Comparison of Impacts of a Corporate All-Comer Mindfulness Program between Employees with Compromised and Preserved Wellbeing

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Abstract

**Background:** Evidence to support a corporate mindfulness program is limited to a small number of studies focusing primarily on employees with compromised wellbeing and/or under high stress levels. The primary aim of this study was to, in a corporate setting, compare the impact of a mindfulness program between employees with compromised and preserved wellbeing.

**Methods:** We conducted in-person and online 8-week adapted Mindfulness-Based Stress Reduction (MBSR) programs among all-comers and compared the impacts on the compromised wellbeing group (CWG), as defined by Total Mood Disturbance (TMD) scores in the Profile of Mood States 2, equal to or higher than the Japanese national mean of 50 and Mental Component Summary (MCS) scores in the 12-Item Short-Form Health Survey second version, lower than the national mean, and on the preserved wellbeing group (PWG), as defined by either TMD scores lower than 50 or MCS scores equal to or higher than 50.

**Results:** Thirty-six employees completed the pre- and post-assessment. The CWG, accounting for 17 of 36 (47.2%), had significantly higher TMD [Mean±SD (95% confidence interval): 60.6±10.3 (55.3 - 65.9)] and lower MCS [40.6±5.5 (37.8 - 43.5)] scores than the national mean as expected and attended class more frequently than the PWG (6.1±1.6 times vs. 4.6±2.3, respectively, p < 0.05), while the PWG had
significantly lower TMD [45.7±4.5 (43.5 - 47.9)] and higher MCS [52.8±6.5 (49.6 - 55.9)] scores than the national mean. Both the CWG and PWG showed significant similar within group improvements after the program in Perceived Stress Scale (PSS: 32.4±8.8 to 25.6±9.7, p< 0.05, Cohen’s d= -0.69 and 23.2±4.5 to 21.2±5.2, p < 0.01, d = -0.78, respectively) and TMD (60.6±10.3 to 51.4±11.9, p < 0.05, d = -0.69 and 45.7±4.5 to 42.9±4.4, p < 0.01, d = -0.70) scores while only the CWG showed an improved MCS score. Changes from the baseline between the groups were significant only in MCS scores.

**Conclusions:** The current study suggests that adapted MBSR may be beneficial for corporate employees with preserved wellbeing, providing corporate planners with the evidence required to expand corporate mindfulness programs to a larger employee population.

**Keywords:** mindfulness, corporate program, all-comer, wellbeing, Japanese

**Background**

With increasing occupational demands, a substantial number of workers are under significant stress worldwide. For example, in 2017, the American Psychological Association found that 58% of Americans reportedly felt that their work was a “very significant” or “somewhat significant” source of stress [1]. The UK’s Health and Safety Executive reported that work-related stress represented a significant threat to the health of the workforce of Great Britain, accounting for 51% of work-related illnesses and 55% of working days lost in 2019/2020 [2]. Similarly, 58% of Japanese workers indicated feeling that they suffer from intense work-related stress [3]. To prevent mental health-related disorders, an annual “stress check” is now legally required in workplaces with ≥ 50 employees in Japan [4].
Hassard et al. [5] found that stress affects people on multiple levels. For
individuals, stress contributes to health impairments such as depression, cardiovascular
diseases, musculoskeletal disorders, diabetes, mortality, and reduced quality of life; for
organizations, stress leads to costs related to absenteeism, presenteeism, reduced
productivity, and high staff turnover; and for society, its effects are manifested as
public health care costs [5]. Hassard et al. [5] concluded that “there is a strong
‘business case’ for preventing stress and psychosocial risks at work.”

There is an increasing expectation that mindfulness may alleviate stress and
improve work performance and productivity [6,7]. Several large companies such as
Google, General Mills, Intel, and Target, have launched mindfulness programs for their
workforces [8,9], and thirteen percent of U.S. workers report engaging in mindfulness-
enhancing practices [10]. A recent meta-analysis of 53 randomized controlled studies
on mindfulness interventions in the workplace indicates that mindfulness interventions
have demonstrated consistent improvements in perceived stress (Hedge’s g = -0.66, k =
43), negative symptoms (g = -0.56, k = 40), and wellbeing (g = 0.68, k = 22), but there
is insufficient evidence of their effect on job performance and productivity [11].

