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The Relationship Between Mindfulness and Work-Related Stress

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Title

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Abstract

Stress is both a health risk and an economic risk for our society. Employers search for ways to offer possible stress reducers for their employees. Mindfulness as a stress reducer is a fairly new research area but with a good amount of research papers suggesting that mindfulness programmes over several weeks are successful in reducing subjective perceived stress as well as physiological stress, such as blood pressure and cortisol levels. This study aims to examine whether mindfulness could show positive effects on stress at work, after only one mindfulness session, compared to being on an extended break. Measurements includes the Shirom-Melamed Burnout Questionnaire (SMBQ), blood pressure and pulse. The results show that engaging in one single mindfulness session does have an effect on lowering blood pressure as well as lowering perceived tension, which is one of four parts of the SMBQ.

Acknowledgements

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Keywords

Mindfulness, Work-Related stress, Blood pressure, Pulse, SMBQ, Subjective stress, Objective stress

Stress is a growing public health problem and there is an urge in society to manage this issue, due to its costs both financially and regarding people's well being. Mindfulness as a possible solution for decreasing people's stress levels is a relatively new but growing research area. Baer et al (2006 p. 27) defines mindfulness as “bringing one’s complete attention to the experiences occurring in the present moment, in a nonjudgmental or accepting way”. Mindfulness is the practise of being consciously present of your mind, body and surroundings. Exercises in mindfulness are designed to increase the level of consciousness of the trainee by paying full attention to single elements such as your breath, certain sense perceptions or body parts.

Because a lot of the stress people experience arises at their workplace, many employers nowadays offer courses in mindfulness, often called mindfulness-based stress-reduction, MBSR (Klatt, Buckworth, Malarkey 2009). Having highly stressed employees is expensive, it effects productivity negatively and of course result in health risks (Wolever, Bobinet, McCabe, Mackenzie, Fekete et al. 2012), which are strong reasons for finding solutions to reduce stress at work and research suggests that mindfulness could be such a potential solution. Of importance to the employers is that these programmes must show results of effectiveness as well as being economically justifiable (ibid).

The ways of measuring mindfulness effect on stress are several, including both objective and subjective measurements. The main objective measurements of stress in mindfulness research are systolic and diabolic blood pressure, heart rate and hormone levels (cortisol) while the subjective measurements include mood, perceived stress and burnout levels (Roeser, Schonert-Reichl, Jha, Cullen, Wallace et al. 2013; Wolever et al. 2012; Klatt et al. 2009; Shearer, Hunt, Chowdhury, Nicol 2016). One study used a general survey as well as a diary booklet as an efficient way of measuring results over time (Hülshager, Alberts, Feinholdt, Lang, 2013). Others used the Perceived Stress Scale (PSS), where the participants note how often they have felt or thought the different statements the last month (Shapiro, Astin, Bishop, Cordova, 2005; Wolever et al. 2012). Previous research have often used different scales to show that their participants have grown to be more mindful during the programme, using for example The Mindful Attention Awareness Scale (MAAS) (Baer et al. 2006) or the Five Factor Mindfulness Questionnaire (FFMQ) (Roeser et al. 2013).

Mindfulness and stress should be considered a fairly new subject of research, but already in the late 90s a psychology study showed that teachers that meditated 2-5 times a week perceived less stress and less anxiety than a control group (Anderson, Levinson, Barker, Kiewra, 1999). More recent studies includes experiments on different professions, with mindfulness programmes lasting 4-8 weeks. They have shown significant results on reduced subjective stress levels as well as an effect on physiological stress. The participants both perceived that their stress levels had been reduced and showed results of lowered blood pressure and less secretion of stress hormones, such as cortisol (Wolever et al. 2012; Shapiro et al. 2005; Walach, Nord, Zier, Dietz-Waschkowski, Kersig, et al. 2007; Klatt et al. 2009; Roeser et al. 2013). There has been research finding it harder to prove statistically significant effects on cortisol levels as well as subjective perceived stress for working adults, for example health care professionals (Galantino, Baime, Maguire, Szapary, Farrar 2005), why more experiments are required before drawing certain conclusions.

One mindfulness experiment recently showed that participants in a mindfulness group had lower anxiety levels than both a control group and a group where the participants interacted with a dog. The groups also had a cognitive challenge while measuring heart rate variability, showing that the mindfulness group managed to cope with their stress responses better than

the other two groups (Shearer et al. 2016). Findings show that high scores on The Mindful Attention Awareness Scale (MAAS) equals high well being and people who are mindful are less stressed as well as cope better with stress (Weinstein, Brown, Ryan 2009). Research is quite coherent concerning mindfulness effect on healthy people and their perceived stress (Chiesa & Serretti 2009; Grossman, Niemann, Schmidt, Walach, 2004), but have also shown positive results on for example cancer patients stress levels (Brown & Ryan 2003), and on people with stress-related problems, illness, anxiety and chronic pain (Carmody & Baer 2008). Practising mindfulness makes you more mindful and being mindful leads to greater well being (ibid).

All these above mentioned studies suggest that mindfulness programmes can be of great benefit at workplaces with stressed employees. What the studies all have in common is that the mindfulness sessions were several and long, taking up a lot of time and effort for the employees withholding them from work for many hours during the programme. These factors might deter other employers from trying out mindfulness at their workplace. Our study explores whether mindfulness on a smaller scale also could have these positive effects on stress, possibly lowering the threshold for both employers and employees of engaging in mindfulness sessions.

This paper investigates whether only one session of mindfulness could show result of reducing stress levels short term, both subjective stress level as well as physiological.

Hypothesis

One session of mindfulness at a workplace could lead to reduced perceived stress as well as decreased blood pressure levels among the employees.

