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Keep Calm and Carry On: Immediate- vs. Six-Month Effects of Mindfulness Training on Academic Performance

Abstract

Mindfulness practices are gaining popularity in private and public organizations. In a randomized controlled trial, we examine whether mindfulness training improves the academic performance of university students. The intervention improves mental health and non-cognitive skills. However, it takes time before students' performance can benefit from the training: we find that, if anything, the intervention marginally decreases average grades right after the end of the intervention, whereas it significantly increases academic performance, by about 0.4 standard deviations, six months after.

JEL-Codes: I210, C930, I120, I310.

Keywords: performance, mental health, education, meditation, field experiment.

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1 Introduction

Mindfulness practices are becoming increasingly popular in the Western world, including in private and public organizations. According to Lyddy et al. (2021), more than half of all large companies offer their employees some form of mindfulness training as of 2021. International organizations, including the United Nations, and public entities like the Australian government and the United States Postal Service offer similar programs to their employees. Mindfulness training is even part of the agenda of the World Economic Forum. Similarly, more and more educational institutions offer free mindfulness courses to their students or consider integrating them into their teaching curriculum. For instance, the British government launched a project in 2019, introducing mindfulness practices in up to 370 English schools to improve youth mental health.[1] Mindfulness programs are also offered at universities where a large share of students report experiencing stress and common mental health problems, such as anxiety and depression. Top universities, such as Cambridge, Harvard, MIT, Oxford, Stanford, and Yale, are among those offering free mindfulness programs to their students.

Extensive literature provides evidence on the effectiveness of mindfulness practices in achieving their main goals, namely, in reducing stress, anxiety and depression (see, for instance, Khoury, 2015, for a review). However, little is known about the potential spillovers of mindfulness training on performance. The very few existing studies addressing this question measure performance through cognitive laboratory tasks, finding null or very marginal and selective positive effects of the training (Hafenbrack and Vohs, 2018; Charness et al., 2022; Shreekumar and Vautrey, 2022), or have such a small sample size (below thirty subjects per treatment) which makes it very hard to draw any evidence-based conclusion (Hall, 1999). Hence, to the best of our knowledge, our study is the first pre-registered and relatively large randomized controlled trial to investigate the causal effects of a mindfulness training on academic performance, measured right after the program and six months after it ended.

On the one hand, mindfulness training may help improve academic performance by reducing anxiety and depression (Owens et al., 2012), which are often associated with lower academic performance (see Bernal-Morales et al. (2015) and Pascoe et al. (2020) for a detailed literature review). Furthermore, mindfulness practice may also improve academic performance by increasing self-control and focus (Tang et al., 2015), which positively influence learning (Duckworth et al., 2019). Finally, mindfulness practices increase present-moment awareness and reduce mind-wandering, the latter of which has been found to negatively affect exam performance and the ability to remember newly acquired information (e.g., Risko et al. (2012), Mrazek et al. (2013), Schacter and Szpunar (2015), and Wammes et al. (2016)). Hence, there are good reasons to believe that mindfulness training not only improves mental health but may also help to improve performance, which is arguably one of the reasons why it has become so popular in education and businesses.

[1] www.gov.uk/government/news/one-of-the-largest-mental-health-trials-launches-in-schools

On the other hand, other arguments point to the potential limitations or even negative effects of mindfulness training on academic performance. One argument concerns stress, whose impact on performance is less straightforward than it is for anxiety and depression. While excessive stress can hinder learning and memory, some stress may facilitate them (Vogel and Schwabe, 2016).[2] Therefore, mindfulness practices, by reducing stress, could potentially reduce academic performance. Moreover, mindfulness training may reduce students' motivation to study by shifting attention away from future goals towards the present moment and acceptance of the status quo(Hafenbrack and Vohs, 2018). Lastly, successful mindfulness training requires learning new practices and adopting a new daily routine, which at the beginning may divert time and cognitive effort away from studying, affecting overall academic performance.

In collaboration with one of the largest German health insurance providers, we offered a standardized free 8-week mindfulness course to students at the University of Cologne. Interested students could apply to the course by registering and completing an online questionnaire. Applicants were then randomly assigned to the treatment (102) or the control group (122), and students in the treatment group were offered a place in the course. Randomization was stratified along the students' (planned) exams and we used re-randomization to ensure all relevant baseline measures were balanced. To determine the impact of the training on academic performance, we had access to grade information from the university's administrative records for the semesters before, immediately after, and up to six months after the intervention. In addition, we collected data on students' mental health (stress, anxiety and depression), mindfulness, non-cognitive skills (self-control, conscientiousness and neuroticism), concentration on a task, study behavior, and health (self-care) behavior before the intervention started and soon after it ended.

Our main findings can be summarized as follows. Consistent with previous evidence, the mindfulness program significantly improved students' self-reported mental health, mindfulness and non-cognitive skills, and very marginally increased concentration on a task. However, we find that, if anything, the intervention marginally decreased students' immediate academic performance by a maximum of 0.26 standard deviations depending on the specification.

We only observe robust positive effects of the intervention on academic performance six months after the program ended. Specifically, the mindfulness training significantly improved six-month academic performance by a minimum of 0.39 standard deviations. All our results also survive several robustness checks (including sample restriction, inverse probability weighting, imputation of missings) to address attrition concerns.

Taken together, these findings reveal that mindfulness practices can have substantial positive spillover effects on academic performance but that it may take time before students can reap these additional benefits. Thus, when given sufficient time, mindfulness training can serve as a powerful tool not only for enhancing well-being but also for

[2]This inverted U-shaped relationship between arousal and performance is known as the Yerkes-Dodson law (Yerkes and Dodson, 1908). See Teigen (1994) for a discussion.

boosting (academic) performance.

2 The Experiment

2.1 Timeline

The course was advertised via the mailing list, newsletters, and social media accounts of the Faculty of Management, Economics and Social Sciences of the University of Cologne (see Appendix Figure F.1 for the invite and Figure F.2 for the registration page). At the beginning of May, students were informed about whether they had received a place in the course or not. The meditation course started on May 15 and lasted for nine weeks, including a break of one week in the middle of June for the spring break holidays. The course was timed such that it ended together with the official lecture period of the summer semester. Most exams of the summer semester are written in the three weeks surrounding the end of the lecture period (see Appendix Figure B.1 for the timing of exams). Thus, our main analysis on the immediate effects of the intervention on academic performance uses all the grades of the exams written during the main exam period of the summer semester, namely from July 6 until July 27.

Consistent with this definition, our analysis on the six-month effects of the intervention on academic performance focuses on grades of the exams written during the main exam period of the winter semester, namely January 25 through February 19, i.e., about half a year after the end of the intervention. As shown in Appendix Figure B.1, there are two secondary exam periods, in the second half of September and in the end of November / beginning of December, in which fewer exams are written. These consist of the retakes and voluntarily delayed exams of the summer semester (94) and the midterm exams of the winter semester (41), respectively. Due to the limited sample size, these results are not the primary focus of our analysis, but we report them in footnote 12.