Similarly, Bartlett et al. conducted an in-depth review of individual studies as well as a
meta-analysis of 23 randomized control studies of workplace mindfulness training, and
found beneficial effects for the following: mindfulness (Hedge’s g = 0.45, p < 0.001);
stress (g = 0.56, p < 0.001); anxiety (g = 0.62, p < 0.001); psychological distress (g =
0.69, p < 0.001); wellbeing (g = 0.46, p = 0.002); and sleep (g = 0.26, p = 0.003) [12].
The authors also concluded in the abstract that “no conclusions could be drawn from
pooled data for burnout due to ambivalence in results, for depression due to publication
bias, or for work performance due to insufficient data.” Although the studies included
in the meta-analysis mostly used adapted mindfulness-based reduction (MBSR)
programs [13], e.g., shorter durations of weekly class and home practice time, these results are mostly comparable to those reported in a meta-analysis of 101 randomized controlled studies of MBSR (Hedge’s g of 0.54 for outcome measures of mental health) [14] and in a meta-analysis of MBSR for healthy subjects based on pre–post analyses (Hedge’s g = 0.55, k = 26) and in-between group analyses (Hedge’s g = .53, k = 18) [14].

In a report by Vonderlin et al. [10], however, majority of the studies were conducted with health care professionals (k = 19, 36%) and teachers (k = 9, 17%), while those in the industrial (k = 4) and finance sectors (k = 3) were small in number. Similarly, in a report by Bartlett et al. [12], only a few studies were conducted in a corporate setting [16-18]. Aikens et al. [16] randomized 89 employees in a company announcing lay-offs into a 7-weekly 60-minute online mindfulness intervention and a wait-list control. The results indicated that the mindfulness intervention group experienced a significant decrease in perceived stress (d = 1.03) and a significant increase in mindfulness (subscales results ranged from d = 0.30 to 1.00), resiliency (d = 0.63), and vigor (d = 0.67). The drop-out rate in the mindfulness intervention group was 10.5%, with 4 out of the 38 participants who had started the program not completing it. The remaining 34 participants attended a mean of more than 6 classes out of 8 and spent a mean of 13 minutes a day on home practice. It is unclear if the program was offered during the workday. Wolever et al. [18] randomly assigned 239 corporate employees with high stress levels to a yoga group (n = 90), a mindfulness group (n = 96 either in-person or online program consisting of 12-weekly hour-long class and 5–15-minute practice), or a control group (n = 53). Compared with the control group, the mindfulness intervention group showed significantly greater improvements in perceived stress (η² = 0.13), sleep quality (η² = 0.04), and the heart rhythm coherence
ratio of heart rate variability ($\eta^2 = 0.03$). The drop-out rates (undefined) were 15% in the mindfulness group vs. 11% in the control group. The class attendance and actual practice time were not reported. The class was held at lunch time, and participants received monetary compensation upon program completion. Huang et al. [17] randomly assigned 144 factory workers with poor mental health to a mindfulness intervention (8 weekly 2-hour class and 45-minute daily home practice) or a control group. Compared with the control group, the intervention group showed significantly lower scores for psychological distress, prolonged fatigue, and perceived stress, although there was insufficient evidence on mitigating job strain. The drop-out rates (undefined) were 19% in the mindfulness group vs. 25% in the control group. The class attendance rates and actual practice times were not reported. The class was held during workhours. In a more inclusive review of 153 articles on workplace mindfulness programs, Lomas et al. found only seven studies conducted in “business” settings, and stated, “a particular need to look at corporate settings” [19].

The review of the literature suggests that the evidence to support a corporate mindfulness program is limited to a small number of studies focused primarily on employees with compromised wellbeing and/or under high stress levels. Since mindfulness may be beneficial not only to those with compromised well-being but also to those with preserved wellbeing [6], and because the latter may be no less important than the former in a corporate setting, we wished to compare the impacts of a mindfulness program between employees with compromised wellbeing and those with preserved wellbeing. This information may provide useful guidance to corporate planners as to the scope of a potential program and a possible estimate of the return on investment.

