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The effects of mindfulness versus thought suppression instruction on the appraisal of emotional and neutral pictures

ORIGINAL PAPER

The present study investigated the effects of brief mindfulness and thought suppression instructions on the appraisal of emotional (positive and negative) and neutral pictures. It was expected that mindfulness would promote positive emotional reactions toward picture stimuli, whereas thought suppression would promote negative emotional reactions. Sixty participants were randomly assigned to one of the three conditions (mindfulness, thought suppression, control). In each condition, participants rated emotional and neutral pictures on two 9-point scales, one pertaining to picture valence and the other to picture arousal. Contrary to what was expected, the present study revealed no effects of mindfulness on dealing with emotions provoked by emotional and neutral pictures. Thought suppression, on the other hand, was found to be a successful strategy in dealing with emotions provoked by negative pictures. It is suggested that thought suppression is a successful short-term emotion regulation strategy for dealing with negative emotions of low intensity.

Keywords: mindfulness; thought suppression; emotional pictures; neutral pictures

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INTRODUCTION

Over the past couple of decades, the emergence of mindfulness has drawn a great deal of attention from behavioural researchers (Brown & Cordon, 2009; Kabat-Zinn, 1982). Definitions of mindfulness proposed by these researchers have often been diverse (Brown, Ryan, & Creswell, 2007; Follette, Palm, & Pearson, 2006), but regardless of this diversity, all of them use at least one of the concepts considered to be crucial for defining mindfulness: attention, awareness, present-centeredness, and non-judgmental stance toward mental content or acceptance (Baer, 2003; Brown et al., 2007; Germer, 2005).

Thought suppression has often been considered the opposite pole of mindfulness (Campbell-Sills, Barlow, Brown, & Hofmann, 2006a, 2006b; Hooper, Davies, Davies, & McHugh, 2011). Instead of being aware and accepting one's thoughts and feelings as they arise (i.e. being mindful), suppression involves conscious effort to ignore or deny the existence of an unwanted thought, which eventually results in an enhanced occurrence of that same thought (Hooper et al., 2011). Summing up literature on thought suppression, Wenzlaff & Wegner (2000) conclude that thought suppression is not merely an ineffective strategy of mental control; it is even counterproductive, fostering the state of mind one had initially hoped to avoid.

Emotional experience and its regulation are central to psychological well-being (Brown & Cordon, 2009). Successful regulation of emotions leads to improvements in overall well-being (Shapiro, Carlson, Astin, & Freedman, 2006), as well as social adjustment (Campbell-Sills et al., 2006b). Unsuccessful regulation of emotions, on the other hand, may lead to various mental health problems, which often have serious consequences for one's well-being (Follette et al., 2006). A number of studies aimed at investigating the effects of mindfulness and thought suppression on emotion regulation. With respect to mindfulness, studies point out that mindfulness helps to increase behavioural willingness and tolerance when dealing with negative material (Arch and Craske, 2006), attenuates emotional intensity when viewing highly emotional pictures in both experienced and beginner meditators (Taylor et al., 2011), and is found to be the best strategy when dealing with emotions provoked by emotional stimuli (Hooper et al., 2011). Studies of thought suppression, on the other hand, consistently claim that it is not only highly ineffective, but also counterproductive (Campbell-Sills et al., 2006b; Hooper et al., 2011; Hooper, Sandoz, Ashton, Clarke, & McHugh, 2012). Taken together, these studies suggest that the ability to accept emotions and to confront them with a non-judgmental stance apparently leads to a more successful emotion regulation and, consequently, improved overall well-being.

So far, the majority of studies conducted assessed the effects of aforementioned coping strategies on dealing with negative stimuli. It would be interesting to examine the effects of these strategies on positive and neutral stimuli as well, thus potentially providing some insight in the overall generalisability of the effects of these strategies across the whole spectrum of emotions. The present study has the purpose to add to the findings outlined above by comparing the effects of mindfulness versus thought

suppression instructions on the appraisal of positive, negative and neutral pictures. More precise, the aim of the present study is to explore the effects of mindfulness versus thought suppression instructions on the appraisal of positive, negative and neutral pictures. In line with the above mentioned studies, it was hypothesized that after hearing a mindfulness instruction, participants would evaluate the pictures as more pleasant and calming, whereas after a thought suppression instruction they would evaluate the pictures as less pleasant and calming. Since valence and arousal are considered to be fundamental dimensions of emotional experience (Bradley & Lang, 1994; Dolcos & Cabeza, 2002), hypotheses were made with respect to both picture valence and picture arousal. Specifically:

1. Mindfulness instruction will facilitate positive emotional reactions toward emotional (positive and negative) pictures, whereas it will have no significant effect on the appraisal of neutral pictures.
 - a) After a mindfulness instruction, positive pictures will be evaluated as more positive, negative pictures as less negative and neutral pictures will be evaluated as slightly more positive.
 - b) After a mindfulness instruction, both positive and negative pictures will be evaluated as less arousing, and neutral pictures will be evaluated as slightly less arousing.
2. Thought suppression instruction will facilitate negative emotional reactions to emotional (positive and negative) pictures, whereas it will have no significant effect on the appraisal of neutral pictures.
 - a) After a thought suppression instruction, positive pictures will be evaluated as less positive, negative pictures as more negative, and neutral pictures will be evaluated as slightly more negative.
 - b) After a thought suppression instruction, both positive and negative pictures will be evaluated as more arousing, and neutral pictures will be evaluated as slightly more arousing.

METHODOLOGY

Participants

Sixty undergraduate and graduate Maastricht University students enrolled in various study programs participated in this experiment in return for either course credit or money vouchers. They were randomly assigned to one of the three conditions: mindfulness ($n=20$), thought suppression ($n=20$) or control ($n=20$).

Design

The present study is part of a more extensive study that also included investigation of the effects of emotional and neutral pictures on memory (recall/recognition task). Overall, the study had four main dependent variables, two of which were the focus of this research - mean valence ratings and mean arousal ratings. Independent variables were the three different conditions used: mindfulness instruction, thought suppression instruction and no instruction (control). A 3 (condition: mindfulness,

thought suppression, no instruction) by 3 (valence ratings: positive, negative, neutral pictures) by 3 (arousal ratings: positive, negative and neutral pictures) between-subject mixed factorial design was used.

Stimuli

In total, 120 pictures taken from the International Affective Picture System (Lang, Bradley, & Cuthbert, 2008) were used as stimulus material. Each picture category used in this research (positive, negative and neutral) included 40 pictures. Sixty of those pictures were used in the rating task, 20 per category. For each category, pictures were selected based on their mean valence and arousal ratings (i.e. norm data). According to Dolcos and Cabeza (2002), valence refers to a continuum ranging from pleasant to unpleasant, with neutral as an intermediate value, whereas arousal pertains to a continuum ranging from calm to excitement. Positive pictures had a mean valence rating of above 7 and a mean arousal rating of above 5 (both on a 9-point scale). Negative pictures had mean ratings of below 3 for valence and above 5 for arousal. Mean valence ratings for neutral pictures ranged between 3.1 to 7 and mean arousal ratings for those pictures were equal to or below 5.

Procedure and materials

In order not to reveal the true purpose of the study to the participants, the experiment was presented as a simple task of evaluating emotional pictures on dimensions of valence and arousal. After arriving at the lab, participants were provided with an informed consent form, which they had to sign in order to start the testing.

Mood - In an attempt to see whether the effects of the instructions could be separated from the effects of mood, participants' mood was assessed using a 16-item Brief Mood Inspection Scale (BMIS; Mayer & Gaschke, 1988). The scale consists of 5-point items ranging from 1 (*very slightly or not at all*) to 5 (*extremely/ totally*). Participants had to indicate to what extent each statement from the scale applied to them. They were assessed two times – once before the onset of the actual experimental procedure (i.e. baseline measurement) and once after they had heard the emotion regulation instruction (i.e. mindfulness or thought suppression). The majority of other similar studies (e.g. Alberts & Thewissen, 2011) report no influence of mood on dependent variables.

Mindfulness - Next, participants' level of dispositional mindfulness (trait mindfulness) was measured using the Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2003). MAAS consists of 15 6-point items (ranging from 1 – *almost always* to 6 – *almost never*) measuring attention to, and awareness of what occurs in the present moment. Internal consistency (alpha) of the scale was found to be .82 in the student sample and .87 in the adult sample. MAAS was used to assess whether there were any pre-experimental differences in mindfulness among different groups of participants. In addition, participants were asked to indicate their level of meditation experience using one 3-point item ranging from 1 (*no meditation experience*) to 3 (*considerable meditation experience*).