Method

Participants

The experiment had a total of 53 adult participants, 13 men and 40 women, office workers at two different workplaces in Stockholm, Sweden. Men and women were proportionally represented in all different groups. The participants were randomly assigned to either the mindfulness group or the control group, which had a break instead of a mindfulness session. The participants took part in the experiment during their work day.

Instruments

Stress was assessed by the SMBQ – Shirom-Melamed Burnout Questionnaire (Melamed et al. 1992; Shirom et al. 1997, Melamed et al. 1999; Grossi et al. 2003), where the phrase “for most of your day time” was altered to “right now” regarding the statements the participants were to consider. The SMBQ originally consists of 22 statements. In this study only 21 was used since one of the questions concerned problems with getting up in the morning and therefore was irrelevant when the question was to be filled out twice within one hour. The statements in the SMBQ are divided into four subcategories; tension, emotional/physical exhaustion, lethargy and mental exhaustion. The mean of each category is a measure of burn out and the mean of all categories is called SMBQ-Global where a mean above 3.75 is a sign of burn out (ibid). Systolic and diastolic blood pressure as well as pulse were recorded with six Omron M6 (Omron, Japan, lend by SundMed AB). Participants were also asked whether they currently take any blood pressure medication.

Procedure

The SMBQ questionnaire was to be filled out before and after the mindfulness session or the break. The participants also measured their blood pressure both before and after, with our

surveillance and assistance. We had access to six blood pressure monitors, Omron M6. After filling out the SMBQ and measuring blood pressure, the mindfulness group participated in a 35 minute session of mindfulness, led by Magnus Engervall. The control group had a 35 minutes long break, to spend as they wished except entering into any kind of intense physical activity. After the 35 minutes, both groups filled out the SMBQ form and measured their blood pressure again, before they went back to work.

The mindfulness session began with an introduction to the concept of mindfulness and a short explanation about conscious presence and its benefits to well being. The session continued with information concerning what thoughts do to us and how thoughts can take over when we are not consciously present. Then followed a series of exercises, beginning with the participants training to dissociate themselves from their thoughts, paying attention to them without judging or classifying. The second exercise included the task of bringing attention to the three different senses; vision, hearing and touch. Thereafter, followed a body scan exercise, focusing on different body parts. The fourth and last exercise was a breathing exercise where the focus was to direct conscious presence towards the breathing. During all exercises, the participants were encouraged to handle upcoming thoughts by disassociating from them and bringing back focus to the breath, sense or body part in question.

Data Analysis

The data analysis examined differences in blood pressure (systolic and diastolic), pulse and perceived stress/burnout (according to the four subcategories tension, emotional/physical exhaustion, lethargy and mental exhaustion of the SMBQ questionnaire) between the experiment group exercising mindfulness (27 participants) and the control group being on an extended break (26 participants). Repeated measures ANOVA analyses were conducted using GROUP (Mindfulness or Break) as between group variables and the two TIME measurement points (before and after the sessions) as between subjects variables. The effect of gender was not analysed due to uneven distribution in our sample (13 men vs. 40 women). The influence of currently taking blood pressure medication was not analysed since the sample size was too small (5 participants).

Ethics

The participants signed a consent form, informing them about the experiment and their right to end their participation at any time without reason. They were also informed that they are guaranteed anonymity and that the results of the experiment will not be linked to individuals in accordance with the Helsinki declaration (2013).

Results

Blood pressure

The systolic blood pressure (SBP) results revealed a significant main effect of TIME, $F(1,49) = 5.28$, $p = .026$, $\eta_p^2 = .094$. SBP was lower after ($M = 122.91$, $SD = 17.69$) as compared to before the sessions ($M = 126.08$, $SD = 18.91$). There were no main effects of GROUP, $F(1, 49) = .12$, n.s. The results showed a significant TIME*GROUP interaction, $F(1, 49) = 16.69$, $p < .0001$, $\eta_p^2 = .25$, see Fig 1 & Table 1.