We conducted an all-comer mindfulness program in a corporate setting using an
adapted MBSR protocol similar to those used in previous studies shown to have good adherence and efficacy for those with compromised wellbeing and/or under significant stress. We were particularly interested in the impacts of the program in employees whose wellbeing and/or level of stress are comparable or superior to the population mean.

We used the Perceived Stress Scale-14 items version (PSS) [20] as the efficacy marker, similar to other randomized controlled workplace mindfulness studies [16-18]. As markers of wellbeing, we used the Total Mood Disturbance (TMD) score in the Profile of Mood States 2 (POMS 2) and the Mental Component Summary score (MCS) in the health-related quality of life score of the SF-12 [21], for which national norms have been established in Japanese adults. These measures were also used as outcome markers. We conducted the same protocol twice, in-person and online, to evaluate the reproducibility of the results. This study was conducted in a Japanese affiliate firm of a large multi-national company.

Methods

The participants in the current mindfulness program were Japanese employees of a large, multi-national corporate affiliate in Japan. They were recruited primarily from two offices (Osaka and Tokyo) by posting information about the program on the company intranet. The in-person part of the program was held from February 2016 to April 2016 in the Osaka office conference room. The participants in the Tokyo office participated in the program remotely through a video conference with the Osaka office. The online part of the program was held from June 2017 to August 2017. The class was held online using Skype (a Microsoft software product) to link the instructor with the participants. For the ease of participants’ conversations with one another, they gathered in a conference room in Osaka and in Tokyo, respectively, bringing their computer terminals. To strengthen the instructor-participants’ interactions, the 4th class was held
as an in-person class. Although the online course was also planned as an 8-class course over 8 weeks, due to a typhoon alert, the content of the online course was condensed to fit into seven classes over eight weeks. As the program was company-sponsored, it was free for the participants. Both programs were held after work hours.

**Program content**

The basic structure and content of the program were modelled after MBSR [13]. However, it was adapted to a busy corporate office setting by shortening the weekly sessions from 2.5 hours to 1 hour and reducing the amount of time participants were expected to practice outside of class from 45 minutes to 15 minutes per day. Fifteen minutes was considered to be minimally sufficient based on previous studies showing positive outcomes for participants of mindfulness programs who practiced as little as fifteen minutes per day [22]. The total program hours, including both class time and suggested home practice time, was thus reduced from 71–77 hours for MBSR to approximately 19 hours for the study’s program. Weekly themes were mostly identical to those in MBSR (Table 1).

Each class was roughly divided into three parts: 25 minutes of meditation practice, 15 minutes of group discussion, and 15 minutes of informational slide presentations. As with MBSR, audio files for home practice were prepared and provided to participants. Each week, participants were asked to fill out and submit a daily practice record. The entire program was conducted by one of the authors (Y.I.), who had 17 years of Rinzai Zen experience, and was an MBSR teacher trained and qualified by the Centre for Mindfulness at the University of Massachusetts Medical School.
Table 1. Comparison of MBSR* and the current program

