MIND, BRAIN, AND EDUCATION

An 8-week secular mindfulness-based training program for schoolteachers increases dispositional mindfulness, self-reported workplace well-being, visuoconstructive abilities, and processing speed

Luis Heredia[1,2,3], David Ventura[1], Margarita Torrente[1,2], and Paloma Vicens[1,2]

ABSTRACT— Previous research has reported that schoolteachers are an at-risk population for stress and anxiety-related psychological disorders. High stress levels have been linked to the suboptimal use of executive functions, abilities which are a major component of effective job performance in educational contexts. In the present study, 99 teachers from five primary schools in Spain were randomly assigned to a mindfulness training group or wait-list control group. All groups were assessed for dispositional mindfulness, anxiety levels, self-reported well-being, and neuropsychological performance (including attention, mental flexibility and inhibitory control, visuoconstructive abilities and visual memory, verbal fluency and processing speed) prior to and following the training program. The results showed significant differences between the groups in terms of dispositional mindfulness, workplace well-being, visuoconstructive abilities, and one of the processing speed indexes. A within-group analysis indicated a general trend toward improvement in the training group, mainly in dispositional mindfulness and verbal fluency. The assessment of neuropsychological performance in this study also contributes to expanding the existing body of knowledge on the effects of mindfulness-based programs using behavioral measures in a research field that heavily relies on self-reported measures.

[1]Department of Psychology, CRAMC (Research Center for Behavior Assessment), Rovira i Virgili University,
[2]School of Medicine, Laboratory of Toxicology and Environmental Health, Rovira i Virgili University,
[3]Faculty of Education, Universidad Internacional de la Rioja,

Address correspondence to Luis Heredia, Facultat de Ciències de l'Educació i Psicologia. Crta. de Valls, s/n. 43007 Tarragona, Spain. e-mail: luis.heredia@urv.cat

The teaching profession is characterized by a high susceptibility to stress and burnout syndrome (Zhang, Tsang, Wang, & Liu, 2022). These effects have been found to have a detrimental impact on teachers' self-reported well-being, mental health, and job satisfaction (Fathi, Greenier, & Derakhshan, 2021; Saloviita & Pakarinen, 2021). Moreover,

previous research has established a correlation between higher levels of stress in teachers and increased stress levels and diminished academic performance among students (Madigan & Kim, 2021; Oberle & Schonert-Reichl, 2016). The persistent exposure of teachers to high stress levels can negatively affect their neuropsychological performance, mainly related to various prefrontal cortex (PFC) regions. On one hand and, in a very simplified explanation, under a stressful context the amygdala activates the stress pathways in the hypothalamus and brainstem, stimulating the release of catecholamines and glucocorticoids, which affect the PFC regulation through the neuraxis (see Arnsten, 2009). On the other hand, some authors have argued that this decrease in neuropsychological performance is also related to increases in Mind Wandering (MW) as a state of mind directly related to thoughts about personal concerns or goals unrelated to the current task (Banks & Boals, 2017). In this sense, MW competes for limited executive functioning resources reducing the performance in cognitive tasks (Thompson, Besner, & Smilek, 2014). Following the rationale of this theory, we can expect to observe decreases in the different domains of executive functions (EF) such as working memory, mental flexibility, attention, or inhibition, in stressed populations. For example, high stress levels have been related to subpar performance in memory retrieval, verbal fluency and, in general, in executive functions (González-Palau & Medrano, 2022). Executive functions, understood as higher-order thinking processes such as attention span and decision-making, are critical for goal-directed behavior and, consequently, they are key abilities in achieving a satisfactory level of teacher performance in educational settings (Chou et al., 2016; Starcke, Wiesen, Trotzke, & Brand, 2016; Wolf, 2017). Thus, improving teachers' capacity to manage stress while improving their neuropsychological performance would have clear implications for both the well-being of teachers and the academic achievement of students. To our knowledge, there are no studies directly linking teachers' EF performance and their behavior in the classroom. However, we know that when a teacher identifies an educational necessity, executive functions participate in the development of a teaching plan for achieving learning goals, recurrent monitoring, and assessment of learning, as well as implementing changes in the teaching strategy if the strategy does not seem to be working, among other actions (Corriveau, Ronfard, & Cui, 2018).

Some mechanisms for coping with environmental demands can be learned and developed through psychoeducational training programs. In this regard, several studies have explored the potential effectiveness of a range of mindfulness-based programs (MBPs) of differing scopes and with differing degrees of success (Emerson et al., 2017; Kuyken et al., 2022). Previous research has found a correlation between higher levels of dispositional mindfulness, understood as an individual's inherent tendency or trait to be aware of the present moment, accept experiences without judgment, and respond with openness and non-reactivity in their everyday life, and positive outcomes for teachers, including improved relationships at work, reduced psychological strain, enhanced social-emotional competence, and increased academic success for their students. This relationship is likely influenced by a reciprocal causal interaction between teachers and students (Becker, Gallagher, & Whitaker, 2017; Janssen et al., 2022).

In this sense, some authors have suggested that the practice of mindfulness affects two stress resilience pathways in the brain: the regulatory pathway and the reactivity pathway. In the first pathway, mindfulness increases the activity and functional connectivity in the stress regulatory regions of the PFC (mainly the dorsolateral PFC). In the second pathway, it decreases the activity and functional connectivity in regions gating the brain's stress system, such as the amygdala-anterior cingulate cortex pathway (Creswell et al., 2019).

Using an adaptation of the mindfulness-based stress reduction program (MBSR) designed by Kabat-Zinn (2003), Roeser et al. (2013) reported reductions in anxiety, depression, stress levels, and burnout in a sample of 113 primary and secondary school teachers from Canada and the United States. In a meta-analysis including 18 control-trial studies, Zarate, Maggin, and Passmore (2019) concluded that MBPs for teachers significantly reduced stress, burnout, depression, and anxiety. Along the same lines, Jennings et al. (2017) found improvements in classroom interactions after implementing an MBP for elementary school teachers.

As stated above, high stress levels can affect teachers' neuropsychological performance, which can be improved by participation in MBPs. Roeser et al. (2013) found that teachers who participated in an MBP improved in the performance of a visual operation span task, a measure of focused attention and working memory capacity. Similarly, teachers taking part in a training program developed by Flook, Goldberg, Pinger, Bonus, and Davidson (2013) showed improvements in sustained attention assessed via a visual information processing task. However, other authors have failed to detect increases in the selective, sustained, or switching attention levels of healthy university students included in a mindfulness-based training program (Heredia, Gasol, Ventura, Vicens, & Torrente, 2017). Therefore, the effects of mindfulness training on attentional performance remains uncertain. The review by Lao, Kissane, and Meadows (2016) found preliminary evidence of improvements in working memory, cognitive flexibility, and meta-awareness, which are considered components of the executive functions, but

concluded that the scarcity of studies available makes it difficult to draw firm conclusions. Finally, a recent meta-analysis by Whitfield et al. (2021) including 45 studies reported a positive effect of MBPs on working memory and EF in comparison with non-active control groups. However, the authors pointed out methodological concerns about the studies reviewed as a limitation in their conclusions.

