Mindfulness is detrimental to performance in computer-mediated interdependent tasks

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Abstract

In today's organizations interdependent tasks (e.g., negotiations or group-decision makings) are often conducted with computer mediation. Two experiments examined whether mindfulness, known to improve face to face negotiations and decision makings, influences the performance in computer-mediated interdependent tasks. In Study 1, manipulated mindfulness led to a worse outcome in a simulated computer-mediated negotiation compared to a control group. In Study 2, induced mindfulness undermined the decision performance of dyads interacting via text-based computer-mediated communication compared to a no-mindfulness control group. At the same time attention to the social relation was higher in the mindfulness condition. Hence, mindfulness is detrimental to performing on interdependent tasks if interaction partners use it in computer-mediated communication, although it fosters attention to interpersonal relations. Implications for mindfulness research and for research on computer-mediated communication are discussed.

Keywords: Mindfulness; Computer-mediated communication; Negotiating; Group decision making

1. Introduction

Computer-mediated communication (i.e., instant messaging or emailing) is an integral part of the means used to interact in today's work environments. For example, virtual teams whose members are working across geographic or organizational boundaries share and discuss information via computer mediation when they need to negotiate or come to joint decisions (Paul, Seetharaman, Samarah, & Mykytyn, 2004). Even face to face groups often fail to share, discuss, and integrate knowledge and thus their performance is below their potential (Hollingshead, 1996; Stewart and Stasser, 1995). In text-based computer-mediated communication, performance on interdependent tasks is even worse (e.g., Heninger et al., 2006; Robert et al., 2008).

Research suggests that mindfulness influences how well information is integrated in face to face interactions (Dane, 2011; Garland et al., 2015; Langer and Moldoveanu, 2000). Moreover, it has been found that mindfulness improves performance in distributive face to face negotiations (Reb & Narayanan, 2014) and that it reduces biases in individual decision-makings (Hafenbrack, Kinias, & Barsade, 2014). Mindfulness enfolds its positive impact best in dynamic or information-rich and thus confusing tasks and social environments (Dane, 2011; Parker et al., 2015; Seldmeier et al., 2012), and there is a body of
evidence showing positive effects of mindfulness in dynamic and socially rich contexts (Hülsheger et al., 2013; Hülsheger et al., 2014; Reb et al., 2014; Reb et al., 2013). However, there is also evidence for a negative impact of mindfulness in contexts where these features are not provided (e.g., false memory; Wilson, Mickes, Stolarz-fantino, Evrard, & Fantino, 2015).

Text-based computer-mediated communication is often not very dynamic and lacks social richness (Daft and Lengel, 1986; Sassenberg and Jonas, 2007). Therefore, the current research aimed to test whether mindfulness is beneficial to performance in computer-mediated negotiating and group decision-making or perhaps detrimental, considering the characteristics of this way of communication. Thereby, the current research is the first to test the impact of mindfulness on joint performance in computer-mediated interdependent tasks and, thus, it contributes to the understanding of task performance in computer-mediated communication and tests the impact of a mental state that may be not suitable in such situations, namely mindfulness.

1.1. Mindfulness in the context of static task environments

Mindfulness can be defined as an enhanced attention to and awareness of a present reality or current experience (Brown & Ryan, 2003). In addition, it is often described as a state of consciousness which relates to a “wide attentional breadth” (Dane, 2011, p. 1001), in both external and internal processes (Brown & Ryan, 2003). As a consequence, information processing is also getting more extensive, which is supposed to come along with higher openness and enhanced sensitivity to unexpected outcomes (Dane, 2011; Garland et al., 2015).

In contrast to the numerous gains of mindfulness, it might also hinder focusing on tasks in environments where attentional breadth (which is inherent in mindfulness) does not lead to access to additional task related information but to the perception of irrelevant and potentially distracting information (Dane, 2011). In line with this notion, it has been demonstrated that trait mindfulness is positively related to individuals' performance in a complex dynamic and unpredictable task environment, but not to performance in tasks within a static and predictable task environment (Zhang, Ding, Li, & Wu, 2013).