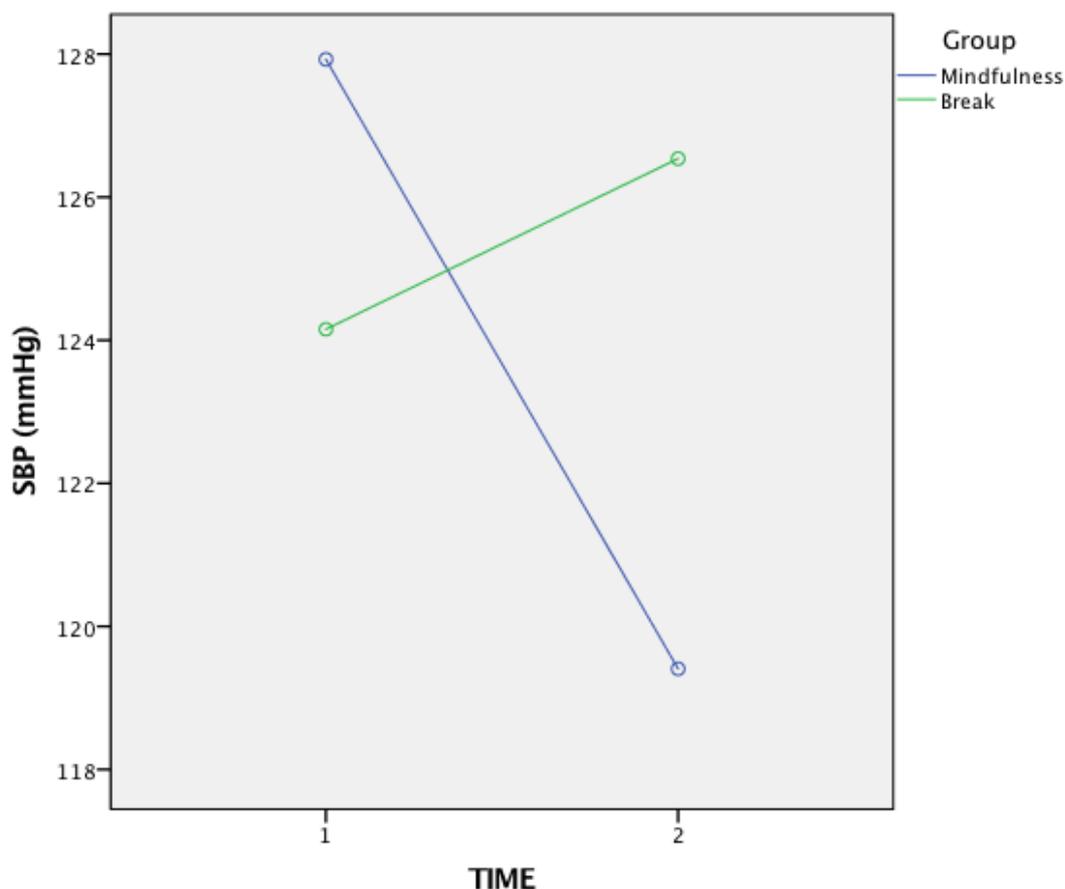


Figure 1. Systolic blood pressure as a function of TIME and GROUP.

The diastolic blood pressure (DBP) results didn't reveal any significant main effect of TIME, $F(1,49) = .07$, n.s. as well as no main effects of GROUP, $F(1, 49) = .21$, n.s. The results showed a tendency of a significant TIME*GROUP interaction, $F(1, 49) = 3.29$, $p = .075$, $\eta_p^2 = .06$, see Fig 2 & Table 1.

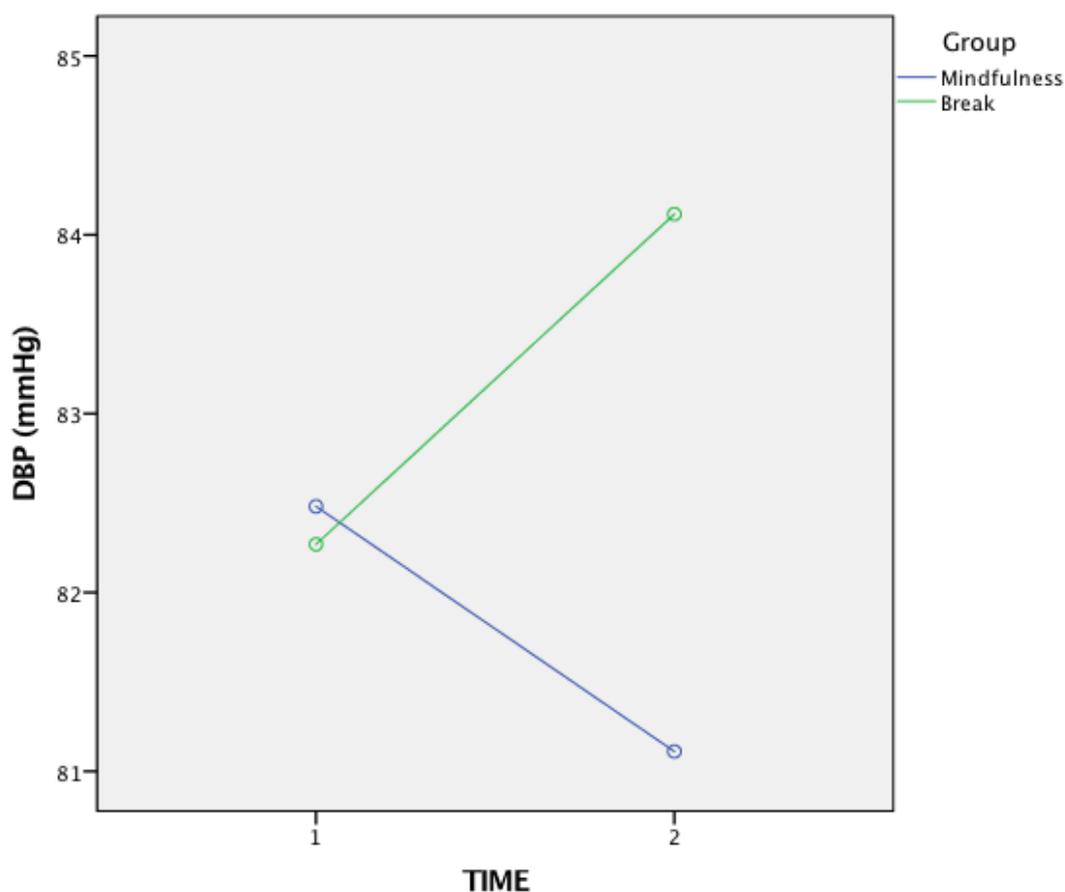


Figure 2. Diastolic blood pressure as a function of TIME and GROUP.

Pulse

The pulse results revealed a significant main effect of TIME, $F(1,49) = 8.57, p = .005, \eta_p^2 = .14$. The pulse was lower after ($M = 72.04, SD = 14.22$) as compared to before the sessions ($M = 75.19, SD = 13.29$). There were no main effects of GROUP, $F(1,49) = 2.43, p = .125, \eta_p^2 = .046$. The results didn't show a significant TIME*GROUP interaction, $F(1, 49) = 1.44, p = .236, \eta_p^2 = .14$, see Fig 3 & Table 1.