Considering the above information, the present study aimed to test the validity of an MBP as a means to improving the well-being of teachers and to expand upon previous research, which relies heavily on self-report measures, through the inclusion of behavioral measures of neuropsychological performance. Because mindfulness exercises mainly consist of specific approaches to training attention and concentration and reducing the mind-wandering state associated with stress through the development of the facets of mindfulness, a reasonable hypothesis is that the changes explored in this study occur simultaneously (training improves neuropsychological performance and reduces stress levels at the same time). Specifically, and based on the findings of previous studies, we anticipated that the training would significantly reduce anxiety levels and improve self-reported well-being and behavioral measures related to executive function, attention, mental flexibility and inhibitory control, visuoconstructive abilities and visual memory, verbal fluency and processing speed.

MATERIALS AND METHODS

Participants

Ninety-nine teachers from five primary schools took part in the study. The participating schools included four public schools and one charter school (partially funded by the Spanish government). The range of participants in each school varied from 12 to 28, and the only inclusion criterion was full-time employment. Potential subjects diagnosed with mental illness were excluded. Participants who attended fewer than 75% of the training sessions were not followed up on in the post-assessment phase (11 participants). All participants were Caucasian. The analyzed sample consisted of a wait-list control group of 44 participants (35 women and nine men) and a training group of 44 participants (41 women and three men). The mean ages of the participants in the control and experimental groups were 42.3 ± 9.53 and 39.6 ± 7.39 years, respectively.

Procedure

A randomized controlled trial (RCT) with two groups (training and wait-list) and pre- and post-training assessments was used to evaluate the effects of an eight-week secular MBP. Five primary schools participated in the study. An initial open-to-all presentation of the study was given to all teachers in each participating school with opportunities for discussion and questions. After the presentation, each school provided the researchers with a list of teachers willing to participate in the study. Once the participants were identified, they were assigned to either a training or a wait-list group within each school in order to control for the influence of external variables related to the different contexts of the schools on the study results. The participants from each school were randomly sorted and systematically assigned a condition of either 1 or 2 (alternating between 1 and 2). The experimental or control conditions were then also randomly assigned to the groups resulting from the first procedure. Pre-training assessments were conducted at each school after participant consent was obtained and before the training program started. Two or three days after the completion of the training program, post-training assessments were performed following the same procedure. The assessments of both control and experimental groups were performed at the same time point in each school.

The tests were applied in the same order in both pre-training and post-training assessments to control for the possible effect of assessment fatigue in the results. All tests were fully and voluntarily completed by the subjects. All assessments were conducted at the beginning (pre-training) and at the end (post-training) of a school term (before vacation periods) at each school. The research protocol followed the ethical principles of the World Medical Association's Declaration of Helsinki (as revised in Tokyo in 2004).

Intervention

The training program consisted of eight 2-h sessions, once a week. The size of the training groups was determined by the number of participants at each school and ranged from 6 to 14. Every training session consisted of the combination of a theoretical presentation and mindfulness practice exercises. The specific content of each session was as follows. Session 1 included a presentation of the training program, a theoretical introduction to the main concepts of mindfulness, raisin meditation, and STOP practice (stop, take a breath, observe, and proceed). Session 2 included a presentation of the meditative attitude, breathing meditation, and walking meditation. In session 3, the researchers introduced body scan and emotion meditation. Session 4 included the practice of centered meditation and the "letting go" exercise. Session 5 consisted of mindful stretching exercises and movements. In session 6, the researchers introduced self-compassion and loving-kindness meditation practices. In session 7, exercises on mindful listening and interpersonal meditation were presented. And finally, in session 8, the program closed with a review of the course content and an overview of the resources and support available for participants to continue their practice.

The researchers conducting the sessions were psychologists who had all received the same specialized training on mindfulness techniques by the Spanish Association of Mindfulness (AEMIND), and they participated in all the training sessions. Participants in the program were expected to spend 10–40 min practicing at home, 6 days per week. To this end, all participants received a CD containing audio-guided practice support for the MBP.

Measures

Mindfulness Assessment

Dispositional mindfulness was assessed using the validated Spanish version of the Five Facet Mindfulness Questionnaire (FFMQ; Aguado et al., 2015) consisting of 39 items and five subscales (observing, describing, acting with awareness, non-judging of inner experience, and non-reactivity to inner experience) with a pre-assessment Cronbach's alpha of 0.83, 0.85, 0.89, 0.92, and 0.79, respectively. The items were rated on a 5-point Likert-type scale ranging from 1 (never or rarely true) to 5 (often or always true). Higher scores in all subscales indicated greater dispositional mindfulness.

Well-being Assessment

Subjective psychological well-being was measured using the Psychological Well-being Scale (PWB; Sánchez-Cánovas, 1998) consisting of 65 items and four subscales. The PWB subscales of subjective psychological well-being, material well-being, workplace well-being, and partner well-being had pre-assessment Cronbach's alphas of 0.89, 0.90, 0.88, and 0.80, respectively. Higher scores on all subscales indicated greater subjective psychological well-being.

Anxiety Assessment

Anxiety levels were assessed using the Anxiety Situations and Responses Inventory (ASRI; Cano & Miguel, 1999) consisting of 66 items and three subscales. The three subscales of cognitive anxiety, physiological anxiety, and motor anxiety had pre-assessment Cronbach's alphas of 0.90, 0.95, and 0.89, respectively. Higher scores on all subscales were interpreted as higher anxiety levels.

Attention Assessment

The d2 Test of Attention (Brickenkamp, 1972) was used to assess both selective attention and concentration. The following indexes were calculated: total number of responses (TR), total number of hits (TA), concentration performance (TA minus errors of commission), and working accuracy (TR minus total errors).

Mental Flexibility and Inhibitory Control

The Stroop test was used to assess mental flexibility and inhibitory control (Stroop, 1935). For each participant, the total number of correct answers for each condition (P: word, C: color naming, and PC: word-color interference) was recorded. In addition, a resistance to interference index was calculated (PC – PC'), with $PC' = (C \times P)/(P + C)$ (Golden, 2007; Rivera et al., 2015). Scores in the P and C conditions are related to processing speed. Scores in the PC condition and resistance to interference index are related to mental flexibility and inhibitory control.

Visuoconstructive Abilities and Visual Memory

The Rey–Osterrieth complex figure test (Rey, 1941) was used to assess perceptual organization, visuocontructive abilities, and visuospatial memory. This test also implies executive functions as it requires the subject to plan how to best copy the complex figure. In this test, subjects had to copy a detailed drawing first and then reproduce it from memory (3 min after copying it). Approximately 20 min later, subjects drew the figure again from memory. In each stage of the test, two measures of performance were recorded: quality of copy (range of possible scores = 0–36), which reflects the accuracy of reproduction of the original figure and it is a measure of visuoconstructive abilities, and the amount of time taken in the reproduction process.

Verbal Fluency

The categorical evocation and verbal fluency subtests of the Revised Barcelona Test (Peña-Casanova, 2005) were used to assess the verbal fluency variable. The test is divided into two parts: the semantic verbal fluency test (SVF), which requires the participant to name as many animals as they can within 1 min, and the verbal phonological fluency test (VPF), which requires the participant to produce as many words as they can beginning with the letter "p" within 1 min. These two tests involve EF, which means they require participants to put the processes underlying vocabulary development (semantic-lexical memory) into operation (García et al., 2012). The total number of correct answers (correct name of an animal or real word that starts with P) was recorded for both parts of the test.

Processing Speed

In this study, the processing speed variable was assessed using scores achieved in the following parameters: amount of time taken for the reproduction process in the Rey–Osterrieth test, number of total responses in the d2 test, and the scores in both the P and C conditions of the Stroop test.