Instructions - After participants had filled in the BMIS and MAAS, they received mindfulness or thought suppression instructions, depending on the experimental

group they were in. The audiotaped instructions were equal in length (5 minutes) and approximate number of words used. The control group received no specific instructions with respect to coping with the upcoming stimuli.

Rating task - After listening to the instructions, participants began with a rating task. The rating task consisted of 20 positive, 20 negative and 20 neutral pictures. Participants were instructed to rate each picture on two 9-point scales by pressing the appropriate number on a keyboard (1 to 9), indicating to what extent the picture is pleasant/unpleasant (valence rating) and arousing/calming (arousal rating) to them personally. This 9-point scale, taken from Bradley and Lang (1994), represents a picture-oriented scale called Self-Assessment Manikin (SAM). SAM ranges from a happy, smiling figure to an unhappy and frowning figure when valence is assessed, and from excited, open-eyed figure to a calm, sleepy figure when representing arousal. Every picture was presented on the screen for 3 seconds and participants rated it on valence and arousal immediately after seeing it. Participants from the experimental groups were instructed to apply their respective instructions when dealing with the stimuli. Control participants were told to rate the pictures based on their first impression.

Filler task - A filler task took place after the rating task and before the next, recall/recognition task. The computer game Tetris Unlimited (Martinez, 2003) was chosen as a filler task. This game draws on the ability of mental rotation and is unlikely to affect the memory of previously viewed pictures (Alberts & Thewissen, 2011). Participants played Tetris Unlimited for 20 minutes.

Recall/recognition task - Next, participants engaged in a recall/recognition task. Since recall/recognition task is not the focus of the current study, it will not be further discussed here.

Manipulation check - After the testing phase, participants from mindfulness and thought suppression groups received a short instruction application questionnaire. This questionnaire consisted of 2 questions – one asked participants if they had been successful in applying the instructions (yes/no question), whereas the other was a 10-point item asking participants to rate their success in applying the instruction. The control group, on the other hand, received a questionnaire asking them to indicate whether they had used some particular strategy when confronted with the pictures and if they did, which strategy it was.

At the end of the experiment, participants were thanked for their participation and told that they would receive a debriefing form after all the participants had been tested.

Statistical analyses

Mood

Repeated measures ANOVA with the score on BMIS as within subjects factor (before and after the instruction) and condition (mindfulness, thought suppression and control) as between subjects factor was used to assess differences in mood between groups on the two measurements

Mindfulness

One-way ANOVA with condition as independent variable and scores on the MAAS as dependent variable was used to assess levels of dispositional mindfulness in different groups of participants. Participants' meditation experience was also assessed using one-way ANOVA with condition as independent variable and scores on the 3-point meditation experience item as dependent variable.

Instructions and strategy use

Scores on the instruction and strategy use questionnaire were computed and then compared using independent samples t-test.

Valence and arousal

Repeated measures ANOVA with condition as between subjects factor and mean valence and arousal ratings respectively as within subjects factors (both with three levels: positive, negative and neutral pictures) was conducted to examine the effect of a specific instruction (or lack thereof) on participants' picture evaluation. Additional multivariate ANOVAs were conducted to further investigate interaction effects between the two factors.

RESULTS

Mood

Repeated measures ANOVA revealed a significant main effect of mood, $F(1, 38) = 83.01, p = .00$. After hearing the instructions, participants' scores were significantly lower ($M = 3.56, SD = .38$) than before ($M = 3.90, SD = .46$), irrespective of the group they were in. However, both main effect of condition ($F(1, 38) = .54, p = .47$) and the interaction effect ($F(1, 38) = 2.48, p = .12$) were found to be non-significant. These results indicate that the reported values of valence and arousal ratings may be affected by changes in participants' mood due to the instructions, and not by the instructions per se.

Mindfulness

One-way ANOVA did not yield a significant effect of mindfulness, $F(2, 57) = 1.21, p = .31$. This result indicates that participants in mindfulness ($M = 56.80, SD = 8.21$), thought suppression ($M = 58.95, SD = 10.07$) and control ($M = 54.55, SD = 8.43$) conditions did not differ with respect to their dispositional levels of mindfulness. Analysis of meditation experience also revealed a non-significant effect, $F(2, 57) = 2.81, p = .07$. Participants in mindfulness ($M = 1.10, SD = .31$), thought suppression ($M = 1.45, SD = .61$) and control condition ($M = 1.25, SD = .44$) did not differ in their levels of prior meditation experience.

