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Evaluation of a Brief Mindfulness-Based Intervention to Reduce Psychological Distress in the Workplace

Simon Grégoire · Lise Lachance

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Abstract Employees of a call center working for a financial institution took part in a brief mindfulness-based intervention (MBI). Each day, during five consecutive weeks, they listened to two short guided meditation sessions using a headset at their workstation (10 min in the morning and 5 min after lunch). A pretest-post-test switching-replication design was used to assess changes in mindfulness, psychological distress, and client satisfaction over the course of the intervention. During the first portion of the study, group 1 ($n=18$) acted as the intervention group while group 2 ($n=25$) acted as the control group. During the second portion, the intervention was replicated, and the roles of the two groups were switched. Data were collected using self-report questionnaires at baseline (t1), week 6 (t2), and week 11 (t3) and examined using both analysis of variance and prediction analysis. The results showed that mindfulness increased while psychological distress (stress, anxiety/depression, fatigue, and negative affect) decreased for all employees throughout the intervention, especially among those with low mindfulness scores at baseline. The satisfaction level of the employees' internal clients significantly increased over time, although the effect size was small. This article contributes to the field of mindfulness at work by (1) introducing a novel MBI specifically designed for call centers, (2) assessing the impact of the intervention on client satisfaction, and (3) doing so using a research design and a statistical technique which have never been used in mindfulness studies.

Keywords Mindfulness · Intervention · Psychological distress · Workplace · Client satisfaction

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Introduction

A significant number of employees suffer from psychological distress, a mental health outcome typified by psychophysiological (e.g., anxiety, depression, fatigue, and stress) and behavioral symptoms (e.g., irritability and anger) that are not specific to a given mental pathology (Dohrenwend et al. 1980). Marchand and Blanc (2011) conducted an 8-year longitudinal study with 5,500 employees working in various organizations in Canada. They found that 46.4 % of these employees experienced at least one episode of psychological distress during that period, 23.5 % had more than one episode, and 10.6 % three or more.

Employees working in the call center industry seem to be especially prone to experiencing psychological distress. A survey of more than 2,000 call handlers in France revealed that a significant number of them had experienced either mild (39.4 %) or severe (8.3 %) psychological distress symptoms over the previous 12 months (Charbotel et al. 2009). Almost 24 % had used psychoactive medication during that period. These results are not surprising, as call center employees face various risk factors for their mental health including a heavy workload, redundant tasks, lack of control over their work, and emotional dissonance (e.g., the incongruence between feeling and action) (De Cia et al. 2012).

Mindfulness-based interventions (MBIs; Cullen 2011) have recently been integrated into work settings in order to reduce psychological distress. Although these interventions may differ in various ways, they are all aimed at helping employees cultivate mindfulness, which involves consciously attending to one's moment-to-moment experience and being aware of one's inner and outer worlds, including thoughts, emotions, sensations, actions, and surroundings (Brown and Ryan 2003). During these interventions, employees learn through a variety of experiential and contemplative exercises how to intentionally pay attention to their ongoing sensory,

cognitive, and emotional experiences without elaborating upon or judging any part of this experience (Kabat-Zinn 2003). Searches on abstract databases such as PsycINFO reveal that the Mindfulness-Based Stress Reduction program (MBSR; Kabat-Zinn 1982) is the most common MBI implemented in work settings so far. Typically offered to groups over a period of 8 weeks, MBSR consists of weekly classes and one silence retreat between the sixth and seventh weeks. Throughout the program, the participants are taught various mindfulness meditation skills such as sitting meditation, Hatha yoga, and body scan (e.g., focusing attention on parts of the body and non-judgmentally noticing whatever sensations may be present in each area) and provided with ways of approaching stressful situations at home or at work using these skills. They are also invited to put these skills into practice in their daily lives for at least 45 min per day, 6 days per week. The goal of MBSR is to help participants develop the ability to calmly step back from thoughts and feelings during stressful situations rather than engaging in anxious worrying or other negative thinking patterns that might otherwise escalate into a cycle of stress reactivity (Bishop 2002).

To date, MBSR proved to be effective in diminishing symptoms of psychological distress among various types of employees (Virgili 2013), including call center agents. To our knowledge, Walach et al. (2007) are the only researchers who have assessed the efficacy of an MBI in a call center. Using both qualitative and quantitative data, the authors showed that, compared to a control group, call center agents in Germany who took part in an MBSR program increased their use of positive strategies to cope with stress and reduced their use of negative strategies. During interviews, most of the employees reported changes on how they coped with stress, stating, for instance, that they were less prone to react automatically or experience immediate panic when facing a problem. Although informative in many ways, the study by Walach et al. (2007) is based on a small sample ($n=27$) which limits the extent to which their findings can be generalized and reduces their statistical power. Moreover, as stress was the main variable examined in their study, it remains unclear to what extent MBIs can help reduce other symptoms of psychological distress such as anxiety, depression, fatigue, and negative affect among call center employees.

Even though MBIs appear to be effective means of promoting mental health among employees, their implementation in work environments such as call centers can represent a challenge. First, they require an extensive time commitment from employees (Zeidan et al. 2010). A typical MBSR protocol consists of weekly 2.5-h group sessions for 8 weeks, with one session being a full day retreat. Participants are also invited to practice meditation at home for 45 min per day, 6 days a week. This level of time commitment might discourage employees from undertaking an MBSR program or increase the chances that they will abandon it. Klatt et al. (2009)

pointed out that as the length of an MBI increases, the rate of attrition also increases. Employers might also be reluctant to invest in time-consuming mental health interventions that keep their employees away from their workstations for extended periods of time. Many call centers operate in a fast-paced and competitive environment where every minute agents are away from their desks could represent the loss of valuable clients. Moreover, Shapiro et al. (2006) have pointed out that time-consuming health interventions in organizations can sometimes backfire, as they end up putting more strain on the employees. According to Bazarko et al. (2013), given that many employees work on a busy schedule, there is a need for interventions that do not add additional time commitment and strain.