1.2. The effects of mindfulness on interpersonal processes

The advantages of mindfulness are not restricted to a dynamic task environment, but they have also been demonstrated for social and relationship outcomes. Mindfulness is associated with better interpersonal outcomes (Sedlmeier et al., 2012) as it correlates with the quality of romantic (Barnes et al., 2007; Carson et al., 2007; Wachs and Cordova, 2007) and professional relationships (Reb et al., 2014). This might result from better interpersonal skills as for example better identifying the emotional state of another person (Winning & Boag, 2015). All in all, this suggests that mindfulness might direct the attention to social and relationship issues, which seems to be beneficial in many social situations such as negotiations where it is possibly useful to identify the emotional state of another person. And indeed, a brief mindfulness exercise improved the outcome of face to face negotiations (Reb & Narayanan, 2014). However, research on the impact of mindfulness has not yet tested what will happen when social cues are lacking and the impact of mindfulness on identifying others' emotional state cannot unfold its potential as in text-based computer-mediated communication. In these cases mindfulness will definitely not be beneficial. It might even be detrimental to performance, because broad attention (i.e., the search for external information but which is not available) might lead people to considering irrelevant and distracting information (e.g., internal information about irrelevant own states).

1.3. Overview of current research

Based on these considerations, we suggest that mindfulness might actually be detrimental to performance in computer-mediated negotiations or group decision-making. This is, because (a) the beneficial effects of mindfulness might not apply in these static task environments and (b) attention to interpersonal processes might occur only in socially rich media. We, thus, hypothesize that mindfulness reduces performance in computer-mediated interpersonal negotiations and group decision-making.

This prediction was tested in two studies using text-based computer-mediated communication. In Study 1, we investigated the influence of manipulated mindfulness on outcomes in a computer-mediated zero-sum negotiation with a simulated other person using a paradigm adapted from van Kleef, De Dreu, Pietroni, and Manstead (2006). Study 2 likewise tested the impact of manipulated mindfulness on decision making quality in dyads using a chat for communication and a paradigm developed by van Ginkel and van Knippenberg (2008). This selection of tasks allows for testing the impact of mindfulness on two types of task performance in interpersonal computer-mediated setting. In the negotiation
performance the individual benefit achieved against the interests of the interaction partner is the indicator of performance, whereas in the decision making task joint performance together with the interaction partner is the indicator of performance. We clearly instructed participants to pursue the respective goal, as we aimed to test the impact of mindfulness on both types of performance in the social context. We expected mindfulness to undermine performance in both cases based on the rational outlined above.

2. Study 1: computer-mediated negotiation

2.1. Method

2.1.1. Participants and design

Fifty users of a library of economics at a German university (women = 27, men = 21, no gender indicated = 2; \( M_{age} = 25.88, SD = 9.52, \) range = 19–61 years) participated voluntarily and without receiving a compensation in an experiment with two conditions (mindfulness vs. control).

2.1.2. Procedure

The study was conducted in a room equipped with six computers. After provision of informed consent, participants were seated in front of a computer and randomly assigned to one of the experimental conditions. In the mindfulness condition, participants listened to an audio file instructing them to eat two raisins mindfully (e.g., “What is the consistency of a raisin? What is the taste on the tongue?”). This is a frequently used mindfulness exercise, applied in clinical as well as nonclinical settings and also in experimental research (Heppner et al., 2008; Hong et al., 2011; Kabat-Zinn, 2013; Kabat-Zinn, 2003; Reb and Narayanan, 2014; Weger et al., 2012). After one guided round with a raisin, participants were asked to repeat the exercise on their own with a second raisin. Participants in the control condition filled in a Sudoku puzzle. The goal of a Sudoku is to fill a \( 9 \times 9 \) Sudoku grid with digits, where each row, each column and each of the \( 3 \times 3 \) quadrants may contain every digit from 1 to 9 only once. A medium-difficult Sudoku puzzle was chosen as a task on which participants could get on within the given time frame. Both tasks were comparable because they require some attention, but are not very energy consuming. At the same time, they clearly differed in the attentional scope: the mindfulness condition induced a broad attentional scope, whereas the Sudoku condition induced focused attention. In both conditions, participants were interrupted after 9 min and asked to continue with the negotiation task.