Instructions and strategy use

Overall, 85% of participants from the experimental groups reported success in applying the instructions. In the mindfulness group, 90% of participants reported being successful, whereas in the thought suppression group 80% of participants successfully applied the instruction. The independent samples t-test results revealed that both mindfulness ($M = .90, SD = .31$) and thought suppression ($M = .80, SD = .41$) groups were equally successful in applying their respective instructions, $t(38) = .87, p = .39$. Moreover, both groups (mindfulness, $M = 7.10, SD = 1.25$; thought suppression, $M = 6.75, SD = 2.05$) rated the success in applying these instructions equally, $t(38) = .65, p = .52$.

Although control group participants were theoretically allowed to use multiple emotion regulation strategies while viewing the pictures, the majority did not report using any strategy (60%). Of the participants who reported using some strategy, 40% tried not to think about the content of the pictures and/or to view the pictures without the emotional charge. Thirty percent tried to think about something other than the pictures. Finally, 20% of participants tried to look away from the pictures and/or used some other strategy, not listed in the questionnaire, for dealing with the emotions that the pictures provoked.

Participants' mean mood, mindfulness and instruction questionnaire scores are shown in Table 1.

Table 1. Means (Standard Deviations) for Mood, Mindfulness and Instruction Application Scales. ^a Brief mood inspection scale administered before the instruction. ^b Brief mood inspection scale administered after the instruction. ^c Mindful attention awareness scale. ^d Meditation experience. ^e Success in applying the instructions. ^f Success in applying the instruction rating.

Condition	Mood		Mindfulness		Instructions	
	BMIS 1 ^a	BMIS 2 ^b	MAAS ^c	ME ^d	SAI ^e	SAIR ^f
Mindfulness	3.83 (.48)	3.54 (.37)	56.80 (8.21)	1.10 (.31)	.90 (.31)	7.10 (1.25)
Thought suppression	3.98 (.43)	3.58 (.39)	58.95 (10.07)	1.45 (.61)	.80 (.41)	6.75 (2.05)
Control	--	--	54.55 (8.43)	1.25 (.44)	--	--
Total	3.90 (.46)	3.56 (.38)	56.77 (8.98)	1.27 (.48)	.85 (.36)	6.93 (1.69)

Note. Control participants were not included in the analyses of mood and instruction application data.

Valence and Arousal

Since in both repeated measures ANOVAs Mauchly's test indicated that the assumption of sphericity had been violated (for ANOVA on valence ratings, $\chi^2(2) = 32.22, p = .00$; for ANOVA on arousal ratings, $\chi^2(2) = 26.08, p = .00$), degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity (for ANOVA on valence ratings, $\epsilon = .70$; for ANOVA on arousal ratings, $\epsilon = .73$). Mean valence and arousal ratings for mindfulness, thought suppression and control conditions for each picture category are shown in Table 2.

Table 2. Means (Standard Deviations) of Valence and Arousal Ratings for Mindfulness, Thought Suppression and Control Condition

	<i>Condition</i>	<i>Valence ratings</i>	<i>Arousal ratings</i>
Positive pictures	Mindfulness	7.02 (.66)	5.09 (1.53)
	Thought suppression	7.17 (.86)	5.06 (1.72)
	Control	7.41 (.83)	5.62 (2.07)
	Total	7.20 (.79)	5.25 (1.78)
Negative pictures	Mindfulness	2.24 (.68)	5.77 (1.68)
	Thought suppression	2.61 (.96)	4.27 (1.82)
	Control	1.82 (.62)	5.59 (1.46)
	Total	2.22 (.82)	5.21 (1.77)
Neutral pictures	Mindfulness	5.43 (.52)	3.07 (1.21)
	Thought suppression	5.44 (.30)	3.01 (1.23)
	Control	5.62 (.65)	3.26 (1.43)
	Total	5.49 (.51)	3.11 (1.28)

Valence

Repeated measures ANOVA with condition as between subjects factor and mean valence ratings as within subjects factor revealed a significant interaction between the two factors, $F(2.78, 79.31) = 3.66, p = .02$. A follow-up multivariate ANOVA was conducted, revealing significant differences between conditions, but only with respect to negative picture ratings, $F(2, 57) = 5.36, p = .01$. No significant differences between the three conditions were found with respect to positive ($F(2, 57) = 1.23, p = .30$) and neutral ($F(2, 57) = .88, p = .42$) picture ratings. Further post hoc tests indicated that participants in the thought suppression condition ($M = 2.61, SD = .96$) rated negative pictures as more pleasant compared to participants in the control condition ($M = 1.82, SD = .62$). There were no significant differences in negative picture ratings between mindfulness ($M = 2.24, SD = .68$) and thought suppression condition, nor between mindfulness and control condition. Figure 1 depicts valence ratings for the three conditions and shows the difference in valence ratings between the thought suppression and control condition within the negative pictures category.

