

# Impact of a Blended Web-Based Mindfulness Programme for General Practitioners: a Pilot Study

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**Abstract** General practitioners (GPs) report high levels of distress. This study examined whether a brief blended web-based mindfulness intervention could be effective at enhancing well-being for GPs and assessed the possible mediating role of awareness. An open uncontrolled trial, with pre-post measurements, was conducted. The programme comprised one face-to-face meeting (4 h) and eight online practice sessions with no support (two weekly sessions over 4 weeks). The primary outcome was positive affect (PANAS-positive). The secondary outcomes were as follows: negative affect (PANAS-negative), awareness (MAAS), resilience (CDRISC), and the burnout subtypes (BCSQ-12). Mixed-effects analysis for repeated measures and mediation analysis by regression models were performed. Two hundred ninety Spanish GPs took part in the study, attending the face-to-face meeting. Nearly one out of 10 participants ( $n = 28$ )

completed ‘one weekly practice’, and 10.4% ( $n = 30$ ) accomplished ‘two or more weekly practices’. There were benefits for those with ‘two or more weekly practices’ in PANAS-positive ( $B = 2.97$ ;  $p = 0.007$ ), and MAAS ( $B = 4.65$ ;  $p = 0.023$ ). We found no benefits for those with ‘one weekly practice’ in any of the outcomes. There were mediating effects of MAAS in PANAS-positive (explaining a 60.8% of total effects). A brief blended mindfulness intervention, with minimum face-to-face contact and web-based practice sessions, seems to confer improvements in the well-being of Spanish GPs. The benefits may be mediated by awareness. The implementation of this kind of programme might enhance the well-being among GPs, but there is a need to improve adherence to practice. Further research using randomized controlled designs will be needed to support the evidence found in our study.

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## Introduction

Mindfulness is the mental ability to focus attention on the direct and immediate perceptions of the present moment, suspending cognitive appraisals and using a non-judgemental state of awareness (Hayes and Shenk 2004). It can also be considered a trait (dispositional mindfulness) that cultivates awareness in daily life with an attitude of curiosity, openness and acceptance through moment-by-moment experience (Bishop et al. 2004). Mindfulness carries a present-centred, non-elaborative and non-judgemental awareness, in which every thought, feeling or sensation that arises in the attentional field is recognized and accepted as it is (Segal et al. 2002). It has become one of the most studied fields in

neurosciences (Cebolla et al. 2014), and it has been observed to activate cerebral regions (e.g. pre-frontal cortex), inducing long-lasting changes in functional neural connectivity and mental habits (Hölzel et al. 2011).

Trait mindfulness can be improved by attention training and meditation (Baer 2003; Kabat-Zinn 2003); it seems to be a mediator of the effects of mindfulness-based interventions (MBIs) on mental health and psychological well-being (Gu et al. 2015) and it has proved to be a protective feature, showing a negative association with stress and a positive relationship with well-being (Brown and Ryan 2003). MBIs usually consist of eight weekly sessions with a length of 120–150 min, and include some practices on a daily basis plus a voluntary retreat (Gotink et al. 2015). They therefore require a high level of commitment to adhere to the programme (Cullen 2011). Mindfulness techniques seem to yield benefits in a large variety of medical and psychological conditions such as anxiety, depression, chronic pain, fibromyalgia, eating disorders, cancer and substance abuse (Baer 2003; Grossman et al. 2004; Sanada et al. 2017). These techniques are currently being widely used in other fields such as education and sports and in the workplace (Cebolla et al. 2014), as for instance with general practitioners (GPs) (Krasner 2009) who report high levels of distress and low health status associated with their jobs (Al-Sareai et al. 2013; Atanes et al. 2015; Dolan et al. 2014; Rabatin et al. 2015). There are experiences of GPs participating in mindfulness training to assist in redirecting their attention to the present moment, gain sensorineural stimuli awareness, reduce stress and burnout and increase health, well-being and satisfaction with life (Irving et al. 2009; Shapiro et al. 2005). Furthermore, some MBIs have been specifically focused on the treatment of anxiety and depression in healthcare professionals, through increasing resilience using elements of meditation that synergizes with nutrition and exercise (Johnson et al. 2015).

