UNCOMFORTABLE BUT DEVELOPMENTAL: HOW MINDFULNESS MODERATES THE IMPACT OF NEGATIVE EMOTIONS ON LEARNING

ABSTRACT

While leadership development theory and practice often promote emotionally challenging programs designed to elicit negative emotions, it remains unclear whether individuals learn and develop from such situations. An interesting but unexamined question is thus, "When do negative emotions stimulate learning, and how?" Integrating the functionalist theory of emotions and the transactional model of stress and coping, we suggest that mindfulness plays a key moderating role in alleviating the known downsides of negative emotional experiences to achieving developmental benefits. We found that the relationship between negative emotions and learning performance was more nuanced, depending on mindfulness: In Study 1, we find that mindfulness is a critical condition that helps mitigate the negative effect of negative emotions on learning performance. In Study 2, we further demonstrate that mindfulness amplifies the benefits of negative emotions on learning performance. In Studies 3 and 4, we conducted controlled interventions to provide evidence that the interaction effect between negative emotions and mindfulness on learning performance is mediated by cognitive appraisals. Specifically, we found that mindfulness helps individuals appraise negative emotion as a challenge, which enhances learning performance. We discuss our results' contributions to the leadership development literature and the practical implications for leadership education and training.

Keywords: cognitive appraisals, leadership development, learning, mindfulness, negative emotions

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Challenging experiences have been touted as the most effective means of accelerating leadership development (Day, Harrison, & Halpin, 2008; Dragoni, Tesluk, Russell, & Oh, 2009; McCauley, Ruderman, Ohlott, & Morrow, 1994; Seibert, Sargent, Kraimer, & Kiazad, 2017). Exposure to challenging experiences might not be easy or comfortable, as it usually entails making and observing one's own mistakes and failures, which invariably elicit negative feelings and defensive reactions. Yet it can help with the process of altering a leader's mental models and behavioral routines (Argyris, 1991). Based on this idea, leadership development programs utilizing experiential learning principles often put leaders in situations that induce stress and discomfort (Tozer, Fazey, & Fazey, 2007). Examples include simulations or action learning projects that are increasingly used in business schools, such as leadership expeditions (Myers & Doyle, 2020), where participants learn leadership skills in an unpredictable, challenging, and dynamic environment (Paulus et al., 2009).

However, it is unclear whether this trend is justified. On the one hand, challenging experiences disrupt routines in ways that release strong negative emotions (Mandler, 1984). Several empirical studies and meta-analyses indicate that negative emotions can impair learning (Beal, Weiss, Barros, & MacDermid, 2005; Bell & Kozlowski, 2008; Colquitt, LePine, & Noe, 2000; Howardson & Behrend, 2016) because they disengage people from a situation and thereby tend to detract them from their learning. According to these findings, the effectiveness of exposing participants to challenging experiences as part of leadership development programs seems questionable, at best. On the other hand, scholars adopting a functional view on negative emotions argue that these emotions can have an adaptive function (Frijda, 1986; Keltner &

Gross, 1999; Rothman & Melwani, 2017), such that negative emotions are crucial to producing transformative development (e.g., crucible events; Bennis & Thomas, 2002).

We demonstrate that whether negative emotions triggered by developmental interventions contribute to or detract from learning depends on mindfulness, defined as the openness and attentiveness to moment-to-moment experiences (Brown & Ryan, 2003). Originating from ancient Eastern traditions, mindfulness has experienced a global surge in popularity. This surge in interest is underpinned by a robust body of research highlighting the various positive effects of mindfulness—ranging from individual outcomes such as increased psychological well-being (Hülsheger, Alberts, Feinholdt, & Lang, 2013; Kay & Young, 2022; Roche, Haar, & Luthans, 2014) to more collective consequences, such as facilitating interpersonal connections (Islam & Holm, in press). Moreover, a number of scholars have proposed that mindfulness, with its important qualities of witnessing awareness or ability to observe difficult experiences in a nonjudgmental manner, is central to leadership training and development (Ashford & DeRue, 2012; Atkins & Styles, 2015; Reb, Sim, Chintakananda, & Bhave, 2015). We argue and provide empirical evidence that mindfulness has the potential to transform emotional experiences and increase learning. Specifically, we expect that mindfulness will enhance leader development based on negative emotions through more detached introspection of one's challenging habitual patterns as well as the willingness to accept and internalize new routines (Kabat-Zinn, 2003; Vago & David, 2012). In sum, we propose that people with high mindfulness are more likely to enjoy beneficial learning outcomes when they experience negative emotions than people with low mindfulness.

Our paper contributes to a better understanding of how difficult experiences can be leveraged to propel development (Day, 2013). Specifically, we make theoretical contributions by

explaining how and when the experience of negative emotions may lead to positive and adaptive responses in the form of learning and development for leaders. Our paper integrates the functionalist view of negative emotions (Johnson-Laird & Oatley, 1998; Keltner & Gross, 1999) and the transactional model of stress and coping (Lazarus & Folkman, 1984) to specify cognitive appraisals as the mechanism that links negative emotions with development. It also positions mindfulness as a contingency factor that facilitates cognitive appraisals in support of leadership development. Figure 1 presents an overview of our theoretical model. We contribute to the mindfulness literature (Good et al., 2016; Reb, Allen, & Vogus, 2020) by demonstrating salutary effects that go beyond the well-established stress-reduction and well-being outcomes. Development entails change at a personal level, and people tend to become defensive and resist change during development (Antonacopoulou & Gabriel, 2001), which blocks learning (Argyris, 1991). Any attempt at developing in a fundamental way, therefore, needs to address not only the cognitive challenge but also the emotional challenge that comes with personal change (Frijda, 2017). Our findings suggest that mindfulness can help leadership developers and leaders themselves transform emotionally challenging episodes into learning and development.

[Insert Figure 1 about here]

THEORIZING AND HYPOTHESES DEVELOPMENT

Negative Emotions and Learning

In the adult education realm, the affective aspect of learning is a major theme in both the academic literature and professional development programs (Taylor, 2008), showing that negative emotions can both promote and prevent development in adulthood. On the hindrance side, negative emotions have been shown to cause rumination, prevent a thorough analysis of information and hinder learning (Kross, Ayduk, & Mischel, 2005; Pearson, 2017). Moreover,

negative emotions interfere with learning by disrupting individuals' ability to process information (Wells & Matthews, 2014), limiting scanning for information (Easterbrook, 1959), and diverting attention away from *information generated at* the event toward *emotions generated by* the event (Nolen-Hoeksema & Morrow, 1991).

Whereas the above work argues that negative emotions compromise effective learning, the functionalist perspective on emotions highlights the potential positive impact of negative emotions (Johnson-Laird & Oatley, 1998; Keltner & Gross, 1999). Such benefits include increased motivation and energy to attain goals and reduce errors (Lyubomirsky, 2011). Negative emotions are also closely tied to a reappraisal of past actions and counterfactual thinking (Baumeister, Vohs, DeWall, & Zhang, 2007). This is in line with Festinger's (1957) work on cognitive dissonance, which proposes that the negative emotions that result from disequilibrium can motivate individuals to engage in attitudinal or behavioral change to reduce their negative emotional state (Hinojosa, Gardner, Walker, Cogliser, & Gullifor, 2017). Leadership development research also suggests that high-impact experiences can lead to changes in the linkages of an individual's self-construct (Avolio & Hannah, 2008; Hibbert, Beech, & Siedlok, 2017).

The preceding overview provides evidence for both perspectives and suggests that the process of learning from negative emotional experiences is imperfect and uneven in its achievement, implying some variance in how individuals respond to negative emotions. To better understand this complex relationship between negative emotional experiences and leadership development, we draw on insights from broader work on the role of developmental challenges, which focuses on experiences that disrupt routine in ways that trigger negative emotions (Cao & Hamori, 2020; Mandler, 1984). This field of research has produced equally mixed results,

spurring a line of empirical work on factors that explain differences in how people learn from such experiences. In the following section, we argue that mindfulness can play a role in helping people extract developmental benefits from negative emotional experiences.

The Moderating Role of Mindfulness

In the leadership development literature, there is some theoretical work that explores the role of mindfulness. For example, Ashford and DeRue's (2012) model of mindful engagement for experiential leadership development argues that, to maximize the developmental value of any experience, individuals must approach and go through their experiences mindfully. They consider mindfulness a "state of being" in which people are actively aware of themselves and their surroundings, open to new information, and willing and able to process their experience from multiple perspectives. Atkins and Styles (2015) argue that mindfulness can contribute to the development of mental complexity in leaders, especially in response to dynamic challenges, by enabling leaders to self-regulate more effectively and better respond to and learn from challenges. Similarly, Reb et al. (2015) propose that by facilitating the shifting of experiences from identification to detachment, mindfulness can enable leaders to constructively progress to higher stages of their development.

Following these lines of theorizing, we hypothesize that mindfulness can moderate the effects of negative emotions on learning performance. We argue that in the leadership development context, emotionally challenging experiences are seen as jolting triggers (Roberts, Dutton, Spreitzer, Heaphy, & Quinn, 2005) that can disrupt routine and change one's preexisting schema and mental representation of oneself and the world. These transformative experiences or "crucibles" (as coined by Bennis & Thomas, 2002) can be thought of as a "kind of super-concentrated form of leadership development." However, as these experiences are novel,

disruptive, and emotionally intense, leaders run the risk of emotional overload by shifting cognitive resources away from learning and development to performance anxiety (DeRue & Wellman, 2009; Noe, Tews, & Dachner, 2010).

We argue that mindfulness can put people into a better position to make sense of and thus learn from negative emotional experiences, because mindfulness centers on cultivating nonjudgmental awareness and acceptance of present-moment experiences—whether positive or negative. Mindfulness thus transcends the mere regulation of emotions. Rather than modifying emotional responses, which is the primary purpose of emotion regulation (Gross, 2015), mindfulness represents primarily an attention deployment approach (Arch & Landy, 2015). Nonjudgmental awareness refers to an ability to hold even painful thoughts and feelings in balanced awareness rather than avoiding or overidentifying with them. Moreover, mindfulness promotes acceptance of the current reality, including one's current emotional state (Chambers, Gullone, & Allen, 2009), which diminishes susceptibility to automatic behaviors in response to negative emotions (Garland, Farb, Goldin, & Fredrickson, 2015). Therefore, highly mindful individuals can experience less self-conscious reflection on negative emotions, while observing and accepting these emotions without trying to control their emotional states. In sum, mindfulness enables an greater distance from emotions, while simultaneously amplifying individuals' focus on the factual aspects associated with those emotions. This can contribute to a leader's greater ability to discern valuable information from their challenging emotions and events, which facilitates learning (Chang, Huang, & Lin, 2015).