|         | MBSR                                      | Current Program                     |
|---------|-------------------------------------------|-------------------------------------|
| Class 1 | 3 hr                                      | 1 hr (Theme: What is mindfulness?)  |
| Home practice | BS (45 min) x ≥ 6/wk                     | Sitting med. (15 min) x ≥ 6/wk      |
| Class 2 | 2.5 hr                                    | 1 hr (Theme: Perception)            |
| Home practice | BS (45 min) x ≥ 6/wk                     | Sitting med. (15 min) x ≥ 6/wk      |
| Class 3 | 2.5 hr                                    | 1 hr (Theme: Pleasant events)       |
| Home practice | BS (45 min) x ≥ 3/wk                     | BS (15 min) x ≥ 6/wk                |
|          |                                           | Lying yoga (45 min) x ≥ 3/wk        |
| Class 4 | 2.5 hr                                    | 1 hr (Theme: Stress reaction)       |
| Home practice | BS (45 min) x ≥ 3/wk                     | Standing yoga (15 min) x ≥ 6/wk     |
|          |                                           | Standing yoga (45 min) x ≥ 3/wk      |
|          |                                           | Breath meditation daily (20min)      |
| Class 5 | 2.5 hr                                    | 1 hr (Theme: Stress response)       |
| Home practice | Sitting med. (45 min) x ≥ 3/wk           | Sitting med. (15 min) x ≥ 3/wk      |
|          |                                           | BS/yoga (45 min) x ≥ 3/wk           |
| Class 6 | 2.5 hr                                    | 1 hr (Theme: Difficult communication)|
| Home practice | Sitting med. (45 min) x ≥ 3/wk           | Sitting med. (15 min) x ≥ 3/wk      |
|          |                                           | BS/yoga (45 min) x ≥ 3/wk           |
| Class 7 | 2.5 hr                                    | 1 hr (Theme: Self, Whole, Connection)|
| Home practice | Own choice (45 min) x ≥ 6/wk            | Own choice (15 min) x ≥ 3/wk        |
| Class 8 | 3.5 hr                                    | 1 hr (Theme: New departure)         |
| Day retreat | 7.5 hr                                 | None                                |
| Total commitment |                              |          |
| Class   | 29 hr                                     | 8 hr                               |
| Home practice | ≥ 42–48 hr                            | ≥ 10.5 hr                          |
| Total   | ≥ 71–77 hr                                | ≥ 18.5 hr                          |

BS: Body scan.

Sitting med: Sitting meditation.

*MBSR Standards and Practice [13].
Measures

The participants completed questionnaires at the first session that included demographic information as well as Japanese versions of three survey instruments, all of which have been used as outcome measures in previous MBSR outcome research: 1) Perceived Stress Scale (PSS-14) [20]; 2) Profile of Mood States Second Edition (POMS 2) [23]; and 3) 12-Item Short-Form Health Survey second version (SF-12), a health-related quality of life (HRQOL) scale [24,21]. Those who finished the program completed the same scales again during the last session. No participants that completed the initial assessment missed the end-of-study assessment.

PSS-14 was used because stress reduction is a major aim of mindfulness programs. As such, PSS-14 is frequently used as an outcome measure of MBSR studies. The scale was designed to measure “the degree to which individuals appraise situations in their lives as stressful,” and “how unpredictable, uncontrollable, and overloaded respondents find their lives” [25]. It is a 14-item instrument that assesses perceived stressful experience or stress responses over the previous month using 5-point Likert type scales. The total possible score ranges from 0 to 56. Higher scores represent high stress levels. Cronbach's alpha was 0.74, and the national norm for Japanese is not established.

The total mood disturbance score based on the POMS 2 was used as a measure of wellbeing. POMS consists of a collection of self-rating tools that allow for the assessment of transient, fluctuating feelings, and enduring affective states and comprises six scales: Anger-Hostility, Confusion-Bewilderment, Depression-Depression, Fatigue-Inertia, Tension-Anxiety, and Vigor-Activity. The POMS 2 is an adjective checklist in which participants rate the adjectives using a 5-point Likert response scale ranging from 0 = Not at all to 4 = Extremely. We used the 35-item short form. The
TMD score was determined by adding the five negative mood scores minus the Vigor-Activity score, and higher scores represent higher mood disturbance. The Japanese version uses norm-based scoring algorithms [T-score transformation with mean, 50±10 (SD)], enabling the comparison of participants to the national mean. Cronbach's alpha for each of the subscales ranged from 0.84 to 0.91.

SF-12 was also used as a measure of wellbeing. SF-12 is a health-related QOL measure that yields an eight-scale profile of scores (“Physical functioning,” “Role physical,” “Bodily pain,” “General health,” “Vitality,” “Social functioning,” “Role emotional,” and “Mental health”). Higher scores indicate higher quality of life, that is, better physical functioning, fewer role limitations due to physical health problems, less bodily pain, higher general health, vitality (energy/fatigue), social functioning, less role limitations due to emotional problems, and higher mental health (psychological distress and wellbeing), respectively. We used the mental component summary score, which is a composite score calculated based on the scores from the eight scales. The Japanese version uses Japanese norm-based scoring algorithms, enabling the comparison of participants to the national mean. Cronbach’s alpha for each of the subscales ranged from 0.55 to 0.93. The recall period for all three scales was set to four weeks, so that baseline responses reflect the 4-week period before the first session, and post-program responses reflect the period during the second half of the 8-week program. At the end of the program, the participants were asked to report the practice time (minutes per each practice and times per week). Written informed consent was obtained for possible publication of the results. This study was approved by the Institutional Review Board (IRB) of Kobe Tokushukai Hospital.