However, the implementation of new models of intervention such as MBIs through, for instance, national health systems, require feasible, scalable and cost-effective programmes, based on evidence (Demarzo et al. 2015a, b), particularly in the face of financial crises such as that experienced by Spain in recent years (Heras-Mosteiro et al. 2016). To achieve this, some efforts have been orientated towards developing efficacious and abbreviated MBIs in general populations (Klatt et al. 2009; Morrison et al. 2014), in primary care settings (Demarzo et al. 2015a, b) and also among GPs (Fortney et al. 2013). Exploring the benefits of web-based MBIs, blended or not, and the barriers and opportunities for their implementation in different populations and contexts may help to reduce healthcare costs. Blended learning is the combination of traditional face-to-face learning and e-learning, and it seems to be more effective than non-blended, e-learning instruction for knowledge acquisition in health professions (Liu et al. 2016). This field of work is still very

incipient, especially regarding the use of MBIs, with many questions remaining as to the intensity required, delivery systems and contexts. In fact, these models of intervention are starting to proliferate without much evidence behind them. Describing the characteristics of users and other aspects of the online interventions that could facilitate the implementation of blended web-based MBIs, as well as discovering possible mediating factors of improvements, might allow us to capitalize on the key processes involved in generating positive outcomes with this kind of new programmes (Windgassen et al. 2016).

In this context, the aim of this study was to investigate the hypotheses that a blended mindfulness-based programme for GPs, without support or guidance, would improve well-being, and that the construct of awareness would be a mediating factor for improvement. Moreover, we also aimed to provide an exploratory description of the general features of GPs related to the level of use of the online modules, to identify factors that might influence the adherence to the programme.

## Method

### Participants

Spanish GPs were recruited from a mindfulness course offered by the University of Alcalá de Henares (UAH), Madrid, Spain. Our sample size calculation was based on testing differences between pre- and post-intervention measures on the Positive and Negative Affect Schedule (PANAS), in its positive facet, ranging between 10 and 50. Considering the self-guided nature and very low intensity of the intervention, we aimed to detect small differences. Assuming a mean of 32.74 and a SD of 8.31 (López-Gómez et al. 2015), a corresponding difference in scores of 1.50 points (effect size  $d = 0.20$ ), a bilateral test with a 95% confidence interval and a statistical power of 80%, we needed 145 participants. Given the online procedure of obtaining data and the unsupported nature of the intervention, we expected a very high dropout rate, with a value of around 50% of participants (Christensen et al. 2009), so we inflated the numbers to reach a total sample size of 290 subjects.

The inclusion criteria were (a) ability to understand and write in Spanish and (b) willingness to participate in the study and the signing of an informed consent form. The exclusion criteria were (a) failure to complete the baseline assessment and (b) failure to complete the first face-to-face informative mindfulness session.

### Procedure

Spanish GPs all over the country were invited to participate freely by the educational foundation of an international

pharmaceutical company. However, assessments of the MBI were conducted by the directors of the programme (MAM and RM), without any control from the foundation. The foundation bore the course expenses in their entirety, since participants did not receive any remuneration and were not charged any expenses. The programme was conducted in April 2013. An email was sent from the official UAH website to the registered participants, explaining the aims of the research, the voluntary nature of participation, the possibility of freely withdrawing from the study at any time and the confidential nature of all data. This message contained a link to access an online platform that provided written informed consent. The first 290 subjects interested in participating received a second email with a link, leading them to complete the baseline online survey immediately prior to the start of the intervention. After 4 weeks, the time programmed to carry out the online training, a third email was sent including a new link to access and complete the post-test survey. The protocol was performed in accordance with the ethical standards laid down in the Declaration of Helsinki and its later amendments, and it was approved through the Ethical Committee of the UAH (January 2013), Madrid (Spain).

Participants received a blended, abbreviated web-based MBI of 10 h over a 1-month period based on the standard programme developed by Kabat-Zinn (Kabat-Zinn 1982; Kabat-Zinn et al. 1985), from whose rationale it was adapted. The blended programme did not include a 1-day retreat in silence, but comprised the following:

*One face-to-face meeting* (4 h), in four different groups, which included a theoretical module in order to explain the background to mindfulness, its usefulness for GPs, how to implement a personal practice, and how to incorporate mindfulness into daily life. This first face-to-face session also included a monitored practical module, conducted by a certified MBI instructor (JGC—with 10 years of experience with mindfulness groups), with different practices, such as the raisin exercise, mindfulness of breathing, a body scan exercise, 3-min practice, and a values-based practice adapted from the acceptance and commitment therapy (ACT) (Hayes et al. 2012).