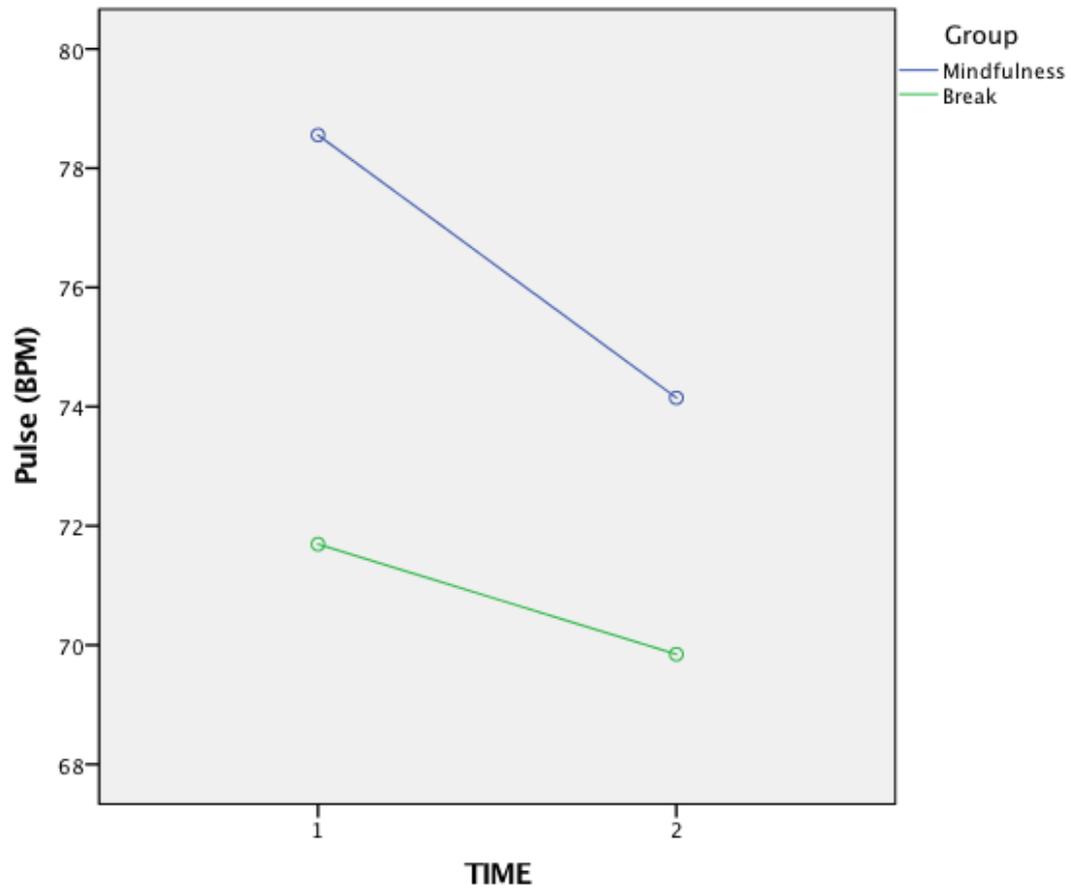


Figure 3. Pulse as a function of TIME and GROUP.

Table 1

Blood pressure & pulse data

	Before session (TIME=1)		After session (TIME=2)	
	Mean	SD	Mean	SD
Systolic blood pressure				
Mindfulness group	127.93	20.61	119.41	18.79
Break group	124.15	17.17	126.54	16.03
Both groups	126.08	18.91	122.91	17.69
Diastolic blood pressure				
Mindfulness group	82.48	12.38	81.11	11.11
Break group	82.27	11.81	84.12	11.07
Both groups	82.38	11.99	82.58	11.08
Pulse				
Mindfulness group	78.56	12.36	74.15	13.48
Break group	71.69	13.55	69.85	14.90
Both groups	75.19	13.29	72.04	14.22

*Table 1: Means and standard deviations of TIME and GROUP for collected blood pressure & pulse data.**SMBQ – Global*

The results of the the SMBQ Global measure revealed a significant main effect of TIME, $F(1,49) = 16.21, p = .000, \eta_p^2 = .24$. The total SMBQ score was lower after ($M = 3.07, SD = 0.98$) as compared to before the sessions ($M = 3.50, SD = 0.86$). There were no main effects of GROUP, $F(1,49) = .79, n.s.$ The results didn't show a significant TIME*GROUP interaction, $F(1, 49) = .03, n.s.$ see Fig 4 & Table 2.