Second, MBIs typically remain classroom-based despite the fact that a growing number of organizations are going virtual (Warner and Witzel 2004) and prefer to avoid on-site, in-person interventions that are not easily accessible to employees who telecommute or work in other locations (Bazarko et al. 2013). In addition, as one HR director interviewed during previous investigations said: “many managers are still uncomfortable with the idea of gathering their employees in a room and having them relax by meditating while seated on a cushion with their legs crossed in the lotus position.” As this quote demonstrates, although MBIs are presented as secular interventions, there are deep-seated misconceptions and misunderstandings regarding meditation in the workplace.

Partly for these reasons, brief (or low-dose) MBIs have recently begun to emerge in the workplace. The overall length of these interventions is shortened, and the number of meetings and the amount of practice time are both reduced. For example, Mackenzie et al. (2006) assessed the efficacy of a brief version of the MBSR program lasting 4 weeks rather than the standard eight. They found that, compared to wait-list controls, the nurses and nursing aides who received mindfulness training (1) experienced less burnout symptoms, (2) were more satisfied with their life, and (3) felt more relaxed. Klatt et al. (2009) also offered a brief version of the MBSR program to full time faculty and staff employed at a large university in the USA. In this 6-week intervention, the duration of the weekly meetings was reduced from 2.5 to 1 h, the daily meditation periods were reduced from 45 (or even 60)min to just 20 min of meditation/yoga, and the full day retreat used in traditional MBSR was omitted. Based on the results of their randomized controlled study, the authors assert that a low-dose MBSR program can help increase mindfulness and sleep quality of employees while reducing their perceived stress.

Innovative ways of delivering MBIs in the workplace have also been introduced using formats in which participants do not necessarily need to gather in a classroom. For instance, Hülshager et al. (2013) designed a self-training program inspired by MBSR and mindfulness-based cognitive therapy (MBCT; Segal et al. 2002) that spanned 2 weeks (ten working

days). Employees were not asked to take part in any regular group sessions. They were given a booklet containing detailed information on how and when to conduct various mindfulness practices (e.g., do a body scan twice a day for the duration of the 2-week study) and a CD containing various audio files of guided meditations. The authors found that employees who went through the self-training program had significantly higher levels of mindfulness and felt less emotional exhaustion than did the controls. Wolever et al. (2012) assessed the impact of a stress management program similar in many ways to MBSR, but which explicitly targeted work-related stress, work-life balance, and self-care. The program was provided to employees of an insurance company, both in person in a conventional classroom and through an online virtual classroom that allowed for real-time bidirectional communication. Compared with the control group, employees who took part in the program (either in a classroom or online) showed significantly greater improvements in perceived stress, sleep quality, and heart rhythm coherence ratio. Bazarko et al. (2013) developed a hybrid format MBSR program combining both classroom and telephonic delivery methods to provide access to nurse telecommuters employed at a large multisite health-care company. Their results indicate that the nurses who participated in the intervention showed decreased perceived stress and burnout, improved mental health and social functioning, and increased overall general health.

While these brief and flexible MBIs might be better suited for some work environments, it is important to investigate whether they can provide similar benefits as those derived from interventions such as MBSR (Zeidan et al. 2010). Although preliminary evidence suggests that this is the case, additional studies are required as this promising line of research is still in its infancy.

Interestingly, it has been suggested that in addition to their impact on mental health, MBIs could also have positive impacts on other issues such as work-life balance (Allen and Kiburz 2011), work satisfaction (Hülsheger et al. 2013), leadership development (Baron and Cayer 2011) as well as work performance and turnover intentions (Dane and Brummel 2013; Reb et al. 2013). In call centers, client satisfaction is a critical performance outcome (Feinberg et al. 2002), and surveys are routinely used to track the satisfaction levels of both internal and external clients. The influence of MBIs on client satisfaction remains unknown; however, there is evidence suggesting that call agents who receive mindfulness training might also be better at interacting with clients, which could in turn increase the satisfaction of those clients. For instance, it has been shown that mindfulness training helps promote *reperceiving* Shapiro et al. (2005) or cognitive defusion (Hayes et al. 2012), that is, the ability to observe one's thoughts or emotions as temporary events in the mind not requiring any particular response rather than as

reflections of the self that are necessarily true or important. By cultivating mindfulness, one gains an increasing capacity for objectivity about one's own internal experience. This ability might be a valuable one for call center agents as they have to interact with clients and customers on a regular basis and face many emotional demands (Grebner et al. 2003). Thus, when dealing with difficult thoughts (e.g., "I'm not good at this," "I'm stupid") or emotions (e.g., anger and sadness) during an interaction with a client, a mindful employee might be better at distancing himself from these mental experiences and observing them objectively and non-judgmentally. For instance, an agent who has been insulted may feel angry, but instead of reacting upon it, he/she simply notices and observes the emotion without any attempt to avoid or control it. Rather than responding automatically or impulsively to his client, he/she remains calm and serene. Although from a conceptual standpoint, the relationship between MBIs and client satisfaction appears to be reasonable; it has not yet been tested empirically.