In addition to conducting the analyses on original data, both repeated measures and multivariate ANOVA were conducted on the data set containing no outliers, i.e. participants who had valence ratings that were more than 2.5 standard deviations higher or lower than the mean score. There were two such participants in the present study. It has been argued that outliers may lead to distortions of parameter and statistic estimates (Zimmerman, 1994). In the present research, however, no changes in the pattern of results occurred when outliers were excluded from the analyses. Repeated measures ANOVA revealed a significant interaction effect, $F(2.84, 78.03) = 4.59, p = .01$. Multivariate analyses of simple effects repeated the same pattern of results obtained in the original analyses – significant differences between

conditions were found only with respect to negative picture ratings, $F(2, 55) = 6.44$, $p = .00$. There were no differences between conditions neither in positive ($F(2, 55) = 1.64$, $p = .20$) nor in neutral ($F(2, 55) = .42$, $p = .66$) picture category. Further post hoc tests indicated that participants in the thought suppression condition ($M = 2.61$, $SD = .96$) evaluated negative pictures as more pleasant compared to participants in the control condition ($M = 1.74$, $SD = .53$). There were no significant differences in negative picture ratings between mindfulness ($M = 2.24$, $SD = .68$) and thought suppression condition, nor between mindfulness and control condition.

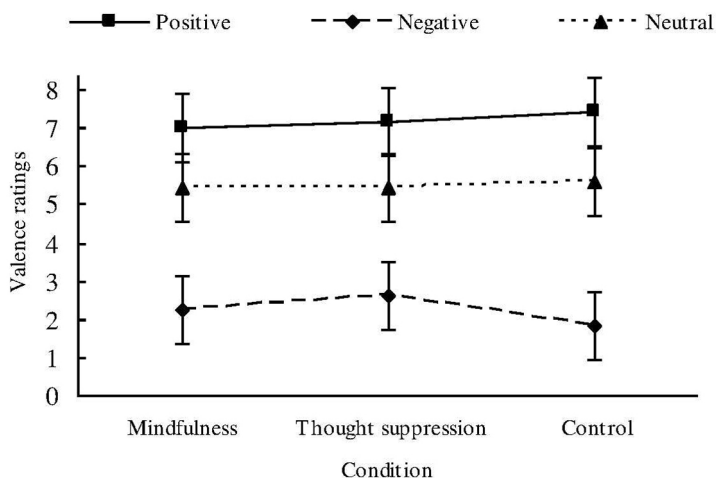


Figure 1: Self-reported valence ratings of positive, negative and neutral pictures for participants from mindfulness, thought suppression and control groups.

Arousal

A similar repeated measures ANOVA procedure conducted for arousal ratings did not reveal a significant interaction effect, $F(2.92, 83.07) = 2.43$, $p = .07$. However, since the interaction was only slightly insignificant, multivariate ANOVA was conducted to further investigate interaction effects. The analysis conducted after the exclusion of outliers from the initial analysis served as justification for the use of multivariate ANOVA on the initial results. In the analyses of outliers, three participants were found to have arousal ratings that were more than 2.5 standard deviations higher or lower than the mean score. The repeated measure ANOVA without these outliers revealed a significant interaction effect, $F(3.06, 82.59) = 4.42$, $p = .01$. A follow up multivariate ANOVA revealed significant differences between conditions, but only with respect to negative picture ratings, $F(2, 54) = 8.44$, $p = .00$. No significant differences between the three conditions were found with respect to positive ($F(2, 54) = .98$, $p = .38$) and neutral ($F(2, 54) = .23$, $p = .79$) picture ratings. Further post hoc tests indicated that participants in the thought suppression condition ($M = 4.27$, $SD = 1.82$) rated negative pictures as less arousing compared to participants in both mindfulness ($M = 5.97$, $SD = 1.45$) and control condition ($M = 5.94$, SD

= 1.03). There were no significant differences in negative picture ratings between mindfulness and control condition.