Data Analyses

IBM SPSS© v25.0 (IBM Corporation, New York, USA) statistics software was used to analyze the results. Homogeneity of variance was analyzed using a Levene test, and differences between groups in the pre-training assessment were analyzed by means of multiple one-tailed *t*-tests. Because of the high variability between groups observed in the study, probably because of intrinsic variability between schools, the differences between groups in the post-training assessment were analyzed by multiple ANCOVA, with the scores obtained in the previous assessment defined as covariables. ANCOVA-POST has been proposed as the most effective method to analyze treatment effects compared to ANOVA and general linear models (O'Connell et al., 2017). Because we were also interested in detecting any changes in each variable over time, the intragroup differences between pre- and post-training assessments were analyzed using multiple one-tailed paired *t*-tests. To correct for type I errors due to multiple pairwise contrasts, *p*-values were adjusted using the Holm–Bonferroni correction (Holm, 1979).

Cohen's d and η_p^2 were used as measures of the effect sizes. In keeping with the proposal by Cohen, Cohen, West, and Aiken (2003), *d* values lower than 0.3 were considered negligible, values between 0.3 and 0.5 were considered small effects, values between 0.5 and 0.8 were medium effects, and those greater than 0.8 were considered large effects. Significance for all tests was set at $p < .05$. The η_p^2 values above 0.02 were considered small effects, those above 0.13 were considered medium effects, and those above 0.24 were considered large effects. The materials and analysis codes for this study will be provided by the corresponding author upon request.

RESULTS

Intergroup comparisons revealed no differences in gender representation ($\chi^2[1, N = 87] = 3.42$, $p = .056$), self-reported initial stress levels ($\chi^2[1, N = 87] = 0.02$, $p = .901$), previous experience in meditation practices ($\chi^2[1, N = 87] = 1.54$, $p = .215$), or daily sports practice ($\chi^2[1, N = 87] = 1.97$, $p = .160$). Comparisons of the pre-training measures did not show any significant differences between the wait-list and the training group for any of the outcomes included in the study. Moreover, no significant differences between male and female groups were observed in the baseline of any of the outcomes assessed in the study. Therefore, males and females were not divided into subgroups for the analyses.

The multiple ANCOVA performed on the post-training results revealed significant differences between groups in various measures. In the FFMQ, the trained group reported higher levels for the observing ($F[1,84] = 20.52$, $p = .000$, $\eta_p^2 = 0.196$) and non-reacting ($F[1,84] = 6.54$, $p = .012$, $\eta^2 = 0.072$) subscales than the control group, suggesting an increase in some facets of dispositional mindfulness. The trained group also had higher levels on the workplace well-being scale ($F[1,84] = 5.382$, $p = .023$, $\eta_p^2 = 0.060$) than the control group and higher levels for quality of copy than the control group ($F[1,84] = 7.965$, $p = .006$, $\eta_p^2 = 0.087$) on the Rey–Osterrieth complex figure test, the part of the test related to visuoconstructive abilities.

In the Stroop test, the trained group obtained more hits in processing speed (P part) ($F[1,84] = 10.74$, $p = .002$, $\eta_p^2 = 0.113$) than the control group. No significant differences were found in the other measures (see Tables 1 and 2).

Table 3 shows the results obtained in the baseline and post-training psychological assessment for both the control

Table 1
Results Obtained in the ANCOVA Analyses of Psychological Outcomes

	SS	df	*MS*	F	p*	η_p^2
Five facets mindfulness questionnaire						
Observe	372.022	1	372.022	20.527	**<.001**	**0.196**
Describe	50.117	1	50.117	3.632	.060	0.041
Act with awareness	51.906	1	51.906	2.140	.147	0.025
Non-Judge	0.019	1	0.019	0.001	.976	0.000
Non-React	69.616	1	69.616	6.545	**.012**	**0.072**
Psychological well-being scale						
Subjective well-being	35.809	1	35.809	0.554	.459	0.007
Material well-being	7.321	1	7.321	0.545	.462	0.006
Workplace well-being	28.237	1	28.237	5.382	**.023**	**0.060**
Partner well-being	3.031	1	3.031	0.117	.733	0.001
Situations and responses of anxiety inventory						
Cognitive anxiety	521.612	1	521.612	2.021	.159	0.023
Physiological anxiety	176.777	1	176.777	1.067	.305	0.13
Motor anxiety	143.271	1	143.271	0.688	.409	0.008

Note: *$P < 0.5$ (in bold).
MS = mean square; SS = sum of squares.

Table 2
Results Obtained in the ANCOVA Analyses of Neuropsychological Outcomes

	SS	df	*MS*	F	p*	η_p^2
Rey–Osterrieth complex figure						
Quality of copy	31.415	1	31.415	7.965	**.006**	**0.087**
Time taken	223.749	1	223.749	0.088	.767	0.001
Quality of copy 3'	0.539	1	0.539	0.037	.847	0.000
Quality of copy 20'	3.428	1	3.428	0.263	.609	0.003
Stroop test						
Correct answers (P)	1,143.989	1	1,143.989	10.747	**.002**	**0.113**
Correct answers (C)	57.599	1	57.599	1.560	.215	0.018
Correct answers (PC)	123.077	1	123.077	3.789	.055	0.043
Resistance to interference (PC-PC')	15.862	1	15.862	0.505	.479	0.006
Attention test D2						
Total number of responses	1,089.249	1	1,089.249	0.525	.471	0.007
Total number of hits	1,195.592	1	1,195.592	2.251	.137	0.027
Concentration	1,167.155	1	1,167.155	2.077	.153	0.025
Working accuracy	2,481.041	1	2,481.041	1.271	.263	0.016
Categorical evocation and verbal fluency subtest						
Correct answers (animals)	70.469	1	70.469	3.508	.065	0.040
Correct answers (letter "p")	22.525	1	22.525	1.427	.236	0.017

Note: *$P < 0.5$ (in bold).
MS = mean square; SS = sum of squares.

Table 3
Baseline and Post-Training Measures of Psychological Assessment for Control and Trained Groups

	Control group			*Trained group*		
	Baseline	*Post*	*d*	*Baseline*	*Post*	*d*
Five facets mindfulness questionnaire						
Observe	24.581 ± 5.025	**22.860 ± 5.906***	**−0.31**	25.423 ± 4.971	**27.500 ± 4.240***	**0.45**
Describe	28.093 ± 6.059	28.847 ± 5.981	0.12	29.945 ± 6.563	**31.773 ± 6.042***	**0.29**
Act with awareness	28.651 ± 6.388	28.558 ± 7.443	−0.01	27.347 ± 6.246	**29.223 ± 5.467***	**0.32**
Non-Judge	30.581 ± 5.270	32.542 ± 5.772	0.35	28.796 ± 7.419	**31.477 ± 5.994***	**0.40**
Non-React	21.279 ± 3.705	21.571 ± 3.952	0.07	21.969 ± 4.892	**23.750 ± 4.132***	**0.39**
Psychological well-being scale						
Subjective well-being	115.221 ± 15.093	118.070 ± 14.835	0.19	115.750 ± 12.964	**119.750 ± 11.449***	**0.33**
Material well-being	40.828 ± 6.727	41.419 ± 5.873	0.09	41.682 ± 6.386	42.568 ± 5.492	0.15
Workplace well-being	42.791 ± 3.883	42.558 ± 3.521	−0.06	43.793 ± 3.737	44.409 ± 3.493	0.17
Partner well-being	60.445 ± 10.193	62.524 ± 10.106	0.20	61.243 ± 8.939	62.809 ± 8.788	0.18
Situations and responses of anxiety inventory						
Cognitive anxiety	69.535 ± 35.968	**58.529 ± 34.308***	**−0.31**	71.756 ± 36.458	**55.395 ± 31.516***	**−0.48**
Physiological anxiety	31.908 ± 24.609	29.035 ± 27.883	−0.11	35.968 ± 29.539	**29.581 ± 24.390***	**−0.24**
Motor anxiety	28.907 ± 19.780	26.078 ± 21.884	−0.14	38.199 ± 32.815	**31.383 ± 31.561***	**−0.21**

Notes: Data are expressed as means ± SD. *$P < 0.5$ (in bold).
*$p < .05$ versus baseline assessment.

