A short-term mindfulness intervention: effects on stress, happiness and productivity in the workplace

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March 2013
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ABSTRACT

Negative stress and unhappiness are two factors that can negatively influence psychological well-being in working adults and can also influence workplace productivity. Mindfulness has been shown to reduce stress in working adults; however it is unclear by which mechanisms its positive effects are applied. Thirty-three adults working in a professional complaint handling workplace were randomly assigned to either a mindfulness condition or an active control condition to investigate whether a short-term mindfulness intervention would improve trait mindfulness, stress, happiness and productivity over a four week period. Despite observing no significant changes in trait mindfulness, happiness or productivity, the mindfulness condition experienced significant reductions of self-reported stress from pre-post intervention. No significant changes were observed in any of the variables for the control condition. The current study provides promising results in terms of stress reduction in working adults, whilst raising questions regarding the mechanisms by which stress reduction is achieved and highlights that the efficacy of short-term mindfulness interventions needs further study.

KEY WORDS: MINDFULNESS INTERVENTION WORKING ADULT WELL-BEING STRESS HAPPINESS PRODUCTIVITY
Introduction

Mindfulness, a construct derived from Buddhist meditation practices, has been adapted by Western Psychology and implemented in a variety of ways to improve health and well-being. The word *mindfulness* has been used to describe a psychological trait, a practice of cultivating mindfulness (e.g. through mindfulness meditation), a state of awareness, or a psychological process (Germer, Siegel & Fulton, 2005). One of the most commonly cited mindfulness definitions is the awareness that arises through “paying attention in a particular way: on purpose, in the present moment, and nonjudgmentally” (Kabat-Zinn, 1994). Whereas Bishop et al. (2004) see mindfulness as a multifaceted state, others see it as a single component, comprising of an awareness of and receptive attention to current events and experiences (Brown & Ryan, 2003).

As trait and state mindfulness have been found to independently improve well-being (Brown & Ryan, 2003), other research has been performed to identify the correlational relationship between them (Thompson & Waltz, 2007). Their findings, that they were not significantly correlated, suggest that state and trait, mindfulness should be investigated as separate, non-linear concepts. The majority of research into trait mindfulness has found it has a positive effect on psychological well-being (Shapiro et al., 2011; Moss et al., 2012) and mediates the relationship between mindful practice and changes in perceived stress and well-being (Carmody & Baer, 2008).

Much mindfulness research focuses upon Mindfulness-Based Stress Reduction (MBSR), a group program that teaches mindfulness meditation in a structured, experiential format over an intensive eight week period (Kabat-Zinn, 2003). Carmody & Baer (2008) found that in a participant group of 174, from pre-post MBSR intervention, increased mindfulness scores mediated the relationship between mindfulness meditation and improved psychological well-being. This study established the benefits of regular home practice of mindfulness meditation during an MBSR intervention and established that everyday mindfulness should be conceptualised as a multi-faceted construct involving observing internal and external stimuli, acting with awareness, labelling experiences, non-judging of and non-reactivity to inner experiences (Baer et al., 2007).

Current research shows that mindfulness training can be beneficial to a number of aspects of physical and mental health, including stress problems (Kabat-Zinn, 1990; Carmody & Baer, 2008; Kim et al., 2009). However, the positive effects of mindfulness practice could interrogated against the general effects observed from participation in general relaxation (Piazza-Waggoner et al., 2003), or mindful yoga (Sauer-Zavala et al., 2012). Sauer-Zavala et al (2012) found that psychological well-being increased regardless of whether participants were in a sitting meditation, body scan or mindful yoga condition, and improvements were consistent with those found evaluating mindfulness based interventions in their entirety (Baer, 2003; Keng et al, 2011). These findings suggest that the effects of mindfulness based interventions may not be due to any one component of the interventions used and some of the changes found after MBSR may not necessarily be linked directly to increased mindfulness (Delgado et al., 2010). However, the small to medium effect sizes found in their study are lower than the
medium to large effect sizes typically found in MBSR studies (Carmody & Baer, 2008; Greeson et al., 2011).

The Health and Safety Executive (2012) announced that in 2011 and 2012 there were 428,000 cases of work-related stress reported in the U.K., accounting for 40% of all work-related illnesses and 10.4 million working days lost, and one of the results of workplace stress is reduced quantity and quality of work (Michie, 2002). MBSR intervention studies generally study clinical groups, or students, and investigate general psychological health benefits (e.g. Brown & Ryan, 2003; Baer et al., 2006) with little research directed towards non-clinical groups, particularly working adults.