Appendix Table C.1 provides an overview of the relevant dates and events of the study.

2.2 Outcome Measures

We accessed students' pre- and post-intervention grade information from the university's administrative records. Grades at German universities vary from 1 to 6 following a descending order: i.e., 1 represents the best possible grade and 6 the worst possible grade. Grades lower than or equal to 4 are passing grades. For the sake of clarity, we invert the grades so that higher grades correspond to better academic performance.

Our primary pre-registered outcome, the grade average, is derived from computing the weighted arithmetic mean of the grades obtained by a student within the different exam periods as defined in section 2.1. Each grade is multiplied by the study points a student received for it and then divided by the sum of the study points the student earned for the whole period:

$$\overline{grade_{i,t}} = \frac{\sum_{k=1}^{n}(module\ grade_{i,t,k} \times module\ points_k)}{\sum_{k=1}^{n} module\ points_{i,t,k}}$$

where i denotes the student, t denotes the exam period, and k denotes the module. This is the same formula the university uses to compute a student's average grade. Furthermore, as the means and standard deviations of grades differ significantly across the 10 study programs our participants follow (e.g., the mean passing grade is 1.8 (sd 0.48) for the MSc in Political Science and 2.6 (sd 0.78) for the BSc in Economics), we standardize the grades to a mean of 0 and a standard deviation of 1 at the program level to make performance comparable across the programs. This also makes our effect sizes easily comparable with those found in other studies.

Our selection of secondary outcomes was based on the previous literature showing that that (i) they are influenced by meditation, and (ii) they are relevant for academic outcomes. Stress, anxiety and depression were measured using the well-known ten-items Perceived Stress Scale (PSS; Cohen et al., 1983), the seven-item Generalized Anxiety Disorder questionnaire (GAD-7; Spitzer et al., 2006) and the nine-item Patient Health Questionnaire (PHQ-9; Kroenke et al., 2001), respectively. Mindfulness is measured using a selected number (eight) of questions from the Mindful Attention Awareness Scale (MAAS), (Brown and Ryan, 2003). Self-control was elicited using the Brief Self-Control Scale (BSCS; Tangney et al., 2004), while we elicited students' conscientiousness and neuroticism using a selected number (nine and seven, respectively) of questions from the Big Five Inventory (BFI; John et al., 1991). For each of these self-reported variables, we created an index based on the sum of the different items, and higher index values indicating better performance in each area. Finally, in order to measure students' cognitive skills and, in particular, concentration on a task, we used an incentivized Stroop task (Stroop, 1935), which requires participants to identify the color of a printed word when the word's meaning and color may be incongruent. The individual score is computed by dividing the number of correct answers (of a total of 20) by the time a participant needs to answer all tasks. We incentivized the task by paying 20 euros each to those participants who were the three fastest among those with the most correct answers. All variables were preregistered and measured before and after the intervention. All items from the baseline and follow-up questionnaires are listed in Appendix Table F.3. To increase comparability, we standardized each of these variables to a mean of 0 and a standard deviation of 1 over the whole sample level.

2.3 The data

By April 24, 2019, 224 eligible candidates completed the surveys and were randomly assigned to either the treatment or control group at an individual level, with stratification along planned exams.[3] The budget provided by the health insurance provider could cover

[3]We received 282 applications (completed surveys). From this group, we excluded 58 because (i) they did not plan to write any exams in the summer semester, (ii) they did not plan to take any exam that at least one other applicant indicated they would write in the summer semester, and/or (iii) they did not indicate any availability for any of the time slots offered for the meditation course.

the costs of the course for a maximum of 102 participants (6 meditation groups of 17 participants each). Therefore, 102 applicants were allocated to the treatment group, and 122 to the control group, resulting in a total of 224 observations in our sample size. We used a rerandomization approach based on Morgan and Rubin (2012) to ensure that both groups were balanced along baseline characteristics

Appendix Table A.1 displays the mean values of the baseline primary and secondary variables, along with some demographics, separately for the treatment and control groups, using the overall sample. All these variables are balanced for the overall sample. Of the 224 students on our overall sample, 181 (84 (82%) in the treatment group and 97 (80%) in the control group) took at least one exam in the summer semester, immediately after our intervention. Attrition is balanced between the treatments (p=0.592). Additionally, Appendix Table A.2 shows that this reduced sample is balanced at baseline, although the p-value for prior grade decreases to 0.205, suggesting slightly less balance compared to the overall sample. Furthermore, 124 students from the overall sample (56 (55%) in the treatment group and 68 (56%) in the control group) took at least one exam in the winter semester, six months after our intervention. Once again, attrition is balanced between the treatment groups (p=0.900). Appendix Table A.3 shows that this reduced sample remains balanced at baseline.

The follow-up questionnaire was answered by 94 students in the treatment group (92%) and 93 students in the control group (76%) after a maximum of four personalized reminders were sent by email. Attrition is not balanced between the treatments (p=0.001). Despite this difference, we do not find it to affect balance between the treatments (see Appendix Table A.4)

As explained later, we run several robustness-checks to address attrition concerns and our results survive all the additional tests.

We also compare our experimental sample with the overall student body of the faculty to examine if certain students were more inclined to participate in the experiment. As shown in Appendix Table C.2, our sample's characteristics closely resembled those of the faculty's student body. This suggests that the meditation program attracted students of different genders, ages, and study programs almost equally. Hence, our findings are likely to be generalizable to students within this social science faculty, which happens to be one of the largest in Germany.

Furthermore, our sample of students showed moderate levels of stress, with an average PSS score of 21 (out of 40). This aligns well with the average stress level of German university students, as reported in the study by Herbst et al. (2016), where the average PSS score was 20..

3 The Intervention

Our intervention is based on the well-known "mindfulness-based stress reduction" (MBSR) program developed by Jon Kabat-Zinn (1994) in the 1970s in the US. This program has

significant advantages as it is secular and highly standardized, making it a subject of extensive scientific research and widely adopted globally, not only in education but also in health care, companies and public organizations. Mindfulness is a broad term that encompasses different meditation techniques, cognitive skills, and attitudes and is commonly defined as "paying attention in a particular way: on purpose, in the present moment, and non-judgmentally" (Kabat-Zinn, 1994, p. 4).