Hypothesis 1. Mindfulness moderates the relationship between negative emotions and learning performance in a reversal manner, such that the relationship becomes positive when mindfulness is high and negative when mindfulness is low.

Mindfulness and Cognitive Appraisals of Negative Emotions

What could be the mediating mechanism that links the interactive effect of negative emotions and mindfulness on learning performance? We argue that cognitive appraisal plays a crucial role. Appraisals refer to individuals' evaluation of stressors, which can elicit different coping processes (Lazarus, 1991). According to the transactional model of stress and coping (Lazarus, 1966), when faced with a negative emotional experience, individuals can choose to view that particular experience as a challenge or as a threat (LeDoux, 2012; Searle & Auton, 2015). Research has shown that these contrasting cognitive evaluations can lead to different behavioral outcomes (Lazarus & Folkman, 1984). A challenge appraisal motivates coping and functional behavior, while a threat appraisal motivates avoidance coping and dysfunctional behavior (Ganster & Rosen, 2013). In line with our theorized role of mindfulness, we argue that mindfulness helps people engage in an adaptive coping process in the event of a negative emotional experience, thereby enhancing challenge appraisal and mitigating threat appraisal (Garland, Gaylord, & Park, 2009)—which will have different implications for their learning.

First, mindfulness encourages a less defensive stance, making people more willing to expose themselves to negative emotional experiences. Therefore, being highly mindful can make people less susceptible to threat appraisals, which prevent them from making sense of and learning important information from negative emotions (Jamieson, Black, Pelaia, Gravelding, Gordils, & Reis, 2022). Second, mindfulness may enhance people's capacity to adaptively view negatively valenced situations as a challenge. Challenge appraisal promotes "turning toward" such difficult emotions (Lazarus & Folkman, 1984). In sum, individuals who are highly mindful will be more capable to appraise negative experiences as a challenge: they can attune to their negative emotional experiences in a constructive way, believing that negative emotions can help shape their goals and enrich their development (Garland et al., 2015). Therefore, we posit:

Hypothesis 2a. Mindfulness moderates the positive relationship between negative emotions and challenge appraisal, such that this relationship is stronger when mindfulness is high.

Hypothesis 2b. Mindfulness moderates the positive relationship between negative emotions and threat appraisal, such that this relationship is weaker when mindfulness is high.

Moderated Mediation Effect

People respond to the appraisal of emotions rather than emotions themselves (Lerner & Keltner, 2000). Cognitive appraisals thus enable individuals to determine the appropriate response to a situation (Jones, Meijen, McCarthy, & Sheffield, 2009). In a learning context, challenge appraisals have been found to relate to greater behavioral engagement, while threat appraisals were related to lower behavioral engagement (Putwain, Symes, & Wilkinson, 2017; Searle & Auton, 2015). We therefore expect a relationship between challenge and threat appraisals and the extent to which individuals engage in learning. We posit that threat appraisal, which represents a threat to identity and self-worth, will negatively predict learning performance, because individuals will attempt to prevent or avoid engaging with the negative emotional experience (Skinner & Brewer, 2002). In contrast, we suggest a positive relationship between challenge appraisal and learning performance, because challenge appraisal stimulates an approach-oriented tendency, in which individuals will proactively approach the demands of the situation (Li, Lin, & Liu, 2019). Given prior arguments that mindfulness moderates the relationship between negative emotions and cognitive appraisal, we articulate additional hypotheses, which describe the overall moderated mediation effect.

Hypothesis 3a. The indirect effect of negative emotions on learning performance through challenge appraisal is stronger when mindfulness is high.

H3b: The indirect effect of negative emotions on learning performance through threat appraisal is weaker when mindfulness is high.

Overview of Studies

We conducted four studies to test our hypotheses. Study 1 surveyed students engaging in an action learning project, and Study 2 surveyed students who participated in an experiential leadership simulation. Studies 1 and 2 were survey-based. Therefore, to strengthen our causality claim, in Study 3 (an online experiment), we measured negative emotions and manipulated mindfulness. Finally, to further improve internal validity and emphasize our focus on a leadership context, we conducted Study 4, in which we manipulated both mindfulness and negative emotions with a task involving a leadership experience.

STUDY 1

Sample, Setting, and Procedure

Study 1 aimed to provide the evidence for Hypothesis 1—that mindfulness moderates the relationship between negative emotions and learning performance. We also included learning goal orientation and emotion regulation as alternative moderators, and satisfaction as an alternative dependent variable in order to examine discriminant validity. We collected data from MBA students participating in an intense, concentrated one-week leadership course at the outset of an MBA program at a leading German business school. The program was designed to teach leadership by having students apply core principles around leadership in an experiential setting. The students worked in teams of four to five people and faced different challenges every day.

The challenges featured core topics of the MBA program (see Appendix A for further descriptions). All challenges were extremely demanding: students worked under time pressure (for example, to create an online campaign from scratch within three hours), in competition with other student teams (the performance of all teams was ranked on a daily basis), and alongside team members that had diverse experiences and demographic and cultural backgrounds (students were allocated to teams to maximize diversity in these aspects). In addition, the challenges were "real" in the sense that their goal was to raise awareness of and funds for a reputable children's charity. As such, this program can be considered an action learning project (Day & Sin, 2011; Marquardt, Leonard, Freedman, & Hill, 2009).

Each day, for every new challenge, a new team leader was chosen, ensuring that each student stepped up as leader once over the course of the week. After completing the challenge of the day, students took time to reflect on the leadership and team process. Then, moderated by their mentor, they met to discuss the learnings of the day in order to improve leadership and team dynamics. Of the 137 students involved, 130 completed the surveys. The final sample consisted of 71% men with an average age of 30. Of them, 53% were Caucasian, 27% Asian, 3% African American, and 5% Hispanic (12% did not supply ethnicity data).

Measures

The data collection process consisted of two phases. In the first phase, participants completed an online survey before starting the course that assessed their demographic information and personality traits. In the second phase, we asked the leaders of the teams for daily reports of their experienced emotions, mindfulness, and reaction to the challenge of the day. In addition, we asked team members (i.e., followers) to complete the ratings of their respective team leaders at the end of each day.

Experienced emotions. To assess daily emotions, we asked the leaders to report their experienced emotions using the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988). The PANAS measures positive emotions and negative emotions using 12 adjectives. Individuals rate the extent to which they experienced each emotion during the session on a scale of 1 to 5 (1 = not at all; 5 = an extreme amount). Sample adjectives for positive emotions included "enthusiastic," "active," and "inspired." Sample adjectives for negative emotions included "upset," "distressed," and "anxious."

Mindfulness. We measured mindfulness using a 10-item mindfulness scale (Brown & Ryan, 2003). Participants rated their agreement with the ten statements (1 = strongly disagree; 5 = strongly agree). Sample items were "It was easy for me to concentrate on what I was doing," "I could tolerate emotional pain," and "I tried to notice any feelings and thoughts without judging them." The measure was intended to capture the generalized mindfulness over the course of the program.

Learning performance. We used perceptions of leadership effectiveness as an indicator of individual learning. Specifically, we measured team members' ratings of their team leaders' effectiveness as leaders (i.e., team followers matched with one unique team leader) as an indicator of the team leaders' learning performance. This "follower-rated" measure is particularly relevant for our study because it is situated within a leadership context. Many leadership scholars define leader development as the enhancement of an individual's capacity to be effective in leadership roles and processes (Van Velsor, McCauley, & Ruderman, 2010). Consequently, follower perceptions often serve as a key indicator of a leader's learning and success. This approach aligns with previous research in the field (e.g., Day & Sin, 2011; DeRue & Wellman, 2009; Tan, Peters, & Rebs, 2023). In our study, team members were asked to rate

"how effective was your leader today" (on a scale of 1, weak, to 10, strong). The results of this rating can be considered a general perception of leadership effectiveness, indicating the extent to which the leader implemented aspects of the leadership lessons they were taught on the day they led the team. In terms of the unit of analysis, it is important to note that while this measure is team-bound (in the sense that it involves the aggregation of multiple followers' ratings for each leader), we aggregate the team members' perceptions to the individual leader level. Therefore, our learning performance measure is at the individual-level unit of analysis.

Control variables and discriminant validity variables. Because the response to negative emotions is not only dependent on the experienced negative emotions but also on the experience of positive emotions (Fredrickson & Branigan, 2005), we controlled for positive emotions in all analyses. We also controlled for age, gender, and openness to experience, which have been shown to relate to learning (Maurer, 2001). A 5-item, 5-point scale developed by John and Srivastava (1999) was used to measure openness to experience. To provide evidence for discriminant validity, we also assessed the traits "learning goal orientation" and "emotion regulation (reappraisal)" as alternative moderators, and satisfaction as an alternative dependent variable. Learning goal orientation was measured using a 3-item, 5-point scale (Vandewalle, 1997). Emotion regulation was measured using a 6-item, 5-point scale (Gross & John, 2003). To measure satisfaction, we used a single item to indicate the level of satisfaction that participants felt with each session. The item was, "I am satisfied with what I learned from the experience today." This kind of item is commonly used to tap into the gut reaction of participants after training (Brown, 2005). Ratings were given on a 5-point Likert scale.

Analysis, Results, and Discussion

The analyses employed in this study were all conducted at the leader level. Before aggregation, we checked our learning performance measure for inter-rater agreement (Bliese, 2000). The ICCs were $ICC_1 = .41$ and $ICC_2 = .72$ ($F = 3.63$, $p < 0.01$). These results indicated that we could aggregate the individual data from the team member level to the team (or leader) level. We tested all hypotheses using regression analysis in SPSS (Hayes, 2013). Descriptive statistics and bivariate correlations are reported in Table A1 in Appendix B.

Hypothesis 1 predicted mindfulness to moderate the relationship between negative emotions and learning performance. As seen in Table 1, we found a significant Negative emotions x Mindfulness interaction coefficient, $B = 1.24$, $p < .05$. The interaction graph can be seen in Figure 2. We examined the interaction results, and the simple slope test revealed that the negative relationship between negative emotions and learning performance was statistically significant and negative when mindfulness was low ($B = -1.26$, $SE = .37$, $t = -3.43$, $p < .001$) but not high ($B = -.05$, $SE = .29$, $t = -.16$, *ns*).

