in the Lisbon District that were equivalent in terms of socioeconomic status (middle socioeconomic level). The random participants distribution between the experimental group and the control group was conducted so as to guarantee both groups were equal in size and socio-economic characteristics.

Procedure

Intervention procedures

The intervention was a 50-h course (consisting of 25 h delivered by an expert and 25 h of program implementation by teachers) over 6 sessions. The duration of the course was twelve and a half hours longer than that offered by the Hawn Foundation for two reasons. First, the contents (social and emotional learning, mindfulness, neuroscience and positive psychology) were quite new to teachers so they had to be clarified theoretically and gain experience through practice. Thus, teachers trained their mindfulness skills, experimented and rehearsed how to implement each session and expanded their knowledge on how each theoretical component could benefit the promotion of social and emotional skills and on managing the classroom in a positive way. Second, for each 25 h of training, certified by the Portuguese Ministry of Education, teachers receive a credit. Hence, those teachers who participated in this study and who successfully completed the training sessions received 2 credits for their career development. The participants were divided into three training groups and the training sessions were implemented at two different stages of the school year for each

group: in September/October 2012 and January/February 2013. The teachers began to implement the MindUP program after the second training session. Teachers did not have to fund the training or pay for the manual for the implementation of the program as well as the chime to do the mindfulness practice.

Program

The MindUP program is a comprehensive classroom and evidence-based curriculum that has taken over a decade to construct by leading experts in the fields of cognitive developmental neuroscience, SEL and positive psychology (such as Adele Diamond, Kimberly Schonert-Reichl). The feedback of teachers was also taken into consideration during the development of the program. It aims to enhance students' self-awareness, focused attention, self-regulation, and to reduce stress. The program is organized into three levels: preschool to 2nd grade; 3rd to 5th grade; and 6th to 8th grade. For each level a manual, adapted to each developmental phase, was created with detailed instructions for the implementation of each session. The classroom teacher implements the program after receiving 25 h of training (see Intervention procedures). As this study focused on the 3rd grade of the elementary school, the second level manual was used. The manual and worksheets used for the implementation of the MindUP program were translated and adapted to the Portuguese language with the help of teachers, who reviewed the adequacy of the contents to the Portuguese educational system, and a linguist, who reviewed the suitability of the Portuguese language.

The curriculum comprises 15 lessons taught sequentially once a week for approximately 45–60 min and is organized in 4 units. Each lesson comprises mindfulness practices along with different activities that allow children to learn about their brain, understand how their feelings and thoughts affect their actions and learn ways of becoming a caring and altruistic person. Therefore, in units 1 and 2, children learn how training their focused awareness might affect their brain and then practice mindfulness on their senses (e.g., mindful seeing, mindful smelling). In unit 3, children learn social and emotional understanding through the practice of perspective taking, optimism and savoring happy experiences. Lastly, in unit 4, children have the opportunity to put mindful awareness into practice by practicing gratitude, performing acts of kindness and by planning, in a group context, a social project to benefit their school community. The program also entails a set of suggested activities (e.g., math, language, social, and emotional learning) that teachers can integrate into daily classroom activities that serve to generalize the skills learned. Beyond the 15 lessons, the program contains the core formal mindfulness practice that involves firstly focusing attention on a single resonant sound, then on one's breathing and body sensations and

ending the exercise back on the sound, without judgment, while remaining responsive to their internal and external experiences (pleasurable, neutral or difficult). This practice is carried out every day for 3 min, three times a day—in the morning, after the lunch break, and at the end of the class. A more detailed description of the MindUP program can be found in the book chapter by Maloney et al. (2016).

Data Collection Procedures

The study was approved by the Scientific and Ethical Council of the Faculty of Psychology, University of Lisbon, and by the General Directorate for Education of the Portuguese Ministry of Education and Science.

An invitation letter and the questionnaires were sent to the Principals of selected schools with a view to obtaining their permission to conduct the study. Students were required to obtain written informed parental consent and teachers also signed an informed consent. There were no exclusion criteria and participation was voluntary.

Data was collected for teachers and children at two points: before the beginning of the implementation (for children) and before training (for teachers); and after conclusion of the program implementation (end of school year). All questionnaires were administered to students in groups, at school, during a pre-arranged class period, in the presence of a teacher. At the beginning of the session, a member of the research team read a standardized set of instructions to the pupils and assured them that their answers would remain anonymous and confidential. All participants were reminded that there were no right or wrong answers. To ensure that all students understood what was being requested, all items were read aloud and students answered them at the same time. Teachers answered the questionnaires individually, and anonymity and confidentiality were again assured.