Our intervention closely followed the standard MBSR course, with few necessary adjustments due to funding and university constraints. The course comprised eight weekly 60-minute group sessions held on the university campus on Wednesday or Friday, with six groups in total, each including 17 participants.[4] Participants were provided with audio recordings and handouts and were asked to practice mindfulness exercises daily. These exercises included a 12-minute "body scan" or mindful movement, or a 30-minute sitting meditation, along with three-minute "time out" reflections on thoughts and feelings three times a day. The course content covered formal sitting mindfulness meditation, body awareness, mindful movements, and group discussions of experiences.. Two skilled and certified MBSR teachers, appointed and compensated by the health insurance provider, designed and taught the course.[5] The same teacher led each group session, and before the intervention began, the two teachers worked closely together to ensure consistency and uniformity across all eight sessions in the six groups. For a detailed description of the structure and content of each session, see Appendix Table F.4. Note that although the teachers and participants were aware that the program would be evaluated, they were kept unaware of the study's main goal.

4 Empirical Strategy

For each outcome, we report results of OLS regressions with and without control variables. We refer to models that contain only a treatment dummy and no control variable as "endline" (EL) specifications. "Value-added" (VA) specifications include control variables such as the baseline measure of the outcome, baseline-performance, study-program, and study-year fixed effects. VA specifications take the following form:

$$y_{it} = \alpha + \beta\ Treatment_i + \gamma y_{it-1} + X_i\delta + \varepsilon \tag{1}$$

where α is a common intercept; $Treatment_i$ is a binary variable equal to 1 if student i was assigned to the treatment group, and 0 otherwise; and y_{it} is the dependent variable. In the case of our primary outcome, y_{it} is equal to $\overline{grade_{i,t}}$ – as defined by equation 2.2 – namely, the post-intervention performance of student i measured by the weighted arithmetic mean of the grades obtained either (i) in the main exam period of the 2019

[4]For the sake of external validity, note that most weekly trainings offered by the top universities listed in the introduction also last between 1 and 2 hours.

[5]Note that in Germany the individual cost of attending a standard MBSR program outside of the university is about 400 euros, which is equivalent to about $450 (as of the time of the experiment).

summer semester right after the intervention, or (ii) in the main exam period of the following winter semester, about half a year after the end of the intervention. These two variables represent, respectively, students' performance right after the program ended and six months after. In the case of the secondary outcomes, y_{it} takes the form of an index over the questions used to elicit that specific outcome in the endline questionnaire.

y_{it-1} is the baseline measure of the respective outcome. In the case of the primary outcome, y_{it-1} is equal to the student's prior grade: i.e., the weighted average grade over all modules completed in the current program before the semester in which the intervention took place. In the case of the secondary outcomes, y_{it-1} is equal to the baseline scale elicited in the first questionnaire. Finally, X_i denotes a row vector of control variables, consisting of the following: prior ECTS credits (sum of study points over all modules completed in the current program before the semester in which the intervention took place), study-program dummies (10 categories; see Table 2), and study-year dummies (4 categories: "1st year", "2nd year", "3rd year", "4th or higher year"). In this model, β can be interpreted as the average treatment effect.

Additionally, for each outcome, we also report results of running alternative OLS regressions of the following form:

$$\Delta y_i = \alpha + \beta \; Treatment_i + \varepsilon \tag{2}$$

where Δy_i is the difference between the endline and baseline (y_{it} - y_{it-1}) outcomes. In this model, β can be interpreted as the average difference-in-differences between the treatment and control groups.[6] We refer to this model as a "first-difference specification" (FD). It is an individual-level fixed-effects model that only uses variation at the level of the individual and is intended to eliminate bias from unobserved, time-invariant variables. We show these results as a robustness check, acknowledging that neither the VA nor the FD models are clearly superior in our case.[7]

Our empirical strategy can be interpreted as follows. The univariate regression of the endline score on the treatment dummy (i.e., equation 1 without controls) does not control for any possible imbalances at baseline and simply compares outcomes. The multivariate regression of the endline score on the treatment dummy and the baseline score, as well as baseline performance and study-program and study-year fixed effects (i.e., equation 1), identifies effects from differences between treatment and control groups within the cells resulting from the control variables. And, finally, the univariate regression of the

[6]The first-difference specification produces exactly the same coefficient and standard error for the treatment dummy as a difference-in-differences model with standard errors clustered on the individual level (using the "cluster" option in Stata that is based on Liang and Zeger (1986)) of the form $y_i = \alpha + \beta \; TreatGroup_i + \gamma \; Time_i + \delta \; (TreatGroup_i * Time_i) + \varepsilon$.

[7]The FD model assumes very high predictive power of the baseline for the endline measure. However, if the baseline is based on different measures than the endline and thus is a noisy control variable, the VA model might be preferred. For a discussion, see McKenzie (2012). In our case, the grades are based on different exams in the pre- and post-intervention periods, and correlations are rather low: 0.49 for the baseline and immediate grade and 0.58 for the baseline and six-month grade.

first difference on the treatment dummy (i.e., equation 2) identifies the treatment effect from changes within individuals. Thus, these models control for possible imbalances at baseline with increasing strictness. Note, however, that none of our baseline measures are significantly unbalanced. We show all specifications throughout.[8]

5 Results

5.1 Immediate Effects on mental health and other skills

Before turning to our main research question we test whether our mindfulness training was successful in achieving its main goal of improving mental health, and whether, consistent with previous evidence, it also affects non-cognitive skills, mindfulness and concentration measured by a laboratory task. This serves mainly as a validity check for our intervention.

We observe that stress, anxiety, and depression are reduced between 0.4 and 0.7 standard deviations (sd) (see Appendix Table C.3). Similarly, self-control and conscientiousness are both improved by about 0.5 sd, whereas neuroticism is reduced by 0.4 sd (see Appendix Table C.4). All results are significant at the 1% level. Appendix Table C.5 shows that the score in the stroop task increased by about 0.2 standard deviations, with this effect being marginally significant in the first-difference specification, though not significant in the value-added specification. This table also shows that the treatment improves mindfulness by about 0.6 standard deviations and the effect is significant at the 1% level.[9]

Appendix Table C.6 shows that models without control variables and just comparing the endline scores find very similar results to all the ones described above. We conclude that, consistent with previous evidence, our mindfulness intervention improved students' mental health, non-cognitive skills, mindfulness and very marginally task concentration.

5.2 Immediate Effects on Grades

Table 1 presents results from OLS regressions of students' grades obtained during the main exam period for the 2019 summer semester immediately after the intervention. Model (1) has the endline grade as dependent variable and includes the binary treatment variable, *Treat*. Model (2) repeats this analysis but additionally controls for prior performance, as well as study-program and study-year fixed effects, making this a value-added model. Model (3) has the first-differenced grade (endline grade – baseline grade) as dependent variable and includes the binary treatment variable, making this an individual-level fixed-effects model that only detects changes within individuals. While Model (1) gives a treatment effect of -0.31 sd (p=0.035), Model (2) gives a treatment effect of -0.26 sd

[8] Note that because we have few clusters in the treatment group and no clusters in the control group, these specifications do not take into account potential dependencies between observations belonging to the same meditation group. Importantly, however, group assignment was independent of exams taken.