[Insert Table 1 and Figure 2 about here]

To provide evidence for discriminant validity, we next examined learning goal orientation and emotion regulation as alternative moderators. We found that neither learning goal orientation ($B = .32$, $SE = .51$, $t = .63$, *ns*) nor emotion regulation ($B = .28$, $SE = .32$, $t = .87$, *ns*) moderate the relation between negative emotions and learning performance. In addition, we also entered satisfaction as a dependent variable instead of learning performance and conducted the same analyses. Mindfulness did not moderate the relation between negative emotions and satisfaction ($B = -.51$, $SE = .35$, $t = -1.46$, *ns*). Overall, Study 1 provided partial support for Hypothesis 1. While we hypothesized that mindfulness would moderate the relationship between negative emotions and learning performance in a *reversal* manner, we found that mindfulness

instead *buffered* against the adverse effect of negative emotions on learning performance. One possible reason why the interaction was significant but not in the shape that we hypothesized could be that mindfulness, at least in the context of this study, only dampened the intensity of experienced negative emotions and therefore reduced its harmful effects but did not fully regulate the negative emotions to the extent that individuals can derive beneficial effects from it. Additional discriminant validity analyses found that the moderated model did not hold for learning goal orientation and emotion regulation. This finding provides some reassurance that the model holds specifically for mindfulness and not for these other, potentially related moderators. Similarly, the results for satisfaction suggest that mindfulness does not moderate all responses to negative emotions.

STUDY 2

Sample, Settings, and Procedure

The purpose of Study 2 was twofold: first, to investigate whether we would observe similar or different results with regard to the nature of the interactive effects of negative emotions and mindfulness on learning performance. Second, we again examined learning goal orientation as an alternative moderator and satisfaction as an alternative dependent variable to see whether we could replicate the findings on discriminant validity observed in Study 1. Similar to Study 1, we collected data from an experiential leadership development course for Study 2. However, instead of an action learning project, students engaged in leadership simulations in class. We collected data from EMBA students participating in a leadership development course for four consecutive days at the start of the EMBA program at a large Dutch university. Following the hierarchical taxonomy of leadership behavior (Yukl, 2012), each session focused on one specific aspect of leadership: task-oriented, relationship-oriented, change-oriented, and ethics-oriented leadership.

Each session lasted about three hours. More details on the course activities for each day can be found in Appendix C.

Three weeks after the course, students were asked to reflect on each of the sessions and integrate the findings into a plan to improve their leadership behavior. Specifically, this was done by challenging students to write a case about themselves, highlighting the problem they faced in each component of leadership and a proposed solution (based on the feedback and teachings) showing how to implement, in concrete, actionable steps, ways to lead differently. We explain this in more detail in the next section on measures. We used this assignment to assess learning performance.

Of the 47 students contacted, 44 completed the surveys. For those in the final sample, we obtained 183 (out of a maximum of 220) sets of experienced sample surveys. Approximately 73% of the students were men and 89% were Caucasian, and they were on average 36 years old (SD = 5.88).

Measures

The data collection process consisted of three phases. In the first phase, participants completed an online survey that assessed their demographic information and personality traits ahead of the program start. In the second phase, students reported their experienced emotions, mindfulness, and reaction to the sessions (e.g., how satisfied they were with the session) at the end of each session (i.e., day). The experience sampled data were collected through a short online survey. In the third phase, as part of an assignment for the course, the participants completed a personal case.

The same measures as in Study 1 were used to assess positive and negative emotions, training satisfaction, and the control (age, gender, and openness to experience) and discriminant

validity (learning goal orientation) variables. Last, given the possibility that the effect of the sessions might have depended on the students' baseline leadership proficiency (as measured by their 360-degree feedback data collected at the start of the program) and on the order of the sessions, which might have affected participants' fatigue or boredom, we include these two factors as additional control variables.

Mindfulness. We measured mindfulness using an adapted, 3-item version of the mindfulness scale used in Study 1. The other items from the original scale were excluded in this study because they were not suitable for the simulated nature of this class. Moreover, given the nature of the survey (administered every session), we shortened the scale to three items to reduce the lengths of the survey in line with standard practice (Lane & Shrout, 2010).

Learning performance. About three weeks after the course, students were instructed to write a personal case featuring one or more leadership challenges related to course learning. The case had to reflect a real and unfinished leadership problem that each student was wrestling with at the time. In addition to identifying the problem, the students had to implement solutions in the workplace (this was possible for these EMBA students, as they were working full-time while studying). The case was around 1,000 words. Participants' scores on this written assignment were used as a measure of their learning performance. This use of reflexive journals or personal reflection to demonstrate student learning is common in management learning and education (Cassell, 2018). Two independent assistants, blind to the hypotheses, coded participant reflection. The evaluation criteria were based on two main dimensions: (1) root cause analysis and problem description and (2) credible solution. Appendix D provides more details on these grading dimensions and an example of a high- and a low-score case. Essentially, the overall score indicates the extent to which students were able to integrate course learning and develop

insightful, practical solutions to their leadership challenges. The internalization and behavioral change aspects are illustrated by their articulation of the behavioral problem they faced and how they used course concepts to work toward a solution that would effectively solve the problem.

Analysis, Results, and Discussion

In this study, we used Mplus 8.4 (Muthén & Muthén, 2012) to conduct regression analyses controlling for the nested nature of the data. We tested how mindfulness influenced the relationship between negative emotions that occurred during the session and satisfaction with the session and subsequent learning performance. Table A2 in Appendix E reports the descriptive statistics and between-individual correlations among trait scores and average experienced-sampled scores for all the study variables.

Hypothesis 1 predicted that mindfulness moderates the relationship between negative emotions and learning performance. As seen in Table 2, we found a significant Negative emotions x Mindfulness interaction coefficient, $B = .75$, $p < .001$. The interaction graph can be seen in Figure 3. In support of Hypothesis 1, the relationship between negative emotions and learning performance was positive when mindfulness was high ($B = .58$, $SE = .14$, $t = 4.23$, $p < .001$), but not significant when mindfulness was low ($B = -.17$, $SE = .17$, $t = -1.00$, *ns*). Accordingly, negative emotions seem to offer the potential to enhance learning performance, but this potential is realized only when mindfulness is high. Again, we conducted additional analyses to demonstrate the discriminant validity of our model. As expected, learning goal orientation did not moderate the relationship between negative emotions and learning performance ($B = .08$, $SE = .10$, $t = .80$, *ns*). Furthermore, mindfulness did not moderate the relationship between negative emotions and satisfaction ($B = -.05$, $SE = .07$, $t = -.70$, *ns*).

[Insert Table 2 and Figure 3 about here]

In Study 2, we found that when mindfulness is high, negative emotional experience is positively associated with superior learning performance, providing further support for Hypothesis 1. However, similar to Study 1, we measured rather than induced mindfulness, thereby not allowing for causal inferences and practical value, as mindfulness is a malleable construct. Moreover, our study did not examine the mechanisms of how the interactive effect of negative emotions and mindfulness leads to learning performance. Therefore, we designed Study 3, an online experiment, to address these limitations. In Study 3, we focus on cognitive appraisals as the key mechanism. Below, we theorize how cognitive appraisal can serve as a mediator between negative emotions and learning performance when mindfulness is present.

STUDY 3

Sample and Settings

Study 3 sought to examine the moderating effect of mindfulness on the relationship between cognitive (challenge and threat) appraisal and learning performance (Hypotheses 2a and 2b), and test the overall moderated mediation model (Hypotheses 3a and 3b). In this online experiment, participants were asked to recall a recent experience where they received negative feedback about their behavior or performance within a work, school, or teamwork context. Participants were 107 students recruited via a research study participation platform at a large Dutch university, where students can earn credits for research participation. Five participants were excluded as a result of failing the attention checks, leaving a final sample of 102. About 47.6% of the respondents were women, of which 72.5% indicated that they were Dutch.

Procedure and Manipulations

Negative emotions induction. We used an autobiographic recall procedure (Galinsky, Gruenfeld, & Magee, 2003) to elicit a salient experience of negative emotions following the recall of an

interpersonally stressful event (Ozawa, 2021), such as when one receives negative feedback. Participants were asked to respond to the following prompt:

> *Please recall a specific instance in the recent past (last six months) where your supervisor gave you negative performance feedback (e.g., they told you that you did not do a good job on a certain task, that your performance was poor, that they were not happy with your work, gave you criticism on your work, etc.). If you cannot recall an instance where you were given negative feedback by your supervisor in the last six months, think about the last time you were given negative feedback by a supervisor in your current or previous organization (or where you received negative feedback from your professor or your classmate(s) on your individual or team work during your studies). Once you've identified the specific instance, close your eyes, and take a minute to visualize the situation, as if you were reliving the experience again.*

To make sure the participants recalled the specific incident and the details of the situation, we asked them to also provide a written account of the incident to elaborate on what happened and how they felt. Participants were then asked to indicate to what extent they experienced the specific emotions as part of the recall task.

Mindfulness manipulation. After completing this first part of the experiment, students proceeded to the second part, which entailed mindfulness manipulation using a flashcard exercise (Liang, Brown, Ferris, Hanig, Lian, & Keeping, 2018). Participants were randomly assigned to either a mindfulness or a control (mind-wandering) condition. Participants in each condition were presented with six statements, framed as flashcards that appeared on their screens one by one. They were instructed to read each flashcard slowly and focus on the thought that each statement invoked. Sample statements included, "Be aware of your thoughts and feelings," "As best as you can, concentrate on the present moment" (mindfulness condition), "Let your mind wander to whichever thought it wants," "Let your mind roam as it normally would" (mind-wandering condition). This was followed by attention-check measures and cognitive appraisals (challenge and threat appraisals). Then, the participants were asked to write down what they had

learned from recalling the negative feedback. Specifically, they were asked how they interpreted the feedback now, and what difference this recalling of feedback made. Last, the participants completed the demographics questions.

Mindfulness manipulation check. We performed a pilot study with 46 participants recruited via Prolific consisting of employees based in the US to test whether our mindfulness manipulation worked as intended. As a manipulation check for mindfulness, we used the 5-item developed by Reb and Narayanan (2014), which assessed the extent to which participants were focused on the present moment. A sample item is: "I went through the exercise without being really attentive to what was happening in the moment" (reverse-coded). An analysis of variance showed that, as expected, participants in the mindfulness condition scored significantly higher ($M = 4.63$, $SD = .63$) on the manipulation check than participants in the mind-wandering condition ($M = 4.01$, $SD = .59$), $F(1, 44) = 11.72$, $p < .001$. This shows that our mindfulness manipulation was successful. No manipulation check was included in the main study, so as to avoid the demand effect (Shaffakat, Otaye-Ebede, Reb, Chandwani, & Vongswasdi, 2022).