Measures

Children Measures

Positive and Negative Affect Positive and negative affect were measured using a Portuguese version (name deleted to maintain the integrity of the review process) of the PANAS-C (Laurent et al. 1999). This measure comprised 27 items structured in two subscales: positive affect (15 items; e.g., "Indicate to what extent you have felt happy over the past 2 weeks") and negative affect (12 items; e.g., "Indicate to what extent you have felt sad over the past 2 weeks"). Children rated how often they had felt each emotion or feeling (e.g., sad and interested) over the past 2 weeks on a 5-point rating scale ranging from 1 (very slightly or not at all) to 5 (extremely). The validation study of the original PANAS-C reported good internal consistency of .89 for positive affect and .92 for negative affect,

assessed via Cronbach's alphas. The results of the study of the confirmatory factor model of the Portuguese version indicated that the best model fit had the same factor structure as the original PANAS-C version, but with 9 items less: positive affect (7 items) and negative affect (10 items; experimental group: $\chi^2/df = 1.82$, CFI = .932, TLI = .918, RMSEA = .061; control group: $\chi^2/df = 2.38$, CFI = .917, TLI = .900, RMSEA = .061). The measurement invariance analysis across the two groups and measure times (pre-test—T1 and post-test—T2) revealed that this measure was invariant: configural (T1 − $\Delta\chi^2$ (15) = 20.94, p = .14; T2 − $\Delta\chi^2$ (15) = 7.24, p = .95), metric (T1 − $\Delta\chi^2$ (30) = 36.98, p = .18; T2 − $\Delta\chi^2$ (30) = 23.72, p = .78) and scalar (T1 − $\Delta\chi^2$(15) = 15.19, p = .44; T2 − $\Delta\chi^2$(15) = 18.33, p = .25). For the present study, Cronbach's alphas at pre-test and post-test for the positive affect subscale were .82 and .84 respectively, and for the negative affect subscale .82 and .84, respectively.

Emotional Control A Portuguese version (name deleted to maintain the integrity of the review process) of the emotional regulation questionnaire—children and adolescents (ERQ–CA; Gullone and Taffe 2012) was used to assess emotional control strategies. This questionnaire comprised 10 items organized in two subscales: cognitive reappraisal (6 items; e.g., "When I want to feel happier, I think about something different") and expressive suppression (4 items; e.g., "I keep my feelings to myself"). Responses were given on a 5-point rating scale ranging from 1 (strongly disagree) to 5 (strongly agree). The validation study of the original ERQ–CA reported good internal consistency of .83 for cognitive reappraisal and .75 for expressive suppression, assessed via Cronbach's alphas. After conducting a confirmatory factor analysis of the Portuguese version of this questionnaire, the best model fit to our data resulted in two subscales (with 2 items less): cognitive reappraisal (5 items) and expressive suppression (3 items; experimental group: $\chi^2/df = 2.07$, CFI = .947, TLI = .912, RMSEA = .07; control group: $\chi^2/df = 1.48$, CFI = .970, TLI = .951, RMSEA = .046). Measurement invariance analysis across the two groups revealed that this measure was invariant: configural (T1 − $\Delta\chi^2$ (6) = 11.14, p = .084; T2 − $\Delta\chi^2$ (6) = 1.87, p = .93), metric (T1 − $\Delta\chi^2$ (12) = 17.09, p = .15; T2 − $\Delta\chi^2$ (12) = 5.75, p = .93) and scalar (T1 − $\Delta\chi^2$ (6) = 5.39, p = .50; T2 − $\Delta\chi^2$ (6) = 4.09, p = .66). In the current study, Cronbach's alphas at pre-test and post-test for the cognitive reappraisal subscale were .63 and .68, respectively, and for the expressive suppression subscale were .71 and .71, respectively.