[9] All results remain highly significant even after correcting for multiple hypotheses testing.

(p=0.055), and Model (3) gives an insignificant treatment effect of -0.10 sd (p=0.491).[10] While all three models suggest that the effect of the meditation program on immediate academic performance was negative, controlling for imbalances in prior performance with increasing strictness reduces the treatment effect size to the degree that the null hypothesis of no effect can no longer be rejected. We interpret these findings as evidence that, if anything, the program harmed students' immediate performance.

Table 1: Grade (Immediate)

	(1) Grade (E)	(2) Grade (VA)	(3) Grade (FD)
Treat	-0.308**	-0.260*	-0.102
	(0.145)	(0.135)	(0.148)
Prior Grade		0.458***	
		(0.080)	
Prior ECTS Credits		0.005*	
		(0.002)	
Study Program FE	No	Yes	No
Study Year FE	No	Yes	No
R^2	0.025	0.294	0.003
N	181	177	177

Note: This table shows OLS regressions of the mean grade of the main summer-semester exam period on the treatment dummy. Model (1) does not include any control variables. Model (2) uses summer-semester grade as dependent variable and controls for prior mean grade, prior total ECTS credits, study-program fixed effects (9 dummies), and study-year fixed effects (3 dummies). Model (3) uses the change in grade (summer-semester grade − baseline grade) as dependent variable and does not include any control variables. All models include a constant. Heteroskedasticity robust standard errors are in parentheses. * $p < .1$, ** $p < .05$, *** $p < .01$

5.3 Six-Month Effects on Grades

Table 2 presents results from OLS regressions of students' grades obtained during the main exam period of the 2019/20 winter semester, half a year after the intervention. The table, again, shows results for a model with the endline grade as dependent variable and without any control variables, a value-added model additionally controlling for prior performance and study-year and study-program fixed effects, and a model with the first-differenced grade as the dependent variable and no further control variables. All three models show that the meditation intervention had a significantly positive effect on six-month academic performance. While Model (1) gives a treatment effect of 0.28 sd (p=0.099), Model (2) gives a treatment effect of 0.39 sd (p=0.017), and Model (3) gives a treatment effect of

[10] Ex-post power calculations on the specifications without controls reveal that Models (1) and (3) reach a power of 66% and 17%, respectively. We are thus underpowered to determine whether the insignificant coefficient of -0.102 on the treatment dummy in Model (3) is a real null effect.

0.45 sd (p=0.010).[11] We interpret these findings as robust evidence that the program positively affected students' six-month performance.

Table 2: Grade (six months)

	(1) Grade (E)	(2) Grade (VA)	(3) Grade (FD)
Treat	0.284*	0.386**	0.446***
	(0.171)	(0.159)	(0.170)
Prior Grade		0.515***	
		(0.105)	
Prior ECTS Credits		0.003	
		(0.002)	
Study Program FE	No	Yes	No
Study Year FE	No	Yes	No
R^2	0.022	0.318	0.053
N	124	121	121

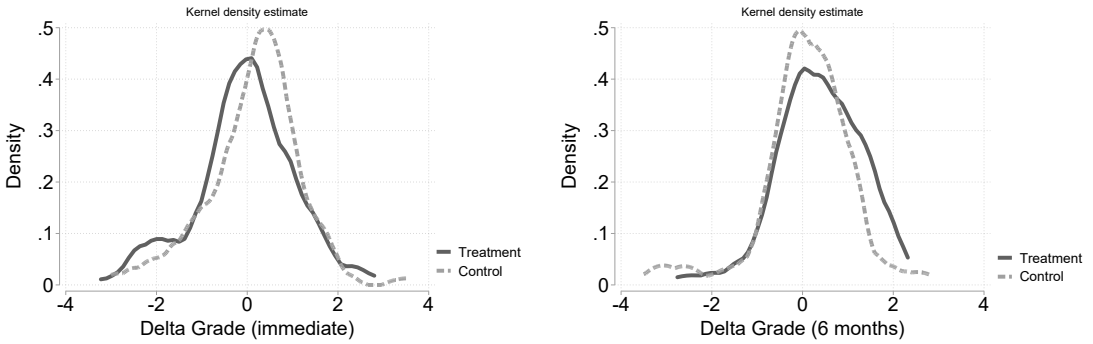
Note: This table shows OLS regressions of the mean grade of the main winter-semester exam period on the treatment dummy. Model (1) does not include any control variables. Model (2) uses the winter-semester grade as dependent variable and controls for prior mean grade, prior total ECTS credits, study-program fixed effects (9 dummies), and study-year fixed effects (3 dummies). Model (3) uses the change in grade (winter-semester grade − baseline grade) as dependent variable and does not include any control variables. All models include a constant. Heteroskedasticity robust standard errors are in parentheses.
* $p < .1$, ** $p < .05$, *** $p < .01$

Finally, similar results emerge when looking at the distributions of changes in immediate and six-month grades compared with the baseline (see Figure 1). The exact p-value for the combined Kolmogorov-Smirnov (KS) test for the left-hand panel (delta immediate grade) of Figure 1 is 0.148. The exact p-value for the combined KS test for the right-hand panel (delta six-month grade) is 0.097.[12]

[11] Ex-post power calculations on the specifications without controls reveal that Models (1) and (3) reach a power of 47% and 78%, respectively.

[12] Appendix Table C.7 reports the results for the exams taken after the 2019 summer break and for the mid-term exams of the 2019/20 winter semester. As can be seen, the positive effects of the training start emerging already several weeks after the end of the intervention.

Figure 1: Distributions of Changes in Immediate and Six-Month Grades



Notes: The left-hand panel shows changes in the immediate grades and the right-hand panel shows changes in the six-month grades by treatment group. Grades are non-standardized.

5.4 Effects on Number of Exams and ECTS Study Points

We check whether the intervention had any effect on the "quantity" of exams taken. Wilcoxon rank-sum tests indicate no treatment difference in (i) the number of planned exams ($p = 0.76$), (ii) the number of actual exams taken ($p = 0.54$), or (iii) the number of exams not taken, i.e., the number of planned exams minus the number of exams actually taken ($p = 0.35$). In both the treatment and the control groups, students took on average about 1 exam less than planned, namely about 1.3 exams instead of 2.4. Furthermore, note that most courses are mandatory and are only offered once a year during a specific semester. Therefore, students do not have a lot of freedom to move them around.

Finally, one might worry that students in the treatment group decided to switch their planned exams towards more difficult ones in the summer semester and to easier ones in the winter semester. While we cannot directly test for this conjecture, we may look at the number of ECTS study points, which indicate the workload of a module in which a student is writing an exam and determines its weight in the student's overall grade. Thus, the higher the total number of ECTS study points completed during an exam period, the higher the overall workload completed. Appendix Table C.8 shows that the number of ECTS points is not affected by the treatment, either right after or six months after our intervention ended. Thus, the observed quality changes in performance were not accompanied by quantity changes: the six-month improvement (immediate reduction) in average grades did not come at the expense (advantage) of completing fewer (more) ECTS points.