The few recent studies on non-clinical groups have indicated that MBSR can provide significant psychosocial benefits for a number of populations, including samples complaining of stress (Chiesa & Serretti, 2009), and health care professionals exposed to work-related stress (Irving, Dobkin & Park, 2009). Malarkey, Jarjoura & Klatt (2013) introduced a shortened MBSR intervention in the workplace so that participants could fit the normally time consuming programme around their working lives. However, they measured cortisol levels rather than self-reported stress and found only a non-significant drop in the mindfulness group compared to controls. Another workplace study using a shortened MBSR program for nurses, (MacKenzie, Poulin & Seidman-Carlson, 2006) found that emotional exhaustion, deemed to be stress related, decreased in the mindfulness group compared to controls. This study provided MBSR recordings and instructed participants to practice daily for 10 minutes, with weekly group support meetings. These studies highlight the need for an effective, shortened MBSR intervention, as most workers would be unable to attend an eight week intensive program.

As work stress has been identified as a major cause of employee turnover and burnout, and linked to many physical and psychological complaints and increased health insurance claims (Schnall, Dobson, & Rosskam, 2009), the evidence suggests that mindfulness-based practices may be a fruitful addition to organisational wellness programs. Employers could benefit from having healthier employees, less sickness, insurance claims and re-training costs. If research can show that mindfulness training can also increase productivity then it would be further beneficial to provide mindfulness programs for employees.

In addition to evidence of a mindfulness-stress relationship, there is also some support for a mindfulness-happiness relationship as people with higher trait mindfulness have been found to have higher indicators of happiness (Hollis-Walker & Colosimo, 2011). Therefore, MBSR could be effective as a happiness intervention and evidence suggest that happiness levels can affect workplace outcomes, albeit subjectively (Lyubomirsky et al., 2005). However, happiness oriented interventions have generally provided inconclusive results (Seligman, Steen, Park & Peterson, 2005).

Lyubomirsky et al. (2005) found that positive affect can be associated with various positive life outcomes, including improved health and workplace performance ratings, although much of the workplace performance findings were based upon subjective supervisory ratings rather than objective performance measures.
However, it is not possible to deduce whether performance ratings would change if happiness was manipulated. Interestingly, practitioners of mindfulness are judged to look happier than non-practitioners (Choi, Karremans & Barendregt, 2012), which may account for some increased subjective ratings.

Recent articles have been critical of the lack of applied mindfulness research in the workplace; helping to highlight that mindfulness could benefit workplace performance in terms of improved relationships, resilience and task performance (Glomb, Duffy, Bono & Yang, 2011). Little research has investigated more objective correlates of mindfulness interventions, such as their effects on cognitive function or workplace performance. Some studies have found that increased mindfulness improves self-regulation of attention, leading to fewer cognitive failings such as 'distraction' and 'blunders' (Herndon, 2008). However, there is a general lack of research into different cognitive correlates of mindfulness practice and the impact they may have in the workplace, particularly in relation to productivity.

As an attention-related concept, mindfulness in pertinent to how individuals focus attention in the workplace. Some research has noted that the way in which employees focus their attention affects how they make decisions (Nadkarni & Barr, 2008) and whether they notice resources available to them (Weick, 1993), which may impact upon productivity. However, mindfulness' role in this research and in other workplace performance outcomes is generally unexplored. It has been suggested that mindfulness may be useful or harmful to workplace task performance, depending on the type of task and the individual's ability to perform the task (Dane, 2011). Whilst these theories may be sound they remain to be effectively tested.

The current study aimed to investigate the positive effects of mindfulness on a working adult population, who are in need of short-term therapies that will fit into often busy lives, to help cope with working life. A quasi-experimental design was employed with participants randomly assigned to either a mindfulness or active control condition. Both conditions took part in three weekly sessions and with measures of mindfulness, stress and happiness taken pre-post intervention using self-report questionnaires and measures of productivity taken, also pre-post intervention, from workplace complaint completion data. The data was interrogated in order to assess any changes as a result of the mindfulness intervention.

The first hypothesis was that participants in the mindfulness condition would experience significant increases in trait mindfulness from week 1 to week 4. The second was that the mindfulness intervention would significantly reduce stress from week 1 to week 4. The third was that the mindfulness condition would experience significant increases in happiness from week 1 to week 4 and finally that the mindfulness intervention would lead to a significant increase in productivity from week 1 to week 4. It was also expected that either stress or happiness would mediate any relationship between mindfulness and productivity.
Methodology

Design

A 2 X 2 mixed quasi-experimental design was used where the independent between-subjects variable was group type (mindfulness vs. control) and the independent within-subjects variable was assessment time (week 1 and week 4). The dependent variables were scores in mindfulness, stress, and happiness as measured by self-report questionnaires and, productivity, as measured by naturally occurring workplace productivity measures relating to the number of complaints completed in a one week period.