Measures

Negative emotions were measured as in Studies 1 and 2. We assessed cognitive appraisals using an adapted version of Drach-Zahavy and Erez's (2002) 6-item measure. The items were: "I viewed the task as a challenge," "The task presented itself as a challenge to me," "I felt challenged by this task" (challenge appraisal); and "I viewed the task as a threat," "The task presented itself as a threat to me," and "I felt threatened by the task" (threat appraisal).

To measure learning performance, we used participants' written reflections about what they had learned from the recall task (specifically, what they learned from the negative feedback after having had a chance to think about it). The question prompt was designed to be open-ended,

such that participants could freely express any thoughts that came up. Two independent raters, who did not know which condition participants were assigned to, coded participants' responses. The coding scheme was adapted from Grossmann and Kross's (2014) reflection-based measurement of reasoning. Given our reflection prompt, which focused on receiving feedback about work performance, we evaluated the participants' reflection on two aspects: (1) recognition of the possibility of change based on the feedback and (2) consideration of the feedback-giver's perspective. Appendix F provides more detail about these dimensions and an example of a high- and a low-score reflection. As in the previous study, we controlled for positive emotions.

Analysis, Results, and Discussion

Table A3 in Appendix G displays descriptive statistics and intercorrelations between the study variables used in our hypothesis-testing. In Hypotheses 2 and 3, we expected that the interactive effect between mindfulness and negative emotions would translate into individuals' learning performance through the mediation of the two different types of cognitive appraisals. We used the PROCESS syntax for SPSS (Hayes, 2013) to test these hypotheses in order to provide direct estimations of conditional indirect effects, using a bias-corrected bootstrapping technique (n = 10000).

The negative emotion–mindfulness interaction term was significantly associated with challenge appraisal ($B = .35$, $p < .05$) (see Figure 4). Moreover, as shown in Table 3, challenge appraisal was positively related to learning performance ($B = 1.05$, $p < .001$). Results also showed a positive indirect effect of negative emotions on learning performance via challenge appraisal in the mindfulness condition (.29; 95% CI [.04, .55]) and a negative but nonsignificant effect in the control condition (-.08; 95% CI [-.29, .18]). The effects of these conditional indirect

effects were significantly different from one another (.37; 95% CI [.01, .70]). Therefore, Hypotheses 2a and 3a were supported. The relationship between negative emotion and threat appraisal was not moderated by mindfulness ($B = .08$, *ns*), contrary to our expectation. In addition, threat appraisal had a negative but not significant effect on learning performance ($B = -.22$, *ns*). The overall indirect effect of negative emotion was not significant (-.16; 95% CI [-.42, .07]) in the mindfulness condition, nor was it significant in the control condition (-.14; 95% CI [-.36, .07]). Therefore, Hypotheses 2b and 3b were not supported.

Study 3 provided evidence for the effect of interaction between negative emotions and mindfulness on challenge appraisal. When mindfulness is high, negative emotions were positively related to challenge appraisal. Furthermore, it showed that challenge appraisal mediates the interaction effect on learning performance. On the other hand, the effect of interaction between negative emotions and mindfulness on threat appraisal was not significant, and threat appraisal did not mediate this interaction effect on learning performance. Moreover, the study used an experimental design with strong internal validity and the ability to draw causal conclusions on the effect of mindfulness. However, in this study we only measured (rather than manipulated) negative emotional experience, thus reducing our ability to draw causal inference with regard to the effect of negative emotions. Moreover, the scenario and the sample might raise concern about the generalizability to the leadership context. We designed Study 4 to address these limitations.

[Insert Table 3 and Figure 4 about here]

STUDY 4

Sample and Settings

In Study 4, our goal was to replicate and strengthen the findings of Study 3 by manipulating negative emotions with a focus on participants' real leadership experience. Data was obtained from US participants recruited via Prolific, which has been shown to provide data comparable to those obtained through traditional methods (Peer, Brandimarte, Samat, & Acquisti, 2017). As in Study 3, we screened out inattentive participants. Three individuals failed the attention check and were excluded. The final sample was 158 participants. In this sample, 50% were men, the average age was 39.27 (*SD* = 6.41), and 50% had received at least an undergraduate or a first degree. To be eligible for the study, participants had to be full-time employees with at least two years of management experience and hold a position with leadership or supervisory duties.

Procedure and Manipulations

Participants were informed that the study was designed to understand reactions to a leadership experience in a workplace context. The study employed an experimental between-subjects design in which participants were randomly assigned to a negative or a control (positive) emotional experience condition and to a mindfulness or a control (mind-wandering) condition. In the survey, participants were first randomly assigned to a negative or a control (positive) emotional experience condition.

Negative emotions manipulations. Similar to Study 3, we used an autobiographic recall procedure. However, for this study, we focused on a specific leadership incident. Participants were asked to respond to the following prompt:

> *Please recall a specific instance in the recent past (within the last few months) where you had a negative (positive) leadership experience. Think about a*

situation that resulted in negative (positive) emotions. This could be a moment where you made a mistake, experienced failure, had a conflict with someone at work, or received negative feedback from others (achieved a significant goal, received praise or recognition from others, or made a positive impact on your team or organization). Once you've identified the specific situation, close your eyes and take a minute to imagine the moment, as if you were reliving the experience again, including all the feelings and emotions associated with the experience.

Next, participants were asked to write down a description of the event to elaborate on what happened and how they felt. After the manipulation check, we randomly assigned participants to mindfulness or mind-wandering conditions using a flashcard exercise, similar to what we used in Study 3. This was followed by attention-check measures and cognitive appraisals (challenge and threat appraisals). Then, the participants were asked to write down what they had learned from recalling the leadership incident. Finally, the participants responded to the demographics questions.

Measures

Cognitive appraisals and learning performance were measured as in Study 3. For the negative emotional experience and control (positive emotional experience) condition, participants were asked to respond to the question: "To what extent does the situation you recall involve a positive or negative emotional experience?" on a 7-point scale, ranging from 1 (extremely positive) to 7 (extremely negative). An analysis of variance indicated that participants in the negative emotions condition scored significantly higher ($M = 6.26$, $SD = 1.16$) on the manipulation check than participants in the positive emotions condition ($M = 2.20$, $SD = 1.59$), $F(1, 156) = 335.61$, $p < .001$, suggesting that our manipulation had the intended effect.

Analysis, Results, and Discussion

Table A4 in Appendix H shows the means, standard deviations, reliabilities, and intercorrelations of the study variables. The variables correlate with each other in the expected direction.

To test Hypothesis 2a, we first examined whether the interaction between negative emotions and mindfulness was related to challenge appraisal. As seen in Table 4, we found a significant interaction ($B = .65$, $p < .05$). We plotted this interaction (see Figure 5) illustrating that in the negative emotions condition, challenge appraisal was higher in the mindfulness condition ($M = 4.23$, $SD = .63$) than in the control (mind-wandering) condition ($M = 3.72$, $SD = 1.25$), providing support for the hypothesis. In contrast, we did not find support for Hypothesis 2b, which predicted that mindfulness attenuates the relationship between negative emotions and threat appraisal ($B = .66$, *ns*). Next, we tested the proposed moderating mediating effects. Results indicated a positive indirect effect of negative emotions on learning performance mediated by challenge appraisal (.36; 95% CI [.01, .74]), thus supporting Hypothesis 3a. However, we found that the indirect effect of negative emotions on learning performance via threat appraisal was not significant. Therefore, Hypothesis 3b was not supported (-.03; 95% CI [-.20, .05]).

Overall, Study 4 provides an important replication of Study 3's findings using a very different operationalization of negative emotions (measured in Study 3, manipulated via autobiographic recall procedure in Study 4). Because we manipulated both our independent variables, this study provides enhanced internal validity. Moreover, we used different samples (students in Study 3, working adults in Study 4), allowing us to generalize our findings to the leadership and workplace context.

[Insert Table 4 and Figure 5 about here]

GENERAL DISCUSSION

Across four studies, we investigated when negative emotions and how stimulate learning. Specifically, drawing on the functionalist theory of emotions and the transactional model of stress and coping (Lazarus & Folkman, 1984), we posited that mindfulness can be leveraged in the event of a negative emotional experience to enhance challenge appraisal and mitigate threat appraisal, and thereby change the relationship between negative emotions and learning performance. As summarized in Table 5, our findings generally supported our proposed model, such that individuals with high levels of mindfulness not only experienced higher levels of challenge appraisal (but not threat appraisal) in response to negative emotions but also were more likely to have superior learning performance as a result. It is important to note that the four studies are complementary, utilizing different research designs, samples, and approaches to measuring mindfulness and learning performance, thereby demonstrating the robustness and generalizability of our findings. Specifically, mindfulness is measured as a trait in Study 1 and as a state in Studies 2–4. Learning performance is assessed through follower ratings of leader effectiveness in Study 1, which complements the leader self-reported learning performance measures used in Studies 2–4. The use of these different measures allows us to capture both external and self-reflected perspectives on learning outcomes. Additionally, our supplementary analyses confirm the discriminant validity of these measures, addressing potential concerns of construct overlap, and ruling out several alternative explanations. This comprehensive approach highlights the comparability and complementarity of our studies while contributing meaningful insights into the theoretical and practical implications for leadership development

[Insert Table 5 about here]

Although learning from experience that elicits negative emotions is often celebrated in practice—as evidenced by the increasing popularity of programs that focus on putting people in

stressful situations, such as leadership expeditions, police training simulations for managers, etc.—scholarly work suggests that negative emotions have either negative effects (Elfenbein, 2023; Lindebaum & Jordan, 2014) or at the very least act as a double-edged sword (Cheng & McCarthy, 2018; González-Gómez & Richter, 2015). This paper provides a more nuanced perspective by adding leader learning and development outcomes as important effects of negative emotions (in combination with mindfulness). Specifically, we add to the research on emotions and learning (Noe et al., 2010; Vogel, Reichard, Batistič, & Černe, 2020) by helping to create an understanding of how to mitigate the negative effects of negative emotions and leverage leadership training for positive outcomes. These insights also contribute to the literature on management education, where lay beliefs hold that management educators should avoid practices that may elicit negative emotions through self-revelatory experiences among students (Argyris, 1991). Our findings suggest that it may be more appropriate to incorporate mindfulness techniques, enabling students to maintain perspective when confronted with such emotions. In other words, fostering mindfulness may serve as a more constructive alternative to shielding students from the negative emotions that naturally arise from challenging or failure experiences that are essential to their growth as both managers and individuals.