6 Attrition concerns

As described in Section 2.3, the samples used for our immediate and six-month analyses are not identical. Some students finished their studies in the summer semester and thus

took no exams in the following winter semester. Hence, 70 students have observed grades immediately but not six months later.[13] Additionally, a few students took exams only in the winter semester and not in the summer semester, resulting in 13 students whose grades were observed in the winter but not in the summer. This raises concerns that (selective) attrition might influence our results. However, several factors strongly mitigate this concern:

- **Sample restriction**: We run again our immediate and six-month analyses described in sections 5.2 and 5.3, limiting the sample to students with both immediate and six-month grades observed. Results remain unchanged (see Appendix Table E.1).

- **Inverse probability weighting**: We correct for attrition in the samples for the immediate and the six-month grades as well as for the endline questionnaire by inverse probability weighting (IPW). Applying IPW to our grades, mental health, non-cognitive skills, Stroop task and mindfulness outcomes, we find that all results remain robust as shown in Appendix Tables E.2, E.3, and E.4.

- **Imputation of Missings**: We test whether our results are robust to simulations involving the imputation of missings. In doing so, we take a conservative approach. For observations with a baseline grade but no immediate (six-month) grade, we assume a zero treatment effect and that both concerned treatment and control group students underwent the same grade change that the control group with observed immediate (six-month) grades experienced on average. We apply the same logic to students who did not fill in an endline questionnaire and for whom we thus do not observe outcomes for mental health, non-cognitive skills, concentration or mindfulness. As can be seen from Appendix Tables E.5, E.6, and E.7. the coefficients of the treatment dummy are reduced in magnitude but significance levels are not affected.

7 Potential Channels

7.1 Immediate Effects

As argued in the introduction, there are three possible (non-mutually exclusive) explanations for the observed negative immediate effect of the intervention on the grades.

First, it could be that the relationship between stress and performance is positive in our sample and therefore by reducing the former, the meditation course also reduced the latter. However, our data do not support this explanation as we find no correlation between stress and grades at baseline (Appendix Table C.9). Moreover, the immediate variation in grades is not associated with the immediate variation in stress (Appendix Table C.12).

[13] Reassuringly, students who had a reduction in immediate grades compared to baseline are not more likely to have a missing long-term grade, i.e., to drop out of the sample ($p = 0.871$).

Second, it could also be that the intervention reduced students' academic motivation and thus their study behavior. The questionnaire included 15 questions on study behavior, including related to concentration while studying (5), learning strategies (4), study self-concept and engagement, (3), and exam behavior (3) (see Appendix Table F.3). Four natural indexes of study behavior were created based on the sum of the respective variables, with a higher index indicating better performance in each area. As shown in Appendix Table C.10, the intervention significantly improved all indexes expect for exam behavior ($p < 0.01$). Thus, our evidence contradicts the second explanation.

A third explanation is that the intervention, by requiring students to initially invest time and effort in learning new self-care practices and healthy habits, took resources away from studying in the immediate term – even though the students remained equally motivated to perform well academically. We thus examine whether the intervention influenced students' self-care practices and habits and how these changes correlate with grade outcomes.

The questionnaire included seven questions related to health behavior and self-care practices. We first present the results for each statement separately and then aggregate them into a single index , with a higher index corresponding to a healthier behavior and/or greater self-care. As shown in Appendix Table C.11,, students in the treatment group report drinking less coffee or tea to stay awake (β: -0.20, $p = 0.031$), seeking significantly more conscious relaxation (β: 0.51, $p = 0.000$) and being significantly less likely go to bed late and be tired the next day than students in the control group (β: -0.44, $p = 0.001$). When combined into a single index, the intervention significantly improved students' overall health behavior and self-care practices (β: 0.42, $p < 0.01$).

Examining the correlations between changes in immediate grades and other relevant pre-registered variables, we find variation in immediate grades is mainly (negatively) associated with variation in the health behavior index (β=-0.164, $p = 0.07$) – and in particular, with the variables affected by the intervention, namely, with relaxing more consciously (β=-0.238, $p = 0.010$) and with being less likely to go to bed late (β=0.149, $p = 0.04$) (see Appendix Table C.12). With the exception of conscientiousness, where the negative association is less clear, our findings align with this third explanation.

7.2 Six-Month Effects

First, we want to rule out the possibility that the observed six-month positive effect is merely a compensatory response from students in the treatment group trying to make up for the initial reduction in immediate grades compared to their average baseline grades. To do this, we investigate whether the treatment effect on six-month grades differs based on whether students' immediate grades were higher or lower than their baseline grades.. The results, as shown in Appendix Table D.1, reveal that the positive six-month treatment effect is much larger and only significant for students who already experienced an increase in immediate grades compared to baseline. The students who experienced a reduction in

immediate grades do not experience a significant increase in six-month grades (although the coefficient remains positive).

Next, we investigate which channel(s) better explain(s) the six-month increase in performance (e.g., improvements in mental health, in non-cognitive skills, in mindfulness, and/or in task concentration). However, as the ex-post questionnaire was only administered immediately after the intervention, we lack direct observations of the secondary outcomes six months later. Despite this limitation, we analyze how changes in the immediate term might predict changes in grades after six months. Examining the correlations between changes in grades (from baseline to six months) and changes in each of the pre-registered channels (from baseline to immediate), we find that the variation in six-month grades is only positively associated with the variation in mindfulness (β=0.208, $p = 0.08$ and β=0.227, $p = 0.08$ in Appendix Table C.13). Mindfulness seems to be the key factor behind the six-month performance improvement. It enhances present-moment and self-awareness, enabling students to address negative thought patterns affecting their academic performance. The stronger correlation observed after six months suggests that building mindfulness skills takes time.

Finally, we investigate whether students who are more likely to continue practicing mindfulness after the course experienced higher long-term benefits in terms of academic performance. Since we cannot directly observe who continues practicing mindfulness after the intervention, we use an item "own practice" from the ex-post questionnaire that asks to all our students how often they have meditated on their own in the last two months (specifying "beyond or independent of the course exercises" in the treatment group) which best approximates their motivation or likelihood to continue these practices. We divide subjects into those who practiced on their own at least sometimes (71.0%) and those who never practiced on their own (29.0%). Testing the interaction between treatment and individual practice (see Appendix Table D.2), we find that the treatment effect for students who did not practice on their own is negative and not significant. However for those who did, the coefficient is positive, large and very significant. This suggests that the long-term positive effect of the intervention on academic performance is driven by students who practiced (and likely continued practicing) on their own, beyond the course's instructions. Additionally, Appendix Table D.2 also indicate that exercising on one's own while attending the training and doing the course exercises did not produce any additional benefit in immediate grades, supporting the idea that continued individual practice after the intervention is the driving factor behind our six-month results.