*Online training*, which included both audio and video, with practices such as handling thoughts and emotions, walking meditation, mindful movements and kindly awareness meditation. These practices required around 45 min per session for completion. It was recommended that participants practised at least twice a week (completing a total of 1.5 h) for 4 weeks. Online training also provided extended theoretical descriptions in texts and articles. All participants had free access to the materials over the 4 weeks. A detailed description of the contents can be found elsewhere (Garcia-Campayo and

Piva-Demarzo 2015; Piva-Demarzo and Garcia-Campayo 2015). No supervision or feedback was provided during the online training.

## Measures

A set of background information was collected at pre-test, including socio-demographic variables such as age, sex, stable relationship ('yes', 'no'), residence ('parents', 'alone', 'partner', 'partner and children'), employment status ('employed', 'unemployed', 'sick leave'), type of contract ('temporary', 'permanent', 'permanent public sector'), and prior experience in meditation or mind-body techniques, at least once a week during the last month ('yes', 'no'). In case of a positive answer to the previous question, it was requested that the main technique used should be specified. The number of online practices completed every week was also asked at post-test.

Several mindfulness facets, including awareness, are associated with positive affect (Lopez et al. 2016), and positive affect seems to be increased through MBIs (Bakker et al. 2014). The capacity to experience positive affect is associated with higher resilience against depression, negative emotional experiences and other forms of psychopathology (Ong et al. 2010; Tugade and Fredrickson 2004; Wichers et al. 2010). Moreover, positive emotions predict increases in life satisfaction possibly through developing resources for living well (Cohn et al. 2011). Therefore, the Positive Affect Schedule of the PANAS (PANAS-positive) (Watson et al. 1988), as an independent continuous variable, was used in the present study as the primary outcome to measure well-being. PANAS-positive is a self-reported subscale that measures 'positive' affectivity. It consists of a list of 10 adjectives, rated on a 5-point scale. Present-moment instructions were used. The PANAS has been validated in Spanish with appropriate psychometric properties ( $\alpha = 0.91$ ) (Sandín et al. 1999).

Secondary outcomes included negative affect, measured by the Negative Affect Schedule of the PANAS (PANAS-negative); mindful awareness, measured by the Mindful Attention Awareness Scale (MAAS); resilience, using the Connor-Davidson Resilience Scale (CDRISC); and types of burnout, using the Burnout Clinical Subtype Questionnaire (BCSQ12). PANAS-negative (Watson et al. 1988) is a self-reported subscale that measures 'negative' affectivity with excellent psychometric properties ( $\alpha = 0.89$ ), and consists of a list of 10 adjectives, rated on a 5-point scale (Sandín et al. 1999). The MAAS is a 15-item measure of dispositional mindfulness in terms of 'awareness' of what is taking place at the present moment (Brown and Ryan 2003). All the items are negative worded, and they are rated on a Likert scale from 1 (almost always) to 6 (almost never). Higher scores reflect higher levels of awareness. This scale has been

validated in Spanish with good psychometric properties ( $\alpha = 0.89$ ) (Soler et al. 2012). The CD-RISC is a 10-item measure of ‘resilience’, as a dynamic and flexible process of adaptation to life changes (Campbell-Sills and Stein 2007). Each item is rated on a Likert scale from 0 (‘not at all’) to 4 (‘almost always’). Higher values indicate higher levels of resilience. Its internal consistency is  $\alpha = 0.85$  in its Spanish validation (Notario-Pacheco et al. 2011). The BCSQ-12 is a 12-item measure of burnout profiles, through the dimensions of ‘overload’ ( $\alpha = 0.87$ ), ‘lack of development’ ( $\alpha = 0.89$ ) and ‘neglect’ ( $\alpha = 0.85$ ) (Montero-Marín et al. 2011). Participants report the degree of agreement with each of the items, using a Likert scale scored from 1 (totally disagree) to 7 (totally agree). This questionnaire presents good psychometric features in its Spanish version (Montero-Marín et al. 2011, 2012).

### Data Analyses

Participants were described in their socio-demographics at baseline, using means (SD) and frequencies (percentages). An exploratory comparison was made in order to assess associations between general features and level of online practice completion. We theoretically defined three levels of compliance with the online training: ‘no weekly practice’ (no compliance = 0), ‘one weekly practice’ (simple compliance but not reaching the recommended dose = 1) and ‘two or more weekly practices’ (compliance reaching the recommended dose = 2).