Of equal importance is that we enhance current understanding of the relationship between negative emotions and leadership development by integrating insights from the mindfulness literature. Had we not accounted for mindfulness in our research, we would have found a null or negative association between negative emotional experience and learning outcome. Our studies demonstrated that the relationship between negative emotions and learning performance varies depending on mindfulness. This finding is particularly noteworthy because, while several scholars have proposed a role for mindfulness in leadership development (Ashford & DeRue,

2012; Reb et al., 2015), our work is among the first to examine this idea empirically. Our results provide evidence that an important moderating condition for the effect of emotionally challenging experiences on leadership development is the extent to which people are mindful. Furthermore, we contribute to the literature on mindfulness by demonstrating that mindfulness not only has the well-established effects on well-being (Hülsheger et al., 2013; Kay & Young, 2022; Roche et al., 2014) but also impacts other relevant outcomes, such as learning and development in organizations.

Finally, we highlight the importance of cognitive appraisal as a key mechanism to explain how negative emotions and mindfulness can help people reap a developmental benefit of an emotionally challenging experience. Using the transactional theory of stress and coping (Lazarus & Folkman, 1984), we examined how people can change the potentially debilitating downstream effect of negative emotions and enhance learning performance by amplifying the adaptive potential of negative emotions through challenge appraisal. While studies have reported relationships between challenging experiences and leadership development (Courtright, Colbert, & Choi, 2014; DeRue & Wellman, 2009; Preenen, Van Vianen, & De Pater, 2014), no studies have specifically examined how mindfulness impacts leadership development through the cognitive appraisal process. Interestingly, however, mindfulness did not moderate the relationship between negative emotions and threat appraisal. One possible explanation is that mindfulness does not influence all appraisals similarly, and that specifically, mindfulness does something different than simply removing a threat. This notion would be supported by previous research, which finds that the salutary effects of mindfulness on stress are partially mediated by strengthening a positive cognitive–emotional process rather than by disrupting a negative one (Garland, Gaylord, & Fredrickson, 2011). Hence, learning in the face of negative emotional

experiences is not the result of a mere absence or suppression of the feeling of threat but is instead underpinned by a distinct set of active coping strategies. Such a strategy seems to involve direct contemplation and positive, challenge-oriented psychological processes facilitated by mindfulness that can motivate people to see the events as inherently meaningful for personal growth and development.

Limitations and Future Research

This study is subject to limitations that point to directions for future research. We focused on negative emotions rather than studying multiple affective states, discrete emotions, or affective variability. Emotion scholars have increasingly called for researchers to examine specific emotions rather than more general levels of positive or negative affect (Daniels & Robinson, 2019; Gibson & Callister, 2010; Kish-Gephart, Detert, Treviño, & Edmondson, 2009). Therefore, future research could take a more granular view of emotions. We have, on an exploratory basis, conducted analyses with respect to the specific emotions included in our studies, but we did not find meaningful effects. The reasons may range from poor psychometrics (e.g., single items) to issues with statistical power (e.g., not enough people feeling a certain way) to more fundamental ones, including that multiple different negative emotions may need to be elicited to bring about the effects we describe in this paper. Therefore, with a proper study design tailored to specific emotions, future research could explore whether mindfulness has more impact on certain emotions than others. For instance, one could ask whether mindfulness facilitates greater learning from anger than from sadness. Alternatively, studies might examine whether mindfulness affects various negative emotions equally. Investigating these questions would require carefully designing specific discrete emotions for comparison, which is beyond the scope of this study.

Another limitation of our study is that we did not include additional contingency factors that may be of relevance. We ruled out alternative moderators (learning goal orientation and emotion regulation) but recognize that there are other possibilities. Future research could build on our findings by examining the role of other individual difference factors and/or other contextual factors in helping leaders to leverage negative emotions for developmental benefits. For example, research has established that psychological safety has positive links to learning behavior in general (Liu, Hu, Li, Wang, & Lin, 2014) and to learning from failure in particular (Carmeli, 2007; Carmeli & Gittell, 2009). However, many questions remain unanswered. For example, is it possible that mindfulness can help increase individuals' tolerance for taking a risk and experiencing challenging emotions even when feeling psychologically unsafe in the presence of identity threats (Wanless, 2016)? Alternatively, future research could examine the interaction between negative emotions, mindfulness, and psychological safety. Psychological safety might amplify the positive effects of an individual's mindfulness, so they engage even more constructively with an emotionally challenging experience. Similarly, future research could also examine whether mindfulness increases other responses to negative emotions. In this paper, we have examined challenge and threat appraisals and ruled out perceived control as an alternative explanation, but research has shown that different negative emotions are related to other cognitive appraisals, for example, appraisal of uncertainty (Lerner & Keltner, 2000).

Last, our sample from three studies was drawn from educational settings, and we focused on leadership developmental interventions that were carefully designed and structured for a pedagogical purpose. Future research may examine the external validity of our findings by examining emotionally challenging experiences that naturally occur in organizational settings. While we believe that our findings can be generalized to other settings, it would be interesting to

examine whether mindfulness, measured or induced, in an organizational setting is similarly effective in regulating different types of emotionally challenging experiences.

Practical Implications

Our findings about the affective states, in this case negative emotions, that emerge in response to different teaching and experiential learning activities and their relationship to different training and developmental outcomes can be an important guide for instructional planning and evaluation. As seen in our supplementary analysis regarding satisfaction as an alternative outcome, putting people in an emotionally challenging situation can potentially hurt satisfaction scores. However, if the target outcome is the transfer of learning, then inducing negative emotions in class might prove to be beneficial when also making sure that participants are being mindful. These actionable research insights (Bartunek & Egri, 2012; Joullié & Gould, 2022) also present the case for incorporating mindfulness practice as a brief intervention within leadership development programs (Atkins & Styles, 2015). Similarly, such findings may offer practical implications for leaders to become more effective in learning from uncomfortable experiences (Crosina, Frey, Corbett, & Greenberg, 2024) instead of trying to "eliminate the negative" (Learmonth & Humphreys, 2011). While our study focuses on the context of formal educational programs, which can help guide the design and delivery of management education (Lindebaum, 2024), the insights may be extended to day-to-day activities in organizations.

Conclusion

Challenging experiences that take individuals out of their routines and stretch them beyond their comfort zones are important sources of development. However, inducing or engaging in a challenging experience that triggers negative emotions may prove to be a double-edged sword. We showed that mindfulness is one potential factor in mitigating and even reversing the

detrimental effect of negative emotions. Therefore, our paper highlighted the critical role that mindfulness plays in the relationship between emotionally challenging experiences and leader development. Our findings inform future research and interventions aimed at developing leaders effectively, both in educational institutions and in organizations.

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Table 1

Mindfulness as Moderator (Study 1)

	B	*SE*	*t*	R^2
Outcome variable: learning performance				
	.14			
Age	-.03	.04	-.84	
Gender	-.06	.31	-.18	
Openness to experience	-.12	.19	-.63	
Positive emotions	.04	.24	.15	
Negative emotions	-5.09**	1.83	-2.78	
Mindfulness	-2.85**	1.03	-2.76	
Negative emotions x Mindfulness	1.24*	.50	2.51	

*p <.05, **p <.01.

Unstandardized regression coefficients are reported.

Table 2

Mindfulness as Moderator (Study 2)

	B	*SE*	*t*	R^2
Outcome variable: learning performance				
	.40			
Age	.00	.01	.21	
Gender	-.08	.16	-.53	
Openness to experience	.10	.05	2.19	
Positive emotions	-.06	.13	-.43	
Negative emotions	-3.17**	.86	-3.70	
Mindfulness	-.21	.35	-.62	
Negative emotions x Mindfulness	.75**	.18	4.09	

*p <.05, **p <.01.

Unstandardized regression coefficients are reported

Table 3

Regression results of the moderated mediation model (Study 3)

	Dependent variable: Learning performance		*Mediator variable: Challenge appraisal*		*Mediator variable: Threat appraisal*	
	B	*SE*	*B*	*SE*	*B*	*SE*
Negative emotions	.06	.15	-.07	.10	.64**	.11
Challenge appraisal	1.05**	.15				
Threat appraisal	-.22	.15				
Mindfulness[a]			-1.21*	.56	-.20	.58
Negative emotions x Mindfulness			.35*	.16	.08	.17
Positive emotions	.21	.17	.43**	.10	-.10	.11
R^2	.42**		.21**		.43**	

*p <.05, **p <.01. [a]Control condition = 0, Mindfulness condition = 1.

Unstandardized regression coefficients are reported.

Table 4

Regression results of the moderated mediation model (Study 4)

	Dependent variable: Learning performance		*Mediator variable: Challenge appraisal*		*Mediator variable: Threat appraisal*	
	B	*SE*	*B*	*SE*	*B*	*SE*
Negative emotions[a]	.10	.19	-.28	.22	.78**	.26
Challenge appraisal	.55**	.09				
Threat appraisal	-.05	.07				
Mindfulness[b]			-.15	.22	.00	.26
Negative emotions x Mindfulness			.65*	.32	.66	.37
R^2	.21**		.03**		.22**	

*p <.05, **p <.01. [a]Control condition = 0, Negative emotions condition = 1, [b]Control condition = 0, Mindfulness condition = 1.

Unstandardized regression coefficients are reported.