The goal of this study was to build upon and extend existing research on the role of MBIs in the workplace. More specifically, its aim was to develop a brief and flexible MBI for call center employees and assess its effect on mindfulness, psychological distress, and client satisfaction. Based on past studies, we hypothesized that mindfulness would increase from pre-intervention to post-intervention (H1) while psychological distress would decrease (H2). We also hypothesized that the decrease in psychological distress would be associated with gains in mindfulness (H3). The second aim of this study was to assess the impact of this MBI on client satisfaction. We hypothesized that client satisfaction would increase from pre-intervention to post-intervention (H4). The study makes three contributions: (1) it introduces a novel MBI specifically designed for call centers; (2) it assesses the impact of the intervention on client satisfaction, a performance outcome that has not been examined in mindfulness research to date; and (3) it does so using a research design (i.e., the pretest-post-test control group switching-replication design) and a statistical technique (prediction analysis) which have never been used in mindfulness studies to our knowledge.

Method

Participants

The intervention described below was offered to 102 full time employees of the call center of a financial institution in Canada. Forty-nine employees ($N=49$) working in three different cities chose to take part in the intervention. Most of the participating employees were women (91 %). Seventy-five percent were call center agents and the remainders were managers. The mean age was 35.8 with an age range of 26

to 57. The participating employees received no monetary compensation or other incentive for taking part in this study.

Experimental Design

The intervention was assessed using a pretest-post-test control group switching-replication design (Trochim and Donnelly 2007). This design can be conceptualized as two pre-post-treatment-control designs grafted together. During the first portion of the study, group 1 acted as the intervention group while group 2 acted as the controls. During the second portion, the intervention was repeated and the roles were switched: Group 1 became the control group while Group 2 became the intervention group. By the end of the study, all of the employees had completed the intervention (Table 1).

In order to create groups of similar size, the random function in Excel was used to generate a number for each participant. The employees with odd numbers were assigned to group 1 while those with even numbers were assigned to group 2. Because the participants' vacation and training schedules had to be taken into account, full randomization was not possible, and three employees ($n=3$) were assigned to their preferred group to accommodate their schedule. Twenty-four participants were assigned to group 1 ($n=24$) while 25 were assigned to group 2 ($n=25$). Six employees did not complete all the questionnaires. Therefore, the analyses were conducted on a sample of 43 employees ($N=43$), 18 in group 1 ($n=18$), and 25 in group 2 ($n=25$). Unfortunately, it was not possible to compare those employees who completed all three questionnaires and those who answered only one or two, as no statistical test would provide sufficient power.

Procedure

The 5-week intervention used in this study consisted of 15 min of daily audio sessions. Everyday, for five consecutive weeks, the participating employees were guided through brief body scans and sitting meditation sessions. During regular working hours, they were invited to listen to a 10-min audio session in the morning before beginning their work and an additional 5-min audio session just after lunch. All audio sessions were created and recorded by a Shambhala Buddhist nun with more than 20 years of experience teaching mindfulness meditation. These sessions covered five different themes, one for each week (*attention to physical sensations, attention to the breath, attention to sounds and silence, attention to emotions, and awakening confidence*), and they were based on the following processes: attention and awareness, acceptance and openness, decentering, letting go, focusing on the present moment, and the practice of being fully aware during everyday activities.

For the meditation sessions during week 1, the employees were simply asked to bring more attention to their physical

sensations and tensions in their bodies without trying to achieve any particular objective. During week 2, they were gradually trained to turn their attention to their breath and encouraged to use it as an anchor during periods of tension and distress at work. They were also encouraged to stay in the present moment whenever possible rather than ruminate about the past or worry about the future. In week 3, the employees were trained to turn their attention to sounds and to silence. They were also encouraged to be mindful of both their internal and external experience and to avoid acting impulsively or automatically. During week 4, they were helped to be more attentive and aware of their emotions and were encouraged to deal with difficult emotions with acceptance, curiosity, and openness. In week 5, the employees were helped to develop self-confidence. Specifically, they were encouraged to see their fears, insecurities, or anxiety at work as natural and to try to handle those emotions with kindness rather than attempting to control them or becoming paralyzed by them.

At the end of each audio session, the employees were encouraged to apply what they had learned throughout the day, both at work and at home. The language used in these sessions was slightly adapted to fit the corporate world. For example, the words "Buddhism" and "meditation" were never used. Before launching the intervention, all of the recorded sessions were reviewed by the organization to make sure the content was secular and contained no spiritual references.

All of the recorded sessions were uploaded on an internal server in mp3 format so that the employees would simply select the tracks for the day on their computer and listen to them using a headset at their workstation. Precautions were taken to make sure that the employees were undisturbed during the sessions. For example, they were asked to turn off their computer screen or move their chair away from it and close their eyes while listening to the audio sessions. There were also given a sign (*Please do not disturb*) which they could hang on their office door or put on their desk when listening to a session. Moreover, all employees within the call center were made aware that a study was being conducted and asked to collaborate by not disturbing their colleagues during their guided meditations.

