

Acceptability and Effectiveness of a Long-Term Educational Intervention to Reduce Physicians' Stress-Related Conditions

Alberto Amutio, PhD; Cristina Martínez-Taboada, PhD; Luis Carlos Delgado, PhD; Daniel Hermosilla, PhD; María Jesus Mozaz, PhD

Introduction: This study aimed to test the acceptability and effectiveness of a two-phase mindfulness-based stress reduction program (8-week initial treatment plus a 10-month maintenance phase) in alleviating work stress-related symptoms (i.e., burnout, heart rate [HR], and blood pressure [BP]) in a sample of 42 physicians.

Methods: A randomized controlled trial and a simple pre-post design were used, respectively, for each of the two phases of the study. Outcome measures included the Five Facets of Mindfulness Questionnaire and the Maslach Burnout Questionnaire. HR and BP measures were also obtained in the experimental group by means of a digital monitor.

Results: After the initial 8 weeks of treatment, significant improvements for the experimental group in mindfulness levels and reductions in emotional exhaustion, HR, and BP were obtained. Effect sizes (Cohen *d*) significantly increased over the 10-month maintenance period, especially for mindfulness and systolic BP. Acceptance was notably high (low attrition rate and high compliance with program activities).

Discussion: Outcomes are significant in terms of practical consequences for reducing and controlling risks of developing burnout and cardiovascular disease in this population and enhancing well-being in life.

Keywords: health professionals, burnout, blood pressure, heart rate, mindfulness, evaluation-educational intervention, experimental/quasi-experimental design, innovative educational interventions

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According to the Fifth European Working Conditions Survey, work stress and burnout affect at least one in every five workers in Europe and are one of the four most often mentioned occupational health problems.¹ Particularly, a high prevalence of emotional exhaustion, a key component of the burnout syndrome, is found among physicians.² In turn, burnout predicts a series of negative consequences at several levels: physical, psychological, socio-familial, and professional. Similar results have been obtained across different countries.^{3,4}

Work stress has received much attention in the last few decades.⁵ Concretely, behavioral medicine has provided evidence for the

negative contribution of work stress in blood pressure (BP).^{6,7} High BP represents a risk factor for coronary heart disease and individuals with chronic work stress show increased BP and heart rate (HR).^{7,8} A wide range of formal stress management techniques have been found to reduce stress.^{5,9} One of the mind-body interventions available for work stress and other stress-related problems is mindfulness meditation. Mindfulness can be described as nonjudgmental attention to experiences in the present moment.¹⁰ It is both a practice and a way of being in the world.¹¹ Bishop et al.¹² proposed a two-component model of mindfulness: self-regulation of attention and acceptance of ones' own experiences (nonreactive awareness). Results from different studies reveal that mindfulness-based stress management techniques produce clinically significant short-term reductions in burnout and other stress-related conditions in different populations.¹³⁻¹⁵ Overall, mindfulness techniques have proved successful in the treatment of a wide array of psychosomatic and physical dysfunctions.¹⁶⁻¹⁸

In the last years, a program known as mindfulness-based stress reduction (MBSR) has been successfully applied to health care professionals to reduce stress-related symptoms including burnout.¹⁹⁻²² In the same line, various types of psycho-educational interventions based on MBSR for treating occupational stress in health professionals in some countries have been undertaken.²³⁻²⁵ MBSR has also been applied to other professionals, including teachers and students,^{26,27} and even the general population.²⁸

Ample evidence exists regarding the effects of relaxation and stress management on BP.⁹ However, less is known regarding the potential of meditation training as an intervention for

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Dr. Amutio: Department of Social Psychology and Methodology of the Behavioral Sciences, Faculty of Psychology, University of the Basque Country (UPV/EHU), Spain.

Dr. Martínez-Taboada: Department of Social Psychology and Methodology of the Behavioral Sciences, Faculty of Psychology, University of the Basque Country (UPV/EHU), Spain. **Dr. Delgado:** Department of Psychology and Sociology, University of Zaragoza-Unizar, Spain. **Dr. Hermosilla:** Department of Social Psychology and Methodology of the Behavioral Sciences, Faculty of Psychology, University of the Basque Country (UPV/EHU), Spain. **Dr. Mozaz:** Department of Basic Psychology, Faculty of Psychology, University of the Basque Country (UPV/EHU), Spain.