Table 4
Baseline and Post-Training Measures of Neuropsychological Assessment for Control and Trained Groups

	Control group			*Trained group*		
	Baseline	*Post*	*d*	*Baseline*	*Post*	*d*
Rey–Osterrieth complex figure						
Quality of copy	34.093 ± 2.080	**32.674 ± 1.961***	**−0.70**	33.795 ± 1.812	33.773 ± 2.219	−0.01
Time taken	122.047 ± 47.456	106.744 ± 62.497	−0.27	135.682 ± 69.436	**116.159 ± 50.753***	**−0.32**
Quality of copy 3′	20.047 ± 5.622	**25.000 ± 5.402***	**0.90**	19.432 ± 4.720	**24.784 ± 4.399***	**1.17**
Quality of copy 20′	20.023 ± 5.597	**24.674 ± 5.065***	**0.87**	19.648 ± 4.394	**24.841 ± 4.385***	**1.18**
Stroop test						
Correct answers (P)	107.070 ± 16.627	109.954 ± 14.588	0.18	105.546 ± 21.216	**116.250 ± 16.943***	**0.56**
Correct answers (C)	71.651 ± 10.596	**75.721 ± 10.861***	**0.38**	74.795 ± 12.860	**80.114 ± 12.937***	**0.41**
Correct answers (PC)	47.279 ± 9.555	48.767 ± 10.472	0.15	50.000 ± 10.430	**53.591 ± 10.641***	**0.34**
Resistance to Interference (PC-PC′)	4.531 ± 7.361	4.114 ± 7.959	−0.05	6.493 ± 7.285	6.300 ± 6.909	−0.03
Attention test D2						
Total number of responses	469.268 ± 70.066	**511.463 ± 67.492***	**0.61**	454.667 ± 77.982	**507.571 ± 77.278***	**0.68**
Total number of hits	176.488 ± 33.193	**197.317 ± 33.679***	**0.56**	167.119 ± 40.190	**197.952 ± 37.941***	**0.79**
Concentration	175.756 ± 33.522	**196.829 ± 33.628***	**0.62**	166.285 ± 41.115	**197.523 ± 38.189***	**0.78**
Working accuracy	428.500 ± 79.454	**487.881 ± 38.189***	**0.76**	446.902 ± 69.461	**490.414 ± 65.376***	**0.64**
Categorical evocation and verbal fluency Subtest						
Correct answers (animals)	24.465 ± 5.054	24.953 ± 5.341	0.09	24.068 ± 4.929	**26.523 ± 5.316***	**0.48**
Correct answers (letter "p")	16.814 ± 4.441	17.907 ± 4.674	0.24	17.841 ± 4.029	**19.500 ± 4.511***	**0.39**

Notes: Data are expressed as means ± SD. *$P < 0.5$ (in bold).
*$p < .05$ versus baseline assessment.

and the trained group. The results of the analyses comparing pre- and post-training measures indicated differential effects depending on the group. The trained group exhibited increases in observing ($t[43] = 2.499$, $p = .016$, $d = 0.45$), describing (t[43] = 3.098, $p = .003$, $d = 0.29$), acting with awareness (t[43] = 2.707, $p = .10$, $d = 0.32$), non-judging of inner experience (t[43] = 3.341, $p = .002$, $d = 0.40$), and non-reactivity to inner experience (t[43] = 2.737, $p = .009$, $d = 0.39$). Meanwhile the control group reported a reduction only in the observing subscale ($t[42] = 3.014$, $p = .004$, $d = 0.31$). Thus, we found a tendency toward increased dispositional mindfulness in the trained group that we did not observe in the control group.

The training group reported higher levels of subjective psychological well-being ($t[43] = 3.199$, $p = .003$, $d = 0.33$) after the training program than before it, while the control group showed no significant difference in self-reported well-being. In addition, the trained group reported reduced cognitive anxiety (t[43] = 5.342, $p < 0.001$, $d = 0.48$), physiological anxiety (t[43] = 3.087, $p = .004$, $d = 0.24$), and motor anxiety (t[43] = 3.186, $p = .003$, $d = 0.21$) after training, while the control group only reported reductions in cognitive anxiety (t[42] = 5.037, $p < .001$, $d = 0.31$). Summarizing the results obtained in these tests, the trained group showed a tendency toward increased self-reported well-being and also reduced anxiety levels. These tendencies were not observed in the control group.

Table 4 shows the results obtained in the baseline and post-training neuropsychological assessments for both the control and the trained group. The results of the Rey–Osterrieth complex figure test show that the control group performed worse on the copy task ($t[42] = 4.175$, $p < .001$, $d = 0.70$), although the amount of time spent on it remained unchanged. The trained group, on the other hand, spent less time on the task ($t[43] = 2.876$, $p = .006$, $d = 0.32$), but the quality of the copy score did not improve or worsen over baseline. Both groups had better recall at 3 and 20 min (control group: $t[42] = 7.206$, $p < .001$, $d = 0.90$, and $t[42] = 7.368$, $p < .001$, $d = 0.87$; trained group: t[43] = 8.729, $p < .001$, $d = 1.17$ and t[43] = 8.583, $p < .001$, $d = 1.18$).

The processing speed and mental flexibility of the trained group showed improvements in some of the measures of the Stroop test. Specifically, the performance of the trained group improved in the three conditions of the test: processing speed (parts P and C; $t[43] = 5.171$, $p < .001$, $d = 0.56$ and $t[43] = 5.399$, $p < .001$, $d = 0.41$) and mental flexibility/inhibitory control (PC condition; $t[43] = 4.003$, $p < .001$, $d = 0.34$). The control group only performed better in condition C compared to the previous assessment ($t[42] = 4.541$, $p < .001$, $d = 0.38$).

In the d2 attention test, the scores of both the experimental and the control group increased in all of the measures recorded: total number of responses (control group: $t[40] = 6.326$, $p < .001$, $d = 0.61$; trained group: $t[41] = 6.4$, $p < .001$, $d = 0.68$), number of hits (control

group: $t[40] = 7.446$, $p < .001$, $d = 0.56$; trained group: $t[41] = 6.688$, $p < .001$, $d = 0.79$), concentration (control group: $t[40] = 7.415$, $p < .001$, $d = 0.62$; trained group: $t[41] = 6.453$, $p < .001$, $d = 0.78$) and working accuracy (control group: $t[40] = 7.009$, $p < .001$, $d = 0.76$; trained group: $t[41] = 6.966$, $p < .001$, $d = 0.64$). These results may be related to the practice effect in both groups. Finally, the trained group also obtained higher scores during the post-training assessment for the number of hits in the semantic fluency test ($t[43] = 3.745$, $p < .001$, $d = 0.48$) and the phonological fluency test ($t[43] = 2.536$, $p = .015$, $d = 0.39$). The control group's scores for verbal fluency remained unchanged in the post-training assessment. Therefore, we observed a tendency toward improved levels of verbal fluency in the trained group.