Participants

Participants were recruited using opportunity sampling in the complaints handling department of a large financial services provider, with the help of an informative departmental email (Appendix A). A power analysis (Appendix B) calculated using G*Power 3.1.5 (Faul, et al., 2007) determined that a minimum of 19 participants were required¹.

In total 33 participants took part, \( n = 17 \) for the mindfulness condition and \( n = 16 \) for the control condition, consisting of 57.58% females and 42.42% males. Participants were matched for gender before being randomly allocated to a condition, with three participants being removed from the control group due to non-completion of the weekly tasks.

Due to practical constraints, participants were not matched for scores on the FFMQ, DASS, OHQ or productivity prior to the onset of the study. As a result, differences in scores between the mindfulness and control conditions at weeks 1 and 4 were not matched, as it would not have been practical to match levels of all of the variables prior to random assignment to a condition. Similar procedures in design and analysis have been used in other studies (Kang, et al., 2009; Shapiro et al., 2007).

Materials

Self-report Questionnaires (Appendices C-F)

The Five Facet Mindfulness Questionnaire (FFQM; Baer et al., 2006) is a 39 item questionnaire designed to measure trait mindfulness and comprises of five subscales; observing, describing, acting with awareness, non-judging of inner experience and non-reactivity to inner experience. Items are rated on a 5 point Likert-scale (1 = never, to 5 = very often). Higher score totals represent higher levels of mindfulness, with the highest possible score being 195 and the lowest being 39. Scores from the individual sub-scales will not be investigated in this study. There is a good overall internal consistency for this scale with a Cronbach’s alpha of .92, with the individual scales scoring between .75 and .91 (Baer et al., 2006).

¹Calculated using a significance level of .05, power of .8 and a small effect size (Cohen’s \( d = .33 \)).
The Depression Anxiety and Stress Scales (DASS; Lovibond & Lovibond, 1995) is a 42 item scale that measures depression, anxiety and stress, comprising of three subscales representing each factor. Items are rated on a 4 point Likert-scale (0 = does not apply, to 3 = applies very much). Higher score totals represent higher levels of the measured factors. As this study is not measuring depression or anxiety, only the 14 point stress scale will be used, which has a highest score of 42 and a lowest of 0. Splitting the scales in such a way is acceptable according to the authors (Lovibond & Lovibond, 1995). On its own, the stress scale has a good internal consistency with a Cronbach’s alpha of .90 (Lovibond & Lovibond, 1995).

The Oxford Happiness Questionnaire (OHQ; Hills & Argyle, 2002) is a 29 item unidimensional scale that measures happiness. Items are rated on a 6 point Likert-scale (1 = strongly disagree, to 6 = strongly agree). Higher score totals represent higher levels of happiness, with the highest score being 174 and the lowest being 29. There is a good internal consistency for this scale with a Cronbach’s alpha of .91 (Hills & Argyle, 2002).

The Toronto Mindfulness Scale (TMS; Lau et al., 2006) is a 13 item scale used to assess participant’s engagement with the mindfulness meditation practice. It contains two subscales; observing and decentring, which are rated on a 5 point Likert-scale (0 = not at all, to 4 = very much). Higher score totals represent higher levels of state mindfulness, with the highest score being 52 and the lowest being 0. There is a good overall consistency for this scale with a Cronbach’s alpha of .91 (Lau et al., 2006) and with α coefficients of .93 for curiosity and .91 for decentring. Scores from the individual sub-scales will not be investigated in this study.

Permission to use all of the questionnaires was obtained.

Productivity scores were measured by obtaining naturally occurring figures taken from an existing workplace performance management tool. Data was based upon the volume of complaints responded to by each participant in the one week period prior to the completion of the week 1 and week 4 questionnaires. Each completed complaint was then assessed for the number of aspects addressed within the complaint and the total aspects addressed figure will be taken as the total score.

Permission to use this data has been obtained by the organisation.

**Recordings**

Participants in the mindfulness condition listened to recordings from Series 3 of Jon Kabat-Zinn’s Guided Mindfulness Meditation (Kabat-Zinn, 2005). Different and important aspects of MBSR meditation have been incorporated into the study, such as the body scan and sitting meditation (Kabat-Zinn, 1982). Week one was Breathscape, Track 1 from CD 1, week two was Choiceless Awareness - Nowscape, Track 1 from CD 3, and week 3 was Bodyscape, Track 2 from CD 1 (all tracks are provided on the enclosed data disk). This use of recordings is similar to other mindfulness intervention studies (Kang et al., 2009) that have aimed to cultivate mindfulness in participants. Permission to use the recordings in experimental conditions was sought before the onset of the study.
The control group listened to two podcasts each week from the ten part BBC Radio 4 series, A History of the Brain (Bunn, 2011). Week one was ‘A Hole in the Head’ and ‘The Blood of the Gladiators’, week two was ‘The Origin of Common Sense’ and ‘Spirits in the Material World’ and week three was ‘All or Nothing’ and ‘Einstein’s Brain’ (all tracks are provided on the enclosed data disk). The use of neutral educational recordings from a public radio broadcast as a control condition has been validated in previous studies (e.g. Erisman & Roemer, 2010).