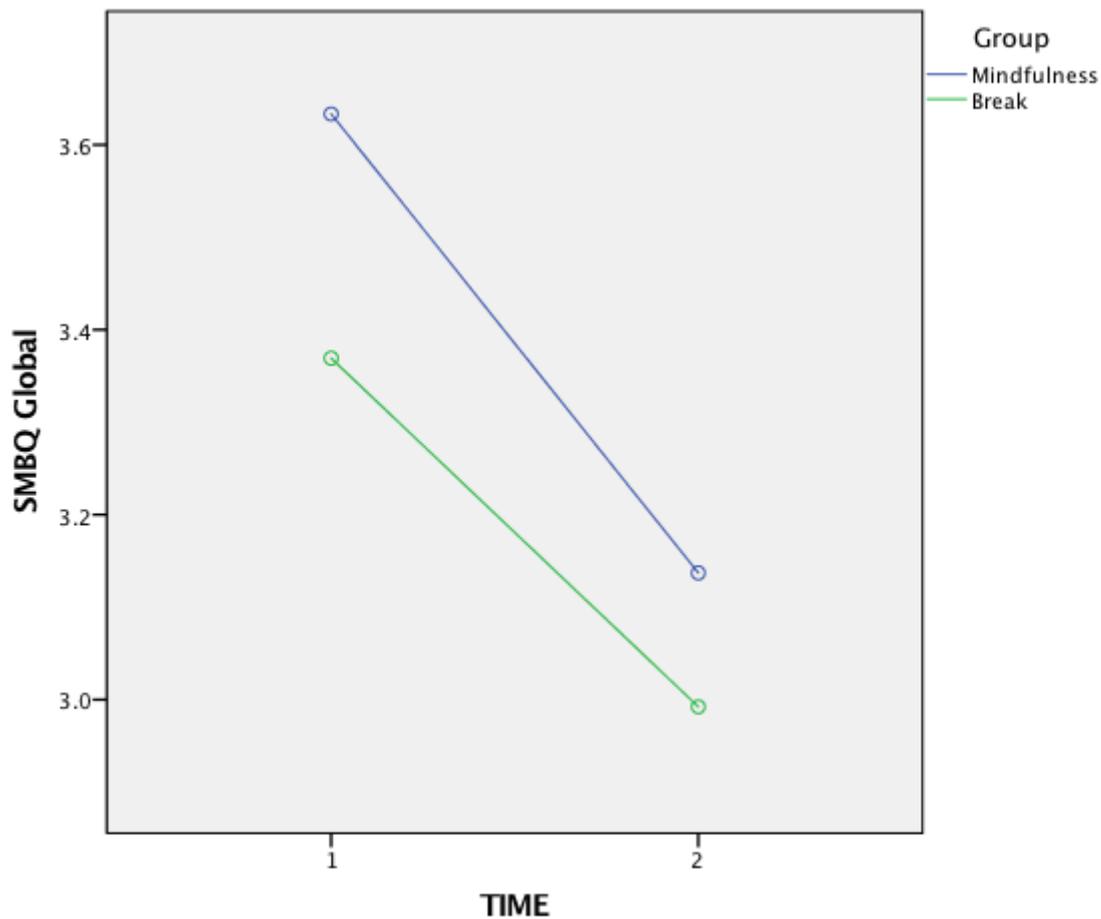


Figure 4. SMBQ Global as a function of TIME and GROUP.

SMBQ - Tension

The results of the subcategory Tension of the SMBQ questionnaire revealed a significant main effect of TIME, $F(1,49) = 23.05, p < .000, \eta_p^2 = .31$. The tension was lower after ($M = 3.1, SD = 1.29$) as compared to before the sessions ($M = 3.81, SD = 1.06$). There were no main effects of GROUP, $F(1,49) = .76, n.s$. The results showed a tendency of a significant TIME*GROUP interaction, $F(1, 49) = 3.77, p = .058, \eta_p^2 = .07$, see Fig 5 & Table 2.

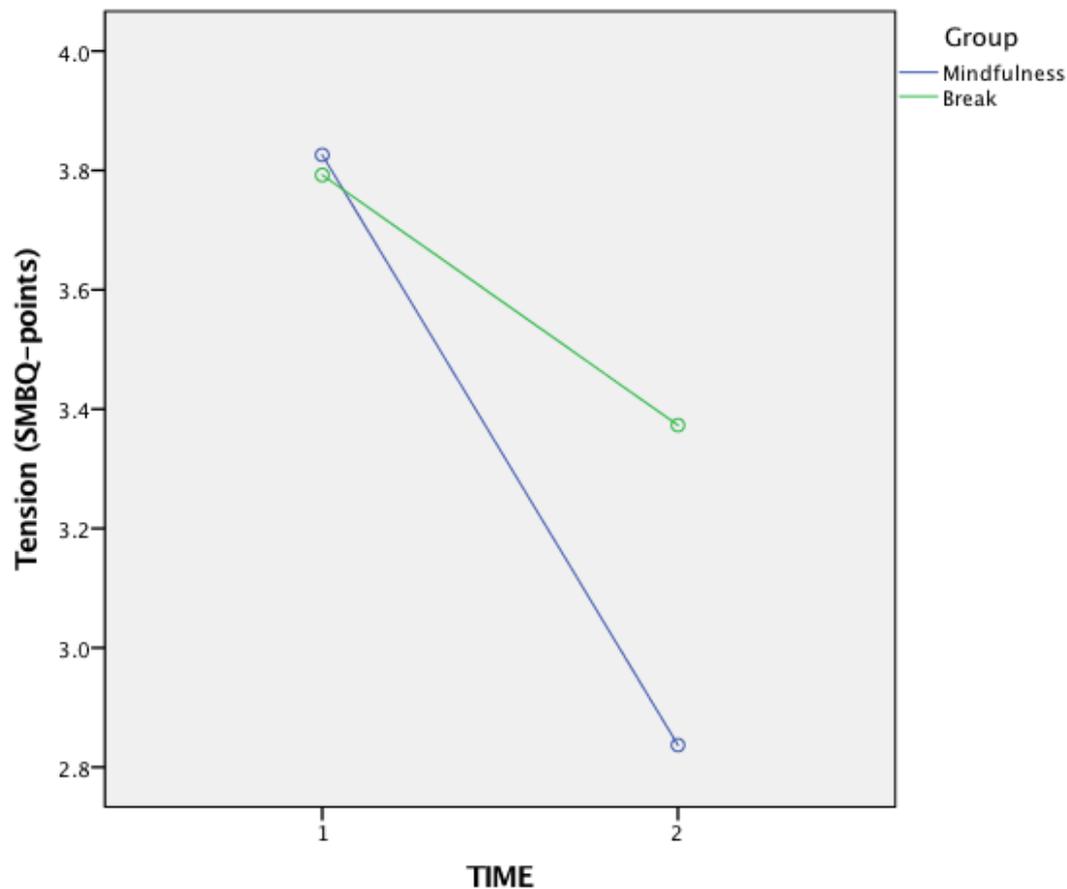


Figure 5. Tension as a function of TIME and GROUP.