DISCUSSION

This paper aimed to expand upon existing research on the effectiveness of MBPs for teachers, which typically relies heavily on self-reported measures. The training program partially succeeded in increasing the dispositional mindfulness of the participants. This increase was one of the strongest effects observed after the implementation of the training program based on mindfulness practices and it is consistent with that found in previous studies (Beuchel, Ophoff, Cramer, & Hautzinger, 2022; Roeser et al., 2013; Song & Lindquist, 2015). However, there is a lack of consensus among the studies in this field regarding the specific subscales affected by the training process. Studies have variously reported increases in the describing scale (Flook et al., 2013), the observing and non-judging scales (Frank, Reibel, Broderick, Cantrell, & Metz, 2015; Heredia et al., 2017), the acting with awareness scale (Asuero et al., 2014), and the observing, acting with awareness, non-judging, and non-reacting scales (Beuchel et al., 2022). Participants in the present study self-reported increases in the observing and non-reacting scales. The inconsistent results reported in previous studies may be related to the content of each training program and the time taken to practice and develop each of the facets based on the main goal of the intervention. It has been suggested that these differences in content and focus may selectively modify the results obtained in the scale dimensions (Quaglia, Braun, Freeman, McDaniel, & Brown, 2016).

Self-reported well-being has been associated with the development of the facets of mindfulness in previous studies, regardless of the meditative experience of the participants (Hanley, Warner, & Garland, 2015; Nell, 2016), although some reviews have indicated that most of these studies were not RCTs and were of low experimental quality (Lomas, Medina, Ivtzan, Rupprecht, & Eiroa-Orosa, 2017, 2018). We found an increase in self-reported levels of workplace well-being, but no changes in the other test scales (subjective well-being, material well-being, and partner well-being). This effect may be related to improved social relations between the teachers in the experimental group, as MBPs also help build a secure space of exchange and recognition among participants. The absence of improvement found in other well-being scales could be related to the conceptualization of well-being in the development of the questionnaires used to assess this variable or to the lack of improvement reported in the subscales of the FFMQ that have been related to self-reported well-being.

A deep discussion about the definition of subjective well-being goes beyond the scope of this study, but it can be assumed that psychological well-being is conceptualized primarily in two ways: from a hedonic or a eudemonic perspective (for a review see Huta, 2016). Hedonism is associated with increased personal satisfaction and pleasant emotions and reduced negative emotional states, while eudaimonism is related to personal growth, life purpose, and a particular way of being in which the individual does not avoid unpleasant emotions. Some authors have argued that mindfulness practices are more closely linked to emotional regulation processes based on eudemonic rather than hedonic perspectives (Garland, Farb, Goldin, & Fredrickson, 2015; Verhaeghen, 2021). Indeed, a review of the literature reveals that studies using the PANAS or WHO-5 questionnaires, which are more related to the hedonic perspective (Delle, Massimini, & Bassi, 2011; Kusier & Folker, 2020), do not report changes in self-reported well-being (Bonde, Fjorback, Frydenberg, & Juul, 2022; Jennings, Frank, Snowberg, Coccia, & Greenberg, 2013), whereas those using the Ryff's psychological well-being questionnaire (Waterman et al., 2010) based on the eudemonic perspective report an increase in participants' self-reported well-being (Jenaabadi, Pilechi, Salmabadi, & Tayarani Rad, 2017; Qazinezam, Momtazi, & Yaghubi, 2014). In our study, we only observed an increase in the perception of workplace well-being in the mindfulness-trained group compared to the control group using the PWB scale. The items of this questionnaire are more related to happiness and positive emotional states, therefore considering psychological well-being from a hedonic perspective. To corroborate our hypothesis, in future studies, it may be worthwhile to assess the effects of different MBPs on self-reported well-being considering the specific questionnaires used. Another possible explanation for these findings may be related to the lack of improvements observed for some of the subscales of the FFMQ after the implementation of the MBP. Baer et al. (2008) reported that describing, non-judging, and non-reacting are related to self-reported well-being, but observing is not. Our participants reported improvements only in the non-reacting subscale. However, there is a common consensus that MBPs generally have

a positive impact on the self-reported well-being of participants, and a recent meta-analysis by Phan et al. (2022) presented compelling evidence to support that notion.

Another effect widely reported in the research on mindfulness training programs is the reduction of participants' anxiety levels compared to subjects in wait-list control groups (Lomas et al., 2017; McConville, McAleer, & Hahne, 2017; Song & Lindquist, 2015), though studies using active control groups have reported conflicting results (Britton et al., 2014; Halladay et al., 2019). We therefore expected to observe such a reduction after the implementation of the MBP. However, no differences between groups at post-training assessment were observed. Thus, we cannot conclude that MBP did not affect this variable. Considering the above, the subjects in the mindfulness-trained group reported reduced cognitive, physiological, and motor anxiety levels after the training when compared to levels recorded in the pre-training assessment. This change was not reported in control group. Bearing this in mind, we hypothesize that this is an effect related to other contextual variables, not the MBP, that may modify the teachers' self-reported anxiety (e.g., workload during the assessment period). In this study, the post-assessments were conducted before vacation periods in all participating schools, which may be a possible explanation for the reduced cognitive anxiety levels reported also in the control group. Thus, the assessment period chosen may be a critical variable affecting participants' anxiety levels and is therefore a factor that should be considered in future research. In this sense, when various schools are sequentially recruited, it is important to maintain the same assessment periods in all the schools. The use of control groups with unequal representation in each trained group assessed in each school could lead to less robust conclusions.

With regard to neuropsychological outcomes, attentional focus is an important component of mindfulness practice, and we expected to observe an increase in participants' attentional skills after the MBP. Previous studies have reported differing results depending on the type of attention assessed. For instance, MacCoon, MacLean, Davidson, Saron, and Lutz (2014) and Rodriguez-Vega et al. (2014) found no significant differences in sustained attention in studies using both passive and active control groups, and Baccarani (2013) and Jensen, Vangkilde, Frokjaer, and Hasselbalch (2012) reported improvements in selective attention but not in sustained or divided attention. In our study, levels of selective attention did not improve as assessed by the d2 test. However, there were significant differences between groups in copy quality of the Rey–Osterriech complex figure test in the post-training assessment. The within-group analyses indicated a significant reduction in this variable for the control group, while the trained group showed a flat trend. Thus, a possible explanation is that MBPs helped to maintain performance against external variables. Some authors have related this part of the Rey test to both attention and concentration (Shin, Park, Park, Seol, & Kwon, 2006). Thus, this result could indicate a possible improvement in attention and concentration in the trained participants. Despite these results, improvements in attention attributable to participation MBPs remain unclear at present. Authors such as Jha, Krompinger, and Baime (2007) have argued that improvements in attention skills require long, intensive interventions. However, a review by Lao et al. (2016) indicated that most studies on MBPs do not find improvements in attention skills, and Di Francesco et al. (2017) concluded that higher dispositional mindfulness is not related to increases in attention efficiency. Finally, it is important to note that no improvements in attention were detected in a recent meta-analysis by Whitfield et al. (2021), which included 56 studies.

Verbal fluency was another neuropsychological outcome assessed in the present study. Zeidan, Johnson, Diamond, David, and Goolkasian (2010) and Lassander et al. (2020) observed increases in the semantic and phonologic fluency of participants after the implementation of an MBP. In our study, there were no significant differences in the post-training assessment of either group. Therefore, we were unable to confirm the improvements that have been reported in previous studies.