Correspondence: Alberto Amutio, PhD, Department of Social Psychology and Methodology of the Behavioral Sciences, Faculty of Psychology, University of the Basque Country (UPV/EHU), Avda Tolosa, 70, Donostia-San Sebastian, Gipuzkoa 20018, Spain; e-mail: alberto.amutio@ehu.es.

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hypertension. In addition, previous studies of interventions for BP and other stress-related conditions lasting up to 8 weeks have shown improvements, but the results tend to fall off after the intervention ends. In this sense, there is clearly considerable promise, with a variety of studies demonstrating efficacy of meditation techniques, including mindfulness, in the short-term reduction of BP and other stress-related conditions.^{7,9,13,15} However, longer studies evaluating mid- and long-term effects are needed.²⁵

This study is one of the first evaluating the effectiveness of a long-term mindfulness intervention in reducing stress-related conditions, and especially BP, in health care professionals and assessing the acceptability of a long-term mindfulness intervention to physicians. Given the high prevalence of stress among physicians, its negative consequences for health care systems and patient care,^{2-4,29} and the scarcity of studies on the long-term effects of mindfulness techniques,²⁵ the main goal of this study was to evaluate the acceptability and effectiveness of an 8-week MBSR-based psycho-educational program followed by a maintenance phase of 10 additional months in reducing physicians' stress (specifically, burnout, HR, and BP levels). We hypothesized that the MBSR-based program would be effective for reducing these stress-related outcomes.

METHODS

Design

The study was designed as a randomized controlled trial for the initial 8-week phase and an uncontrolled pre-post design was used for the 10-month maintenance phase.

Participants

The total sample comprised 42 physicians with an average age of 47.31 (SD = 9.42) of whom 57.1% were women and 42.9% men, who enrolled in a course offered by the Official Medical College of Biscay, in the Basque Country (Spain). All participants were actively used in public (42.9%) or private (52.4%) practice. As for number of years worked, 66.7% of the sample had a work experience of at least 10 years. The inclusion criteria were willingness to complete the questionnaires and commitment to adhere to the program's attendance and dedication requirements. The exclusion criteria were being in psychiatric or psychological treatment, or not being actively used at the time of the study.

Instruments

Psychological Measures

Maslach Burnout Inventory. A version designed for human services and specifically for health professionals was used.³⁰ The 22-item inventory assesses the three aspects of the burnout syndrome: emotional exhaustion, depersonalization, and lack of personal accomplishment on a 6-point Likert-type scale ranging from 0 (never) to 6 (everyday). Cronbach alpha in our sample for burnout was 0.90 (0.87 for emotional exhaustion, 0.80 for depersonalization, and 0.83 for lack of personal accomplishment).

Five Facets of Mindfulness Questionnaire. The Five Facets of Mindfulness Questionnaire measures a trait-like general tendency to be mindful in daily life. Each item of the questionnaire was evaluated on a 5-point Likert-type scale ranging from 1 (never or very rarely) to 5 (very frequently or always). The five scales of this 39-item questionnaire are: nonreactivity, observing,

acting with awareness, describing, and nonjudging. A Spanish version was used.^{31,32} This study demonstrated satisfying internal consistencies (Cronbach alpha ranging from 0.73 to 0.90).

Qualitative Questionnaire. An open-ended questionnaire included questions related to how participants felt after the course; the efficacy of the course in relation to their personal feelings, professional skills, and in the relationships with their patients; and their overall satisfaction level with the course.

Physiological Measures

A digital monitor (Model M3; Omron Healthcare Co., Kyoto, Japan) to record HR (in beats per minute—bpm) and BP (in mm Hg). Individual measures were taken before and after each of the sessions during the two different phases of the study. These measures were registered on a record sheet specially designed for that purpose. No physiological measures were recorded in the control group because of practical constraints.

Procedure

Participants were recruited among health care professionals through the Official Medical College of Biscay in Spain. Those interested were invited to an introductory meeting where the general contents of the course were presented. Of the 44 professionals who attended this meeting, two were excluded for not meeting the criteria. During this meeting, all participants read and signed the official statement of informed consent approved by the University of the Basque Country and were given the pretest questionnaires.

Participants in the experimental group ($n = 21$) were randomly selected using the statistical program SPSS 20.0. The remaining subjects were included in the control group ($n = 21$). Each participant in the experimental group committed to attending the sessions, doing the exercises assigned as homework, and answering the evaluation questions at the end of each of the phases of the study. The waitlist control group was told that a similar course would be offered again.

The intervention followed the MBSR program content and format,^{22,33} which is based on the psycho-educational model of Krasner et al.²⁴ sessions took place in the evenings, after work.