Prospective participants attended a group information meeting during week 1 prior to the beginning of the intervention. Three information meetings were organized, one in each of the three cities where the participating employees were located. The meetings took place within the offices of the financial institution and were held by the first author of this study and the Buddhist nun who had prepared the audio sessions. The goal of these meetings was to explain the aims and format of the intervention and respond to any questions from the participants. The first measurements (t_1) were completed immediately after these meetings while the other measurements were completed at week 6 (t_2) and week 11 (t_3 ; see Table 1). Mid-training meetings were also held at the

Table 1 The pretest-post-test control group design with switching-replication used in the study

	t1					t2					t3
	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11
Group 1		X1	X2	X3	X4	X5					
	O					O					O
Group 2							X1	X2	X3	X4	X5
	O					O					O

t times of measurement, *W* weeks, *X* sessions, *O* data collection

beginning of week 4 (for group 1) and at the beginning of week 9 (for group 2), again, one in each of the three cities. These 1-h meetings were led by the Buddhist nun and were intended to provide the participants with additional training on better regulating their emotions at work, as a complement to the audio sessions.

The investigators received approval from their university institutional review board prior to recruiting employees for this study. All employees gave written informed consent before participating in the program. They received no compensation for taking part in this study.

Measures

The demographic characteristics were assessed at t1. Participants were asked to report their age, gender, occupation, and work site. The other variables were assessed at all three data collection time points (t1, t2, and t3).

Mindfulness was assessed using the Mindfulness Attention Awareness Scale (MAAS; Brown and Ryan 2003; Jermann et al. 2009). This 15-item scale addresses cognitive, emotional, physical, interpersonal, and general domains in an indirect way (e.g., “I find myself doing things without paying attention”). Respondents must indicate how frequently they experience the situation described in each item using a six-point Likert scale ranging from 1 (*almost always*) to 6 (*almost never*), where high scores reflect more mindfulness. Brown and Ryan (2003) assumed that indirect items would be more “diagnostic” than direct claims of mindfulness since mindless states are more common than mindful states (Brown and Ryan 2003, p. 825). People completing the MAAS are thus asked to rate how often they have experiences of mindlessness (e.g., being on automatic pilot). The coefficients of internal consistency of the MAAS were above .90 across the three measurement time points.

Consistent with the definition of psychological distress presented above (Dohrenwend et al. 1980) and the psychophysiological and behavioral symptoms commonly associated with it, we assessed psychological distress using the following indicators: (a) stress, (b) anxiety and depression, (c) fatigue, and (d) negative affect. Stress was measured using the

Psychological Stress Measure (PSM-9; Lemyre and Lalande-Markon 2009; Lemyre and Tessier 1988). The respondents were again asked to evaluate how often over the last 5 days they had experienced various manifestations of stress (e.g., “I felt preoccupied, concerned or anxious.”) using a five-point Likert scale ranging from 1 (*never*) to 5 (*always*). High scores on the PSM-9 reflect more stress. Alpha coefficients for the scale varied from .86 to .92 across all measurement time points.

Anxiety and depression were measured using the five-item subscale of the same name of the Psychological Distress Manifestation Scale (PDMS; Massé et al. 1998). Respondents were asked to evaluate how often they had experienced various manifestations or signs of anxiety and depression (e.g., “I felt preoccupied and uneasy.”) over the last 5 days using a five-point Likert scale ranging from 1 (never) to 5 (always). High scores reflect more anxiety and depression. The alphas for this subscale varied from .86 to .91 across all measurement time points.

The respondents’ level of fatigue was measured using the Fatigue Scale (Chalder et al. 1993). They were asked whether or not they had experienced, over the last 5 days, physical (e.g., “Do you feel sleepy or drowsy?”) or mental (e.g., “Do you have difficulty concentrating?”) symptoms of fatigue. This 14-item scale is based on a four-point Likert scale ranging from 1 (less than usual) to 4 (much more than usual). Higher scores on this scale indicate greater fatigue. In this study, the alpha coefficient indices of internal consistency for the Fatigue Scale varied from .91 to .94.

Negative affect was measured using the subscale of the same name of the *Positive and Negative Affect Schedule* (PANAS; Gaudreau 2000; Watson et al. 1988). This subscale comprised ten negative mood adjectives such as “scared” and was used in this study to assess the frequency of negative affect over the last 5 days. The PANAS uses a five-point Likert scale, ranging from 1 (*not at all or very slightly*) to 5 (*extremely*). Higher scores indicate higher negative affect. Alpha coefficients for this subscale varied from .77 to .87.

The level of satisfaction of the clients was assessed using an internal survey developed by the organization. At t1 ($n = 1673$) and t3 ($n = 1146$), internal clients of the study

participants were randomly selected and asked to complete the survey via the Internet. The respondents to the survey were clients within the organization who dealt with the employees previously described on the phone on a regular basis. About 3 % of the clients completed both times of measurement. The response rate was 39.7 % at t1 and 39.1 % at t3, with a maximum margin of error of ± 1.1 %. The eight items contained in the survey aimed at assessing clients' level of satisfaction when dealing with call agents (e.g., "I am satisfied with the way my requests are handled."). It is based on a four-point Likert scale ranging from 1 (*not at all satisfied*) to 4 (*very satisfied*) so that a high score indicates greater satisfaction. To uncover the underlying structure of the eight items, an exploratory factor analysis (EFA; principal axis factoring extraction method) was applied to the t1 data. The Bartlett's test of sphericity, chi-square test ($\chi^2(28)=7721.34, p<.001$), and Kaiser-Meyer-Olkin value (.94) all suggested that the data were suitable for this type of analysis. The EFA revealed only one factor with eigenvalues greater than 1, and the scree plot indicated a clear break after this factor, which explained a total of 60 % of the variance (eigenvalue=4.60). These results were replicated with the t3 data. Moreover, the alpha coefficients for t1 and t3 were .92.