Overall, the mindfulness and control groups listened to recordings for approximately the same length of time which was 60 to 70 minutes over the three week period. The length of the recordings were almost identical to the 20 minute mindfulness recordings used in Zeidan et al. (2010).

Procedure

Participants were provided with a different recording each week, for three weeks, and instructed to listen to each recording once, at home, whilst alone, seated and wearing headphones and on the same day each week. Each group were provided with the same written instruction to accompany each recording (Appendix G) to ensure that the format of the interventions were kept the same.

Group A were provided with a mindfulness exercise and to ensure that any observed changes could be attributed to the mindfulness intervention. Group B took part in a structurally similar exercise.

All participants were provided with instructions, which advised them not to discuss the exercises during the course of the study to ensure that group support was not a factor in any observed changes. Group support has been identified as a potentially beneficial aspect of MBSR (Chisea & Serretti, 2009) which needed to be controlled in this study.

Baseline measures of all variables (mindfulness, stress, happiness and workplace productivity) were assessed pre-intervention (week 1) and post-intervention (week 4). This was to measure any changes in the variables that were expected to change alongside mindfulness, which has been validated in longer term trials using the FFMQ (Carmody et al., 2009).

To ensure that participants were engaging with the meditation exercises, they were instructed to complete the TMS after listening to each recording, in line with Erisman & Roemer (2010). The control group received a similarly constructed Likert-scale questionnaire (Appendix H) with questions linked to their recordings to ensure that conditions were similar. Examples of the control questions include, question 3 ‘I was interested to learn more about the history of the brain’ and question 7 ‘I found the recordings to be engaging’.

The first sets of questionnaires were completed at the briefing session, before the first recordings were administered. The TMS and corresponding control questionnaires were completed immediately after participants had listened to their recording each week and the final sets of questionnaires were completed one
week after the final recordings were listened to. Productivity measures were taken from naturally occurring complaint completion data recorded by the organisation. This data was recorded at the same time as the first and final sets of questionnaires were administered. Complaints complete in the one week period prior to the week 1 and week 4 questionnaire sets being administered.

**Ethics**

Ethical issues were taken into consideration and BPS guidelines were followed. Ethics forms EFC and AEAF (Appendices I & J) were completed and signed by the study supervisor, prior to participants taking part in experimental tasks.

Participant consent was obtained prior to the onset of the study (Appendix K), following a briefing (Appendix L) and were debriefed (Appendix M) once the final sets of questionnaires had been collected.

One ethical consideration was that the mindfulness group received an intervention aimed at improving psychological wellbeing and linked with some physical benefits, whilst the control group did not, despite each group being asked to make the same commitment of time and effort to the study. However, the control recordings were selected due to their interesting educational content and control participants were offered information regarding MBSR following the conclusion of the experiment.

**Results**

**Preparation of data**

All raw data (refer to data disk) from the meditation \((N = 17)\) and control \((N = 13)\) groups were entered into IBM SPSS Statistics 19.0 for Windows (SPSS Inc., 2010), which was used for all calculations. All graphs and tables were derived from SPSS outputs (Appendix N). Following data input from all questionnaires, reverse item questions from the FFMQ and OHQ were reverse scored (refer to raw data disk) in line with the author’s instructions, and total scores for each questionnaire at each assessment time (weeks 1 and 4) were calculated. In order to check internal consistency reliability, Cronbach’s alpha (\(\alpha\)) coefficients were generated for each scale at each assessment time. All scales, except for the TMS Week 2 which has an \(\alpha\) coefficient of .66, were found to have a \(\alpha\) of over 0.7, as shown in Table 1, indicating satisfactory reliability (Nunally, 1978).
Table 1

Internal Consistency (reliability) and confidence intervals for all measures at each assessment time