2.1.2.1. Negotiation task

The negotiation task was an adapted version of the paradigm from van Kleef, De Dreu, Pietroni, and Manstead (2006), which is characterized by the main features of a real-life negotiation: For the negotiator, the issues to be negotiated are of different importance, he/she knows only about his/her own scores, and the negotiations contain offer-counteroffer sequences (van Kleef et al., 2006). Participants were assigned the role of the seller of a mobile phone. Their objective was to negotiate with the buyers three issues – the price, the warranty period, and the duration of the service contract. Participants were presented a score chart with nine possible levels of agreement to each of the three issues. If they sold the phone for 110€, they would yield 0 points (level 9 – the lowest level), and if they sold it for 150€, they would yield 400 points (level 1 – the highest level), with an increase of 50 points from level to level. For the warranty period, 9 months would yield 0 points (level 9), and 1 month 120 points (level 1) with increases of 15 points from level to level. As to the duration of the service, 1 month would yield 0 points (level 9), and 9 months would yield 240 points (level 1). Participants were informed that the best deal would be level 1-1-1 with a total outcome of 760 points and that they should aim at gaining as many points as possible. They were told that two buyers were interested and one had already made a proposal of 190 points. The second buyer, simulated by the computer, started to offer 8-7-8 in the first round (e.g. “I offer you price-warranty period-duration of service contract: 8-7-8”). In every round, the computer increased its offer step by step: T 8-7-7 in round 2, then 8-6-7 in round 3, 7-6-7 in round 4, 7-5-7 in round 5, 7-5-6 in round 6 and 6-4-6 in round 7 (which equals to 315 points). After the first, the third and the sixth round, participants got an additional text message (similar to an instant message) from the simulated buyer reflecting a negative affect (e.g. “This makes me angry”). These messages were used to assure that participants understood that the negotiation partner strongly disagreed with their offers. No other
information was provided. After every round participants could either agree with the offer by the computer or disagree and propose a different one. The negotiation ended, when an agreement was reached or participant’s offer equaled or exceeded the offer which the computer would make in the next round (see van Kleef et al., 2006).

2.1.3. Measures
The number of points in the negotiation gained from round 1–7 was the major dependent variable (range 190–315 points). Furthermore, we measured whether participants agreed with an offer by the computer and in which round they did so.

2.2. Results and discussion
We predicted that participants in the mindfulness condition would perform worse in the negotiation task than participants in the control condition. To test our hypothesis a $t$-test for independent samples was conducted. This test indicated that, in line with the hypothesis, participants performed worse in the mindfulness condition ($M = 209.00, SD = 35.85$) than participants in the control condition ($M = 235.40, SD = 52.34$), $t(42.46) = 2.08, p = 0.044, d = 0.59$.

For exploratory reasons, we also analyzed the impact of mindfulness on other metrics in this task. On average, it took participants in the mindfulness condition ($M = 2.36, SD = 2.41$) one round less to negotiate than participants in the control condition ($M = 3.48, SD = 2.83$). This difference is, however, not statistically significant, $t(48) = 1.51, p = 0.139, d = 0.43$. The percentage of participants who reached an agreement did not differ between conditions, $\chi^2(1) = 1.39, p = 0.377, d = 0.33$ (mindfulness: 56%, control condition: 72%).

Overall, these findings support our hypothesis that mindfulness leads to a poorer performance on a computer-mediated interpersonal task with high interdependence. Mindful people achieved worse outcomes for themselves. The exploratory analysis indicated no effects of mindfulness regarding the duration of the negotiation and the likelihood of reaching an agreement. Two key limitations of this study were addressed in a follow-up study: (a) the interaction partner was simulated and (b) no manipulation check was assessed.

3. Study 2: Computer-mediated joint decision-making
The aim of Study 2 was to replicate the results from Study 1 using a different task, namely decision making rather than negotiating, and a real rather than a simulated interaction partner. We studied the influence of mindfulness on decisions made by dyads in a computer-mediated discussion setting (addressing limitation (a) of Study 1). Thereby, we tested again whether mindfulness leads to a poorer performance in a computer-mediated setting. Furthermore, we also assessed the impact of mindfulness on attention to internal and external issues to address the limitation (b) of Study 1 (i.e., the lack of a manipulation-check). We assumed that mindfulness—due to the broader attention—leads to greater private and interpersonal awareness. Both aspects were assessed in separate measures that served as a manipulation check. The main prediction was that mindfulness would cause lower performance compared to a control condition. The control condition in Study 2 was altered in a way that rendered it more similar to the experimental condition: Participants had to listen to an audio file with a neutral content.