8 Conclusion

To the best of our knowledge, we conducted the first pre-registered and relatively large randomized controlled trial investigating potential spillovers of a mindfulness training on academic achievement in higher education. Furthermore, we are also the first to study academic performance six months after the intervention, providing valuable insights into

the effects of mindfulness training on student outcomes in the longer term.

Consistent with previous studies, the intervention improves students' mental health (stress, anxiety and depression), mindfulness and non-cognitive skills (self-control, conscientiousness and neuroticism). We also observe a marginal improvement in task concentration. However, our main result reveals that it takes time for students to benefit from the positive spillovers of the mindfulness training on their academic performance. Our analysis shows that, if anything, the intervention worsened students' immediate academic performance. We only observe robust significant positive effects of the intervention on academic performance six months after the end of the intervention. Upon investigating the factors behind these results, we find that the intervention leads to a significant improvement in daily health behavior and self-care practices, like increased relaxation and better sleep habits, which may take resources away from studying in the immediate term. However, we observe that the key driver for higher academic performance in the longer term is students' continued mindfulness practice and enhanced awareness of their thoughts and emotions (mindfulness).

The study's findings highlight the significant positive spillover effects of mindfulness meditation on academic performance, but they also emphasize the importance of allowing sufficient time for students to fully reap these additional benefits. Like any valuable investment, mindfulness training may initially require students to invest time and effort in learning new self-care practices and creating healthier habits, potentially hindering immediate performance. However, as students continue to practice mindfulness, the positive effects are likely to emerge, leading to improved performance in the longer term.

The study's implications are crucial for educational institutions and organizations that offer or consider providing mindfulness training to students and employees aiming to enhance well-being and performance. The findings also provide valuable insights into the debate on integrating mindfulness training into educational curricula. It highlights that mental health and performance are separate goals that may not be aligned in the immediate term. Recognizing the long-term performance benefits of mindfulness, it is important to allow sufficient time for the beneficiaries of such training to fully realize these advantages. In other words, keep calm and carry on.

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Online Appendix

A Balance Checks

Table A.1: Balance Checks: Whole Sample

	(1) Control	(2) Treat	(3) Overall	(4) (1) vs. (2), p-value
Prior Grade (non-inv.), excl. failed	2.286	2.346	2.313	0.451
	(0.052)	(0.062)	(0.040)	
Prior Grade (non-inv.), incl. failed	2.665	2.757	2.706	0.457
	(0.084)	(0.090)	(0.061)	
Prior ECTS Credits	62.752	59.939	61.493	0.613
	(3.669)	(4.200)	(2.759)	
Female	0.541	0.529	0.536	0.863
	(0.045)	(0.050)	(0.033)	
Bachelor Student	0.746	0.706	0.728	0.505
	(0.040)	(0.045)	(0.030)	
BSc Business Administration	0.213	0.216	0.214	0.963
	(0.037)	(0.041)	(0.027)	
BSc Economics	0.115	0.108	0.112	0.871
	(0.029)	(0.031)	(0.021)	
BSc Economics w/ Social Sciences	0.082	0.049	0.067	0.328
	(0.025)	(0.021)	(0.017)	
BSc Social Sciences	0.180	0.196	0.188	0.765
	(0.035)	(0.040)	(0.026)	
BSc Health Economics	0.033	0.059	0.045	0.350
	(0.016)	(0.023)	(0.014)	
BSc Information Systems	0.123	0.078	0.103	0.276
	(0.030)	(0.027)	(0.020)	
MSc Business Administration	0.107	0.108	0.107	0.975
	(0.028)	(0.031)	(0.021)	
MSc Economics	0.082	0.069	0.076	0.709
	(0.025)	(0.025)	(0.018)	
MSc Political Science	0.033	0.049	0.040	0.540
	(0.016)	(0.021)	(0.013)	
MSc Other Program	0.033	0.069	0.049	0.218
	(0.016)	(0.025)	(0.014)	
1st Year Student	0.328	0.363	0.344	0.586
	(0.043)	(0.048)	(0.032)	
2nd Year Student	0.385	0.363	0.375	0.730
	(0.044)	(0.048)	(0.032)	
3rd Year Student	0.230	0.176	0.205	0.330
	(0.038)	(0.038)	(0.027)	
4th Year Student	0.057	0.098	0.076	0.254
	(0.021)	(0.030)	(0.018)	
Stress (BL)	21.328	20.578	20.987	0.145
	(0.363)	(0.355)	(0.256)	
Anxiety (BL)	9.197	8.784	9.009	0.524
	(0.461)	(0.441)	(0.321)	
Depression (BL)	9.492	9.480	9.487	0.987
	(0.454)	(0.510)	(0.338)	
Stroop Task (BL)	0.511	0.486	0.500	0.302
	(0.016)	(0.018)	(0.012)	
Self-Control (BL)	39.762	39.461	39.625	0.796
	(0.781)	(0.868)	(0.580)	
Conscientiousness (BL)	30.508	30.147	30.344	0.634
	(0.524)	(0.540)	(0.376)	
Neuroticism (BL)	21.828	21.902	21.862	0.915
	(0.489)	(0.480)	(0.344)	
Mindfulness (BL)	26.984	27.471	27.205	0.457
	(0.426)	(0.502)	(0.325)	
Study Behavior (BL)	46.893	46.951	46.920	0.957
	(0.751)	(0.746)	(0.530)	
Health Behavior (BL)	23.770	24.127	23.933	0.426
	(0.301)	(0.332)	(0.223)	
N	122	102	224	
Proportion	0.545	0.455	1.000	

Note: This table shows balance checks on pre-intervention outcomes for the whole sample included in the randomization. Column (1) shows the mean value of the respective variable in the control group. Column (2) shows the mean value of the respective variable in the treatment group. Column (3) shows the mean value of the respective variable over both groups. Column (4) shows the p-value from a t-test of the differences of the means of the respective variable across the treatment and control group. Standard errors are shown in parentheses.