The primary analysis was carried out for PANAS-positive, in those participants who completed ‘one weekly practice’ and ‘two or more weekly practices’ separately, using multi-level, mixed-effects linear regression in which time acts as an independent variable and the random part is assigned to subjects. Restricted maximum likelihood regression (REML) was used, with estimated regression coefficients ( $B$ ), adjusting for prior meditation or mind-body practice (at least once a week during the last month: ‘yes’, ‘no’). REML produces less biased estimates of variance parameters when using small sample sizes or unbalanced data (Egbewale et al. 2014). Effect sizes (ESs) were calculated by means of Cohen’s  $d$ , corrected for the dependence of the repeated measures (Morris and DeShon 2002). Overall,  $d = 0.20$  is regarded as small, whilst 0.50 as medium, and 0.80 large.

Secondary analyses comprised comparisons of PANAS-negative, MAAS, CDRISC, overload, lack of development and neglect, using the same analytical strategy described in the primary analyses. We also explored the possible mediating effects of awareness (mediating variable) on PANAS-positive (dependent variable). For this purpose, we followed the guidance on mediation analysis using linear regression estimates

(Mackinnon and Dwyer 1993), including all the levels of compliance (independent variable). We also developed a separate mediation analysis excluding non-compliant participants, to assess the impact of reaching the recommended dose vs. simple compliance.

The overall  $\alpha$  level was set at 0.05, using two-sided tests, and taking into account Bonferroni’s criterion for the primary analyses, as a way to balance between type I and type II errors (Feise 2002). Secondary analyses were considered exploratory; therefore, we did not use corrections for multiple measurements (Feise 2002). Analyses were performed using the STATA-12 statistical package.

### Results

General practitioners (GPs) ( $n = 290$ ) from different Spanish regions took part in the study and attended the first face-to-face mindfulness meeting. This sample comprised adults of European ethnicity, between 27 and 61 years of age (mean = 49.01; SD = 7.27), and 77.5% were females (Table 1). In total, 79.9% ( $n = 232$ ) did not complete at least 1 online practice session per week, and were therefore considered non-completers of the programme, whereas 20.1% of participants ( $n = 58$ ) completed at least 1 online practice per week, with a mean of 2.44 (SD = 1.97), a median of 2 and a mode of 1 session per week. Specifically, 9.7% of participants ( $n = 28$ ) completed ‘one weekly practice’, and 10.4% of participants ( $n = 30$ ) completed the recommended ‘two or more weekly practices’.

As shown in Table 1, completers of the recommended ‘two or more weekly practices’ seemed to be older, and it was more common for them not to be in a stable relationship, to be unemployed and to have had previous experience in meditation or mind-body techniques once a week during the previous month. Participants with previous experience had been practising different techniques, such as breathing exercises ( $n = 6$ ), yoga ( $n = 4$ ), tai-chi ( $n = 2$ ), transcendental meditation ( $n = 2$ ), qi gong ( $n = 1$ ), Zen meditation ( $n = 1$ ), mantras ( $n = 1$ ), progressive relaxation ( $n = 1$ ) and autogenous training ( $n = 1$ ). There were no relevant differences in either the main or secondary outcomes at baseline according to the completion group.

Primary outcome data were obtained for 208 participants at post-test (71.2%). No basal differences in socio-demographics or primary outcome were observed between those who completed the post-test survey and those who did not complete it, although we found differences at baseline in ‘overload’ between those who completed the post-test (Mn = 11.98; SD = 4.85) and those who did not complete it (Mn = 13.26; SD = 4.60). In view of this, missing data were considered at random, but not completely at random (National Research Council (US) Panel on Handling Missing Data in Clinical Trials 2010; Bell et al. 2013).