<table>
<thead>
<tr>
<th>Measure²</th>
<th>Number of items in measure</th>
<th>Reliability</th>
<th>95% confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>FFMQ Week 1</td>
<td>39</td>
<td>0.91***</td>
<td>0.85 - 0.95</td>
</tr>
<tr>
<td>FFMQ Week 4</td>
<td>39</td>
<td>0.85***</td>
<td>0.76 - 0.92</td>
</tr>
<tr>
<td>DASS Week 1</td>
<td>14</td>
<td>0.94***</td>
<td>0.9 - 0.97</td>
</tr>
<tr>
<td>DASS Week 4</td>
<td>14</td>
<td>0.91***</td>
<td>0.85 - 0.95</td>
</tr>
<tr>
<td>OHQ Week 1</td>
<td>29</td>
<td>0.89***</td>
<td>0.83 - 0.94</td>
</tr>
<tr>
<td>OHQ Week 4</td>
<td>29</td>
<td>0.88***</td>
<td>0.81 - 0.94</td>
</tr>
<tr>
<td>TMS Week 1</td>
<td>13</td>
<td>0.86***</td>
<td>0.73 - 0.94</td>
</tr>
<tr>
<td>TMS Week 2</td>
<td>13</td>
<td>0.66</td>
<td>0.36 - 0.86</td>
</tr>
<tr>
<td>TMS Week 3</td>
<td>13</td>
<td>0.79***</td>
<td>0.62 - 0.92</td>
</tr>
</tbody>
</table>

Note: F test with true value = 0.7, * p < .05. **p < .01. ***p < .001

For the FFMQ, DASS and OHQ measures, week 1 refers to the baseline measurements taken pre-intervention. Week 4 refers to measurements taken post-intervention for the same measures. These terms will be used to describe these data sets from this point forward.

Manipulation Check

Paired sample t-tests were conducted on the experimental group’s weekly TMS scores as a manipulation check to measure the effectiveness of engagement with the mindfulness intervention. Only one of the t-tests indicated a significant increase in mean scores, with week 3 scores (M = 33.29, SD = 6.13) significantly increasing from week 2 scores (M = 29.94, SD = 4.78), t(16) = 2.82, p < .02. Week 2 scores (M = 29.94, SD = 4.78) did not increase significantly from week 1 (M = 30.34, SD = 8.08), t(16) = .18, and week 3 scores (M = 33.29, SD = 6.13) did not significantly increase from week 1 scores (M = 30.34, SD = 8.08), t(16) = 1.59.

In order to determine whether the mindfulness group participants were engaged from the beginning, and to evaluate whether the increased scores in week 3 were significantly different from previous research using the TMS as a manipulation check, one-sample t-tests were performed. The mean TMS value (M = 29.13) observed in past research by Erisman and Roemer (2010), who also used the TMS as a manipulation check, was not significantly different from the values found in week 1, t(16) = .56, p = .581, nor in week 2, t(16) = .70, p = .494, in the present study. However, they were significantly lower than the values found in week 3, t(16) = 2.8, p < .013. This demonstrates that participants were suitably engaged in the first two sessions, although even more so in week 3, perhaps suggesting that

² FFMQ= Five Factor Mindfulness Questionnaire, DASS= Stress subscale of Depression Anxiety and Stress scale, OHQ= Oxford Happiness Questionnaire, TMS= Toronto Mindfulness Questionnaire
participants found the Body-scan meditation easier to engage with than those used in weeks 1 and 2.

**Hypothesis One**

To determine whether trait mindfulness increased significantly from week 1 to week 4, FFMQ scores were measured pre-post intervention for participants in both conditions. The means and standard deviations of the FFMQ scores for the mindfulness and control groups at week 1 and 4 are presented in Table 2.

**Table 2**

**Descriptive statistics for the FFMQ at weeks 1 and 4**

<table>
<thead>
<tr>
<th>Assessment Time</th>
<th>Mindfulness (n = 17)</th>
<th>Control (n = 13)</th>
<th>Total Sample (n = 30)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FFMQ Week 1</td>
<td>M = 118.35, SD = 19.38</td>
<td>M = 128.69, SD = 12.98</td>
<td>M = 122.83, SD = 17.44</td>
</tr>
<tr>
<td>FFMQ Week 4</td>
<td>M = 121.24, SD = 14.81</td>
<td>M = 129.08, SD = 10.39</td>
<td>M = 123.33, SD = 13.10</td>
</tr>
<tr>
<td>Overall</td>
<td>M = 119.79, SD = -</td>
<td>M = 128.88, SD = -</td>
<td>M = 123.08, SD = -</td>
</tr>
</tbody>
</table>

A 2 X 2 mixed factorial ANOVA was conducted, with a within-subjects independent variable of assessment time (week 1 and week 4), a between-subjects independent variable of condition (mindfulness or control) and a dependent variable of FFMQ score. Significant main effects were not found for assessment time, $F(1, 28) = 0.04$, $p = .947$, or condition $F(1, 28) = 2.13$, $p = .156$. There was also no significant interaction observed, $F(1, 28) = 1.88$, $p = .182$. This is illustrated in Figure 4. No post-hoc tests were required as no significant effects or interactions were observed. However, mean increases in mindfulness were greater in the mindfulness group (week 1 $M = 118.35$, week 4 $M = 121.24$) than in the control (week 1 $M = 128.69$, week 4 $M = 129.08$), which were very similar over time.
Figure 1: A means plot to illustrate the interaction between participant group (meditation vs. control) and assessment time (pre and post intervention)

Hypothesis Two

To determine whether stress had decreased significantly from week 1 to week 4, DASS scores were measured pre and post intervention for participants in both conditions. The means and standard deviations of the FFMQ scores for the mindfulness and control groups at week 1 and 4 are presented in Table 3.