First Phase (Initial, 8 Weeks)

Phase 1 of the intervention was 28 hours long (8 weekly sessions of 2.5 hours each over 2 months plus one additional 8-hour retreat session). Average attendance at the sessions in this phase was 95.2%.

The sessions were taught following the standardized MBSR protocol^{22,33} by an MBSR instructor who was trained by Kabat-Zinn at the Stress Reduction Clinic in the University of Massachusetts (USA). The setting in which the program was implemented was the Official Medical College of Biscay in Spain. Basically, the structure and activities of the educational program for each of the weekly sessions was the following:

1. A 20-minute powerpoint presentation of a particular topic related to the medical profession (e.g., dealing with suffering, interpersonal relationships).
2. A 45-minute mindfulness exercise (body-scan, yoga stretches, and meditation—i.e., breathing, observing thoughts, walking meditation).

3. A 60-minute group reflection about the weekly topic and the experiences with the mindfulness practice. This included Krasner's narrative and appreciative inquiry exercises.²⁴
4. Dedicated time to record HR and BP at the beginning and end of each session.

Additionally, participants were asked to practice mindfulness exercises everyday for a period of 45 minutes by means of a set of CDs distributed to them and containing the same exercises as the ones practiced in the class sessions. They were also required to register the number of days practiced per week and the length of each of the sessions in minutes by means of a record sheet specially designed for that purpose.

On completion of the first phase of the intervention, a first posttest was given for both of the groups to verify the effect of the program over the studied psychological variables.

Second Phase (Maintenance, 10 Months)

The second phase (maintenance) involved only the experimental group ($n = 21$) and was designed to improve on or at least maintain the results obtained in the previous phase. Phase 2 was 10 months in length and began 4 weeks after the end of Phase 1. One session of 2.5 hours was offered per month (25 hours). These sessions also took place in the evenings, after work. A different instructor trained at the Roosevelt University Stress Institute in Chicago (USA) taught this maintenance phase. The structure and educational activities of the sessions were the same as in the previous phase. HR and BP measures were recorded at the beginning and end for each of the monthly sessions. Also, participants were asked to register monthly the number of days and amount of time they practiced at home. At the end of this phase the psychological measures were readministered. Measurements were not taken from the control group during this phase because of logistical reasons.

Statistical Analysis

The Kolmogorov-Smirnov test confirmed that all variables were normally distributed ($P > 0.05$). Levene test determined

homogeneity of variances or homocedasticity for each of the variables ($P > 0.05$). Consequently, analysis of variance (ANOVA) was selected as the primary statistical test.

Initial ANOVAs were conducted to ensure that there were no significant differences between the experimental and control groups at pretreatment. Second, a series of ANOVAs for repeated measures were calculated for each of the psychological variables to verify whether there were statistically significant differences between the average scores of the experimental and control groups before and after the first 8-week phase of our training program. Third, within-group ANOVAs were performed to test for significant differences in the experimental group between average change scores during the two different phases of the study in all the variables. Also, magnitude of change exhibited by the experimental group through intervention according to the posttest and maintenance phase measures was calculated using Cohen d ³⁴ relative to the effect of the MBSR intervention. Additionally Pearson correlation coefficients were computed to evaluate associations among mindfulness and all other related dimensions.

RESULTS

No initial differences between groups were found for the main variables of our study (mindfulness, $F = 2.51$, $P = 0.12$; burnout, $F = 1.11$, $P = 0.30$; and emotional exhaustion, $F = 2.87$, $P = 0.10$), including demographic or professional characteristics ($P > 0.05$). The most significant results of this study can be summarized as follows:

As can be seen in Table 1, after the first 8-week treatment phase, mindfulness levels significantly increased for the experimental group ($P < 0.001$). Emotional exhaustion, the key component of burnout, significantly decreased ($P = 0.05$). These changes are graphically represented in Figure 1. No significant variations between pretreatment and posttreatment measures in these psychological variables were found in the control group.