Self-Compassion Self-compassion was assessed with the self-compassion scale—children (SCS—C) (K. Neff, personal communication, September 30, 2011). This scale was not published; however, permission from the author was granted to use it in the present study. It consisted of 26 items that measure the positive and negative aspects of self-compassion organized in 6 subscales: self-kindness (5 items; e.g., "I try to be loving towards myself when I'm feeling sad, angry, lonely, or afraid") versus self-judgment (5 items; reverse-coded; e.g., "I'm unkind to myself when I feel I'm not "good enough""); common humanity (4 items; e.g., "When things are going badly for me, I remember that difficulties are part of life, and that everyone goes through them") versus isolation (4 items; reverse-coded; e.g., "When I think about things I don't do well, I feel separate and cut off from everybody else in the world"); and mindfulness (4 items; e.g., "When something upsets me I try to notice my emotions and not get carried away by them.") versus over-identification (4 items; reverse-coded; e.g., "When I'm feeling sad, angry, lonely, or afraid I tend to focus on and worry about everything that's wrong."). Responses were given on a 5-point rating scale ranging from 1 (almost never) to 5 (almost always). A Portuguese version of this scale (name deleted to maintain the integrity of the review process) was used and its factorial validity and invariance across the experimental and control groups were analyzed in the present study. The results of confirmatory factor analysis for the best model fit to our data showed a different structure from the original (K. Neff, personal communication, September 30, 2011). The modified SCS-C was composed by 4 subscales: self-kindness (5 items), common humanity (3 items), self-judgment (4 items), and mindfulness (4 items; experimental group: $\chi^2/df = 1.16$, CFI = .951, TLI = .941, RMSEA = .031; control group: $\chi^2/df = 1.49$, CFI = .902, TLI = .882, RMSEA = .047). Measurement invariance analysis across the two groups revealed that this measure was invariant: configural (T1 − $\Delta\chi^2$ (14) = 11.02, p = .58; T2 − $\Delta\chi^2$ (14) = 10.91, p = .69), metric (T1 − $\Delta\chi^2$ (28) = 21.15, p = .82; T2 − $\Delta\chi^2$ (28) = 21.54, p = .80) and scalar (T1 − $\Delta\chi^2$ (14) = 10.09, p = .76; T2 − $\Delta\chi^2$ (14) = 10.61, p = .72). In the present study, Cronbach's alphas at pre-test and post-test for the self-kindness subscale were .64 and .70, respectively, .63 and .66, respectively, for the common humanity subscale; .70 and .65, respectively, for the self-judgment subscale and .57 and .64, respectively, for the mindfulness subscale.

Mindfulness The mindful attention awareness scale adapted for children (MAAS-C; Lawlor et al. 2013) was used to assess the frequency of mindful states over time among children (e.g., "I could be feeling a certain way and not realize it until later"). This scale comprised 15 items and children rated their responses on a 6-point rating scale from 1 (almost always) to 6 (almost never). The study by Lawlor et al. (2013) reported good internal consistency of .84 assessed via Cronbach's alphas. The results from the study of the confirmatory factor model of the Portuguese version (name deleted to maintain the integrity of the review process) indicated that the best model fit had the same structure with 10 items less (experimental group: $\chi^2/df = 2.12$, CFI = .952, TLI = .910,

RMSEA = .072; control group: $\chi^2/df = 2.02$, CFI = .961, TLI = .927, RMSEA = .067). The measurement invariance analysis across the two groups revealed that this measure was invariant: configural (T1 – $\Delta\chi^2$ (4) = 2.95, p = .57; T2 – $\Delta\chi^2$ (4) = 6.12, p = .19), metric (T1 – $\Delta\chi^2$ (8) = 4.76, p = .78; T2 – $\Delta\chi^2$ (8) = 8.91.54, p = .35), and scalar (T1 – $\Delta\chi^2$ (4) = 1.71, p = .79; T2 – $\Delta\chi^2$ (4) = 2.12, p = .71). In the present study, Cronbach's alphas at pre-test and post-test for this scale were .70.

Teachers' Measures

Emotional Control The emotion regulation questionnaire (ERQ) (Gross and John 2003; Portuguese version by Vaz and Martins 2008) evaluated the way teachers regulate their emotions. This questionnaire comprised 10 items organized in two subscales: Reappraisal (6 items; e.g., "I control my emotions by changing the way I think about the situation I'm in"; α = .80) and Suppression (4 items; "I control my emotions by not expressing them"; α = .73). Teachers rated their responses on a 7-point rating scale ranging from 1 (strongly disagree) to 7 (strongly agree).