When multivariate ANOVA was conducted on the initial results, the same pattern was revealed. Significant differences between conditions were found only with respect to negative picture ratings, $F(2, 57) = 4.89, p = .01$. No significant differences between the three conditions were found with respect to positive ($F(2, 57) = .61, p = .55$) and neutral ($F(2, 57) = .20, p = .82$) picture ratings. Post hoc tests further indicated that participants in the thought suppression condition ($M = 4.27, SD = 1.82$) rated negative pictures as less arousing compared to participants in both mindfulness ($M = 5.77, SD = 1.68$) and control condition ($M = 5.59, SD = 1.46$). There were no significant differences in negative picture ratings between mindfulness and control condition. Figure 2 depicts arousal ratings for the three conditions and shows the difference in arousal ratings between the thought suppression condition and mindfulness and control conditions within the negative pictures category.

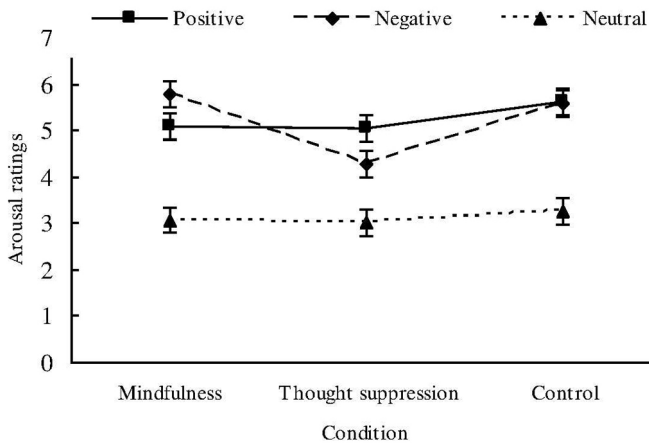


Figure 2: Self-reported arousal ratings of positive, negative and neutral pictures for participants from mindfulness, thought suppression and control groups.

DISCUSSION

The current study examined the effects of mindfulness and thought suppression instructions on the appraisal of emotional (positive and negative) and neutral pictures. It was hypothesized that participants in the mindfulness condition would evaluate both emotional and neutral pictures as more positive compared to participants in the control group, whereas participants in the thought suppression condition would evaluate the pictures as more negative. The results, however, provided weak support for these assumptions. It was concluded that thought suppression is a successful strategy for dealing with emotions provoked by negative-valenced pictures. On the other hand, mindful attention to either positive, negative

or neutral material did not have any effect on dealing with emotions provoked by such material.

Further analyses were conducted in order to control for participants' mood, trait mindfulness and success in applying the instructions. Analysis of mood revealed that participants' mood changed after hearing their respective instructions. It is therefore possible that participants' valence and arousal ratings were not directly influenced by the instructions, but instead by changes in their mood after hearing the instructions. Analysis of trait mindfulness revealed no differences between participants in the three different conditions with respect to trait mindfulness and meditation experience. Finally, 85% of participants from the experimental groups reported success in applying their instructions. Furthermore, the majority (60%) of the control group participants reported not using any particular strategy when viewing the pictures, whereas of the ones that did use some strategy, majority (40%) tried not to think about the content of the pictures and/or to view the pictures without the emotional charge.

From a standpoint of the prevalence of literature on the topic, this study's findings regarding the effects of mindfulness and thought suppression are unexpected. Both quantitative and qualitative studies on mindfulness have repeatedly shown that mindfulness has a positive impact on emotions, especially with respect to negative emotions (Brown et al., 2007; Holzel et al., 2011; Nickerson & Hinton, 2011). However, Lykins and Baer (2009) suggested that in order for these beneficial effects of mindfulness to take place, one has to be an experienced mindfulness practitioner. Therefore, despite the fact that brief mindfulness instructions were shown to yield desired effects (e.g., Hooper et al., 2011), it is still conceivable that the lack of time to really grasp the instruction to stay with the emotion, as well as relative meditation inexperience might have contributed to potential difficulties in understanding the complex concept of mindfulness.

Another explanation for not finding the desired mindfulness effects concerns the picture stimuli used in the experiment. It is possible that the content of the pictures was too distant and not meaningful enough for participants to really experience the emotion. In other words, it might be that, for the actual effects of mindfulness to take place, the material has to be emotionally salient and relevant to the self, at least if one is not an experienced mindfulness practitioner.