No changes were observed in inhibitory control; however, improvements in this variable have been reported in previous studies that used a passive control group (Rodriguez-Vega et al., 2014) but not in those with active control groups (Basso, McHale, Ende, Oberlin, & Suzuki, 2019; Bhayee et al., 2016). Therefore, it is difficult to conclude that MBPs are the cause of this effect. Finally, the results indicated a possible increase in processing speed (one of the indexes assessed which showed an increase) but not in cognitive flexibility in trained participants compared to non-trained subjects in the post-training assessment. These results agree with previous studies reporting increases in processing speed regardless of the duration or theoretical content of the program (Adhikari, Kothari, & Khadka, 2018; Basso et al., 2019; Bhayee et al., 2016). This is important because more practice time seems to be necessary to obtain improvements in attention, and therefore the duration of the program may be an important variable depending on the effects to be assessed. Some authors have suggested that increased attention is related to anchorage practice based on gently redirecting one's attention back to continuous breathing (Müller, Gerasimova, & Ritter, 2016).

In summary, there is ample evidence in previous literature regarding the effects of MBPs on anxiety levels and subjective well-being, which have been linked to student outcomes (see Deer, 2023 for a review). However, knowledge

about their effects on cognitive performance is limited. The present study included a variety of measures related to cognitive functioning, and the results indicated that MBPs can also influence some of these domains, such as visuoconstructive abilities and processing speed, probably through the two stress resilience pathways modified, mostly the regulatory pathway improving functional connectivity and increasing processing speed. In a similar way, a better performance in a complex visuoconstructive ability task could be explained by decreased activation of the MW leading to a release in the executive functioning resources that can be used for other executive tasks as planning. Since executive processes have been proposed as a mediator in the effectiveness of teacher behavior (Barraza & Rodríguez, 2023; Davis-Unger & Carlson, 2008), MBPs may be a useful strategy for improving teaching-learning processes in school settings.

CONCLUSIONS

Considering our results as a whole, the mindfulness-based training program implemented in this study increased participants' levels of observation, workplace well-being, processing speed, and visuoconstructive ability. The MBP did not affect their self-reported anxiety levels, attention, inhibitory control/mental flexibility, or verbal fluency. Moreover, the trained group showed a general trend toward improved anxiety levels, visual memory, and verbal fluency. However, this general tendency cannot be assumed as an effect of the mindfulness training.

Limitations and Future Research

It is important to note that the sample included in this study was a nonclinical population with an overrepresentation of women; thus, the results should not be generalized to the male population. Moreover, 11 of the participants in the study did not attend 75% of the training sessions and were therefore not followed up with post-assessments. This constitutes a dropout rate of 11%, which should be considered in the design of future studies. For future research, the inclusion of a control group for each school might lead to more robust conclusions by avoiding biases related to the particularities of each educational context and mitigate the practice effect in some of the tests. Moreover, the assessment period of all the groups in each school should be considered a confounding variable that can affect the results of MBP studies, as high workload periods can influence teachers' anxiety or stress levels. This effect was substantiated in our study by the improvements observed in both the control and trained group. Another important limitation was the absence of an active control group in the experimental design. In future studies, it will be necessary to include active control groups to draw stronger conclusions about the effects of MBPs. Finally, despite the consensus about the improvements resulting from MBPs using self-reported measures, more studies including behavioral measures are needed in order to draw stronger conclusions in this field of research.

FUNDING INFORMATION

Support for this study was provided by the Universities and Research Secretariat of the Department of Economy and Knowledge of the Government of Catalonia.

CONFLICT OF INTEREST STATEMENT

The authors declare that they have no conflict of interest.

ETHICS STATEMENT

Approval was obtained from Clinical Research Ethics Committee of the Pere Virgili Health Research Institute (IISPV) (reference number: 15-01-29/1proj1). The procedures used in this study adhere to the tenets of the Declaration of Helsinki. Informed consent was obtained from all individual participants included in the study.

REFERENCES

Adhikari, K., Kothari, F., & Khadka, A. (2018). The effect of short-term training of vipassana's body-scan on select cognitive functions. *Psychological Studies*, *63*(3), 228–235.

Aguado, J., Luciano, J. V., Cebolla, A., Serrano-Blanco, A., Soler, J., & García-Campayo, J. (2015). Bifactor analysis and construct validity of the five facet mindfulness questionnaire (FFMQ) in non-clinical Spanish samples. *Frontiers in Psychology*, *6*, 404.

Arnsten, A. F. T. (2009). Stress signalling pathways that impair prefrontal cortex structure and function. *Nature Reviews Neuroscience*, *10*(6), 410–422.

Asuero, A. M., Queralto, J. M., Pujol-Ribera, E., Berenguera, A., Rodriguez-Blanco, T., & Epstein, R. M. (2014). Effectiveness of a mindfulness education program in primary health care professionals: A pragmatic controlled trial. *Journal of Continuing Education in the Health Professions*, *34*(1), 4–12.

Baccarani, C. (2013). Zen and well-being at the workplace. *The TQM Journal*, *25*(6), 606–624.

Baer, R. A., Smith, G. T., Lykins, E., Button, D., Krietemeyer, J., Sauer, S., … Williams, J. M. (2008). Construct validity of the five facet mindfulness questionnaire in meditating and nonmeditating samples. *Assessment*, *15*(3), 329–342.

Banks, J. B., & Boals, A. (2017). Understanding the role of mind wandering in stress-related working memory impairments. *Cognition and Emotion*, *31*, 1023–1030.

Barraza, P., & Rodríguez, E. (2023). Executive functions and theory of mind in teachers and non-teachers. *Heliyon*, *9*(9), e19915.

Basso, J. C., McHale, A., Ende, V., Oberlin, D. J., & Suzuki, W. A. (2019). Brief, daily meditation enhances attention, memory, mood, and emotional regulation in non-experienced meditators. *Behavioural Brain Research*, *356*, 208–220.

Becker, B. D., Gallagher, K. C., & Whitaker, R. C. (2017). Teachers' dispositional mindfulness and the quality of their relationships with children in head start classrooms. *Journal of School Psychology*, *65*, 40–53.

Beuchel, P., Ophoff, J. G., Cramer, C., & Hautzinger, M. (2022). Promoting occupational health and teaching quality: The impact of a mindfulness intervention inteacher training. *Teaching and Teacher Education*, *114*, 103703.

Bhayee, S., Tomaszewski, P., Lee, D. H., Moffat, G., Pino, L., Moreno, S., & Farb, N. A. (2016). Attentional and affective consequences of technology supported mindfulness training: A randomised, active control, efficacy trial. *BMC Psychology*, *4*(1), 60.

Bonde, E. H., Fjorback, L. O., Frydenberg, M., & Juul, L. (2022). The effectiveness of mindfulness-based stress reduction for school teachers: A cluster-randomized controlled trial. *European Journal of Public Health*, *32*(2), 246–253.

Brickenkamp, R. (1972) *d2-test*. Göttingen: Hogrefe.

Britton, W. B., Lepp, N. E., Niles, H. F., Rocha, T., Fisher, N. E., & Gold, J. S. (2014). A randomized controlled pilot trial of classroom-based mindfulness meditation compared to an active control condition in sixth-grade children. *Journal of School Psychology*, *52*(3), 263–278.

Cano, A., & Miguel, J. J. (1999). Evaluation of anxiety from an interactive and multidimensional focus: The inventory of situations and responses of anxiety (ISRA). *Psicología Contemporánea*, *6*, 14–21.