Significant decreases ($P < 0.001$) in HR and BP levels, both systolic and diastolic, were also obtained in the experimental group (Table 2). The effect sizes of these outcomes were from medium to large.³⁴ Correlation analyses showed that the

TABLE 1.
Mean Values on Burnout and Mindfulness Measures and Between-Group ANOVAs for the Experimental and Control Groups After the 8-Week Treatment Phase

	Control				Experimental				Var		Var × Group	
	Pretest		Posttest		Pretest		Posttest		F	P	F	P
	Mean	SD	Mean	SD	Mean	SD	Mean	SD				
Burnout	1.37	0.69	1.32	0.62	1.63	0.87	1.11	0.82	8.794	0.005	5.718	0.02
Emotional exhaustion	1.85	1.10	1.84	1.07	2.47	1.29	1.74	1.12	4.339	0.044	4.046	0.05
Depersonalization	1.01	0.69	0.91	0.69	1.41	1.42	0.84	1.26	6.482	0.015	2.385	0.13
Lack of personal accomplishment	1.05	0.71	0.99	0.70	0.78	0.67	0.56	0.59	3.217	0.081	0.987	0.32
Mindfulness	3.51	0.37	3.34	0.33	3.34	0.44	3.71	0.51	7.068	0.012	13.144	<0.001
Observing	3.02	0.88	2.83	0.98	3.33	0.60	3.98	0.64	5.009	0.031	18.530	<0.001
Describing	3.88	0.53	3.82	0.58	3.58	0.72	3.83	0.62	2.394	0.130	4.978	0.03
Acting aware	3.93	0.70	3.91	0.61	3.16	0.87	3.48	0.65	1.256	0.270	2.054	0.01
Nonjudging	4.19	0.52	4.16	0.52	3.42	0.64	3.78	0.66	4.985	0.032	6.415	0.01
Nonreacting	3.23	0.57	3.26	0.67	3.17	0.51	3.46	0.63	3.790	0.059	2.753	0.10

Physicians belonged to a wide range of specialties: analysts (3), anesthesiology and rehabilitation (2), digestive (1), surgery (1), hospital pharmacy (1), physiotherapy (1), gynecology (1), homeopathic medicine (3), general medicine (1), forensic medicine (1), rheumatologist (3), preventive medicine (1), family medicine (6), osteopath (2), pediatrics (4), psychiatrists (6), radiologist (1), emergency medicine (2), unknown (2).

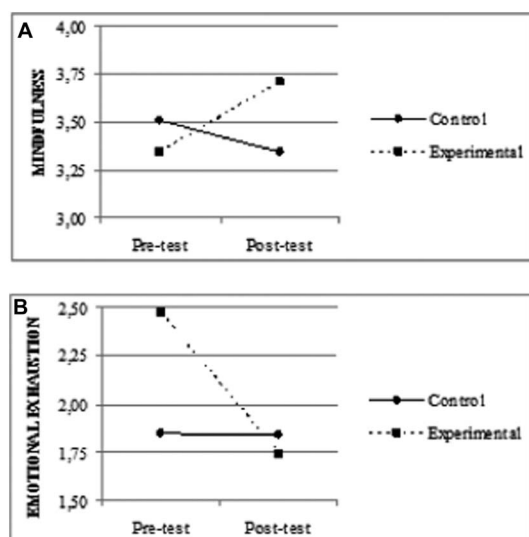


Figure 1. A and B, Between-group mean values for mindfulness and emotional exhaustion at pretest and posttest (end of the first 8-week intervention phase)

total number of hours of home practice was significantly related to BP decrements: systolic BP ($r = 0.68$; $P = 0.03$); diastolic BP ($r = 0.67$; $P = 0.04$), so that the more hours of practice, the higher the BP reductions.

Within-group ANOVAs used to examine the differences between preprogram, post-phase 1, and post-phase 2 measurements in the experimental group revealed even bigger differences in all the studied psychological variables at the end of this second phase. Average mindfulness levels increased ($P < 0.001$, $d = 1.09$) and emotional exhaustion decreased ($P < 0.001$, $d = -0.76$). As for the physiological variables, we also obtained significant declines in HR ($P < 0.001$, $d = -0.59$), systolic BP ($P = 0.01$; $d = -1.05$), and diastolic BP ($P = 0.02$; $d = -0.76$). As shown in Table 2, the main effects (Cohen d) after completion of the maintenance phase are larger than at the end of the first phase of the treatment, especially for mindfulness

and systolic BP. These findings are highly significant and provide support for our initial hypothesis, given the values of the size effects obtained.³⁴

Regarding acceptability of the intervention to participants, the attendance rates for the two phases of the program were 88% for weekly sessions and 72% for monthly sessions, which we consider high given the demands of the course. As for compliance with homework assignments, the average number of days on which participants practiced was 5 days per week and 20 days per month. The average total formal practice time was 32.5 minutes per day, with 64.3% of participants reporting at least 30 minutes of daily practice (Fig. 2).