3.1. Method
3.1.1. Participants and design
Seventy-four undergraduate students (37 dyads) from a German university (55 women, 19 men; $Mage = 24.32, SD = 3.38$, range = 19–35 years) participated in an experiment with two conditions (mindfulness vs. control) in exchange for €8. Due to technical problems, one additional dyad needed to be excluded from the analysis.

3.1.2. Procedure
Participants were invited to the lab in dyads for a study session on teamwork. After providing consent, they were seated in two separate rooms. Dyads were randomly assigned to one of the two experimental conditions (i.e., both members of one dyad were in the same experimental condition). Mindfulness was induced by using the procedure applied in Study 1 (Hong et al., 2011; Kabat-Zinn, 2013 ; Reb and Narayanan, 2014). In the control condition, participants likewise listened to an audio file, this time
providing information about containerized food transportation and using raisins as an example. Again, both conditions required some attention and low to medium effort, but differed in the breadth of attention which was crucial to our prediction. The two audio files had the same speaker, the same length, and they used the same welcome text, introduction, and farewell. In both conditions, two raisins were put next to the computer.

3.1.2.1. Group decision task

After the manipulation, participants first read on their own information about the task. Then they had to solve the task via text chat with the other person. The task was a German translation of the mini market task (van Ginkel et al., 2009; van Ginkel et al., 2008). Originally, the task was designed for three persons, we adapted it to two. Participants were told that they were members of a committee for the management of a small market center. They should advise the local government regarding three decisions for three stores. The decisions were to be made one after the other on the temperature in the market center, the division of the maintenance costs, and the organization of the marketing campaigns. Information regarding each of the three decisions was provided together with a list of potential decisions from which participants had to choose the appropriate ones like in a multiple choice item. As in the original materials by van Ginkel et al. (2009), there were five alternatives regarding the temperature, ten alternatives regarding the maintenance costs, and seven alternatives regarding the marketing campaigns. For correct decision-making, participants needed to consider the perspectives of each aspect for the three stores. They were instructed to find a solution ideally suiting the needs of each of the stores. Besides several shared pieces of information per issue, each participant received one critical, unshared piece of information per task that was relevant for solving that task. This unshared information was also included to reduce the initial agreement about the solution within the dyad and thus to provide more room and need for discussion. The relevant pieces of information about the task were presented in a booklet which was available during task solving. For solving the task together, participants communicated with computer mediation, via a chat tool. In order to use neutral names, one participant had the name X, the other one the name Y. Subsequent to the chat, dyads filled out a brief questionnaire (joint solution, personal opinion) and completed measures of awareness and demographics.

3.1.3. Measures

3.1.3.1. Group performance

Performance scores for decision quality were calculated considering the extent to which the decision of the three issues matched the best solution on the basis of all provided information. Following the rating procedure developed by van Ginkel et al. (2009), participants received 0 to 2 points in case of the temperature and 0 to 3 points for the other two issues, depending on the alternative they chose. The maximum score for the temperature related decision was lower, because there was a higher likelihood that participants guessed the right alternative given that this task provided only five alternatives whereas the other two provided more. The score for each choice represented the extent to which the respective alternative served the interest of the three parties (i.e., shops).

For each individual the score was summed up across the three issues. Higher scores should thus correspond to better decisions, because overall the three parties should be more satisfied. The maximum score was reached if the chosen decision was consistent with all available information, and was decreased if only one part of the information was included. Higher scores indicated a better performance. Because participants could enter the solution into the computer independently from one another, but were asked to come to a solution together, scores were averaged across individuals. Thus, the score could range in total from 0 to 8 points.