Chou, P. H., Lin, W. H., Hung, C. A., Chang, C. C., Li, W. R., Lan, T. H., & Huang, M. W. (2016). Perceived occupational stress is associated with decreased cortical activity of the prefrontal cortex: A multichannel near-infrared spectroscopy study. *Scientific Reports*, *6*, 39089.

Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2003) *Applied multiple regression/correlation analysis for the behavioral sciences*. (3rd ed.). Mahwah: Lawrence Erlbaum Associates Publishers.

Corriveau, K. H., Ronfard, S., & Cui, Y. K. (2018). Cognitive mechanisms associated with children's selective teaching. *Review of Philosophy and Psychology*, *9*, 831–848.

Creswell, J. D., Lindsay, E. K., Villalba, D. K., & Chin, B. (2019). Mindfulness Training and Physical Health: Mechanisms and Outcomes. *Psychosomatic medicine*, *81*(3), 224–232.

Davis-Unger, A. C., & Carlson, S. M. (2008). Children's teaching skills: The role of theory of mind and executive function. *Mind, Brain, and Education*, *2*(3), 128–135.

Deer, B. (2023). On the outcomes of teacher wellbeing: A systematic review of research. *Frontiers in Psychology*, *14*, 1205179.

Delle, F. A., Massimini, F., & Bassi, M. (2011). Hedonism and Eudaimonism in positive psychology. In *Psychological selection and optimal experience across cultures. Cross-cultural advancements in positive psychology*. (Vol. *2*, pp. 3–18). Dordrecht: Springer.

di Francesco, S. A., Simione, L., López-Ramón, M. F., Belardinelli, M. O., Lupiáñez, J., & Raffone, A. (2017). Dispositional mindfulness facets predict the efficiency of attentional networks. *Mindfulness*, *8*(1), 101–109.

Emerson, L.-M., Leyland, A., Hudson, K., Rowse, G., Hanley, P., & Hugh-Jones, S. (2017). Teaching mindfulness to teachers: A systematic review and narrative synthesis. *Mindfulness*, *8*(5), 1136–1149.

Fathi, J., Greenier, V., & Derakhshan, A. (2021). Self-efficacy, reflection, and burnout among Iranian EFL teachers: The mediating role of emotion regulation. *Iranian Journal Language Teaching Research*, *9*, 13–37.

Flook, L., Goldberg, S. B., Pinger, L., Bonus, K., & Davidson, R. J. (2013). Mindfulness for teachers: A pilot study to assess effects on stress, burnout and teaching efficacy. *Mind, Brain, and Education*, *7*(3), 182–195.

Frank, J. L., Reibel, D., Broderick, P., Cantrell, T., & Metz, S. (2015). The effectiveness of mindfulness-based stress reduction on educator stress and well-being: Results from a pilot study. *Mindfulness*, *6*(2), 208–216.

García, E., Rodríguez, C., Martín, R., Jiménez, J. E., Hernández, S., & Díaz, A. (2012). Test de Fluidez Verbal: datos normativos y desarrollo evolutivo en el alumnado de primaria. *European Journal of Education and Psychology*, *5*(1), 53–64.

Garland, E. L., Farb, N. A., Goldin, P. R., & Fredrickson, B. L. (2015). Mindfulness broadens awareness and builds eudemonic meaning: A process model of mindful positive emotion regulation. *Psychological Inquiry*, *26*(4), 293–314.

Golden, C. J. (2007) *Stroop test de colores y palabras, manual*. (5th ed.). Madrid: TEA Ediciones.

González-Palau, F., & Medrano, L. A. (2022). A mini-review of work stress and mindfulness: A neuropsychological point of view. *Frontiers in Psychology*, *13*, 854204.

Halladay, J. E., Dawdy, J. L., McNamara, I. F., Chen, A. J., Vitoroulis, I., McInnes, N., & Munn, C. (2019). Mindfulness for the mental health and well-being of post-secondary students: A systematic review and meta-analysis. *Mindfulness*, *10*(3), 397–414.

Hanley, A., Warner, A., & Garland, E. L. (2015). Associations between mindfulness, psychological well-being, and subjective well-being with respect to contemplative practice. *Journal of Happiness Studies*, *16*(6), 1423–1436.

Heredia, L., Gasol, L., Ventura, D., Vicens, P., & Torrente, M. (2017). Mindfulness-based stress reduction training program increases psychological well-being, and emotional regulation, but not attentional performance. A pilot study. *Mindfulness & Compassion*, *2*(2), 130–137.

Holm, S. (1979). A simple sequentially rejective multiple test procedure. *Scandinavian Journal of Statistics*, *6*(2), 65–70.

Huta, V. (2016). Eudaimonic and hedonic orientations: Theoretical considerations and research findings. In J. Vittersø (Ed.), *Handbook of Eudaimonic well-being. International Handbooks of Quality-of-Life*. Cham: Springer.

Janssen, M., Heerkens, Y., van der Heijden, B., Korzilius, H., Peters, P., & Engels, J. (2022). Effects of mindfulness-based stress reduction and an organizational health intervention on Dutch teachers' mental health. *Health Promotion International*, *38*(3), 1–15.

Jenaabadi, H., Pilechi, L., Salmabadi, M., & Tayarani Rad, A. (2017). The effectiveness of training mindfulness skills in professional stress and psychological well-being of female teachers. *Iran Occupational Health Journal*, *13*(6), 58–69.

Jennings, P. A., Brown, J. L., Frank, J. L., Doyle, S., Oh, Y., … Greenberg, R. (2017). Impacts of the CARE for teachers program on teachers' social and emotional competence and classroom interactions. *Journal of Educational Psychology*, *109*, 1–19.

Jennings, P. A., Frank, J. L., Snowberg, K. E., Coccia, M. A., & Greenberg, M. T. (2013). Improving classroom learning environments by cultivating awareness and resilience in education

(CARE): Results of a randomized controlled trial. *School Psychology Quarterly*, *28*(4), 374–390.

Jensen, C. G., Vangkilde, S., Frokjaer, V., & Hasselbalch, S. G. (2012). Mindfulness training affects attention—Or is it attentional effort? *Journal of Experimental Psychology. General*, *141*(1), 106–123.

Jha, A. P., Krompinger, J., & Baime, M. J. (2007). Mindfulness training modifies subsystems of attention. *Cognitive, Affective, & Behavioral Neuroscience*, *7*(2), 109–119.

Kabat-Zinn, J. (2003). Mindfulness-based stress reduction (MBSR). *Constructivism in the Human Sciences*, *8*(2), 73–83.

Kusier, A. O., & Folker, A. P. (2020). The well-being index WHO-5: Hedonistic foundation and practical limitations. *Medical Humanities*, *46*(3), 333–339.

Kuyken, W., Ball, S., Crane, C., Ganguli, P., Jones, B., Montero-Marin, J., … Williams, J. M. G. (2022). Effectiveness of universal school-based mindfulness training compared with normal school provision on teacher mental health and school climate: Results of the MYRIAD cluster randomised controlled trial. *Evidence-Based Mental Health*, *25*(3), 125–134.

Lao, S.-A., Kissane, D., & Meadows, G. (2016). Cognitive effects of MBSR/MBCT: A systematic review of neuropsychological outcomes. *Consciousness and Cognition*, *45*, 109–123.