Table A.2: Balance Checks: Sample with Immediate Grade Outcome

	(1) Control	(2) Treat	(3) Overall	(4) (1) vs. (2), p-value
Prior Grade (non-inv.), excl. failed	2.303	2.401	2.348	0.273
	(0.059)	(0.067)	(0.044)	
Prior Grade (non-inv.), incl. failed	2.638	2.808	2.716	0.205
	(0.089)	(0.101)	(0.067)	
Prior ECTS Credits	63.938	63.148	63.576	0.898
	(3.988)	(4.732)	(3.052)	
Female	0.526	0.548	0.536	0.770
	(0.051)	(0.055)	(0.037)	
Bachelor Student	0.794	0.762	0.779	0.608
	(0.041)	(0.047)	(0.031)	
BSc Business Administration	0.227	0.250	0.238	0.716
	(0.043)	(0.048)	(0.032)	
BSc Economics	0.124	0.131	0.127	0.885
	(0.034)	(0.037)	(0.025)	
BSc Economics w/ Social Sciences	0.082	0.060	0.072	0.553
	(0.028)	(0.026)	(0.019)	
BSc Social Sciences	0.206	0.167	0.188	0.500
	(0.041)	(0.041)	(0.029)	
BSc Health Economics	0.041	0.060	0.050	0.575
	(0.020)	(0.026)	(0.016)	
BSc Information Systems	0.113	0.095	0.105	0.693
	(0.032)	(0.032)	(0.023)	
MSc Business Administration	0.093	0.095	0.094	0.955
	(0.030)	(0.032)	(0.022)	
MSc Economics	0.093	0.060	0.077	0.406
	(0.030)	(0.026)	(0.020)	
MSc Political Science	0.010	0.036	0.022	0.249
	(0.010)	(0.020)	(0.011)	
MSc Other Program	0.010	0.048	0.028	0.128
	(0.010)	(0.023)	(0.012)	
1st Year Student	0.299	0.345	0.320	0.509
	(0.047)	(0.052)	(0.035)	
2nd Year Student	0.423	0.369	0.398	0.465
	(0.050)	(0.053)	(0.036)	
3rd Year Student	0.227	0.179	0.204	0.425
	(0.043)	(0.042)	(0.030)	
4th Year Student	0.052	0.107	0.077	0.164
	(0.023)	(0.034)	(0.020)	
Stress (BL)	21.577	20.560	21.105	0.083
	(0.412)	(0.408)	(0.292)	
Anxiety (BL)	9.165	8.500	8.856	0.347
	(0.516)	(0.469)	(0.352)	
Depression (BL)	9.155	9.631	9.376	0.522
	(0.500)	(0.552)	(0.370)	
Stroop Task (BL)	0.509	0.489	0.500	0.456
	(0.018)	(0.019)	(0.013)	
Self-Control (BL)	40.557	38.869	39.773	0.193
	(0.876)	(0.949)	(0.645)	
Conscientiousness (BL)	30.701	29.845	30.304	0.305
	(0.573)	(0.601)	(0.415)	
Neuroticism (BL)	21.887	21.726	21.812	0.836
	(0.556)	(0.526)	(0.384)	
Mindfulness (BL)	27.454	27.167	27.320	0.697
	(0.482)	(0.560)	(0.365)	
Study Behavior (BL)	47.938	46.857	47.436	0.351
	(0.820)	(0.805)	(0.577)	
Health Behavior (BL)	23.732	24.155	23.928	0.413
	(0.349)	(0.380)	(0.257)	
N	97	84	181	
Proportion	0.536	0.464	1.000	

Note: This table shows balance checks on pre-intervention outcomes for the sub-sample for whom a grade outcome from the main exam period of the summer semester is observed. Column (1) shows the mean value of the respective variable in the control group. Column (2) shows the mean value of the respective variable in the treatment group. Column (3) shows the mean value of the respective variable over both groups. Column (4) shows the p-value from a t-test of the differences of the means of the respective variable across the treatment and control group. Standard errors are shown in parentheses.

Table A.3: Balance Checks: Sample with Six-Month Grade Outcome

	(1) Control	(2) Treat	(3) Overall	(4) (1) vs. (2), p-value
Prior Grade (non-inv.), excl. failed	2.386	2.426	2.403	0.707
	(0.069)	(0.085)	(0.053)	
Prior Grade (non-inv.), incl. failed	2.774	2.853	2.808	0.634
	(0.107)	(0.127)	(0.082)	
Prior ECTS Credits	58.191	56.264	57.347	0.798
	(5.054)	(5.498)	(3.710)	
Female	0.559	0.536	0.548	0.799
	(0.061)	(0.067)	(0.045)	
Bachelor Student	0.853	0.821	0.839	0.638
	(0.043)	(0.052)	(0.033)	
BSc Business Administration	0.250	0.321	0.282	0.383
	(0.053)	(0.063)	(0.041)	
BSc Economics	0.132	0.143	0.137	0.867
	(0.041)	(0.047)	(0.031)	
BSc Economics w/ Social Sciences	0.074	0.054	0.065	0.656
	(0.032)	(0.030)	(0.022)	
BSc Social Sciences	0.235	0.161	0.202	0.307
	(0.052)	(0.050)	(0.036)	
BSc Health Economics	0.029	0.071	0.048	0.282
	(0.021)	(0.035)	(0.019)	
BSc Information Systems	0.132	0.071	0.105	0.274
	(0.041)	(0.035)	(0.028)	
MSc Business Administration	0.029	0.054	0.040	0.500
	(0.021)	(0.030)	(0.018)	
MSc Economics	0.059	0.018	0.040	0.252
	(0.029)	(0.018)	(0.018)	
MSc Political Science	0.029	0.036	0.032	0.845
	(0.021)	(0.025)	(0.016)	
MSc Other Program	0.029	0.071	0.048	0.282
	(0.021)	(0.035)	(0.019)	
1st Year Student	0.382	0.393	0.387	0.906
	(0.059)	(0.066)	(0.044)	
2nd Year Student	0.324	0.357	0.339	0.697
	(0.057)	(0.065)	(0.043)	
3rd Year Student	0.235	0.196	0.218	0.605
	(0.052)	(0.054)	(0.037)	
4th Year Student	0.059	0.054	0.056	0.901
	(0.029)	(0.030)	(0.021)	
Stress (BL)	21.515	20.714	21.153	0.268
	(0.487)	(0.528)	(0.358)	
Anxiety (BL)	9.662	8.875	9.306	0.363
	(0.630)	(0.564)	(0.429)	
Depression (BL)	10.059	10.107	10.081	0.958
	(0.613)	(0.668)	(0.450)	
Stroop Task (BL)	0.504	0.486	0.496	0.562
	(0.022)	(0.021)	(0.015)	
Self-Control (BL)	39.353	39.036	39.210	0.840
	(1.013)	(1.206)	(0.775)	
Conscientiousness (BL)	30.574	30.232	30.419	0.755
	(0.761)	(0.772)	(0.542)	
Neuroticism (BL)	21.324	21.964	21.613	0.473
	(0.648)	(0.586)	(0.442)	
Mindfulness (BL)	26.529	27.339	26.895	0.369
	(0.579)	(0.697)	(0.447)	
Study Behavior (BL)	46.544	46.732	46.629	0.899
	(1.031)	(1.032)	(0.730)	
Health Behavior (BL)	23.324	23.482	23.395	0.796
	(0.409)	(0.459)	(0.304)	
N	68	56	124	
Proportion	0.548	0.452	1.000	

Note: This table shows balance checks on pre-intervention outcomes for the sub-sample for whom a grade outcome from the main exam period of the winter semester is observed. Column 1 shows the mean value of the respective variable in the control group. Column 2 shows the mean value of the respective variable in the treatment group. Column 3 shows the mean value of the respective variable over both groups. Column 4 shows the p-value from a t-test of the differences of the means of the respective variable across the treatment and control group. Standard errors are shown in parentheses.