**Table 1** Baseline characteristics of participants according to the number of sessions completed per week

Socio-demographic/outcomes	Total ( <i>n</i> = 290)	0 sess./week ( <i>n</i> = 232)	1 sess./week ( <i>n</i> = 28)	≥2 sess./week ( <i>n</i> = 30)
Age, Mn (SD)	49.01 (7.27)	48.72 (7.16)	47.48 (8.16)	52.65 (6.35)
Sex, females (%)	224 (77.5)	180 (77.6)	21 (77.8)	23 (76.7)
Stable relationship, yes (%)	212 (73.4)	171 (73.7)	23 (81.5)	19 (63.3)
Residence (%)				
Parents	23 (7.9)	17 (7.4)	3 (10.7)	3 (10.0)
Alone	41 (14.1)	32 (13.5)	3 (10.7)	6 (20.0)
Partner	44 (15.2)	39 (16.5)	3 (10.7)	2 (6.7)
Partner and children	182 (62.8)	144 (62.6)	19 (67.9)	19 (63.3)
Employment (%)				
Employed	281 (96.9)	228 (98.3)	27 (96.4)	26 (86.7)
Unemployed	6 (2.1)	3 (1.3)	0 (0.0)	3 (10.0)
Sick leave	3 (1.0)	1 (0.4)	1 (3.6)	1 (3.3)
Type of contract (%)				
Temporary	45 (15.5)	38 (16.4)	4 (14.3)	3 (10.0)
Permanent	42 (14.5)	31 (13.4)	5 (17.8)	6 (20.0)
Permanent public sector	203 (70.0)	163 (70.3)	19 (67.9)	21 (70.0)
Prior meditation or mind-body practices, yes (%)	19 (6.5)	8 (3.4)	3 (10.7)	8 (26.7)
PANAS-positive, Mn (SD)	31.34 (6.59)	31.15 (6.62)	32.19 (6.72)	32.03 (6.38)
PANAS-negative, Mn (SD)	19.91 (5.84)	20.16 (5.99)	18.96 (5.21)	19.43 (5.60)
MAAS, Mn (SD)	61.49 (14.32)	60.85 (14.71)	64.00 (12.07)	61.77 (13.41)
CD-RISC, Mn (SD)	37.82 (8.77)	37.56 (8.79)	38.96 (8.96)	38.80 (8.58)
Overload, Mn (SD)	12.42 (4.69)	12.45 (4.66)	13.19 (5.40)	11.50 (4.22)
Lack of development, Mn (SD)	10.49 (4.73)	10.33 (4.69)	11.37 (4.58)	10.90 (5.26)
Neglect, Mn (SD)	8.68 (3.48)	8.82 (3.53)	8.08 (2.83)	8.17 (3.58)

Notes: Frequency and percentage (%)

Mn mean, SD standard deviation, sess./week no. of completed sessions per week

Table 2 shows that there were significant pre-post improvements in the primary analysis of the main outcome, PANAS-positive, in those participants who completed the suggested level of ‘two or more weekly practices’ ( $B = 2.97$ ;  $p = 0.007$ ), but there were none in those participants who, although doing ‘one weekly practice’, did not reach the recommended amount of practice ( $B = 1.26$ ;  $p = 0.368$ ).

Similarly, there were significant improvements in MAAS in those participants who completed ‘two or more weekly

practices’ ( $B = 4.65$ ;  $p = 0.023$ ), but there were no significant improvements in those who did ‘one weekly practice’ ( $B = 2.67$ ;  $p = 0.280$ ). There were no significant improvements in either PANAS-negative, in CDRISC or the burnout subtypes, in any of the groups (Table 3).

The mediating role of MAAS on PANAS-positive, controlling the prior meditation or mind-body practice and taking the number of weekly online sessions completed as an independent variable, with the values of ‘no weekly practice’ (0), ‘one

**Table 2** Main outcome (PANAS-positive) analyses according to online completion

Number of sessions	pre Mn (SD)	post Mn (SD)	<i>d</i>	B (95% CI)	<i>p</i>
1 sess./week ( <i>n</i> = 28)	32.19 (6.72)	33.44 (5.42)	−0.17	1.26 (−1.48–4.00)	0.368
≥2 sess./week ( <i>n</i> = 30)	32.03 (6.38)	35.00 (4.91)	−0.53	2.97 (0.82–5.11)	0.007

pre pre-test, post post-test, Mn mean, SD standard deviation, *d* Cohen’s *d* correcting for the dependence of repeated measures, *B* regression coefficient, 95% CI 95% confidence interval, *p* *p* value related to *B* using mixed-effects models, controlling prior meditation or mind-body practice, sess./week number of completed sessions per week