Data Analyses

Hypotheses 1 and 2 were assessed using univariate and multivariate analyses of variance and the prediction analysis technique (Hildebrand et al. 1977; Szabat 2005). Although analysis of variance is a commonly applied technique, prediction analysis is not. This type of analysis was used as it was expected that the non-clinical population participating in this study would show few psychological distress symptoms at baseline. It has been shown that in such circumstances, it is difficult to detect improvement following a mental health intervention using traditional analyses of variance and that these analyses may lead to underestimates of the effects of the intervention, especially when the sample size is small (Ducharme et al. 2007; Lévesque et al. 2008). Prediction analysis addresses this problem by taking into account ceiling and floor effects in the score distribution at baseline and the phenomenon of regression towards the mean for participants at both ends of the scale (extreme scores), which is not the case in univariate and multivariate analyses of variance (Whitlatch et al. 1991). Unlike ANOVA and MANOVA, which serve to analyze the mean differences between groups, prediction analysis refers to expected successful outcomes based on specific criteria for individuals participating in an intervention (experimental condition) and unsuccessful outcomes for those not participating in the intervention (control condition). In other words, predictions for each participant are made based on (1) their scores on dependant variables at baseline and (2) the group they are in (control or intervention).

For example, if a participant in the experimental group scores high for anxiety at baseline, we would expect a large improvement for that particular participant following the intervention as there is a lot of room for improvement. We would make a more modest prediction of improvement for a participant who scored low for anxiety at baseline.

Hypothesis 3 was assessed with gain scores and zero-order correlations (Thomas and Zumbo 2012) while hypothesis 4 was assessed using independent sample *t* test.

Results

According to our first hypothesis, mindfulness was expected to increase throughout the study, but in distinct ways for each group. It was hypothesized that at t2, employees in group 1 would be significantly more mindful than those in group 2, but this difference would no longer be significant at t3. In other words, both a group-by-time interaction effect and a main effect for time were expected. To test this hypothesis, the data were first analyzed by a two-way mixed design analysis of variance (ANOVA) with one between-subject factor (group 1 and group 2) and one within-subject factor (time: t1, t2, and t3). When participants are not randomly assigned to groups, this type of analysis has proven to be more appropriate than the ANCOVA (e.g., Huitema 1980; Lord 1967). In fact, in semi-random methods of group assignment, between-group differences occur not only because of chance variation but also because of systematic differences between the groups.

Prior to running this analysis, the normality of the data was tested using the Kolmogorov-Smirnov and Shapiro-Wilk tests. Moreover, the homogeneity of variance-covariance matrices was assessed with Box's M test. The presence of outliers was also checked (.001 level) using both univariate (*z* scores) and multivariate (Mahalanobis distance) approaches. No violations or outliers were detected.

The ANOVA results revealed a group-by-time interaction effect [$F(2, 82)=6.99, p=.002, \eta_p^2=.15$], main time effect [$F(2, 82)=19.23, p<.000, \eta_p^2=.32$], and no significant main effect for group [$F(1, 41)=0.29, p=.595$]. The group-by-time interaction effect and the main effect for time explained 15 and 32 % of the variance, respectively, as gauged by the partial eta-squared value. Simple effect analysis conducted on the interaction revealed a significant effect for group at t1 [$F(1, 41)=5.48, p=.024; \eta_p^2=.12$], but none at t2 or t3. As shown in Table 2, employees in group 2 were significantly more mindful than those in group 1 at baseline. Regarding the main effect for time, Bonferroni pairwise comparisons (.01 level) revealed that the mean mindfulness scores were higher at t3 than those at t1, regardless of the group.

Our second hypothesis was that psychological distress would decrease in both groups over the course of the

Table 2 The evolution of mindfulness and psychological distress indicators throughout the study for both groups

Variables	gr. 1 (n=18)						gr. 2 (n=25)						Multivariate <i>F</i>			Univariate <i>F</i>		
	t1		t2		t3		t1		t2		t3		GXT	T	G	GXT	T	G
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD						
Mindfulness	3.15	0.81	3.92	0.66	4.09	0.87	3.69	0.70	3.78	0.73	3.99	0.57				6.99**	19.23***	0.29
Psychological distress													2.47*	3.03*	2.43			
Stress	2.66	0.67	2.16	0.77	2.02	0.67	2.81	0.84	2.81	0.64	2.50	0.50				2.78	9.93***	6.12*
Anxiety-depression	2.44	0.64	1.86	0.74	1.80	0.71	2.61	0.90	2.42	0.65	2.28	0.62				1.57	9.48***	5.23*
Fatigue	2.41	0.49	1.99	0.44	2.17	0.46	2.34	0.42	2.23	0.28	1.98	0.44				3.53*	7.60***	0.26
Negative affects	1.88	0.47	1.45	0.35	1.45	0.46	2.01	0.73	2.02	0.60	1.64	0.37				3.53*	9.97***	5.49*

gr: 1 group 1, gr: 2 group 2

* $p < .05$; ** $p < .01$; *** $p < .001$

intervention, but in a different pattern for each group. We hypothesized that at t2, employees in group 1 would be less distressed than those in group 2, but this difference would no longer be significant at t3. Since various measurement time points and multiple non-commensurate psychological distress indicators were used, a doubly multivariate analysis of variance (MANOVA) was performed to test this hypothesis, with group (group 1 and group 2) as the between-subject variable and time (t1, t2, and t3) as the within-subject variable. Assumption testing was conducted to check for normality, homogeneity of variance-covariance matrices, and univariate and multivariate outliers, with no serious violations noted.