Table 3

<table>
<thead>
<tr>
<th>Assessment Time</th>
<th>Mindfulness (n = 17)</th>
<th>Control (n = 13)</th>
<th>Total Sample (n = 30)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>DASS Week 1</td>
<td>18.18</td>
<td>10.85</td>
<td>10.85</td>
</tr>
<tr>
<td>DASS Week 4</td>
<td>12.36</td>
<td>8.44</td>
<td>12.54</td>
</tr>
<tr>
<td>Overall</td>
<td>15.27</td>
<td>-</td>
<td>11.69</td>
</tr>
</tbody>
</table>
A 2 X 2 mixed factorial ANOVA was conducted, with a within-subjects independent variable of assessment time (week 1 and week 4), a between-subjects independent variable of condition (mindfulness or control) and a dependent variable of DASS score. Significant main effects were not found for assessment time, $F(1, 28) = 2.55, p = .122$ or condition, $F(1, 28) = 1.71, p = .201$. However, a significant interaction effect was observed, $F(1, 28) = 8.44, p = .007$. Figure 2 illustrates this interaction.
Figure 2: A means plot to illustrate the interaction between participant group (meditation vs. control) and assessment time (pre and post intervention)

Post-hoc tests

To determine the source of significance within the ANOVA, paired sample t-tests were conducted for both conditions (mindfulness and control) where the independent variable was assessment time (weeks 1 and 4) and the dependent variable was the DASS score. To control for two pairwise comparisons the Bonferroni correction provided a new significance value of .025 (.05/2). A significant decrease in stress was observed for the mindfulness group from week 1 ($M = 18.18$) to week 4 ($M = 12.35$), $t(16) = 2.90$, $p = .010$, but not for the control group from week 1 ($M = 10.85$) to week 4 ($M = 12.54$), $t(12) = 1.25$, $p = .236$, which showed a slight non-significant increase. This indicates that only the mindfulness group experienced a significant decrease in stress.

Hypothesis Three

To determine whether happiness increased significantly from week 1 to week 4, OHQ scores were measured pre and post intervention for participants in both conditions. The means and standard deviations of the OHQ scores for the mindfulness and control groups at week 1 and 4 are presented in Table 4.
Table 4

Descriptive statistics for the OHQ at weeks 1 and 4

<table>
<thead>
<tr>
<th>Assessment Time</th>
<th>Mindfulness (n = 17)</th>
<th>Control (n = 13)</th>
<th>Total Sample (n = 30)</th>
</tr>
</thead>
<tbody>
<tr>
<td>OHQ Week 1</td>
<td>117.88 17.73</td>
<td>114.15 16.79</td>
<td>116.27 17.13</td>
</tr>
<tr>
<td>OHQ Week 4</td>
<td>118.29 16.83</td>
<td>112.85 13.83</td>
<td>115.93 15.59</td>
</tr>
<tr>
<td>Overall</td>
<td>118.08 - -</td>
<td>113.5 - -</td>
<td>116.10 - -</td>
</tr>
</tbody>
</table>

A 2 X 2 mixed factorial ANOVA was conducted, with a within-subjects independent variable of assessment time (week 1 and week 4), a between-subjects independent variable of condition (mindfulness or control) and a dependent variable of OHQ score. Significant main effects were not found for assessment time, \( F(1, 28) = .065, p = .801 \), or condition, \( F(1, 28) = .622, p = .437 \). There was also no significant interaction observed, \( F(1, 28) = .239, p = .629 \). This is illustrated in Figure 3. No post-hoc tests were required as no significant effects or interactions were found. However, small mean increases in happiness were observed in the mindfulness group (week 1 \( M = 117.88 \), week 4 \( M = 118.29 \)), compared to a small decrease in the control (week 1 \( M = 114.15 \), week 4 \( M = 112.85 \)).
Figure 3: A means plot to illustrate the interaction between participant group (meditation vs. control) and assessment time (pre and post intervention)

Hypothesis Four

To determine whether productivity increased significantly from week 1 to week 4, volumes of completed complaints were measured pre and post intervention for participants in both conditions. The means and standard deviations of the completed case volumes for the mindfulness and control groups at week 1 and 4 are presented in Table 5.