SMBQ – Emotional & physical exhaustion

The results of the subcategory Emotional/physical exhaustion of the SMBQ questionnaire revealed a significant main effect of TIME, $F(1,49) = 12.77$, $p = .001$, $\eta_p^2 = .20$. The emotional/physical exhaustion points were lower after ($M = 2.93$, $SD = 1.06$) as compared to before the sessions ($M = 3.36$, $SD = 0.99$). There was a tendency to a significant main effect of GROUP, $F(1,49) = 3.21$, $p = .079$, $\eta_p^2 = .059$. The results didn't show a significant TIME*GROUP interaction, $F(1, 49) = .08$, n.s. see Fig 6 & Table 2.

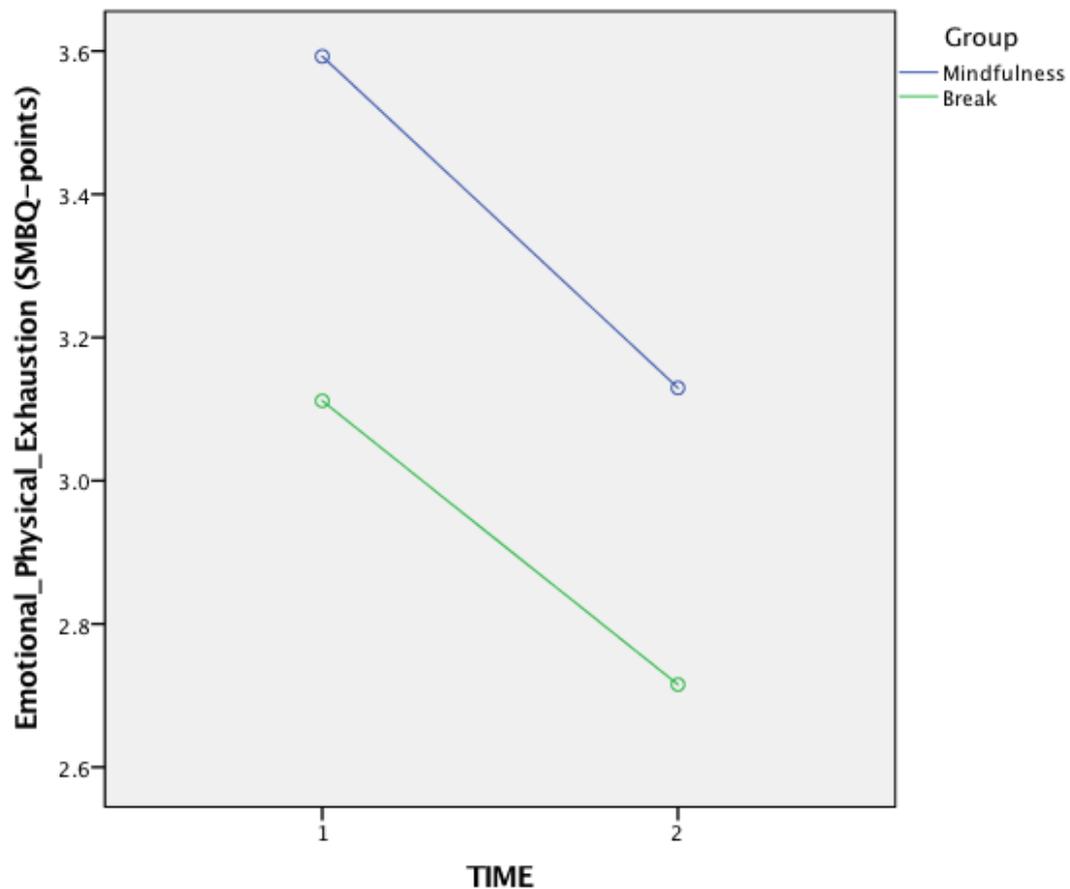


Figure 6. Emotional & physical exhaustion as a function of TIME and GROUP.

SMBQ – Lethargy

The results of the subcategory Lethargy of the SMBQ questionnaire revealed no significant main effect of TIME, $F(1,49) = .98$, n.s. There was also no significant main effect of GROUP, $F(1,49) = 2.58$, $p = .12$, $\eta_p^2 = .048$. The results didn't show a significant TIME*GROUP interaction, $F(1,49) = 1.03$, n.s. see Fig 7 & Table 2.