Self-Compassion Teachers' self-compassion was assessed by the self-compassion scale (SCS; Neff 2003; Portuguese version by Castilho and Pinto-Gouveia 2011). This scale measures how participants are kind and understanding toward themselves in difficult times. The 26 items were organized according to the same structure of the child version with language adaptations (e.g., "I'm disapproving and judgmental about my own flaws and inadequacies") and presented good reliability for all subscales: self-kindness (α = .84), common humanity (α = .77), self-judgment (α = .82), mindfulness (α = .73), isolation (α = .75), and over-identified (α = .78). Teachers rated their responses on a 5-point rating scale ranging from 1 (almost never) to 5 (almost always).

Mindfulness The five facets of mindfulness questionnaire (FFMQ) (Baer 2006; Portuguese version by Gregório and Gouveia 2011) was used to assess teachers' general tendency to be mindful in daily life. This questionnaire comprised 39 items distributed across five subscales: observing (8 items; e.g., "When I'm walking, I deliberately notice the sensations of my body moving"; α = .78), describing (8 items; e.g., "I'm good at finding words to describe my feelings"; α = .88), acting with awareness (8 items; e.g., "When I do things, my mind wanders off and I'm easily distracted"; α = .89), non-reactivity to inner experience (7 items; "I perceive my feelings and emotions without having to react to them"; α = .66), and non-judging of inner experience (8 items; e.g., "I criticize myself for having irrational or inappropriate emotions"; α = .86). Items were rated on a 5-point rating scale ranging from 1 (never or very rarely true) to 5 (very often or always true).

Burnout Teachers' perceived experience of burnout in relation to their work was assessed using the Maslach burnout inventory—educators survey (Maslach et al. 1996; Portuguese version by Marques Pinto et al. 2005). This measure consisted of 22 items divided into three subscales: emotional exhaustion (9 items; e.g., "I feel emotionally drained from my work"; α = .90), depersonalization (5 items; e.g., "I feel I treat some recipients as if they were impersonal objects"; α = .56), and personal accomplishment (8 items, reversed; e.g., "I have accomplished many worthwhile things in this job"; α = .76). The participants rated their personal feelings and attitudes on a 7-point frequency scale, ranging from 0 (never) to 6 (every day).

Data Analysis

In order to detect baseline group differences in the self-report measures, multivariate analyses of covariance (MANCOVA) were conducted, controlling for age, gender, and school year. With a view to addressing the program effects on children and teachers, we used MANCOVAs followed by analyses of covariance (ANCOVA) for significant MACOVAs. For this analysis, we first verified the MANOVA assumptions. For the multivariate normality assumption, we used the Shapiro–Wilk test ($p \geq 0.05$ for the two groups); and the homogeneity of covariance matrices for each group was analyzed with the M Box test (Marôco 2014). Secondly, and in line with Tabachnick and Fidell (2001), in order to understand the direction of change from pre-test to post-test, we computed difference scores (post-test minus pre-test) that were used as dependent variables and type of group (experimental vs control) as the independent variable, controlling for the variables proving to be significant at baseline. In order to evaluate the magnitude of program outcome, effect sizes were calculated. For MANCOVAs, we calculated the partial eta squared (η_p^2), and for two group comparisons (control vs experimental), Cohen's d was computed. Cohen's d values between 0.20 and 0.40 were considered small effect sizes, values between 0.5 and 0.7 moderate effect sizes and values above 0.8 represented large effect sizes (Cohen 1992; Durlak 2009). In order to help clarify the practical importance of an intervention's effect, an improvement index was used, based on Cohen's U3 index, which converts an effect into a percentile gain manifested by the target group (Durlak 2009). The improvement index represents the difference between the percentile rank of the MindUP mean and the percentile rank corresponding to the control group mean (i.e., 50th percentile) in the control group distribution. Alternatively, the improvement index may be interpreted as the expected change in percentile rank for an average control group student when the student has been subject to the intervention (IES 2008).

Results

Students

MANCOVA was used to analyze the baseline differences between the experimental group and the control group in affect (positive and negative affect), emotion control (suppression and reappraisal), self-compassion (self-kindness, common humanity, mindfulness, and self-judgment), and mindfulness, controlling for age, gender, and school year. Results in Table 1 showed that there were no significant differences for the effect of group across all the outcome variables. Nevertheless, age and school year had a significant effect across outcome variables; however, gender showed no significant differences. In Table 2, follow-up ANCOVAs indicated that age had a significant effect on self-kindness, common humanity, positive affect, suppression, and mindfulness (self-compassion subscale); and school year had a significant effect on self-kindness, suppression, common humanity and mindfulness. In order to determine the direction of change, pre-test, post-test means and standard deviations were computed (for all dependent variables) for the experimental group and control group (Table 3).