Table 5
Descriptive statistics for productivity at weeks 1 and 4

<table>
<thead>
<tr>
<th>Assessment Time</th>
<th>Mindfulness</th>
<th>Control</th>
<th>Total Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n = 17)</td>
<td>(n = 13)</td>
<td>(n = 30)</td>
</tr>
<tr>
<td>Productivity</td>
<td>M  SD</td>
<td>M  SD</td>
<td>M  SD</td>
</tr>
<tr>
<td>Week 1</td>
<td>17.12 5.78</td>
<td>14.62 5.25</td>
<td>16.03 5.61</td>
</tr>
<tr>
<td>Week 4</td>
<td>18.88 5.34</td>
<td>14.69 4.85</td>
<td>17.07 5.47</td>
</tr>
<tr>
<td>Overall</td>
<td>18.00 - -</td>
<td>14.65 - -</td>
<td>16.55 - -</td>
</tr>
</tbody>
</table>
A 2 X 2 mixed factorial ANOVA was conducted, with a within-subjects independent variable of assessment time (week 1 and week 4), a between-subjects independent variable of condition (mindfulness or control) and a dependent variable of productivity score. Significant main effects were not found for assessment time, $F(1, 28) = 2.26, p = .144$, or condition, $F(1, 28) = 3.19, p = .085$. There was also no significant interaction observed, $F(1, 28) = 1.896, p = .179$. This is illustrated in Figure 4. No post-hoc tests were required as no significant effects or interactions were found. However, mean increases in productivity were greater in the mindfulness group (week 1 $M = 17.12$, week 4 $M = 18.88$) than in the control (week 1 $M = 14.62$, week 4 $M = 14.69$), which were very similar over time.

Figure 4: A means plot to illustrate the interaction between participant group (meditation vs. control) and assessment time (pre and post intervention)

As no main effects were observed in the study, no further analyses were required to identify mediation between mindfulness and stress, happiness or productivity. In summary, the mindfulness intervention had a significant beneficial effect on stress, and a non-significant beneficial effect on trait mindfulness, happiness and productivity, as seen by mean increases in the mindfulness, but not the control group.
Discussion

The present study aimed to assess the effects of a mindfulness meditation intervention on trait mindfulness, stress, happiness and productivity in a population of working adults, as compared to a control group. The results observed supported the hypothesis for stress, but none of the other hypotheses were supported.

Hypothesis One: Mindfulness

Unexpectedly, trait mindfulness as measured by the FFQM did not significantly increase from week 1 to week 4 in the mindfulness condition. However, a mean increase was observed in the mindfulness condition but not in the control condition, which would be expected. Although a small increase was observed, the results contradict previous findings that self-report measures of trait mindfulness significantly increase with mindfulness training (Carmody & Baer, 2008). However, the present study made use of mindfulness homework only, rather than a full course of MBSR, so other than the TMS manipulation check there was no way of guaranteeing that participants completed the exercises provided. Having said this, the manipulation checks performed on the TMS data suggest that participants were sufficiently engaged.

The significant increase in state mindfulness in week 3, without a significant increase in trait mindfulness may provide some support for Brown & Ryan (2003) as the stress reduction occurred despite no significant increase in trait mindfulness, but could potentially be a result of increased state mindfulness. However, this would need further investigation. The increase may also be a result of the type of MBSR exercise used as week 3 consisted of a Body-scan, which could be more intuitive and easier for novice meditators to engage with, compared with arguably the more meditation based exercises in weeks 1 and 2.

Based on the evidence from other studies into the effect of MBSR on trait mindfulness levels, it is most likely that no significant increases were observed due to the short duration of the intervention and the fact that participants only practiced once per week for around 20 to 30 minutes, rather than daily and over a longer period of time. The lack of group support in this study may also have been a factor (Chisea & Serretti, 2009), as may the consideration that most people taking part in successful mindfulness programs have sought out mindfulness as an intervention and the expectation of increased mindfulness may cause it to occur.

Hypothesis Two: Stress

As predicted, it was observed that self-reported negative stress, as measured by the stress scale from the DASS, significantly reduced in the mindfulness condition from week 1 to week 4 but not in the control condition. This supports research findings that mindfulness interventions can have positive psychosocial effects in groups exposed to work-related stress. (MacKenzie, Poulin & Seidman-Carlson, 2006; Irving, Dobkin & Park, 2009).

These results are also supportive of the use of a short term mindfulness program to reduce measures of self-reported stress in working populations (MacKenzie, Poulin
& Seidman-Carlson, 2006). The time commitment and cost of the eight week MBSR program would prevent most workers from participating, which lends some support for shortening existing programs to include workers. Such interventions may reduce sickness, employee turnover and insurance claims for employers (Schnall, Dobson, & Rosskam, 2009).