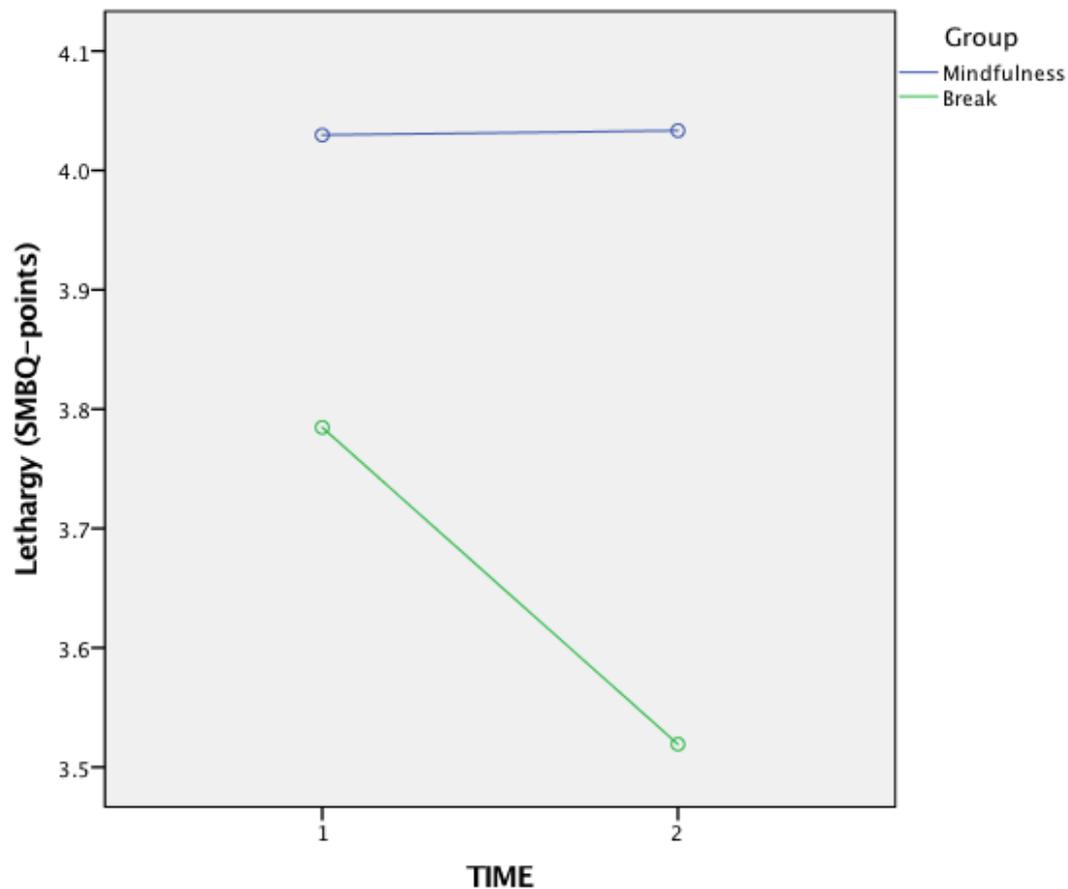


Figure 7. Lethargy as a function of TIME and GROUP.

SMBQ – Mental exhaustion

The results of the subcategory Mental exhaustion of the SMBQ questionnaire revealed a significant main effect of TIME, $F(1,49) = 10.42, p = .002, \eta_p^2 = .17$. The mental exhaustion points were lower after ($M = 2.76, SD = 1.29$) as compared to before the sessions ($M = 3.23, SD = 1.24$). There were no main effects of GROUP, $F(1,49) = .01, n.s.$ The results didn't show a significant TIME*GROUP interaction, $F(1, 49) = .01, n.s.$ see Fig 8 & Table 2.

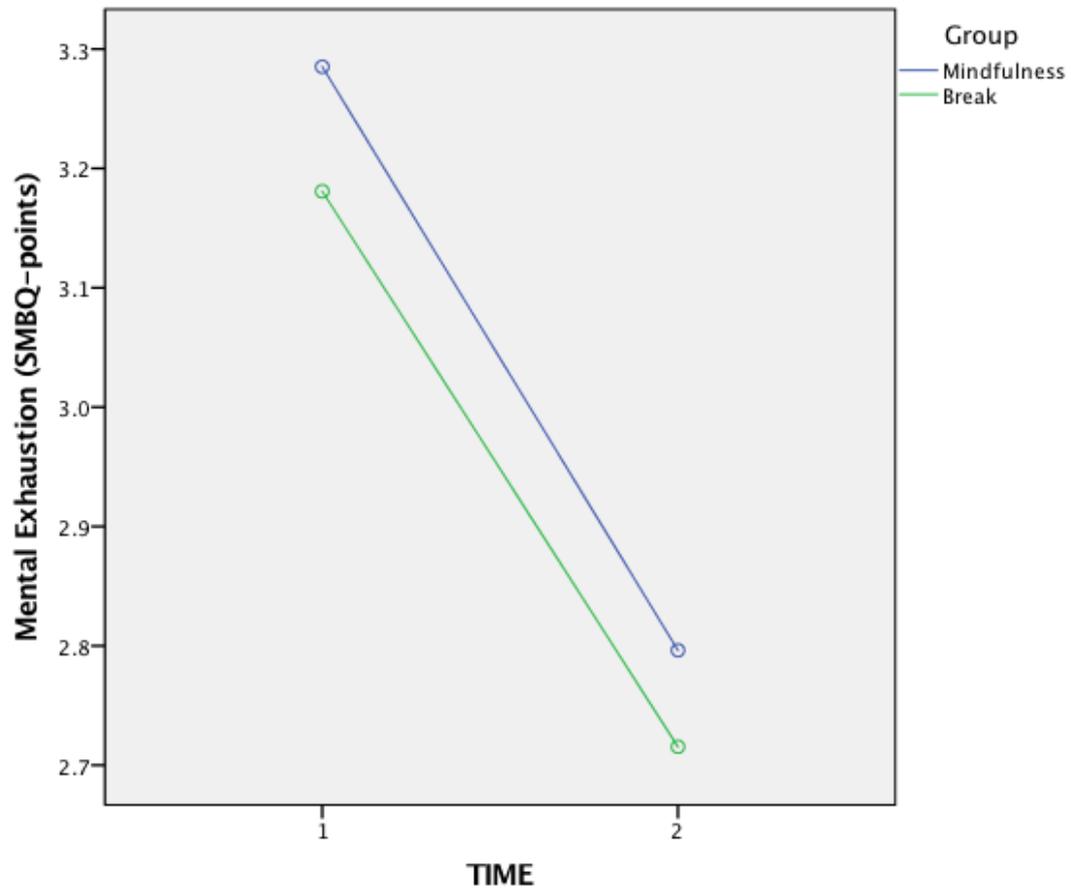


Figure 8. Mental exhaustion as a function of TIME and GROUP.