**Table 3** Analysis of the secondary outcomes according to online completion

Number of sessions/outcomes	pre Mn (SD)	post Mn (SD)	<i>d</i>	B (95% CI)	<i>p</i>
1 sess./week ( <i>n</i> = 28)					
PANAS-negative	18.96 (5.21)	18.52 (4.45)	0.15	−0.44 (−1.59–0.70)	0.446
MAAS	64.00 (12.07)	66.67 (10.88)	−0.21	2.67 (−2.17–7.50)	0.280
CD-RISC	38.96 (8.96)	40.19 (5.17)	−0.12	1.22 (−2.72–5.16)	0.543
Overload	13.19 (5.40)	12.56 (5.27)	0.13	−0.63 (−2.48–1.22)	0.505
Lack of development	11.37 (4.58)	11.65 (4.03)	−0.07	0.32 (−1.25–1.88)	0.694
Neglect	8.08 (2.83)	8.07 (2.67)	−0.01	−0.04 (−1.25–1.17)	0.949
≥2 sess./week ( <i>n</i> = 30)					
PANAS-negative	19.43 (5.60)	18.77 (5.06)	0.17	−0.67 (−2.11–0.77)	0.365
MAAS	61.77 (13.41)	66.37 (11.03)	−0.41	4.65 (0.49–8.71)	0.023
CD-RISC	38.80 (8.58)	41.28 (4.32)	−0.32	2.38 (−0.69–5.45)	0.129
Overload	11.50 (4.22)	11.70 (5.62)	−0.05	0.20 (−1.43–1.83)	0.810
Lack of development	10.90 (5.26)	11.00 (5.69)	−0.02	0.10 (−1.37–1.57)	0.894
Neglect	8.17 (3.58)	8.07 (3.24)	0.03	−0.10 (−1.23–1.03)	0.862

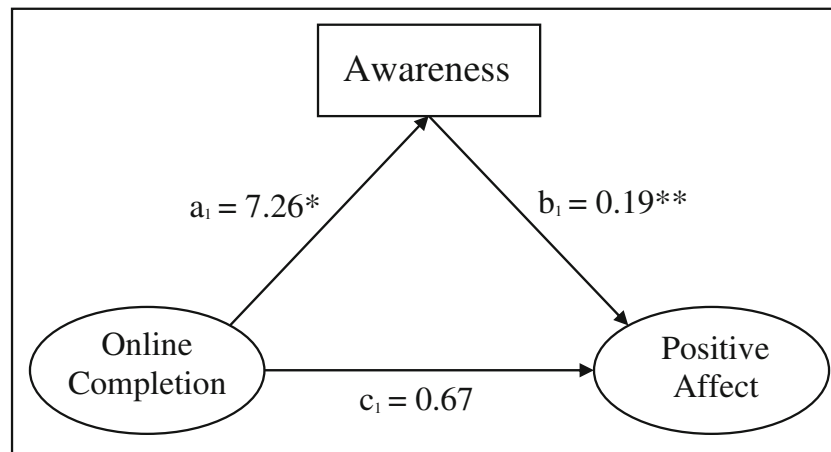
*pre* pre-test, *post* post-test, *Mn* mean, *SD* standard deviation, *d* Cohen's *d* correcting for the dependence of repeated measures, *B* regression coefficient, *95% CI* 95% confidence interval, *p* *p* value related to *B* using mixed-effects models, controlling prior meditation or mind-body practice, *sess./week* number of completed sessions per week

weekly practice' (1) and 'two or more weekly practices' (2), was significant ( $a_1 = 2.96$ ,  $p = 0.025$ ;  $b_1 = 0.10$ ;  $p = 0.002$ ), explaining an 18.1% of the effects, and without eliminating the significance of direct effects ( $c_1 = 1.27$ ;  $p = 0.028$ ). The analyses using only participants who completed 'one weekly practice' (1) and 'two or more weekly practices' (2) (Fig. 1) also showed a significant mediating role of MAAS on PANAS-positive ( $a_1 = 7.26$ ,  $p = 0.033$ ;  $b_1 = 0.19$ ,  $p = 0.009$ ), explaining a 60.8% of the effects, and eliminating the significance of direct effects ( $c_1 = 0.67$ ;  $p = 0.708$ ).

## Discussion

The present work studied the effectiveness of a blended web-based abbreviated MBI aimed at enhancing GPs well-being, with a minimum investment of resources, based on a 4-h face-to-face meeting and 6 h of unsupported online practice. We observed that the positive affect levels of participants at baseline were similar to those corresponding to the general health population of Spain, but they were above the referred normative values after intervention (López-Gómez et al. 2015).