In order to test the effects of the MindUP program on children's self-report, we first conducted a MANCOVA for suppression, common humanity and self-kindness, with difference scores as dependent variables and type of group as the independent variable, controlling for age and school year (shown to have a significant effect at baseline). The results presented in Table 4 indicated a quasi-significant group main effect, a significant effect of school year and quasi-significant difference for age. Follow-up ANCOVAs (Table 5) indicated that compared with the control group, children who had participated in the MindUP program showed a significant decrease in suppression, a quasi significant improvement in common humanity and no significant differences in self-kindness. Secondly, we conducted a MANCOVA (Table 4) for positive affect and mindfulness (MAAS scale), controlling for age (shown to have a significant effect at baseline). The results indicated a quasi-significant group main effect.

Table 1 Students sample—multivariate analysis of covariance of baseline differences between the experimental group and the control group in affect, emotion control, self-compassion and mindfulness, controlling for age, gender, and school year

Variable	Pillai's trace	df	Error df	F	p	η_p^2	Observed Power
Group	0.032	9	412	1.508	.143	.032	0.717
Age	0.066	9	412	3.223	.001	.066	0.810
School year	0.062	9	412	3.048	.002	.062	0.974
Gender	0.034	9	412	1.592	.115	0.34	0.745

Follow-up ANCOVA (Table 5) results showed a significant improvement from pre to post-test in positive affect and no significant difference between the two groups from pre to post-test for mindfulness. Thirdly, we performed a MANOVA for negative affect, self-judgment, and reappraisal with difference scores as dependent variables and type of group as the independent variable. The results showed no significant main effect for group (Table 4). However, follow-up ANOVAs indicated that compared with the control group, children who had participated in MindUP showed a significant decrease in negative affect and for reappraisal and self-judgment no significant differences were found (Table 5). Fourthly, an ANCOVA was performed for mindfulness (self-compassion subscale), controlling for school year (shown to have a significant effect at baseline) and results also showed no significant differences between the two groups (Table 5).

Teachers

First, we used MANCOVA to analyze the baseline differences between the experimental group and the control group in emotion control (reappraisal and suppression), self-compassion (self-kindness, self-judgment, common humanity, isolation, mindfulness, and over-identified), mindfulness (observing, describing,

Table 2 Children sample—follow-up ANCOVA for age and school effects on variables outcomes

Variable	df	Error df	F	p	d	Observed power
Age						
Positive affect	1	420	6.091	.014	0.23	0.692
Negative affect	1	420	1.575	.210	0.12	0.240
Reappraisal	1	420	2.485	.116	0.15	0.350
Suppression	1	420	5.880	.016	0.23	0.677
Self-kindness	1	420	6.962	.009	0.25	0.749
Common humanity	1	420	5.508	.019	0.22	0.649
Self-judgment	1	420	0.412	.522	0.061	0.098
Mindfulness	1	420	2.519	.113	0.15	0.354
Mindfulness	1	420	4.031	.045	0.19	0.517
School year						
Positive affect	1	420	0.020	.888	0.01	0.052
Negative affect	1	420	0.015	.901	0.01	0.052
Reappraisal	1	420	0.010	.920	0.01	0.051
Suppression	1	420	7.659	.006	0.26	0.789
Self-kindness	1	420	7.641	.006	0.26	0.788
Common humanity	1	420	4.173	.042	0.19	0.513
Self-judgment	1	420	0.865	.353	0.09	0.153
Mindfulness	1	420	12.369	.000	0.33	0.939
Mindfulness	1	420	0.275	.601	0.05	0.082

Table 3 Students self-report of affect, emotion control, self-compassion, and mindfulness