DISCUSSION

Our primary goal of confirming the effectiveness of the MBSR program at reducing physicians' levels of stress was mostly met. The results of this study suggest that the mindfulness-based program reduced emotional exhaustion (the main component of the burnout syndrome), HR, and BP levels. These findings support the results of previous studies conducted in Spain^{25,26} and in the United States.^{24,35} These improvements continued to increase over the 10-month maintenance phase, especially for mindfulness, systolic BP and emotional exhaustion. This suggests that continued practice during the intervention is a critical key for the medium and long-term effectiveness of this kind of program, especially for BP, given the significant relationship we found between amount of home practice and this variable, and also if we take into account some studies indicating that the benefits of reduced BP disappear once practice is discontinued.⁹

Additionally, significant reductions in HR were found after 8 weeks of treatment and were maintained until the end of the second phase, 10 months later, in contrast with other studies^{17,36} that revealed decreases in HR only with long-term practitioners. Some authors^{35,37} claim that lower HR reflects a better regulation of the autonomic nervous system, which mediates responses to stress. Our findings are in accordance with the results reported by other researchers.^{13,38}

Overall, baseline values for the studied variables were medium-low. One of the reasons could be the medical

TABLE 2.

Mean Values on Burnout and Mindfulness Measures for the Experimental Group and Within-Group ANOVAs at Pretest, 8 Weeks, and 12 Months of Treatment

	Pretest		Posttest (8 wk)		F	P	d	Posttest (12 mo)		F	P	d
	Mean	SD	Mean	SD				Mean	SD			
Burnout												
Emotional exhaustion	2.47	1.29	1.74	1.12	8.36	0.01	-0.60	1.50	1.26	45.22	<0.001	-0.76
Depersonalization	1.41	1.42	0.84	1.26	13.00	0.00	-0.42	0.72	1.04	6.77	0.02	-0.56
Lack of personal accomplishment	0.78	0.67	0.56	0.59	4.40	0.05	-0.34	0.62	0.68	7.50	0.02	-0.23
Mindfulness	3.60	0.44	3.71	0.51	9.95	0.01	0.77	3.85	0.49	14.38	<0.001	1.09
Observing	3.33	0.60	3.98	0.64	13.07	0.00	1.05	4.09	0.62	14.58	<0.001	1.25
Describing	3.58	0.72	3.83	0.62	6.12	0.02	0.37	4.01	0.58	5.62	0.03	0.66
Acting aware	3.16	0.87	3.48	0.65	1.87	0.19	0.42	3.55	0.69	7.67	0.01	0.50
Nonjudging	3.42	0.64	3.78	0.66	6.35	0.02	0.55	3.96	0.66	8.45	0.01	0.83
Nonreacting	3.17	0.51	3.46	0.63	4.68	0.04	0.51	3.58	0.55	17.05	<0.001	0.77
HR	75.29	11.94	69.00	9.01	10.45	0.00	-0.60	69.57	7.25	11.86	<0.001	-0.59
Systolic BP	140.06	23.90	124.00	24.07	19.41	0.00	-0.67	118.36	17.41	9.63	0.01	-1.05
Diastolic BP	82.12	14.07	71.59	12.15	24.11	0.00	-0.80	71.86	12.88	7.15	0.02	-0.76

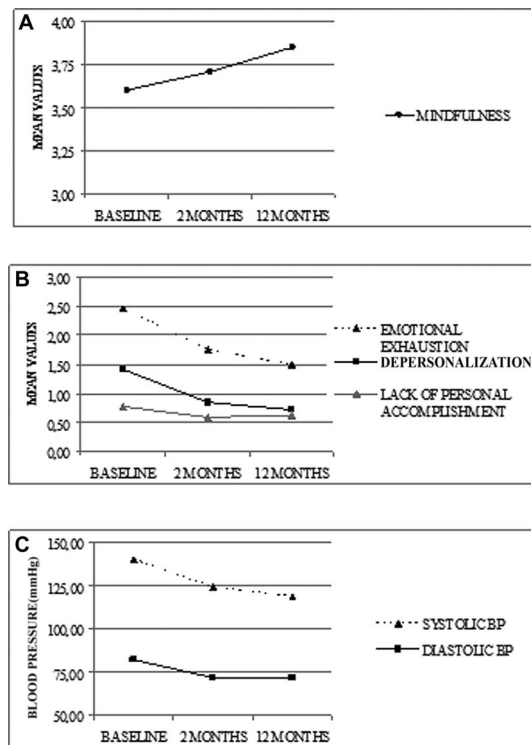


Figure 2. A–C, Mean values for mindfulness, burnout, and BP from pre-treatment to 12 months in the experimental group

specialties of our participants. Burnout levels, for example, have been shown to vary by specialty.³ Participants involved in emergency medicine, general internal medicine, neurology, and family medicine had the highest rates of burnout, whereas pathology, dermatology, general pediatrics, and preventive medicine had the lowest rates. Also, in a previous study of 1275 health professionals from different specialties in the Basque Country, we found that only 5.7% of physicians presented high levels of burnout.²