3.1.3.2. Attention to internal states

To assess whether the mindfulness manipulation successfully altered the attention to internal states, we carefully chose four items of the private self-awareness scale from the questionnaire for the assessment of the self-awareness state (FESS) (Sassenberg, Boos, & Rabung, 2005), which reflects perceptual awareness. Items were rated on a five-item Likert scale “1 = never true” to “5 = always true” (e.g. “During the chat I was aware of my intentions”, \( \alpha = 0.78 \)). As the used items reflect a state of consciousness rather than cognitive operations, they are an indicator for mindfulness (cf. Brown & Ryan, 2003).
3.1.3.3. Attention to external issues

In order to check whether mindfulness manipulation also raised a concern for external issues – here the relationship with the interaction partner –, we measured interpersonal awareness. To this end, we created seven new items for which participants had to indicate their agreement on a five-point Likert scale ranging from 1 = ”never true” to 5 = ”always true” (e.g., “During the chat I was concerned about our mutual understanding”, α = 0.63). One item was omitted from the scale to improve internal consistency at least slightly.

4. Results and discussion

To test the effectiveness of the manipulation, a repeated-measures ANOVA with the condition (mindfulness vs. control) as between subject factor, the person within the dyad and the scale (private self-awareness vs. interpersonal awareness, r = 0.50, N = 74) as within subject factors was computed. Supporting the effectiveness of the mindfulness manipulation, there was a main effect of the manipulation on both measures, F(1, 35) = 5.37, p = 0.026, d = 0.76. Participants in the mindfulness condition reported a higher private self-awareness (M = 2.33, SE = 0.16) and higher interpersonal awareness (M = 3.14, SE = 0.09) than participants in the control condition (private: M = 1.69, SE = 0.15; interpersonal: M = 2.85, SE = 0.09), private: F(1, 35) = 8.68, p = 0.006, d = 1.00, interpersonal: F(1, 35) = 4.86, p = 0.034, d = 0.74.

4.1. Group performance

Regarding the effect of mindfulness on group performance, a t-test revealed a significant difference between the conditions, t(35) = 2.15, p = 0.039; d = 0.71. In line with the prediction, dyads in the mindfulness condition (M = 4.00, SE = 0.59) performed worse than dyads in the control condition (M = 5.58, SE = 0.45).

In line with our hypothesis, we found performance differences between mindful and non-mindful dyads working together on a computer-mediated decision-making task. Dyads in the non-mindfulness condition performed better than dyads in the mindfulness condition. In line with our intention, the manipulation check showed that dyads in the mindfulness condition spent more attention to internal states and to external issues (i.e., interpersonal awareness) than dyads in the control condition – even though the internal consistency of the interpersonal awareness scale was low. This calls for a replication of the impact of mindfulness manipulations on the attention to interpersonal relations.

5. General discussion

The aim of the current research was to test whether mindfulness influences performance in computer-mediated tasks, namely negotiating and group decision-making. To our knowledge, the current studies are the first to examine the effects of mindfulness on performance in interdependent tasks conducted via computer-mediated communication. This is important because modern working life requires individuals more and more to process information together with computer mediation (Paul et al., 2004). Although it has been found that a brief mindfulness training improves face to face negotiations (Reb & Narayanan, 2014) and reduces decisional biases (Hafenbrack et al., 2014), we assumed that various positive effects of mindfulness would not generalize to joint task performance under conditions of computer-mediated communication. Using a well-established negotiation task (van Kleef et al., 2006) and a group decision-making task (van Ginkel et al., 2009; van Ginkel et al., 2008), the results consistently supported our prediction, in Study 1 in a computer-mediated negotiation with a simulated interaction partner as well as in Study 2 in computer-mediated group decision-making with a real other person. Manipulated mindfulness revealed a worse outcome compared to the control condition. In addition, in Study 2 mindfulness increased attention to interpersonal issues, dyads were more aware of the relationship. Across two studies using different). Given, that we applied only one manipulation of mindfulness the results should be replicated using a different procedure (e.g., a more complex mindfulness meditation training). In addition, we did not used other established control conditions, either mind wandering or asking participants to simply eat two raisons without further instruction. However, for the current hypothesis the differences in effort and duration could have been considered a confound. Therefore, we created new control conditions without this potential confound. We tried to compensate for this methodological difference compared to earlier research by using two different control conditions. Nonetheless, it would be interesting to know whether current results replicate with a control condition applied in earlier research.
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