Variable	Experimental (*n* = 223)				Control (*n* = 231)			
	Pre-test		Post-test		Pre-test		Post-test	
	M	SD	*M*	SD	*M*	SD	*M*	SD
PANAS								
Positive affect	4.06	0.91	4.16	0.77	4.09	0.75	3.99	0.83
Negative affect	1.97	0.83	1.85	0.75	1.89	0.76	1.93	0.76
Emotion control								
Reappraisal	4.11	0.91	3.95	0.77	4.04	0.79	3.98	0.78
Suppression	3.00	1.21	2.62	1.09	2.81	1.09	2.69	1.17
Self-compassion								
Self-kindness	2.95	1.00	3.19	0.93	3.13	0.95	3.21	1.02
Common humanity	2.78	1.04	3.08	1.11	3.13	1.9	3.12	1.09
Self-judgment	3.95	0.98	3.89	0.87	3.88	0.99	3.75	1.01
Mindfulness	2.86	0.99	3.03	0.98	3.01	0.94	3.21	0.93
Mindfulness	4.35	1.21	4.54	1.06	4.37	1.05	4.63	1.02

acting with awareness, non-judgmental, and non-reactive), and burnout (emotional exhaustion, depersonalization, and personal accomplishment) controlling for age and years of teaching. Results showed that there were no significant differences for the effect of group across all the outcome variables, as well as for age and years of teaching (Table 6). In order to analyze the direction of change, pre-test, post-test means, and standard deviations were computed (for all dependent variables) for the experimental group and control group (Table 7).

Secondly, a MANCOVA was conducted to test the effects of the MindUP program on all the teacher variables with difference scores as the dependent variable and type of group as the independent variable. The results indicated no significant main effect for group (Table 8). However, the follow-up ANOVA results indicated that compared with the control group, the teachers who had participated in the

MindUP program showed significant improvements from pre to post-test in observing, in personal accomplishment and a quasi-significant effect in self-kindness (Table 9). For the remaining variables no differences were found.

Practical Significance of MindUP effects on children and teachers

In order to better understand the practical significance of incorporating a SEL program integrating mindfulness practices into the regular academic curriculum, we computed an improvement index—Cohen's U3 index—for each outcome. For children, an 8 % gain in Positive Affect, a 7 % gain in Common Humanity, and a reduction of 8 % in Negative Affect and in Suppression were observed. In other words, 58 % of the children who received MindUP scored above the control group mean in positive affect and 57 % in common humanity, while 58 % scored lower in negative affect and suppression. For teachers, a gain of 41 % in observing, 36 % in personal accomplishment and 32 % in self-kindness was observed. More specifically, 91 % of the teachers who implemented MindUP scored above the control group mean in observing, 86 % in personal accomplishment and 82 % in self-kindness.

Discussion

The purpose of the present study was to analyze the effects of the MindUP program on 3rd and 4th grade children's emotion regulation skills, self-compassion, and affect. Additionally, we explored how the implementation of MindUP impacted teachers' mindfulness, self-compassion, emotion regulation skills and burnout. Globally, the findings of our study indicated that the integration of a SEL program with mindfulness practices in the academic curriculum could benefit children's social and emotional skills. Furthermore, our study has

Table 4 Students sample—multivariate analysis for suppression, common humanity, self-kindness, positive affect, mindfulness, negative affect, self-judgment, and reappraisal

Variable	Pillai's trace	*df*	Error *df*	*F*	*p*	η_p^2	Observed power
MANCOVA for suppression, common humanity and self-kindness, with difference scores as dependent variables and type of group as the independent variable, controlling for age, and school year							
Group	0.016	4	433	2.406	.067	.016	0.600
Age	0.017	4	433	2.474	.061	.017	0.613
School year	0.025	4	433	3.680	.012	.025	0.802
MANCOVA for positive affect and mindfulness (MAAS scale), controlling for age							
Group	0.013	4	433	2.852	.059	.013	0.558
MANOVA for negative affect, self-judgment, and reappraisal with difference scores as dependent variables and type of group as the independent variable							
Group	0.014	3	431	2.150	.093	.014	0.547

Table 5 Students sample—follow-up analysis of covariance for emotional control, self-compassion, mindfulness, and affect

Variable	df	Error df	F	p	d	Observed power
Emotional control						
Suppression	1	435	4.288	.039	0.20	0.542
Reappraisal	1	443	1.062	.303	0.00	0.177
Self-Compassion						
Common humanity	1	435	3.317	.069	0.25	0.443
Self-kindness	1	435	0.659	.417	0.07	0.128
Self-judgment	1	443	0.737	.391	0.08	0.137
Mindfulness	1	444	0.007	.934	0.01	0.510
Affect						
Positive affect	1	444	5.263	.022	0.21	0.629
Negative affect	1	443	4.339	.037	0.20	0.553

yielded promising results in terms of the potential benefits for teachers who implement SEL programs that integrate mindfulness practices.