Table 5 Summary of results across the four studies

Study	Sample size and source	Design	Mindfulness operationalization	Learning performance operationalization	Discriminant/Incremental validity	Results
1	137 MBA students in a German business school engaging in a 1-week team-based action learning project	Field multi-source survey	Trait mindfulness (10-item mindfulness scale)	Learning performance measured by team members' rating of leader effectiveness	-LGO and Emotional regulation as alternative moderators -Satisfaction as an alternative dependent variable	• H1 partially supported (mindfulness only *buffered* against the adverse effect of negative emotions on learning performance) • LGO and Emotional regulation did not moderate the relationship between negative emotions and learning performance • Mindfulness did not moderate the relationship between negative emotions and satisfaction
2	47 students (183 experienced sample surveys) in a Dutch university engaging in a 4-day experiential	Field time-lagged survey	State mindfulness (3-item mindfulness scale)	Learning performance measured by students' reflection on their personal leadership case	-LGO as an alternative moderator -Satisfaction as an alternative dependent variable	• H1 supported (mindfulness moderates the relationship between negative emotions and learning performance in a *reversal* manner) • LGO did not moderate the relationship between negative emotions and learning performance

	leadership development course					• Mindfulness did not moderate the relationship between negative emotions and satisfaction
3	107 students in a Dutch university	Experimental study (autobiographic recall task about feedback situation)	State mindfulness manipulation (through a flashcard exercise)	Learning performance measured by participants' written reflections about how they would improve their behavior		• H2a and H3a supported (mindfulness moderates the relationship between negative emotions and challenge appraisal, supporting the conditional indirect effect. • H2b and H3b not supported (mindfulness did not moderate the negative emotions-threat appraisal relationship, not supporting the conditional indirect effect).
4	158 Prolific participants (full-time employees with leadership responsibilities)	Experimental study (autobiographic recall task about leadership situation)	State mindfulness manipulation (through a flashcard exercise)	Learning performance measured by participants' written reflections about how they would improve their behavior		• Same results as Study 3

Figure 1

Theoretical model

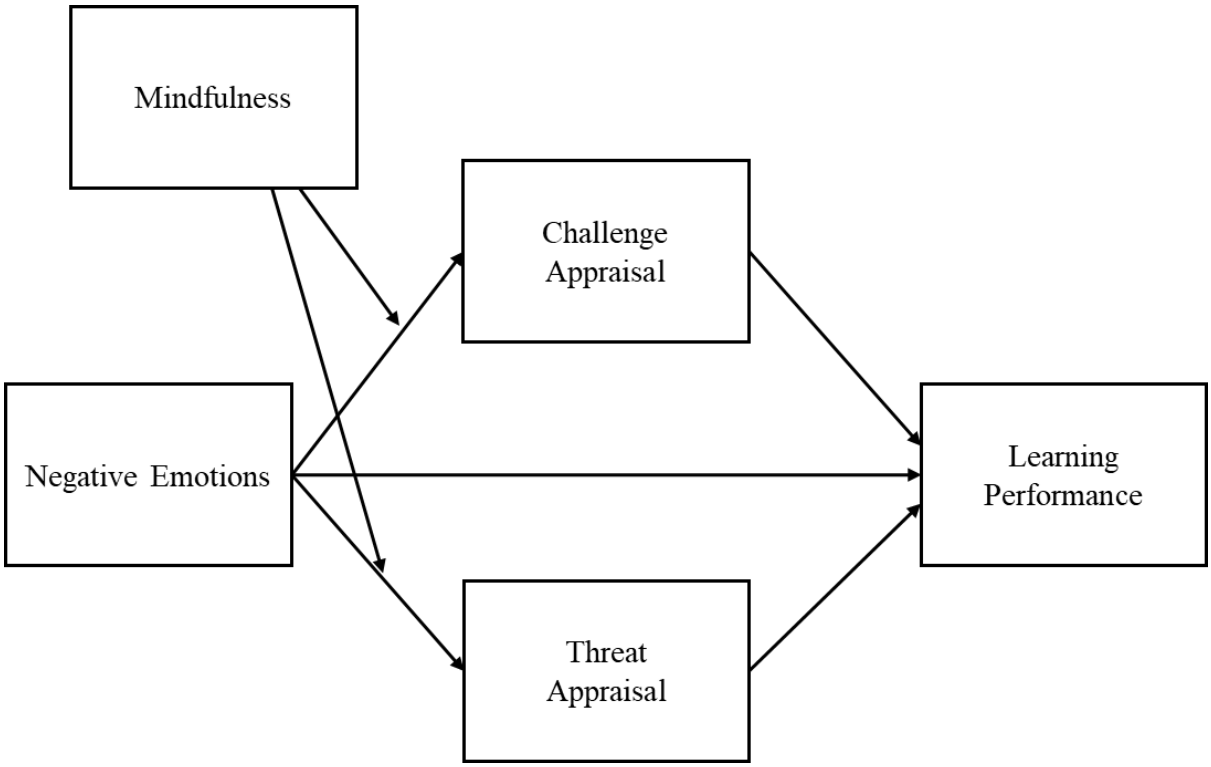


Figure 2

Interactive effect of mindfulness and negative emotions on learning performance (Study 1)

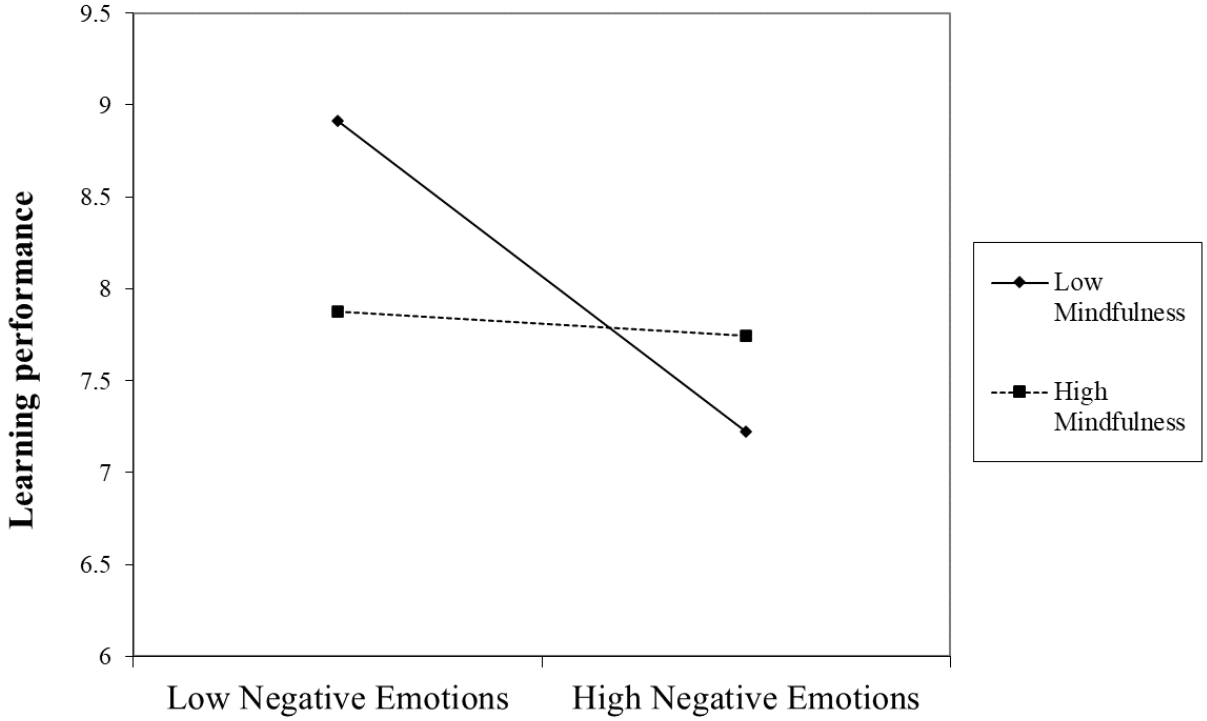


Figure 3

Interactive effect of mindfulness and negative emotions on learning performance (Study 2)

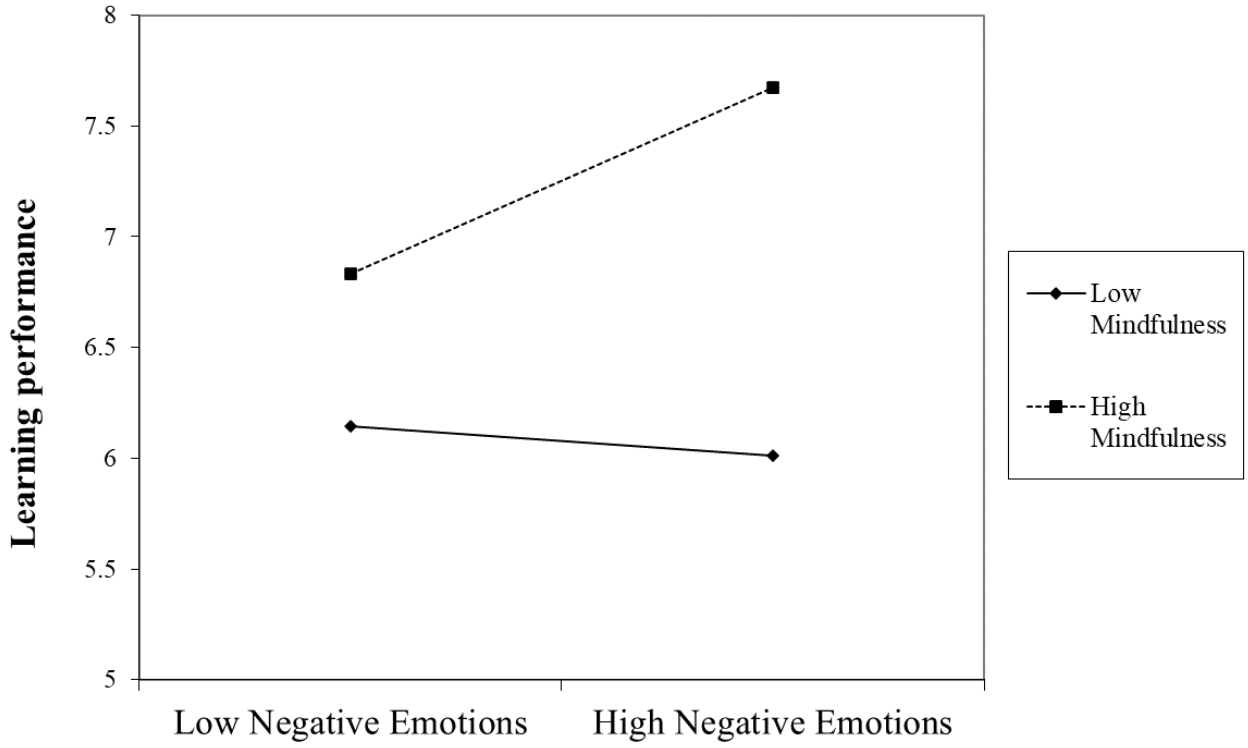


Figure 4

Interactive effect of mindfulness and negative emotions on challenge appraisal (Study 3)