Analysis
For background factors such as age, sex, and baseline scores of self-reported instruments, descriptive statistics were performed. The compromised wellbeing group (CWG) was made up of participants with a TMD score equal to or higher than the national mean of 50 and an MCS score lower than the national mean of 50, while the preserved wellbeing group (PWG) had either a TMD score lower than 50 or an MCS score equal to or higher than 50. Since the continuous variables in each group were often not normally distributed and differed in variance, within- and between-group comparisons were conducted using paired-samples t-tests and independent samples t-tests based on bootstrapping with the bias-corrected and accelerated bootstrap confidence intervals. A chi-square test was used to compare the sex ratio. The effect size (Cohen’s d) was calculated by dividing a mean change with the standard deviation for pre-post changes within a group. The correlations were evaluated by linear regression analysis. All the analyses were conducted with SPSS V.27 (IBM).

**Results**

**Background characteristics of participants**

A total of 39 employees participated in the program, and 36 (20 in in-person and 16 in online) who completed the pre-assessment also completed the post-assessment. Two subjects joined in the middle of the in-person program, and another who failed to complete the baseline survey in the online program was excluded from the analysis. Since there were no meaningful differences between the two delivery modes in the baseline characteristics and changes from the baseline (Supplemental Table 1), the data from the in-person and online courses were pooled for the following analysis. The compromised wellbeing group (CWG) defined by TMD ≥ 50 and MCS < 50 comprised 17 out of 36 participants (47.2%), and the
preserved wellbeing group (PWG), defined by either TMD < 50 or MCS ≥ 50, accounted for 19 out of 36 participants (52.8%). The baseline characteristics are shown in Table 2.

**Table 2.** Baseline characteristics in compromised wellbeing group (CWG), preserved wellbeing group (PWG), and total

|                      | CWG            | PWG            | Total         |
|----------------------|----------------|----------------|---------------|
| **N (F/M)**          | 17 (12/5)      | 19 (12/7)      | 36 (24/12)    |
| **Age**              | 44.8±7.1       | 40.7±6.9       | 42.6±7.2      |
| **TMD**              | 60.6±10.3      | 45.7±4.5**     | 52.7±10.8     |
| **MCS**              | 40.6±5.5       | 52.8±6.5**     | 47.0±8.5      |
| **PSS**              | 32.4±8.8       | 23.2±4.5**     | 27.5±8.2      |
| **Class attended**   | 6.1±1.6        | 4.6±2.3*       | 5.3±2.1       |
| **Home practice**    | 64.5±40.5      | 47.2±43.8      | 55.6±42.5     |

TMD: National norm based total mood disturbance score in POMS2. MCS: National norm based mental component summary score in SF-12. PSS: Crude perceived stress scale score. 95% C.I.: 95% confidence interval

* p < 0.05, ** p < 0.01 compared to CWG by 1000 bootstrap sampling

The comparison between CWG and PWG showed that the sex ratio and the mean age were comparable. In CWG, as expected from the way the groups were defined, the TMD score was significantly higher [60.6±10.3 (55.3–65.9)], and the MCS score was lower [40.6 ± 5.5 (37.8–43.5)] than 50 suggesting CWG had a higher level of mood disturbances and lower mental quality of life (QOL) compared to the average for the Japanese population. In PWG, on the contrary, the TMD score was significantly lower [45.7±4.5 (43.5–47.9)], and the MCS score was larger [52.8±6.5 (49.6–55.9), p=0.08] than 50 suggesting that PWG had a lower level of mood disturbances and a somewhat higher mental QOL compared to the average for the Japanese population. Accordingly, CWG had significantly higher TMD (60.6±10.3 vs.
45.7±4.5, p < 0.01), lower MCS (40.6±5.5 vs. 52.8±6.5, p < 0.01), and higher PSS (32.4±8.8 vs. 23.2±4.5, p < 0.01) scores than PWG. The number of classes attended was significantly higher in CWG compared to that in PWG (6.1±1.6 vs. 4.6±2.3, p < 0.05).