Moreover, the first challenge to a program of this kind (outside work, involving homework and developing for a substantial period) is acceptability to the target audience. Preliminary research suggests that medical professionals may be particularly likely to have high attrition rates because of time and scheduling issues.²¹ In our case, the rate of attendance to the entire program was 80%, which we consider very good, given its length, the fact that the course was not professionally accredited, and the absence of financial compensation. Also, compliance with weekly and monthly assignments was considerably high and sustained over time. Some of the factors that may explain this high acceptability of the program are the instructors' experience with this kind of intervention, the fact that the course was conveniently scheduled for them, and the participant satisfaction with the program, which is reflected in the average evaluation of the course (9.1 points of 10).

With respect to the practical significance of our findings, the magnitude of change obtained in most of our variables and degree of participant acceptability make this MBSR program a promising tool for the prevention of work stress-related symptoms in medical professionals. The significant decreases in BP, which is considered a risk factor for

coronary heart disease in medical doctors,^{7–9} is especially encouraging.

Given that one of the most evident causes of physicians discontent is stress and tension,^{29,39} we consider these outcomes important in terms of their positive impact on physicians' well-being and health, and the potential benefits that might carry over to their relationship with patients, including better patient care. The obtained results are confirmatory of previous studies.^{20,24,40,41}

Regarding the achievements of this research work, we want to emphasize that this study extended over a period of a year. In contrast, there are few longitudinal studies in the mindfulness area and only some sparse evidence suggests that significant improvements after the 8-week program could be maintained in the long-term,^{25,28,42} or even improve as it was the case of our study. Similarly, unlike most of the studies in this area, physiological measures were used in the intervention group, overcoming some of the limitations of previous studies.

There are limitations to this study that suggest a need for further investigations. First, the relatively small sample size did not allow for more robust statistics. Also, participants' characteristics (i.e., the types of specialty in which physicians worked, and the fact that they were not particularly stressed) may have influenced the observed outcomes. In addition, the high reported variance of some variables suggested the presence of outliers. We identified two subjects, one in the experimental group and one in the control group with high levels of burnout (emotional exhaustion, depersonalization, and lack of personal accomplishment). We considered that it would be of special interest to see the evolution of these subjects along the entire study, which, in the case of the experimental group, turned to be very satisfactory with important reductions in burnout at the end. For this reason, and given the small sample size, we decided to retain these subjects in the study.

Second, physiological measures were not registered in the control group because of logistical reasons and practical constraints. Nonetheless, it seems reasonable to conclude that the changes found in physiological variables were due to treatment effects given the significant correlations found between amount of home practice and reductions in BP. A final limitation is the lack of a control group during the second phase of our study. We know that single group pre-post study designs often yield overestimates of effect sizes.⁴³

CONCLUSIONS

Bearing in mind these limitations, we consider that this preliminary study suggests that our mindfulness-based training program may be a useful intervention to decrease physicians' stress, including emotional exhaustion, HR, and BP levels and above all to control the risks of developing burnout and cardiovascular disease. Our findings add to the growing body of literature documenting the effectiveness of mindfulness for the treatment of stress-related health symptoms. This study overcomes some of the limitations of previous studies, such as the exclusive reliance on self-reports and noninclusion of physiological measures and the lack of long maintenance periods. These results should be taken with caution, as exploratory. They represent promising findings that warrant further investigations with larger samples of physicians, including specialties at the front line of care access, such as emergency medicine, general internal medicine, and family medicine, among others.

Clearly, further research is needed with more sophisticated physiological measures and active control groups.

Lessons for Practice

- This study shows that a group MBSR program delivered over an 8-week period significantly reduced emotional exhaustion in physicians in Spain. They also learned how to control other stress-related symptoms, such as HR and BP. Changes persisted over a 10-month maintenance period. Acceptance of the program was notably high.
- It is useful to include psycho-educational programs in continuing professional training to reduce stress-related conditions and to prevent a decrease in well-being and quality of service provided by health professionals.

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