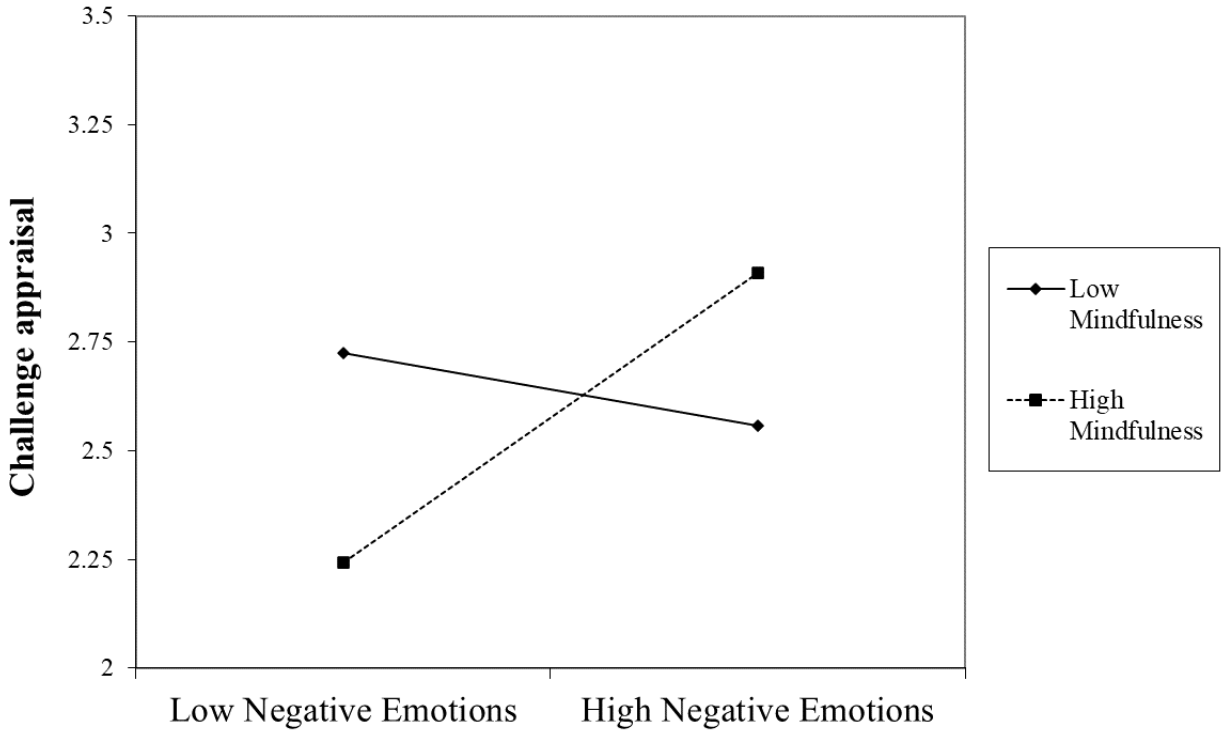
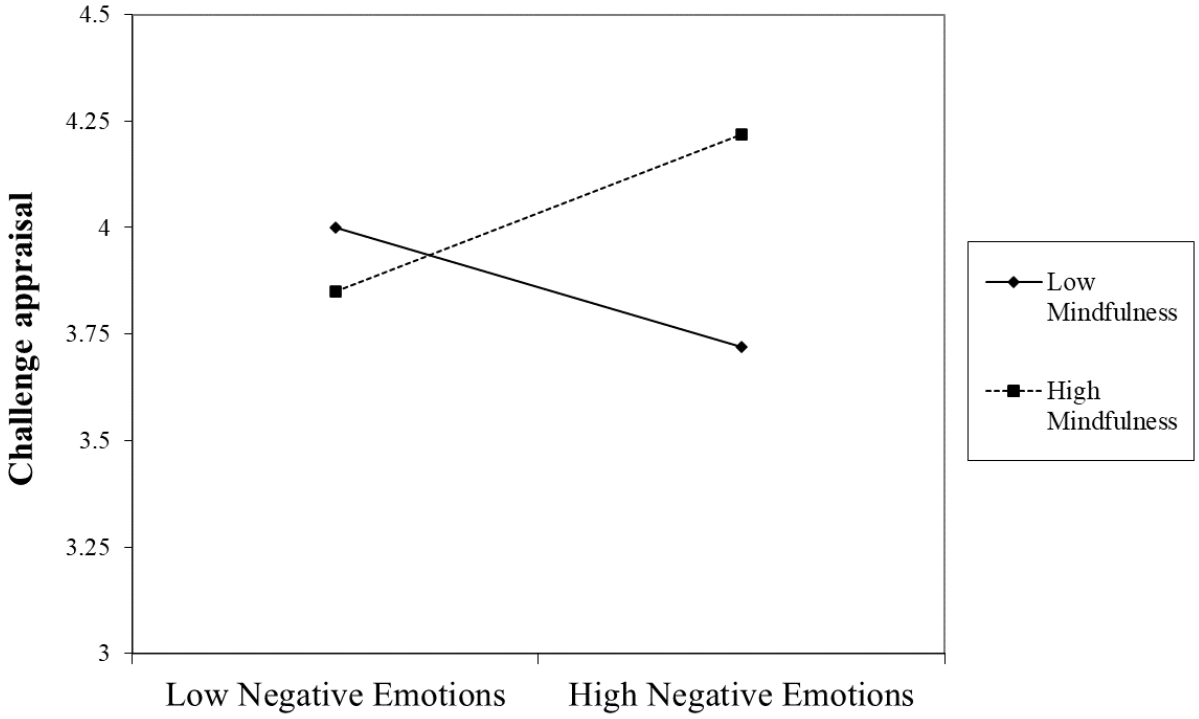


Figure 5

Interactive effect of mindfulness and negative emotions on challenge appraisal (Study 4)



APPENDIX A

Description of the Challenges

Each challenge requires business acumen, strategic thinking, clever organization, and resource allocation ability, as well as creativity and entrepreneurship. The challenges cover business issues such as strategy, brand development, digitalization, marketing, distribution, and sales, and thus serve as previews and real-life examples of business concepts that the students will learn about in greater depth over the course of their MBA program.

Challenge Day 1: Brand Building & Mascoting

The first challenge is to design a brand, brand mascot, and brand messaging to use in their fundraising activities.

Challenge Day 2: Brand Refinement & Hashtag Campaign

This second day provide each team the opportunity to continue developing their brand. In the context of this resource-constrained strategic environment, they will need to think creatively about how to address any potential challenges with their brand, brand mascot, and brand messaging, in order to continuously improve their output. Additionally, they need to think about how they might develop a viral hashtag campaign around their brand, mascot and messaging. Critically, they need to consider how to generate appeal so that donors want to support and donate to their cause.

Challenge Day 3: Digital Infrastructure & Campaign

On Day 3, their campaign goes live, and the task is to raise as much money as possible from private and corporate donors. Specifically, the task involves finalizing the target group for their fundraiser, developing a convincing pitch, setting-up the infrastructure to collect donations, communicating their campaign, and asking for donations.

Challenge Day 4: Refined Campaign & Active Contact

Day 4's task involves seeing through a successful fundraising drive by capitalizing on their digital infrastructure and content to turn as many leads as possible into donations. The challenge is to actively solicit donations from your personal and professional networks, and continuously monitor and improve their strategic, marketing and communication approaches to obtain commitments from company and/or private donors while interacting with them in a friendly, professional manner.

Challenge Day 5: Strategy Challenge

The last day challenge is to respond to the strategic challenges that the charity is facing by developing strategic recommendations. The charity has worked successively on expanding its base of private and institutional donors. However, in order to maximize the number of children in need they can help worldwide, it is necessary to simultaneously strengthen and develop relationships with existing donors, while also continuously attracting new supporters.

APPENDIX B

Table A1

Means, standard deviations, and correlations (Study 1)

	M	*SD*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
1. Age	29.33	3.47									
2. Gender	1.29	.46	.04								
3. Openness to experience	3.86	.75	.01	-.13	(.71)						
4. Learning goal orientation	4.41	.48	-.17	-.05	.35**	(.75)					
5. Emotion Regulation	3.59	.72	.03	.09	.02	.20*	(.80)				
6. Positive emotions	3.20	.62	-.20*	-.16	.09	.12	.75	(.69)			
7. Negative emotions	2.10	.67	.14	.16	.08	.08	.11	-27**	(.66)		
8. Mindfulness	3.58	.49	-.06	.05	.24**	.31**	.41**	.10	.59	(.69)	
9. Satisfaction	3.69	1.06	-.12	-.06	-.11	.14	.07	.11	.10	.15	
10. Learning performance	6.57	1.56	-.13	-.05	-.09	-.08	-.32**	-.16	-.29**	-.13	-.12

*p <.05, **p <.01.

APPENDIX C

Course Activities Description

Each day followed a similar design: students started with a short overview of the gathered knowledge in each of these domains of leadership to ensure students had a good understanding of the core aspects of a certain approach to leadership. Building on this understanding of these core aspects of leadership, students received a 360 feedback assessment of how they scored on this specific aspect of leadership – this 360 was not only quantitative but included extensive qualitative examples and stories to illustrate the quantitative component. Building on this 360 assessment, students engaged in a simulation exercise (akin to a development center) to test their proficiency in this aspect of leadership. For instance, for task-oriented leadership, students were given an in-basket selection exercise that demonstrated their ability to organize and plan, and communicate effectively, as well as set effective goals for themselves and others (see Anseel et al., 2016 for a description of this exercise). For relationship-oriented leadership, students practiced courageous conversations where they had to address an actor who played a difficult fictive person on their EMBA team, asking them to demonstrate their ability to listen well, take other people's perspectives, and use political skills to influence the difficult person toward better performance. For change-oriented leadership, students were asked to come up with a legacy-speech that builds on their life story to answer the question, "why should anyone be led by you?" (Goffee and Jones, 2005) – this speech was done in front of their peers and students were evaluated by their peers, challenging students to effectively communicate their vision for the future, as well as understand how their life was shaped. For ethics-oriented leadership, students engaged in a life-boat exercise where they imagined being stranded in the middle of the ocean with a boat only big enough for one person to survive, and they were asked to come up with a speech that demonstrates "what value that they would bring back to society," this challenged students to be clear about what it is that they value, how different values are prioritized, and whether or not they walk the talk. After every experiential simulation, there was feedback from peers and coaching from the course professor.

APPENDIX D

Personal Case Scoring Criteria

1. **Root Cause Analysis and Problem Description**

- **Problem choice:** Was the problem aligned with class topics?
- **Depth:** Was the problem just stated, or was it thoroughly analyzed? Was there evidence of different levels of analysis, or was it just focused on the symptom?
    - Subjective norms: How is the environment linked to your problem?
    - Behavioral attitude: How does the problem link to what you value? What competing values stand in your way?
    - Perceived behavioral control: Do you feel capable? What external factors stand in your way?
- **Clear description of the problem:** Is there a concrete and independent problem statement? Is it formulated as a question, or did you jump to goal-setting?

2. **Credible Solution**

- **Link to a problem:** Was the solution clearly linked to the problem?
    - Business Case: Was there a clear business case to be made?
    - Smart goals: Did you follow the principles of smart goals – specific, measurable, achievable, relevant, and time-sensitive?
    - Adaptive challenge: Did you understand how your own character could stand in the way of their proposed solution (this links to the problem statement)?
    - Environmental analyses: How can your environment help you solve these problems?
    - Goal tracking: Is there a plan to check whether goals are being reached and to course-correct where necessary?
- **Clear description of the solution:** Is there a concrete and independent solution statement? Is it specific enough (to allow people to invest money)?