Specifically, we observed improvements in positive affect when reaching the recommended dose of online practice completion, with awareness being one of the possible mediating mechanisms that could be acting on these effects. This mediating role of awareness was observed for the total sample, and also when including only those participants who completed 'one weekly practice' (simple completers) vs. 'two or more weekly practices' (recommended dose), reducing the likelihood of a type 1 error owing to the corresponding sample size reduction when using the aforementioned subgroups. Awareness of moment-to-moment experience (Brown and Ryan 2003), the state of attending to one's current actions as opposed to behaving automatically (Baer et al. 2006), is the most parsimonious starting point of mindfulness action mechanisms (Carmody 2009). It is a complex construct that comprises different facets and dynamics of regulation, but mindfulness practices have been reported to be linked to improvements in all of them (Wolkin 2015). The procedure is that at the early stages of practice, one makes progress by using focused attention through concentrative meditation exercises (e.g. to sensory experiences such as breathing) (Bishop et al. 2004). At the more advanced stages, use is made of more



**Fig. 1** Mediation model on the association of the online completion with positive affect, and the role of awareness. Notes:  $a_1 \times b_1$  = indirect effects;  $c_1$  = direct effects adjusted by the mediating effect. Online completion = ‘one weekly practice’ (1) or ‘two or more weekly practices’ (2). Awareness = change scores of MAAS. Positive affect = change scores

of PANAS-positive. Regression coefficients are on the same scale as the corresponding change score-dependent variable. Indirect effects accounted for 60.8% of total effects, eliminating the significance of direct effects. Model controlling prior meditation or mind-body practice. \* $p < 0.05$ ; \*\* $p < 0.01$

receptive attention states, through open monitoring (e.g. to the entire field of awareness) (Jha et al. 2007). It has been said that these practices may bridge mindfulness and psychological well-being, by decreasing ruminative processes of thoughts and emotions, as vicious cycles of unintentionally directed attention (Gu et al 2015; Wolkin 2015).

One limitation of this study is that we used a definition of mindfulness that is exclusively restricted to attentional processes, such as the MAAS (Brown and Ryan 2003), which does not include the component of developing a non-judgemental attitude towards one’s experiences (Baer et al. 2006; Kabat-Zinn 1990). In other words, mindfulness practice not only means paying attention to the here and now with curiosity and openness but also implies an attitude of acceptance and equanimity (Bishop et al. 2004; Farb et al. 2012), which seems to need more time to develop, at least in clinical populations (Bogosian et al. 2016). It is related to the metacognitive ability to accept thoughts, with a non-judgemental perspective, non-attachment and decentring. This specific ability implies awareness, but also de-identification and reduced reactivity to the thought contents (Bernstein et al. 2015). To what extent acceptance also mediates positive affectivity in a medium/long term is an issue for future research, but it might be a good candidate, given the role that experiential avoidance plays in maladaptation and, for example, in physiological ageing processes (Alda et al. 2016).

Nevertheless, we did not observe relief in negative affect, perhaps because mindfulness is a worse predictor of this facet (Lopez et al. 2016); online programmes or brief interventions might be less effective in promoting regular practice of mindfulness and higher levels of commitment to the practice may be necessary to reach significant effects in that variable (Gu

et al. 2015; Vinci et al. 2014). Moreover, we found lower basal values of negative affect in the study participants compared to the Spanish health population (López-Gómez et al. 2015), so there also might have been ground effects to some extent (Wang et al. 2009). The proposed brief programme was unable to raise resilience, which was not surprising if we think of resilience as a trait whose improvement might need more intense and long-term interventions, and it was also unable to modify burnout. It has been said that resilience could play an important role in moderating/mediating burnout levels (Treglown et al. 2016), and affectivity might be implied in these processes (Montero-Marin et al. 2015). A possible explanation why we did not find improvements in these variables could be that the intervention was focused on acquiring personal resources but not on overcoming specific workplace demands (Back et al. 2016). This implies that these aspects of well-being would need to receive greater attention, including some new modules to deal with characteristics of the workplace, and allowing the application of the new skills learnt. Another issue might be the importance of ensuring minimum exposure to the online practices, which may be at least two sessions per week, if we want to improve positive affect. It is also possible that higher levels of compliance than those obtained in the present study might drive improvements in resilience and negative affect and, through them, help prevent burnout in the medium and long term (Montero-Marin et al. 2015). In this respect, it is important to better understand the long-term effect of these interventions in future research, including follow-ups at 6 or 12 months.