The most striking finding of the present study concerns thought suppression. When instructed to suppress their emotions elicited by negative pictures, participants evaluated the pictures as more pleasant and less arousing. This finding is in opposition to the majority of evidence presented in classical studies on the subject (e.g. Wegner, Schneider, Carter III, & White 1987). However, findings have emerged in which this one-sided interpretation of the effects of suppression is called into question. Not only do these studies show that suppression leads to a decrease of expressive behavior (Goldin, McRae, Ramel, & Gross, 2008; Gross & Levenson, 1997; Jackson, Malmstadt, Larson, & Davidson, 2000), but they also indicate that suppression is a successful strategy for reducing distress and other forms of negative subjective experience (Goldin et al., 2008; Pilecki & Mckay, 2012). To account for this finding, Pilecki and Mckay (2012) suggested that suppression could actually be a successful *short-term* strategy for dealing with emotional stimuli

that are presented in a limited period of time. Abramowitz, Tolin and Street (2001) added that suppression is efficient short-term because of the absence of immediate surge of suppressed thoughts into one's mind, i.e. immediate enhancement effect. However, after a certain thought-suppression period, people begin to experience resurgence of those thoughts, i.e. a rebound effect, which consequently leads to a greater feeling of discomfort and the emergence of negative emotions. It is therefore possible that the amount of time participants spent suppressing emotions in the present research was not sufficient for a rebound effect to take place. As a result, participants possibly made a good use of the thought suppression strategy and were able to successfully manage emotions elicited by negative pictures. This implies that suppression might be a successful initial strategy for handling traumatic events. However, after a certain adjustment period, suppression should be replaced with some regulation strategy that potentially has more favorable long-term effects.

Another potential explanation of this study's findings regarding the benefits of thought suppression is that suppression may be effective for negative thoughts of low intensity. Pilecki and McKay (2012) argue that low-intensity thoughts are less relevant to the self and are, hence, more easily suppressed. It might be that the stimuli used in the present study were not close enough to participants' experience in order to be perceived as highly intense, which aided the effort to suppress the emotions provoked by such stimuli.

One unexpected finding of the present study was that participants' mood was different after hearing the instructions. Particularly, they felt worse after they had followed their respective instructions. Although there are no studies dealing with the impact of mood state on mindfulness, there is some literature investigating the relation between mood and thought suppression (Purdon and Clark, 2001; Wyland and Forgas, 2007). Research has shown that people are better able to suppress unwanted thoughts when in a negative mood state (Wyland and Forgas, 2007). Wyland and Forgas (2007) stress that their suppression task was limited to a short period of time and targeted only neutral thoughts and not individually salient thoughts. Taken together, these findings are consistent with the present study's conclusions. The result of the present study, indicating that participants' mood was worse than it was before they heard the instructions, supports the speculations on the effectiveness of thought suppression as a short-term emotion regulation strategy. In spite of these considerations, the impact of mood on thought suppression and other emotion regulation strategies remains unclear and should be further explored.

One limitation of the study pertains to the potential impersonal nature of the stimuli used in the study. It is possible that participants tried to apply mindfulness and thought suppression instructions with a varying degree of effort due to the personal irrelevance of the emotions provoked by the stimuli, thus distorting the results. Another limitation concerns the number of stimuli used in the study. It has been suggested that thought suppression may only be effective in a short period of time. In the present study, 60 stimuli were used and participants did not spend longer than approximately 10 minutes trying to suppress their emotions. It is possible that in everyday life people spend a lot more time suppressing different emotions, which eventually leads to the occurrence of a rebound effect and failure

to self-regulate. Another methodological limitation pertains to the exclusive use of self-report measures for evaluation of valence, arousal and participants' success in applying the instructions. Campbell-Sills, Barlow, Brown & Hoffman (2006a) argue that self-reports are only indicative of attitudes and behaviors that are conscious and add that much emotion regulation takes place outside of conscious awareness. Future studies should therefore include some implicit measures of the degree of emotional intensity provoked by the stimuli and also find a way to measure participants' adherence to the instructions more reliably and objectively.

To conclude, this study adds to the literature that casts doubt over what was thought to be almost unquestionable – that mindfulness is highly effective and thought suppression highly ineffective emotion regulation strategy, and therefore calls for researchers to specify the conditions under which both of these strategies are most effective.

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