Example of a high score case

I have an interesting (and sometimes troublesome) relationship in dealing with both men and women in the workplace. I used to have great friendships with both men and women. Both parties appreciated the candor that I brought to the relationship. Nevertheless, now and then, I would step on some very sensitive toes. Giving my "straightforward" personality, school advisors suggested I study civil engineering, law or physics. I was curious, however, what I was doing wrong in stepping on sensitive toes and I ignored their advice and studied psychology instead. These studies really opened my eyes: all of the sudden I saw all of the problems I was running into. Solving them however was another matter … Being trained as a psychologist, I became emotionally sensitive enough to understand when I would offend women, but I am still not agreeable and mindful enough not step on sensitive toes. I often have the impression that women see me as a threat when I do not "play nice". As a result, my current strategy is: "tip-toe around female friends and colleagues and avoid confrontation". Needless to say that this hinders my effectiveness as a leader. Similarly, I seem to run into trouble with male authority figures. Being trained as a psychologist, I do better with talking about my feelings than some of my male colleagues, something which not all men particularly appreciate. I remember a performance feedback episode with one of my previous bosses … he was utterly uncomfortable to talk about my work-related functioning. I never asked for feedback afterwards. When I have an emotional problem with a male friend, I am often afraid to voice these emotions. This is problematic

because important problems remain unresolved that way. My current strategy toward men is: "Hoping that problems solve themselves and go away." With regards to men and women, it seems that I am caught between being emotionally sensitive enough to talk to women but still not enough to be accepted, and at the same time it appears that I am emotionally too sensitive for men. Maybe I should have studied civil engineering ...

I realize that my old candor has burned a few bridges along the way. The fact that I have burned those bridges is strange because despite my candor, I absolutely hate conflict! I like a good discussion and debate now and then and I am happy to go out and seek feedback but I hate the idea that someone else fundamentally thinks badly of me. In other words, I don't mind a bit of task conflict now and then but I hate relationship conflict. It seems that I am both the competent jerk and a fool eager to be loved. What is pushing me toward the conflict I desperately hope to avoid? This need to both search and avoid conflict puts me in no-mans-land. I believe a big part of the problem lies in the difference between emotional sensitivity and emotional intelligence. While I am sensitive to what others think about me, I may not be fully aware of how others truly perceive me, understanding their emotions (emotional intelligence). Perhaps I am thinking about this too much from my own perspective, while I should perhaps try to take their perspective instead. Rather than forcing men to talk about their feelings and forcing women to accept my dominant male values, perhaps I should try to get into their mindset first. Seek first to understand before being understood. In doing this exercise, I am amazed to understand, for example, how many emotions can be exchanged between men without ever saying a word and how many subtle behaviors and words may be upsetting to women. Being more mindful of the message others are conveying to me should help me. And perhaps I should also realize that I am getting better at it, after my education in psychology I have burned a lot less bridges and even repaired a few bridges deemed beyond repair.

Example of a low score case

My whole life I have considered myself a highly empathic person. I saw myself as someone who is able to understand other people's feelings and take their perspectives in any situation. Even so, my husband or colleagues at work would tell me that I need to listen more carefully. This feedback I would receive during feedback sessions at work or after some discussions with my husband. Throughout my professional career I have learned to embrace a critique and try to learn something out of it. Yet, I was having a hard time to accept that my listening skills are poor. It simply didn't match my own self-image of the emphatic person that I have cultivated for so long.

After receiving a few negative feedback comments about this issue, I started thinking about it in more depth. The truth is that I had this tendency to filter the information I receive in a sense that I simply didn't listen to the parts that I consider to be non-relevant. This led me in few occasions to discussions, privately and professionally, where my interlocutor would reproach my bad habit.

Both a personal and professional challenge I had was to see the situation from another person's perspective. Although I was doing my best to maintain good relations with everybody around me, privately and professionally, sometimes conflicts were unavoidable. As somebody who has an aversion to any kind of conflict, I was making an effort to smooth out the problems. But even then, I rarely listened how other person felt and his/her opinion. Instead, I focused only on my opinion and my feelings, and waited for my turn to say something. This led me to insecurities on how to approach some people. Very often my reactions to other's people actions were too rapid, without considering their motives.

However, knowing that a colleague or close friend/family member was angry at me was making me feel very uncomfortable. So, unwillingly I led a long discussions until I knew that "everything is ok" and that the conflict did not harm our relationship. Yet, even then I felt bad and thought for days about the conflict. After profound reflections, I realized that I was just too concerned about myself. Now I see that I didn't like to feel like the victim in any kind of conflict, but rather above all circumstances. At the end, I started very much doubting my level of empathy and compassion for others, and was questioning my self-confidence and its reflection on listening skills. I wondered what would change in my relationship with others, if I would truly show more empathy and compassion?

So, I decided to take control of the situation and get in front of this. The feedback I received from the persons close to me, as well as colleagues, made me think seriously about my listening skills. I had to face the fact that my self-image was not in line with how I act and what I communicate to interlocutors. When I first confronted this problem, I made it clear to myself that I have to split the perception of myself and my emotions from my behavior. This is very important as my self-perception was often stopping me from understanding the impression I was making on others. The truth is that my bad listening skills firstly reflected on my private relationships, mainly with my husband. As he was the one who was pointing out this issue all the time, I knew that he was the starting point. I sat with my husband and asked him for honest feedback regarding my behavior in the moments when he feels I don't listen what he is saying. I listened carefully to what he was explaining without trying to find an excuse or filtering out the information I was receiving at that moment.

At work I set myself a concreate goal: applying the same pattern of behavior and by the next annual performance review, having my listening skills improved by two levels. What helps me in achieving this goal is the nature of my job, where very often I am forced to lead a long conversations and sometimes even unpleasant discussions. I started thinking profoundly about what would change in my relationship with others if I would truly show more empathy and compassion by involving myself in mindful and active listening. I have occupied my mind with this matter and got to the conclusion that better listening skills would give me more credibility as a future leader, but also as a partner, member of the family and a friend.

The challenge I faced was to see the situation from others' perspective especially in the situations of conflict when I was unconsciously victimizing myself. The moment I became highly aware of these issues, I realized that the only way to fight this is to control my behavior. By controlling my behavior, I understand forcing myself to listen and concentrate on what the other person is trying to tell me. It includes both the facts and emotions as a result of a certain situation. Parallelly, rather than having long discussions, my goal is to resolve the problems based on pure facts.

However, I am aware that I cannot receive such feedback on a daily basis. This is why in my case a self-control is crucial. Therefore, I am practicing self-control on a daily basis and developing it as a part of behavior pattern. It will help me keep under control my emotional side and the notion that I am always right, urge to explain, and making sure that "everything is ok".

APPENDIX E

Table A2

Means, standard deviations, and correlations (Study 2)

	M	*SD*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
1. Age	36.01	5.76									
2. Gender	1.26	.44	-.22**								
3. Openness to experience	2.74	1.66	-.34**	-.05	(.73)						
4. Learning goal orientation	3.39	1.48	-.44**	.05	.95**	(.82)					
5. Leadership proficiency	53.66	21.97	-.19*	.02	.15	.18*					
6. Positive emotions	3.64	.55	-.05	.01	.24*	.23*	-.10	(.76)			
7. Negative emotions	1.72	.57	.04	.04	-.22**	-.17*	-.20*	.05	(.80)		
8. Mindfulness	4.68	.58	.14	-.03	-.20**	-.24**	-.09	.20*	-.10	(.58)	
9. Satisfaction	3.99	.75	-.06	.17*	.01	-.05	.07	.11	-.26**	.08	
10. Learning performance	6.96	1.06	.07	-.11	.03	.01	.00	.10	.05	.44**	-.05

*p <.05, **p <.01.

APPENDIX F

Coding for learning performance based on written reflection

1. Perspectives taking (the extent to which they consider the perspectives of different people involved in the situation, primarily the perspective of the feedback giver)
    a. No perspective taking – The subject is not interested in considering the perspective of the feedback giver, who may not share the same opinion or have the same understanding of the situation as them.
    b. Some perspective-taking – The subject shows some willingness to perspective-take but is only willing to consider certain parts/angles, yet not all thoughts that were shared by the feedback giver. They may point to the understanding of why the feedback giver made the negative feedback but does not fully process the content of the feedback itself.
    c. Full perspective taking – The subject fully consider the perspective of the feedback giver. And this is not only showing the attempt to understand why the feedback giver shared the negative feedback that might serve the feedback giver's interest but also the interests of others in the situation, including the subject's interest.
2. Recognition of the possibility of change (the extent to which they recognize that there is a case for them to consider changing their behaviors)
    a. No recognition of the possibility of change – The subject does not realize that the behaviors in question (where the negative feedback is directed) should/could potentially change in the future.
    b. Some recognition of the possibility of change – The subject recognizes some value and a slight possibility of change or that something about the behaviors (where the negative feedback is directed) may not serve them at that moment. But the subject does not elaborate on the nature of change.
    c. Fully recognizes the possibility of change – Subject recognizes and acknowledges the possibility of change. It pertains to the understanding that not only the behaviors (where the negative feedback is directed) indeed did not serve them at that moment, but it would also hinder them in the future. The subject also elaborates on why and how they think they would change.

APPENDIX G

Table A3

Means, Standard deviations, and Correlations (Study 3)

	M	*SD*	*1*	*2*	*3*	*4*	*5*
1. Negative emotions	3.27	1.20	(.85)				
2. Positive emotions	2.19	.88	.05	(.84)			
3. Mindfulness	.50	.50	-.26**	-.10			
4. Challenge appraisal	3.50	1.01	.11	.40**	-.10	(.84)	
5. Threat appraisal	2.79	1.22	.65**	-.04	-.16	.08	(.91)
6. Learning performance	4.87	1.78	.01	.35**	.06	.63**	-.09

Note: Mindfulness condition coded as 0 = control, 1 = Mindfulness. *p <.05, **p <.01.

APPENDIX H

Table A4

Means, Standard deviations, and Correlations (Study 4)

	M	*SD*	*1*	*2*	*3*	*4*
1. Negative emotions	.50	.50				
2. Mindfulness	.50	.50	.03			
3. Challenge appraisal	3.95	1.01	.03	.09	(.83)	
4. Threat appraisal	2.39	1.29	.43**	.14	.11	(.91)
5. Learning performance	5.86	1.20	.03	.01	.46**	.02

Note: Negative emotion condition coded as 0 = control, 1 = Negative emotions. Mindfulness condition coded as 0 = control, 1 = Mindfulness. *p <.05, **p <.01.