The multivariate analysis revealed a time-by-group interaction effect [$F(8, 34)=2.47, p=.031$, Wilks' lambda=.63, $\eta_p^2=.37$] and a main effect for time [$F(8, 34)=3.03, p=.011$, Wilks' lambda=.58, $\eta_p^2=.42$], but no significant main effect for group [$F(4, 38)=2.43, p=.064$, Wilks' lambda=.80]. The interaction effect suggests that the combined distress indicator evolved differently for each group over time. The examination of this effect at the univariate level showed that while negative affect [$F(2, 82)=3.53, p=.039$, $\eta_p^2=.08$] and fatigue [$F(2, 82)=3.53, p=.037$, $\eta_p^2=.08$] evolved differently for each group, levels of stress [$F(2, 82)=2.78, p=.071$] and anxiety-depression did not [$F(2, 82)=1.57, p=.216$]. Simple effect analyses revealed no differences between the groups at t1 regarding negative affect and fatigue. At t2, the employees in group 1 experienced significantly less negative affect and fatigue than employees in group 2, while at t3, these differences were no longer significant.

The doubly MANOVA also revealed a significant main effect for time on the combined distress indicator. When the results were considered separately with univariate analyses, significant differences were found for all distress indicators. Bonferroni pairwise comparisons showed that, for both groups, the levels of stress, anxiety-depression, negative affect, and fatigue significantly decreased between t1 and t3.

In order to conduct the prediction analyses, the participants were first divided into quartiles based on the distribution of their baseline scores for each dependent variable. For each quartile, criteria for successful and unsuccessful outcomes were defined in standard deviation units in terms of the expected change for each dependent variable. Based on the method of Whitlatch et al. (1991), Table 3 shows the criteria for expected successful outcomes in the experimental condition and for expected unsuccessful outcomes in the control condition.

It is important to note that both positive (e.g., mindfulness) and negative (e.g., anxiety/depression) indicators were examined in the analyses. Moreover, the analyses were conducted to assess changes from t1 to t2 only because the control group used between t2 and t3 cannot be considered a classic control group, as the employees in this group had already taken part in the intervention. Under the prediction model, successful outcomes are expected for participants taking part in the intervention (group 1) and unsuccessful outcomes for those in the control condition (group 2). In other words, the model proposes an association between intervention and successful outcomes. The DEL statistic is used to test the prediction model and z values that serve to test whether the observed values contain more cases than expected under the assumption of no association between intervention and successful outcomes. Unlike chi-square analysis, prediction analysis compares expected with observed cell frequencies only for specified prediction cells rather than among all cells.

These analyses revealed significant differences for all dependent variables (see Table 4). For each of these variables, more participants in group 1 had successful outcomes (from 72.2 to 88.9 %, depending on the variable) than in group 2 (from 24 to 40 %). According to the DEL statistic values, the proposed model described the data from 44 to 58 % better than did the model based on an assumption of no association. In summary, the results of the prediction analyses indicate that the intervention

Table 3 Criteria used to determine expected successful outcomes in the experimental condition and expected unsuccessful outcomes in the control condition

Positive indicators	Negative indicators	Experimental condition (predicted and successful outcomes)	Control condition (predicted and unsuccessful outcomes)
Low	High	More than 1 standard deviation of improvement	Less than 1 standard deviation of improvement
Medium-low	Medium-high	More than .5 standard deviation of improvement	Less than .5 standard deviation of improvement
Medium-high	Medium-low	Any improvement	Stability or deterioration
High	Low	Any improvement, stability or slight deterioration (less than .5 standard deviation)	Stability or deterioration

had positive effects on mindfulness and psychological distress indicators for members of group 1.

According to our third hypothesis, the decrease in psychological distress over the course of the intervention was expected to be associated with an increase in mindfulness. In order to test this hypothesis, gain scores were calculated for all psychological distress indicators and for mindfulness by subtracting the scores obtained on these indicators at t1 from those obtained at t3. The zero-order correlations between distress gain scores and mindfulness gain scores were then examined. These analyses revealed a negative correlation between the mindfulness gain scores and the gain scores for all the indicators of psychological distress (stress: $r = -.50$, $p < .001$; anxiety/depression: $r = -.56$, $p < .001$; fatigue: $r = -.62$, $p < .001$; negative affect: $r = -.46$, $p < .001$) with the strength of the association varying from moderate to strong (Cohen 1988). This suggests that as employees develop their mindfulness skills, their psychological distress tends to diminish.

According to our fourth hypothesis, the intervention would help increase the satisfaction level of clients. In order to test this assumption, a t test with Welch's correction was used, as the variances differed significantly according to Levene's test, $F(1, 2817) = 5.57$, $p = .018$. The results, $t(2498) = -3.28$, $p < .001$, $d = .13$, 95 % CI [-0.08, -0.02], showed that the mean of satisfaction for all eight items was significantly higher at t3 ($M = 3.66$; $SD = .41$) than at t1 ($M = 3.61$; $SD = .42$). However, the effect size was small. Unfortunately, it was not possible to test this hypothesis with multilevel analysis for nested data because the data on client satisfaction gathered by the organization were aggregated, so client satisfaction scores for each employee were not available.