As for the effects on children, our results revealed that the children who participated in the MindUP program proved to be able to take perspective on personal shortcomings and difficulties - children learned to recognize that everyone fails, makes mistakes, and gets it wrong sometimes (a dimension of self-compassion). Although previous studies found no significant impact of mindfulness interventions on children's common humanity (a dimension of self-compassion) this may be a promising result regarding the educational context (Welford and Langmead 2015). As for the absence of significant effects on the remaining components of self-compassion, this could be due to the scale used in our study. As far as we know, there is no other study that analyzes the psychometric properties of this scale for 8 year old children with a large sample.

The results of our study also showed that children who were engaged in MindUP revealed a significant decrease in suppressing their emotions, which could indicate that they were more successful at mood repair (Gross and John 2003). This result is in keeping with previous studies (Meiklejohn

Table 6 Teachers sample—multivariate analysis of covariance of baseline differences between the experimental group and the control group in emotion control, self-compassion, mindfulness, and burnout controlling for age and years of teaching

Variable	Pillai's trace	df	Error df	F	p	η_p^2	Observed Power
Group	0.921	1	14	0.834	.708	.921	0.068
Age	0.955	1	14	1.53	.567	.955	0.080
School year	0.934	1	14	1.014	.663	.934	0.071

Table 7 Teachers self-report of emotional control, burnout, self-compassion, and mindfulness

Variable	Experimental (n = 13)				Control (n = 7)			
	Pre-test		Post-test		Pre-test		Post-test	
	M	SD	M	SD	M	SD	M	SD
Emotion control								
Reappraisal	4.35	1.57	5.38	0.88	4.48	1.02	4.93	0.84
Suppression	3.17	1.76	3.27	0.95	3.21	1.33	4.11	0.89
Burnout								
Emotional exhaustion	2.89	1.06	2.83	1.03	2.79	0.75	3.06	1.16
Depersonalization	0.54	0.59	0.49	0.64	0.77	0.77	1.08	0.82
Personal accomplishment	4.42	0.75	4.83	0.89	4.51	1.12	4.34	0.68
Self-compassion								
Self-kindness	3.08	0.75	3.69	0.76	2.81	0.77	2.86	0.72
Self-judgment	2.91	0.59	2.84	0.81	2.80	0.55	2.94	0.34
Common humanity	3.23	0.80	3.59	0.48	2.86	0.69	3.11	0.71
Mindfulness	3.40	0.60	3.60	0.64	3.14	0.38	3.00	0.38
Isolation	2.60	0.87	2.38	0.66	2.93	0.79	2.89	0.13
Over-identification	3.02	0.90	2.67	0.85	3.07	0.85	3.00	0.57
Mindfulness								
Observing	12.18	3.43	14.92	2.72	11.86	3.63	11.00	4.47
Describing	22.46	7.94	23.62	5.77	24.43	4.93	23.43	4.58
Acting with awareness	25.46	5.09	24.66	2.70	26.14	6.98	24.57	6.45
Non-judgmental	16.69	4.01	16.23	3.89	18.29	4.61	18.71	3.54
Non-reactive	20.38	1.94	23.33	2.43	19.57	3.86	20.71	2.50

et al. 2012; Weare 2013). Contrary to what we expected, no significant results were found for the reappraisal strategy among MindUP children; however, this could be owing to both groups already having shown a high level in this skill at baseline.

In accordance with previous studies, children who participated in the MindUP program improved in positive emotions, which can contribute to flourishing mental health and to improving academic results (Davis and Suveg 2014; Lyubomirsky et al. 2011).

Table 8 Teachers sample—multivariate analysis of covariance between the experimental group and the control group in emotion control, self-compassion, mindfulness, and burnout

Variable	Pillai's trace	df	Error df	F	p	η_p^2	Observed power
Group	0.756	3	16	0.581	.797	.756	0.093

Table 9 Teachers sample—follow-up analysis of variance for emotional control, burnout, self-compassion and mindfulness