Table 2

SMBQ data

	Before session (TIME=1)		After session (TIME=2)	
	Mean	SD	Mean	SD
Global				
Mindfulness group	3.63	0.70	3.14	0.73
Break group	3.37	0.99	2.99	1.20
Both groups	3.50	0.86	3.07	0.98
Tension				
Mindfulness group	3.83	0.82	2.84	1.08
Break group	3.79	1.28	3.37	1.45
Both groups	3.81	1.06	3.10	1.29
Emotional & Physical exhaustion				
Mindfulness group	3.59	0.82	3.13	0.72
Break group	3.11	1.10	2.72	1.31
Both groups	3.36	0.99	2.93	1.06
Lethargy				
Mindfulness group	4.03	0.81	4.03	0.96
Break group	3.79	1.08	3.52	1.08
Both groups	3.91	0.95	3.78	1.04
Mental exhaustion				
Mindfulness group	3.29	1.27	2.80	1.05
Break group	3.18	1.23	2.72	1.53
Both groups	3.23	1.24	2.76	1.29

Table 2: Means and standard deviations of TIME and GROUP for collected SMBQ 1 data.

Note: Values above 3,75 are considered high burnout while values below 2,75 are considered low burnout (healthy) according to the SMBQ scale

Discussion

In line with the hypothesis, the results indicate a positive effect on blood pressure levels in favour of exercising mindfulness. Being on a break slightly increased blood pressure levels while exercising mindfulness significantly decreased blood pressure levels. The results show that the mindfulness session brought blood pressure levels of the participants to ideal levels with a systolic blood pressure of about 119 mmHg and a diastolic blood pressure of about 81 mmHg, while the extended break elevated systolic blood pressure to about 127 mmHg and diastolic blood pressure to about 84 mmHg. The habit of drinking coffee on work breaks is a potential contributing factor to the result. Since the break was designed to be as normal as possible, drinking coffee or entering into other behaviours associated with a normal work break were, however, expected to take place. The positive results of mindfulness on physiological health are in line with previous findings (Wolever et al. 2012; Roeser et al. 2013; Shearer et al. 2016).

Most previous research investigated the effect of longer mindfulness programmes compared to a control group that didn't participate in any mindfulness activities but just kept on working as usual. In this study, a single mindfulness session was compared to being on an extended break. This set-up reveals if it's the mindfulness session itself that reduce objective and subjective stress or if any kind of rest during the workday has the same effect. Some previous studies have taken the same approach with using other kinds of groups. An example is an experiment conducted by Shearer et al. in 2016 using three groups where one of the groups was assigned to pet a dog instead of exercising mindfulness or keeping on working as always. This research using three groups (mindfulness group, pet a dog group and a control group) showed that the mindfulness group had the best effect in reducing stress levels followed by the group petting a dog. The group that just continued working had the highest levels of stress (Shearer et al. 2016). These previous findings indicate that if a third group that just continued working would have been used in the experiment of this paper, it's likely that even greater positive effects would have been shown of the mindfulness session. It's also possible that the results would have revealed positive effects of having an extended break over just working.

The pulse levels decreased for the participants of the mindfulness session as well as for the people being on a break. Even though pulse levels decreased more for mindfulness participants, the result was not strong enough to show a significant difference between the two groups. Experiments including more participants are recommended to clarify if any significant difference exists.

Looking at the subcategories of the SMBQ questionnaire, there is a tendency of a significant result in regards to experienced tension. While participants in both groups experienced lower levels after exercising mindfulness or being on an extended break, participants of the mindfulness session experienced less tension. The mindfulness session took the tension level of the participants from the category "high burn out" with values around 3.8 to "Healthy" values of about 2.8. The break group experienced less than half of this decrease with values dropping from 3.8 to 3.4. The result of $p = .056$ is on the edge of significance encouraging further studies to determine the significance of this finding.

None of the other subcategories of the SMBQ questionnaire (Lethargy, Mental exhaustion or Emotional/physical exhaustion) showed any significant differences between the two groups. The purpose of the SMBQ questionnaire is to measure a participant's degree of burnout at a given time. Even though adjustments were made to fit this experiment, having participants filling out the questionnaire twice within a one-hour period might not be optimal for measuring the current state of mind of the participants. In case of further research with a

similar set-up, other ways of measuring subjectively experienced stress are recommended to be considered. Many measurements of stress, such as the PSS total score (Wolever et al. 2012), diary booklets (Hülshager et al. 2013) and the Perceived Stress Scale (Shapiro et al. 2005) were not applicable for this one time mindfulness and break session, due to its focus on coping with stress over time. The SMBQ was chosen since small adjustments made the questions fit the set-up of the experiment. It might be, however, that stress and burnout is a difficult thing to measure before and after a single session. Even though not perfectly applicable, a mindfulness questionnaire such as the ones used by Baer et al. (2006) or Roeser et al. (2013) might be to consider as measurement instruments for future research.

The findings of this paper supports the hypothesis that not only longer mindfulness programmes but even single mindfulness sessions at work can provide positive health outcomes for employees in terms of decreased blood pressure levels and decreased levels of experienced tension. More studies including a greater amount of participants are recommended to further determine these effects.

Previous research papers with mindfulness programmes lasting several weeks show a lot of positive and significant findings. The experiment of this study included only one single mindfulness session but could still reveal both positive as well as significant results. The popularity of mindfulness programmes at workplaces is increasing (Klatt et al. 2009) but due to time consumption and budgetary limitations it might be a big step for an employer to offer a full program to employees. The result of this paper encourages employers, facing monetary or time restrictions, to offer their employees occasional mindfulness session as a first step. As presented, single mindfulness sessions also have significant positive physiological effects on the health of employees. However, replication of the study is encouraged, for making sure to draw safe conclusions.

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