Lassander, M., Hintsanen, M., Suominen, S., Mullola, S., Fagerlund, A., Vahlbergm, T., & Volanen, S. M. (2020). The effects of school-based mindfulness intervention on executive functioning in a cluster randomized controlled trial. *Developmental Neuropsychology*, *45*(7–8), 469–484.

Lomas, T., Medina, J. C., Ivtzan, I., Rupprecht, S., & Eiroa-Orosa, F. J. (2017). The impact of mindfulness on the wellbeing and performance of educators: A systematic review of the empirical literature. *Teaching and Teacher Education*, *61*, 132–141.

Lomas, T., Medina, J. C., Ivtzan, I., Rupprecht, S., & Eiroa-Orosa, F. J. (2018). A systematic review of the impact of mindfulness on the well-being of healthcare professionals. *Journal of Clinical Psychology*, *74*(3), 319–355.

MacCoon, D. G., MacLean, K. A., Davidson, R. J., Saron, C. D., & Lutz, A. (2014). No sustained attention differences in a longitudinal randomized trial comparing mindfulness based stress reduction versus active control. *PLoS One*, *9*(6), e97551.

Madigan, D. J., & Kim, L. E. (2021). Does teacher burnout affect students? A systematic review of its association with academic achievement and student-reported outcomes. *International Journal of Educational Research*, *105*, 101714.

McConville, J., McAleer, R., & Hahne, A. (2017). Mindfulness training for health profession students-the effect of mindfulness training on psychological well-being, learning and clinical performance of health professional students: A systematic review of randomized and non-randomized controlled trials. *Explore (New York, N.Y.)*, *13*(1), 26–45.

Müller, B. C. N., Gerasimova, A., & Ritter, S. M. (2016). Concentrative meditation influences creativity by increasing cognitive flexibility. *Psychology of Aesthetics, Creativity, and the Arts*, *10*(3), 278–286.

Nell, W. (2016). Mindfulness and psychological well-being among black south African university students and their relatives. *Journal of Psychology in Africa*, *26*(6), 485–490.

Oberle, E., & Schonert-Reichl, K. A. (2016). Stress contagion in the classroom? The link between classroom teacher burnout and morning cortisol in elementary school students. *Social Science & Medicine*, *159*, 30–37.

O'Connell, N. S., Dai, L., Jiang, Y., Speiser, J. L., Ward, R., Wei, W., … Gebregziabher, M. (2017). Methods for analysis of pre-post data in clinical research: A comparison of five common methods. *Journal of Biometrics & Biostatistics*, *8*(1), 1–8.

Peña-Casanova, J. (2005) *Test Barcelona: normalidad, semiología y patología Normalidad semiología y patología neuropsicológicas*. (2nd ed., pp. 63–227). Barcelona: Masson.

Phan, M. L., Renshaw, T. L., Caramanico, J., Greeson, J. M., MacKenzie, E., Atkinson-Diaz, Z., … Nuske, J. H. (2022). Interventions: A systematic review of outcome evidence quality by study design. *Mindfulness*, *13*, 1591–1613.

Qazinezam, M., Momtazi, S., & Yaghubi, N. J. A. (2014). Study the effects of vipassana meditation on increasing the level of psychological well-being of people. *Biosciences, Biotechnology Research Asia*, *11*(3), 1657–1665.

Quaglia, J. T., Braun, S. E., Freeman, S. P., McDaniel, M. A., & Brown, K. W. (2016). Meta-analytic evidence for effects of mindfulness training on dimensions of self-reported dispositional mindfulness. *Psychological Assessment*, *28*(7), 803–818.

Rey, A. (1941). L'examen psychologique dans les cas d'encéphalopathie traumatique. (Les problems.). *Archives de Psychologie*, *28*, 215–285.

Rivera, D., Perrin, P. B., Stevens, L. F., Garza, M. T., Weil, C., Saracho, C. P., … Arango-Lasprilla, J. C. (2015). Stroop color-word interference test: Normative data for the Latin American Spanish speaking adult population. *NeuroRehabilitation*, *37*(4), 591–624.

Rodriguez-Vega, B., Melero-Llorente, J., Bayon-Perez, C., Cebolla, S., Mira, J., Valverde, C., & Fernández-Liria, A. (2014). Impact of mindfulness training on attentional control and anger regulation processes for psychotherapists in training. *Psychotherapy Research*, *24*(2), 202–213.

Roeser, R. W., Schonert-Reichl, K. A., Jha, A., Cullen, M., Wallace, L., Wilensky, R., … Harrison, J. (2013). Mindfulness training and reductions in teacher stress and burnout: Results from two randomized, waitlist-control field trials. *Journal of Educational Psychology*, *105*(3), 787–804.

Saloviita, T., & Pakarinen, E. (2021). Teacher burnout explained: Teacher-, student-, and organisation-level variables. *Teaching and Teacher Education*, *97*, 103221.

Sánchez-Cánovas, J. (1998) *EBP: Escala de bienestar psicológico*. Madrid: TEA.

Shin, M. S., Park, S. Y., Park, S. R., Seol, S. H., & Kwon, J. S. (2006). Clinical and empirical applications of the Rey–Osterrieth complex figure test. *Nature Protocols*, *1*, 892–899.

Song, Y., & Lindquist, R. (2015). Effects of mindfulness-based stress reduction on depression, anxiety, stress and mindfulness in Korean nursing students. *Nurse Education Today*, *35*(1), 86–90.

Starcke, K., Wiesen, C., Trotzke, P., & Brand, M. (2016). Effects of acute laboratory stress on executive functions. *Frontiers in Psychology*, *7*, 461.

Stroop, J. R. (1935). Studies of interference in serial verbal reactions. *Journal of Experimental Psychology*, *18*(6), 643–662.

Thompson, D. R., Besner, D., & Smilek, D. (2014). A resource-control account of sustained attention: Evidence from mind-wandering and vigilance paradigms. *Perspectives on Psychological Science*, *10*(1), 82–96.

Verhaeghen, P. (2021). There is virtue in mindfulness: The relationship between the mindfulness manifold, virtues, and eudemonic wellbeing. *Personality and Individual Differences*, *176*, 110767.

Waterman, A. S., Schwartz, S. J., Zamboanga, B. L., Ravert, R. D., Williams, M. K., Agocha, V., … Donnellan, M. B. (2010). The questionnaire for Eudaimonic well-being: Psychometric properties, demographic comparisons, and evidence of validity. *The Journal of Positive Psychology*, *5*(1), 41–61.

Whitfield, T., Barnhofer, T., Acabchuk, R., Cohen, A., Lee, M., Schlosser, M., … Marchant, N. L. (2021). The effect of mindfulness-based programs on cognitive function in adults: A systematic review and meta-analysis. *Neuropsychology Review*, *32*(3), 677–702.

Wolf, O. T. (2017). Stress and memory retrieval: Mechanisms and consequences. *Current Opinion in Behavioral Sciences*, *14*, 40–46.

Zarate, K., Maggin, D. M., & Passmore, A. (2019). Meta-analysis of mindfulness training on teacher well-being. *Psychology in the Schools*, *56*, 1700–1715.

Zeidan, F., Johnson, S. K., Diamond, B. J., David, Z., & Goolkasian, P. (2010). Mindfulness meditation improves cognition: Evidence of brief mental training. *Consciousness and Cognition*, *19*(2), 597–605.

Zhang, Y., Tsang, K. K., Wang, L., & Liu, D. (2022). Emotional labor mediates the relationship between clan culture and teacher burnout: An examination on gender difference. *Sustainability*, *14*(4), 2260.