**Pre to post changes**

Overall, the participants showed significant improvements after the program in PSS (pre 27.5±8.2, post 23.2±7.9, p < 0.01, d = -0.60) as well as in TMD (pre 52.7±10.8, post 46.9±9.6, p < 0.01, d = -0.59) and MCS scores (pre 47.0±8.5, post 51.8±6.2, 4.6±9.4, p < 0.01, d = 0.52). Similarly, CWG showed significant improvements in PSS (32.4±8.8 to 25.6±9.7, p < 0.05, d = -0.69) as well as TMD (pre 60.6±10.3, post 51.4±11.9, p < 0.05, d = -0.69) and MCS scores (pre 40.6±5.5, post 50.7±6.6, p < 0.01, d = 1.07) (Figure 1 to be placed near here). The PWG also showed significant improvements in PSS (pre 23.2±4.5, post 21.2±5.2, p < 0.01, d = -0.78) as well as TMD (pre 45.7±4.5, post 42.9±4.4, p < 0.01, d = -0.70) but not in MCS scores (pre 52.8±6.5, post 52.9±6.7, p = 0.89, d = 0.01). A significant difference in the change between CWG and PWG was noted only in the MCS scores (p < 0.01). There were correlations between the number of classes attended and score improvements ($r^2 = 1.2$ and 0.08, p = 0.03 and 0.08, respectively, for PSS and TMD).

**Discussion**

We conducted an all-comer mindfulness program in a corporate setting using an adapted MBSR protocol like those used in previous studies shown to have good adherence and efficacy for those with compromised wellbeing and/or under significant stress. The program in the current study, consisting of 8 weekly, 1-hour long classes, and 15 minutes of daily home practice was similar to the majority of the 23 studies in a meta-analysis of workplace mindfulness programs conducted by Bartlett et al. [12], which consisted of 8 weekly (k
the improvements in CWG in this study (PSS, p < 0.05, d = -0.69; TMD, p < 0.05, d = -0.69; MCS, p < 0.001, d = 1.07) were comparable to those reported in the meta-analysis (stress, g = -0.56 and wellbeing, g = 0.46: minus sign added for PSS by the author), which included a small number of corporate studies focused primarily on highly stressed employees [16-18].

The primary aim of this study was to compare the impact of a mindfulness program on employees with compromised and preserved wellbeing in a corporate setting. Noticeably, in this corporate all-comer program, PWG consisted of 19 (52.8%) of the 36 participants, and these participants also showed significant improvements in PSS (p < 0.01, d = -0.88) and TMD scores (p < 0.01, d = -0.75). These findings in PWG are of interest since the average TMD score at baseline was already significantly lower than the average in the Japanese population and are consistent with the idea that enhancement of wellbeing or “promotion of flourishing” [26] beyond normalization may be possible with mindfulness interventions.

The use of appropriate constructs with established national normative data would assist the characterization of study participants. However, such constructs are infrequently used and, thus, participants’ profiles and their impact on the outcomes are inadequately investigated. In the 23 studies on workplace mindfulness programs reviewed by Bartlett et al. [12], we found two studies using outcome markers with established national normative data. McConachi et al. used the Warwick-Edinburgh Mental Well-Being Scale [27] and found that the baseline was comparable to the UK population mean and observed little changes during the program [28]. Prasek used the Patient Reported Outcomes Measurement Information System Global Health Scale [29] and found a significant increase in the score for the measure during the program [30]. But like CWG in this study, the average baseline score was lower than the mean for the US general population. A more inclusive review of data beyond
workplace mindfulness programs also reported a limited number of studies using constructs with established national normative data, and in those studies, participants’ wellbeing was often lower than the population mean [31-34]. The results in this study are unique in showing that employees with preserved wellbeing compared to an average Japanese may benefit as much as those with compromised wellbeing from a mindfulness program.