A major limitation of the programme was the poor adherence; only a relatively low percentage of participants completed the recommended online practical sessions. The level of attrition in online mindfulness programmes

requires further attention if higher participant engagement is to be achieved (Dowd et al. 2015). Some socio-demographic factors seemed to be associated with the level of online compliance. Specifically, it was observed that lower levels of compliance were seen among those who were younger, in employment and in a stable relationship. It has been said that mindfulness practitioners are less likely to be under the age of 40, perhaps because they have a lower perception of risk and less commitment to health promotion activities (Cramer et al. 2016). It has been pointed out that work-related pressures in Spanish GPs specially affect younger individuals with permanent employment status (Molina Siguero et al. 2003). Therefore, demanding workloads could be causing workers with a greater need for attention to be less willing to participate in self-care activities. It has also been said that singles tend to adhere better to the mindfulness practice (Cramer et al. 2016). This could be because they have more free time to practise after working hours, and in some way, this is something that would favour those who might have less social support, and thus, who would be more unprotected against stressful job demands (Montero-Marín et al. 2011). Finally, we observed that prior experience of meditation or mind-body practice might be related to the subsequent amount of online practice completion. In this sense, a preliminary dissemination work of meditation or mind-body exercises, e.g. in the workplace, may help to improve the subsequent engagement and completion of the online mindfulness programme. In this regard, the first face-to-face meeting held in this study appears to be an insufficient means of driving motivation for later independent use of mindfulness activities.

On the other hand, the amount of facilities dedicated to e-learning in medical education has increased sharply in recent years (Ruiz et al. 2006), but their use seems to be quite minimal (Tancred et al. 2015), and there is a need to adapt and test them in each area in order to strengthen teaching/learning processes (Byrne et al. 2016). We have already pointed out that a major limitation of the very simple blended programme used with Spanish GPs was adherence. It has generally been observed that the use of weekly reminders and some kind of guide or support facilitates engagement when using online interventions, favouring better outcomes (Berger et al. 2011; Kleiboer et al. 2015). Therefore, this other aspect of how to encourage greater adherence to practice should also be taken into account in future developments of this short-blended programme, e.g. through the use of mobile applications, telephone calls, emails, text messages or even by social networking or in-person connection and community building as ways to support group ongoing practice. Another parallel strategy should be to reinforce the links between educational programmes for GPs and the health systems where

professionals learn and practise, in the context of this new perspective of developing competencies (Frenk et al. 2010).

In summary, we have observed that the following: firstly, a blended web-based mindfulness programme with minimum face-to-face contact seemed to be feasible and conferred improvements in the positive affect of Spanish GPs; secondly, benefits to affectivity could be mediated by awareness; finally, the implementation of this kind of programmes might be useful for enhancing well-being in GPs in a cost-effective way, but testing the effectiveness using a randomized controlled trial design, improving adherence and exploring the long-term effects are aspects to be considered in future research.

In addition to the referred definition of mindfulness restricted to attentional processes, and also the poor adherence, both referred above, another limitation of the study was the level of dropouts in terms of assessment completion after intervention, although we found acceptable ratios within an expected range, given the nature of the programme (Stallard 2012). In total, between non-completers and dropouts, many participants were lost, and although this result provides interesting exploratory information, we must not lose sight of the increased risk of type I and II error, particularly when making multiple comparisons of secondary outcomes. Moreover, the uncontrolled and non-randomized design could hinder the establishment of solid sources of causation. In this sense, future studies could benefit from an attention-matched control group, and it would also be interesting to compare in-person programmes vs. blended programmes vs. fully online programmes in a three-way RCT design. In the light of our results, RCTs might be difficult to be carried out with primary healthcare professionals, at least among those who do not already have a certain interest in mindfulness. Finally, we did not take into account the satisfaction of GPs with the online platform, which may go towards explaining the low levels of practice and perhaps also dropouts.

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**Compliance with Ethical Standards** The study was approved by the Ethical Committee of the UAH, Madrid (Spain), and it was performed in accordance with the ethical standards laid down in the Declaration of Helsinki and its later amendments. All participants provided their written informed consent before participating in the study.



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

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