Variable	df	Error df	F	p	d	Observed power
Emotion control						
Reappraisal	1	18	0.573	.459	0.37	0.111
Suppression	1	18	1.688	.210	0.64	0.234
Burnout						
Emotional exhaustion	1	18	0.433	.519	0.33	0.096
Depersonalization	1	18	1.371	.257	0.58	0.199
Personal accomplishment	1	18	4.97	.039	1.10	0.560
Self-compassion						
Self-kindness	1	18	3.57	.075	0.93	0.432
Self-judgment	1	18	0.461	.506	0.34	0.099
Common humanity	1	18	0.139	.713	0.18	0.064
Mindfulness	1	18	2.044	.170	0.71	0.273
Isolation	1	18	0.217	.647	0.23	0.073
Over-identification	1	18	0.601	.448	0.38	0.114
Mindfulness						
Observing	1	18	7.17	.015	1.32	0.717
Describing	1	18	1.683	.211	0.64	0.233
Acting with awareness	1	18	0.144	.708	0.19	0.065
Non-judgmental	1	18	0.419	.526	0.32	0.094
Non-reactive	1	18	2.056	.169	0.71	0.274

With regard to mindfulness, no significant effects were observed on students who had participated in the MindUP program; therefore, our results are not in line with previous studies, although it should be noted that most of the previous studies were conducted with older students. Moreover, this may be related to the way mindfulness was evaluated as the existing measures for children are adaptations of adolescent versions and during the data collection we noticed that children had some difficulties understanding the content/meaning of the items. This fact has also been referred to by others authors (Bergomi et al. 2013).

Our study offers some encouraging results regarding the changes experienced by teachers who implemented a SEL program incorporating mindfulness practices. The results found are in consonance with previous studies on specific mindfulness interventions for teachers, showing that teachers were more capable of noticing perceptual events that are probably unnoticed by others and were able to be more supportive and caring toward themselves (Jennings 2014; Jennings et al. 2013; Roeser et al. 2013).

Despite the fact that the results in the remaining variables were not significant, the direction of the changes between pre-test and post-test are in line with the expected results for the experimental group, which was not the case for the control group. It is also possible that the relatively small sample size of the teacher sample hindered the statistical power of the tests to reveal significant results. Indeed, the analysis of effect sizes for some variables revealed effects of moderate size. Additionally, and in keeping with previous studies, our results suggest the need for the application of a specific program for teachers designed to boost the development of their socio-emotional skills and their mindfulness (Jennings et al. 2012; Weare 2014).

Globally, more than half of the children and more than two thirds of teachers who participated in the MindUP program scored above the control group mean. These results are a contribution to recent research on the potential added value of mindfulness practices to a SEL program and strengthen the importance for teachers and students, of adding a SEL program to the academic curriculum through mindfulness practices.

Limitations and future directions

Although the present study holds some promising results on the effects of mindfulness interventions for children and their benefits for the teachers who implement them, it has limitations that warrant mention.

Firstly, regarding the stability of the given changes, it is important to understand how long these changes will be sustained. Therefore, it would be important to analyze follow-up data for children and teachers.

Secondly, considering the design of the study, and in order to validate our results, it would be highly important for future research on MindUP effects to carry out an experimental study with the randomization of the groups. Additionally, future research with a larger sample of teachers is required to confirm our results. Another important aspect is that, as far as we know, there is currently no instrument for the evaluation of mindfulness that is suitable for use with children (8 years), and in this sense, it is essential for future research to construct a new scale that is developmentally tailored to children (e.g. pictorial format), which may include a qualitative dimension and interview methods (e.g., Mason and Hargreaves 2001).

Thirdly, in terms of the implementation process and further understanding of the changes found in this study, it is very important to analyze the role of the quality and fidelity of implementation and teachers' characteristics and their effects on children's outcomes (Berkel et al. 2011). Additionally, as MindUP is a comprehensive program, it would be important to investigate how the different components of the program mediate the children's outcomes, more specifically, by assessing mindfulness as a mechanism of change (Kallapiran et al. 2015). Another aspect, that was not the object of this study, is the relationship between mindfulness and social and emotional learning. It is vital to understand if and how mindfulness influences the development of socio-emotional skills

or the reverse, in order to help schools choose which kind of intervention program would best fit their needs and characteristics.

Compliance with Ethical Standards

Conflict of Interest   The authors declare that they have no conflict of interest.

Ethical Standard   All procedures performed involving human participants were conducted in accordance with the ethical standards of the Scientific and Ethical Council of the Faculty of Psychology, University of Lisbon and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent   Informed consent was obtained for all child participants (children >7 years) through written parental consent and by all the teachers involved in the study.

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