It was also noted that the absolute improvements in PSS and TMD scores in CWG were larger than in PWG, but the magnitude of the effects was similar between the two groups. Since the effect size is calculated by dividing a mean change from the baseline by the standard deviation, the comparable effect sizes between CWG and PWG appear to be due primarily to proportionately smaller standard deviations in changes from the baseline in PWG. These results may provide corporate planners with useful information for supporting the expansion of similar programs to employees without compromised wellbeing.

The class attendance was more frequent in CWG than in PWG (6.1±1.6 vs. 4.6±2.3, respectively p < 0.05). This finding may suggest that a sense of low wellbeing and high stress/distress in CWG motivated them to adhere to the program. Since there were some correlations between the number of classes attended and the improvements in PSS and TMD scores, there is a possibility that further improvements, including improved MCS scores, may have been possible in PWG had they attended the class to a level comparable to CWG. In the current program, the instructor joined on-line, and employees were asked to gather in a single room to facilitate a dyad or triad conversation. Additionally, this program was conducted after work hours. The adherence to or attendance in the class might have been improved by holding the program during workhours, or alternatively setting up a more convenient time, e.g., weekends with remote access from home with the use of technology allowing a break-out room function to facilitate a fluid dyad or triad conversation.
The strength of this study includes the use of instruments whose national normative date is established, defining CWG and PWG in comparison to an average Japanese. The fact that all the participants who had completed the baseline assessment also finished the end-of-study assessment made the efficacy evaluation of this study possible without attrition bias, although intention-to-treat analysis with last observation carried forward as used by Wolever et al. [18] could alleviate this possibility.

There were limitations to this study. First, it included a pre-post comparison assessment lacking a control group; thus, the results obtained from this study may be a temporal phenomenon. However, the primary objective of this study was not to evaluate the efficacy of an intervention compared to a control but to compare the results between those with compromised wellbeing and those with preserved wellbeing. Thus, having a control group was not essential to address our research questions. Furthermore, as presented and discussed in this paper, the efficacy of the modified MBSR approach has been reported in numerous controlled studies in the workplace. Khoury et al. reported similar efficacy of MBSR between studies with a pre-post-study design ($g = 0.55$) and controlled studies ($g = 0.53$) [15] that were similar to that observed in the current study. We recognize that the number of participants in the current study is limited. Thus, future studies are required to replicate the findings with a larger sample size in a design to improve adherence, particularly in those with preserved wellbeing.

Conclusions

In summary, the current study suggests that adapted MBSR may be beneficial for corporate employees with preserved wellbeing, in addition to those with compromised wellbeing, possibly providing corporate planners with the necessary evidence to expand a corporate mindfulness program to a larger employee population.
Abbreviations

MBSR: Mindfulness-Based Stress Reduction
QOL: Quality of Life
PSS: Perceived Stress Scale
TMD: Total Mood Disturbance
POMS: Profile of Mood States
MCS: Mental Component Summary
SF-12: 12-Item Short-Form Health Survey
HRQOL: Health-Related Quality of Life
PWG: Preserved Wellbeing Group
CWG: Compromised Wellbeing Group

Declarations

Ethics approval and consent to participate

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee, and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

This study was approved by the Institutional Review Board (IRB) of Kobe Tokushukai Hospital (R-20-03) and informed consent was obtained from all individual participants included in the study.

Consent for publication

Not applicable

Availability of data and materials
The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

**Competing interests**

The authors declare that they have no competing interests.

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**Authors’ contributions**

YI analyzed and interpreted the data. IS organized the program. Both authors read and approved the final manuscript.

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Figure 1. Comparison of pre- and post-values in CWG and PWG in PSS (A), TMD (B) and MCS (C).

Figure 1 foot notes:

For abbreviations, see Table 2.

*p<0.05, **p<0.01 compared to pre-values within the group by 1000 bootstrap samples. d: Cohen’s d. Error bars are 95% confidence intervals.