**Hypothesis Three: Happiness**

Happiness, as measured by the OHQ, did not increase significantly from week 1 to week 4 in the mindfulness condition. The mean in the mindfulness group was almost identical pre and post intervention compared to a small mean decrease in the control group from week 1 to week 4. Therefore, happiness appeared to be fairly stable over time and self-reported happiness levels did not increase or decrease linearly with trait mindfulness levels, suggesting there is no happiness-mindfulness relationship. This could also be observed in the mean scores at week 1 as the control group appeared more mindful but less happy than the mindfulness group, although participants were not matched so the significance of these differences in unknown. However, this may contradict Hollis-Walker & Colosimo (2011), who found that individuals with higher trait mindfulness tend to have higher self-reported happiness. The results of the present study may be due to the short duration of the intervention and that participants only practiced once per week for around 20-30 minutes, rather than daily and over a longer period of time. Equally, the study was associated with the workplace, which may have affected happiness scores. However, as job satisfaction was not measured it is not possible to identify or explore any potential relationship.

**Hypothesis Four: Productivity**

Productivity, as measured by the volume of complaints completed by participants in the working week before measures were recorded at weeks 1 and week 4, did not increase significantly. However, there was a mean increase of 1.76 complaints completed per week in the mindfulness condition from week 1 to week 4, compared to the control group whose means were almost identical over time. As the researcher was unable to locate any studies specifically exploring effects of mindfulness on workplace productivity, the results may offer limited support for theories that mindfulness interventions may positively affect task performance (Glomb, Duffy, Bono & Yang, 2011; Dane, 2011) and productivity in some work environments.

Although statistically insignificant, in a department of over 100 people, an increase in productivity of 1.76 complaints per person, per week, would be seen as significant to the organisation through which the study was conducted.

**Broader Considerations**

The findings, although unexpected, do provide some support to research findings that have indicated that some effects of mindfulness based interventions, such as MBSR, may not be linked directly to increased mindfulness (Delgado, et al., 2010), as general relaxation training produced similar results. Therefore, the present results suggest that the process 20-30 minutes per week focussed relaxation was enough to significantly reduce self-reported stress in the mindfulness condition,
without significantly changing mindfulness. This supports other relaxation interventions such as yoga (Bower, et al., 2005; Sauer-Zavala et al., 2012), and general relaxation (Piazza-Waggoner et al., 2003).

Whilst there is some evidence to indicate that significantly shortened MBSR interventions can be efficacious at increasing trait mindfulness (Zeidan, et al., 2010), the effects of such interventions on working adults, who are exposed to daily stresses in their working lives, are generally unexplored. Other short-term mindfulness interventions, which have observed significant increases in trait mindfulness (Zeidan, et al., 2010), generally used students and experienced mindfulness teachers in a fully controlled environment. Those studies using shortened versions of MBSR to study working adults are rare, have provided mixed results regarding stress reduction and did not actively measure trait mindfulness (Malarkey, Jarjoura & Klatt, 2013; MacKenzie, Poulin & Seidman-Carlson, 2006). Therefore, the efficacy of short term MBSR on trait mindfulness in working adults requires further study.

The present study was constrained by a number of factors, such as business needs and worker’s busy lives, meaning the MBSR exercises were performed in the participant’s homes. The study was linked with the workplace which could be a longer term source of stress than that experienced by students in other studies. This part of the design, although necessary to assess the efficacy of mindfulness meditation as a resource in busy lives, which cannot spare eight weeks does raise certain issues. Whilst participants may have engaged with the exercises, the home offers more distractions than a controlled environment. Therefore, it may take longer to develop the mindfulness skills required to increase trait mindfulness.

Also, whilst homework is used in MBSR, Vitesse et al, (2009) found only partial support for the benefits of homework as part of MBSR practice and recommended further study of this. Although manipulation checks indicated that participants were engaging with the recordings, it is unclear whether using a homework only design led there to being no significant increase in trait mindfulness, compared to a more controlled location. Studies could easily examine whether location of MBSR practice influences trait mindfulness, which may help to further develop the use of MBSR in non-clinical groups.

Conclusion

The current study demonstrated that a short term mindfulness intervention was successful in reducing self-reported negative stress in a population of working adults. However, the intervention was not successful in significantly influencing levels of trait mindfulness, happiness or productivity. The lack of significant increases in trait mindfulness means that it is not possible to make inferences regarding the mechanisms of the stress reduction observed in this study, particularly as no alternative relaxation techniques were tested. However, there is some hope as the means of the mindfulness group did increase where expected, particularly in terms in of trait mindfulness and productivity, although less so with happiness. These findings, coupled with the significant decrease in self-reported negative stress, suggest that similar research may be warranted, either with increased MBSR exercises during the four week intervention or by extending the length of the
intervention itself. In terms of the impact on self-reported stress, even without the corresponding increases in trait-mindfulness, employers should be encouraged to explore the implementation of efficacious stress relief programs for employees to reduce sickness and insurance claims.

References


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