Discussion

The studies conducted thus far in the workplace suggest that MBIs can help promote mental health among employees (Virgili 2013). Unfortunately, this might not be enough to

Table 4 Successful and unsuccessful outcomes frequencies on dependent measures by group for time changes

Dependent variables	Change from time 1 to time 2				del	z	p
	Successful outcome		Unsuccessful outcome				
	Observed	Expected	Observed	Expected			
Mindfulness							
Group 1	14 (0.78)	8.37	4 (0.22)	9.63			
Group 2	6 (0.24)	11.63	19 (0.76)	13.37			
Stress					0.58	4.66	0.00
Group 1	15 (0.83)	8.79	3 (0.17)	9.21			
Group 2	6 (0.24)	12.21	19 (0.76)	12.79			
Anxiety/depression					0.46	3.48	0.00
Group 1	16 (0.89)	10.88	2 (0.11)	7.12			
Group 2	10 (0.40)	15.12	15 (0.60)	9.88			
Fatigue					0.44	3.15	0.00
Group 1	13 (0.72)	8.37	5 (0.28)	9.63			
Group 2	7 (0.28)	11.63	18 (0.72)	13.37			
Negative affect					0.54	4.30	0.00
Group 1	16 (0.89)	10.05	2 (0.11)	7.95			
Group 2	8 (0.32)	13.95	17 (0.68)	11.05			

convince organizations to adopt these interventions, as they can be time-consuming (Klatt et al. 2009) and are typically offered in classrooms, a setting ill-suited for a growing number of workplaces (Bazarko et al. 2013). It is therefore important to investigate whether MBIs of shorter duration and delivered in a more flexible manner can provide the same health benefits that result from traditional MBIs (Zeidan et al. 2010). It is also important to develop a better understanding of the impacts of MBIs on performance outcomes such as client satisfaction, as such insights may help convince decision-makers to invest in mindfulness initiatives. As many have pointed out, we still have very little data on the effect of MBIs on social and organizational functioning and research regarding the effects of mindfulness training on how employees perform their work tasks is still in its infancy (Dane 2011; De Vibe et al. 2012).

This study was conducted to address these issues. Its aims were to examine the trajectories of the changes in both mindfulness and psychological distresses in call center employees who took part in a 5-week, on-site MBI and to assess the impact of this intervention on client satisfaction, a critical performance outcome in call centers. The intervention proved to be helpful in increasing the employees' level of mindfulness. In fact, a significant change in terms of mindfulness was observed for both groups between t1 and t3. However, the magnitude of this change appeared moderate according to the criteria of Cohen (1988) and was more significant for group 1 participants, probably because they had a lower level of mindfulness at baseline (and therefore more room for improvement). Interestingly, mindfulness level continued to increase for members of group 1 during the second portion of the study even though the intervention was no longer being given to them. At least two reasons might explain this result. First, although employees had been informed that the intervention was over, the meditation sessions were left on the organization's server so that some employees may have continued listening to them outside of working hours, perhaps from their homes. Secondly, the intervention may have longer term effects or produce changes that are accentuated over time. In the future, the use of a 6- or 12-month follow-up design would allow this hypothesis to be tested.

The intervention also helped reduce psychological distress among participating employees. All indicators significantly decreased between t1 and t3, showing a moderate magnitude of change. In the first portion of the study (between t1 and t2), all distress indicators for group 1 decreased, and at t2, they were found to be significantly lower than the indicators for group 2. In the second portion of the study (between t2 and t3), the levels of negative affect and fatigue in group 2 decreased, and at t3, they were no longer different from the levels in group 1. Although levels of stress and anxiety/depression in group 2 also decreased after the intervention, they remained significantly higher than those in group 1 at t3,

contrary to what was expected. Again, these results suggest that the intervention was more beneficial for employees who had lower mindfulness scores at baseline.

The changes in psychological distress over the course of the intervention were associated with changes in mindfulness. As the employees became more mindful, their psychological distress tended to diminish; they became less stressed, anxious, depressed and tired, and tended to experience less negative affect. These correlations suggest that mindfulness played a role in promoting mental health through this intervention. In the future, it would be important to test the robustness of these results by using an active control group and alternative instruments to measure mindfulness.

The results of this study showed that client satisfaction increase significantly throughout the intervention, but that the effect size of this change was rather small. These preliminary findings are promising as they suggest that mindfulness training may change the way employees approach their clients. Employees may gradually become capable of disidentifying from the contents of their mind (i.e., their thoughts and emotions) and view their moment-by-moment experience with greater clarity and objectivity (Shapiro et al. 2006). This shift in perspective may change the way they interact with their clients on the phone in a positive way (e.g., by being less reactive) and, in turn, increase their clients' satisfaction. In the future, it would certainly be interesting to test mediating hypotheses, examining whether, for instance, MBIs influence client satisfaction through their effect on mindfulness or on mental health. In the current study, it was not possible to test such hypothesis because the data on client satisfaction gathered by the organization were aggregated. Therefore, client satisfaction scores for each employee were not available.

This study contributes to the field of mindfulness in the workplace in three distinct ways. From an intervention standpoint, it introduces a novel MBI that has several advantages over traditional MBIs. First, it is less time-consuming. Participants are asked to practice meditation for 15 min per day during five consecutive weeks, which is far less practice than that required in typical MBSR programs. Therefore, busy employees with no prior experience with meditation may be more inclined to try this program and follow it through to completion. For employers, this brief intervention might be easier to integrate into their employees' regular work schedule without adding more strain and time commitment (Shapiro et al. 2005). Second, the intervention is flexible as the employees receive the majority of their mindfulness training at their work station. Such flexibility might be especially convenient for organizations that have employees in various locations or working from home. It can also be more convenient for those organizations that cannot afford to gather their employees in a training room for long periods of time, as is often the case for call centers.

From a research standpoint, this study assessed the impact of a brief MBI on client satisfaction, a variable not previously considered in mindfulness studies. Although the impact of the intervention on this variable was small, managers found it relevant. In fact, client satisfaction within the call center had been stagnant for many years, and they had made various attempts to increase it without success. For these managers, the extent of change in client satisfaction was thus important, meaningful, and useful. The intervention made a noticeable difference in their everyday working life and the lives of their internal clients. Nevertheless, the results of this study with regard to client satisfaction should be interpreted with care, and efforts should be made in the future to replicate these findings.

From a methodological standpoint, this study uses a research design (the pretest-post-test control group switching-replication design) and a statistical technique (prediction analysis) not frequently used in the mindfulness literature and opens new research avenues. In addition to being a robust design, the switching-replication design can be implemented easily in organizations, as all participants can benefit from the intervention in a relatively short period of time. Because of its unique nature, this research design also allows the formulation of innovative hypotheses regarding the evolution of criterion variables throughout the intervention. It thus represents an original alternative to the traditional pretest-post-test designs used in MBI studies. Secondly, traditional univariate and multivariate analyses were complemented by prediction analysis. Not only did we explore how group means evolved over the course of the intervention but we also assessed how each participant changed over time. In the future, we hope this study will encourage other investigators to integrate prediction analysis into their work on mindfulness. The results obtained from prediction analysis can help identify the factors that characterize different individual profiles, which could contribute to a better understanding of the mechanisms of action through which mindfulness works. It would also allow researchers to explore new questions and think about the people and settings they are studying in novel ways.

Limitations and Suggestions for Future Research

The present study has certain limitations that should be taken into account. First, the method used to assign the employees to groups may have introduced a selection bias and threatened the validity of the findings. Even though it is a challenge to do so in work settings, efforts should be made to replicate the results presented in this paper using a fully randomized controlled trial with adequate allocation concealment. Other threats to internal validity include the fact that no data were obtained regarding the employees' prior experience in terms of mindfulness meditation, which may have influenced participation and outcomes in this study. Second, this study

involved a small number of participants ($N=43$) followed for a relatively short period of time (11 weeks). In the future, it would be important to verify whether the effects observed in this study hold for a larger sample size and whether they last over a 6- or 12-month follow-up period. Third, the homogeneity of our sample was quite high. The agents and managers who took part in this study were drawn from a highly specific work environment (a call center of a financial institution) and were mainly women. Future work should examine the applicability of this intervention to a more gender-diverse sample and in different types of work settings. Efforts should also be made to assess the consistency of the employees' participation during the intervention. If this information had been gathered in this study, more nuanced results may have been obtained. Fourth, the self-report questionnaire used to assess mindfulness used in this study has recently received some criticism. Grossman (2011), for example, argues that the MAAS does not measure mindfulness but, rather, the propensity to experience lapses of attention. He also argues that responses to the questionnaire can be influenced by social desirability, especially when used in intervention studies. The results presented in this paper may have been biased by the employees' own desires for gains in terms of mindfulness after spending time and effort on personal development practices for five consecutive weeks. They may have been aware of the "right" answer to items on the MAAS and completed the questionnaire in a socially desirable manner. Fifth, the guided meditations were left on the organization's server throughout the intervention. Although they were not accessible to the members of group 2 during the first portion of the study, the guided meditations continued to be available to the members of group 1 during the second portion of the study, although the group 1 employees no longer had time planned into their schedules to listen to them. It appeared to be a reasonable decision from an ethical standpoint to let the employees of group 1 use the guided meditations for personal use, but this decision may have reduced the power of the study, as we do not know how many employees within this group continued their meditation practice during the second portion of the study. Finally, the intervention presented in this article has certain disadvantages that need to be underlined. For instance, it does not allow employees to benefit significantly from the group dynamic. Participants who take part in group-based mindfulness programs such as MBSR have the opportunity to be supported by the group in their explorations and to offer support as well, which is beneficial in many ways (McCown et al. 2010). Also, in the brief MBI used in this study, the employees cannot take advantage of personal supervision and support or guidance from the trainer, as the program is generic. Therefore, this training format may not be as rich and insightful as those used in traditional MBIs such as MBSR.

Despite its limitations, the present study brings up some interesting follow-up research questions. For instance, based

on the recommendations of Kabat-Zinn (1982), the mindfulness teachings provided in this intervention were presented by a Buddhist nun who embodies mindful qualities and is committed to maintaining a personal meditation practice. Although sound from an intervention standpoint, this choice leaves a research question unanswered: Would we have obtained similar results with an instructor who had less experience with meditation? This is not a trivial question, as a growing number of organizations may be tempted to move towards MBIs and ask their HR staff to manage these interventions even if they do not have any personal experience with meditation. In his book, Chaskalson (2011) sustains that there is a real danger that inexperienced HR personnel will be asked to lead groups based on their own very limited experience of mindfulness. To our knowledge, no research conducted in workplace settings to date has been designed explicitly to examine the influence of the instructor's training in meditation practices on the effectiveness of an MBI. Similarly, there has been no research investigating to what extent MBI instructors need to be present in the training room with their participants in order for the intervention to be effective. In MBSR, instructors typically spend a great deal of time with participants, answering questions or helping them deal with difficulties in their meditation practice. In this study and others (see, for example, Hülshager et al. 2013), the instructors spent very little time with the participants. As stated previously, the Buddhist nun who gave this intervention met with the employees only twice. Obviously, she was with them "virtually" during the entire intervention, but she was not with them in situ. Would we have obtained larger effects sizes if she had met with the employees more often? To what extent can mindfulness meditation be self-taught? These questions warrant further attention in future studies.

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