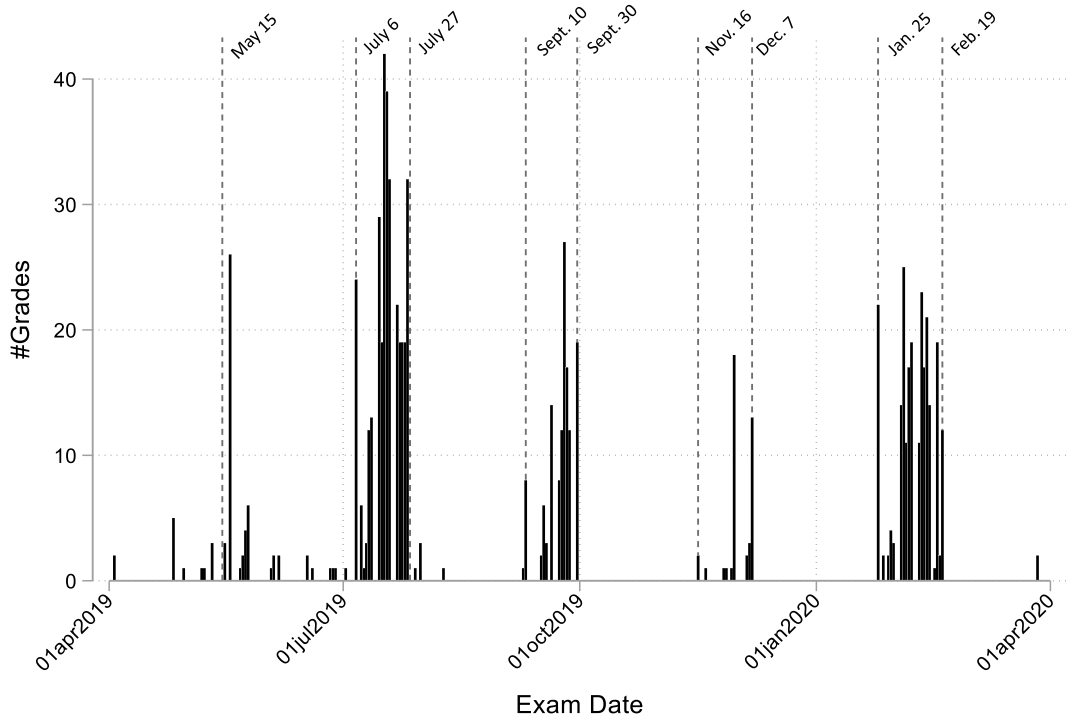
Table A.4: Balance Checks: Sample with Post-Intervention Questionnaire

	(1) Control	(2) Treat	(3) Overall	(4) (1) vs. (2), p-value
Prior Grade (non-inv.), excl. failed	2.275	2.292	2.283	0.846
	(0.061)	(0.060)	(0.043)	
Prior Grade (non-inv.), incl. failed	2.579	2.658	2.618	0.523
	(0.090)	(0.085)	(0.062)	
Prior ECTS Credits	66.489	62.467	64.500	0.505
	(4.124)	(4.400)	(3.009)	
Female	0.559	0.553	0.556	0.935
	(0.052)	(0.052)	(0.036)	
Bachelor Student	0.731	0.702	0.717	0.661
	(0.046)	(0.047)	(0.033)	
BSc Business Administration	0.204	0.213	0.209	0.887
	(0.042)	(0.042)	(0.030)	
BSc Economics	0.118	0.106	0.112	0.798
	(0.034)	(0.032)	(0.023)	
BSc Economics w/ Social Sciences	0.108	0.043	0.075	0.092
	(0.032)	(0.021)	(0.019)	
BSc Social Sciences	0.183	0.202	0.193	0.739
	(0.040)	(0.042)	(0.029)	
BSc Health Economics	0.032	0.064	0.048	0.316
	(0.018)	(0.025)	(0.016)	
BSc Information Systems	0.086	0.074	0.080	0.773
	(0.029)	(0.027)	(0.020)	
MSc Business Administration	0.118	0.106	0.112	0.798
	(0.034)	(0.032)	(0.023)	
MSc Economics	0.086	0.064	0.075	0.567
	(0.029)	(0.025)	(0.019)	
MSc Political Science	0.032	0.053	0.043	0.482
	(0.018)	(0.023)	(0.015)	
MSc Other Program	0.032	0.074	0.053	0.202
	(0.018)	(0.027)	(0.016)	
1st Year Student	0.333	0.351	0.342	0.800
	(0.049)	(0.049)	(0.035)	
2nd Year Student	0.376	0.383	0.380	0.926
	(0.051)	(0.050)	(0.036)	
3rd Year Student	0.258	0.170	0.214	0.145
	(0.046)	(0.039)	(0.030)	
4th Year Student	0.032	0.096	0.064	0.077
	(0.018)	(0.031)	(0.018)	
Stress (BL)	21.849	20.734	21.289	0.045
	(0.405)	(0.375)	(0.278)	
Anxiety (BL)	9.366	9.011	9.187	0.611
	(0.521)	(0.465)	(0.348)	
Depression (BL)	9.860	9.447	9.652	0.588
	(0.538)	(0.539)	(0.380)	
Stroop Task (BL)	0.526	0.489	0.508	0.154
	(0.018)	(0.019)	(0.013)	
Self-Control (BL)	39.430	39.191	39.310	0.852
	(0.897)	(0.904)	(0.635)	
Conscientiousness (BL)	30.280	30.096	30.187	0.825
	(0.601)	(0.571)	(0.413)	
Neuroticism (BL)	22.000	22.266	22.134	0.721
	(0.559)	(0.492)	(0.371)	
Mindfulness (BL)	26.742	27.255	27.000	0.479
	(0.495)	(0.528)	(0.362)	
Study Behavior (BL)	47.097	47.128	47.112	0.979
	(0.886)	(0.789)	(0.591)	
Health Behavior (BL)	23.871	24.043	23.957	0.731
	(0.351)	(0.353)	(0.248)	
N	93	94	187	
Proportion	0.497	0.503	1.000	

Note: This table shows balance checks on pre-intervention outcomes for the sub-sample who answered the post-intervention questionnaire. Column 1 shows the mean value of the respective variable in the control group. Column 2 shows the mean value of the respective variable in the treatment group. Column 3 shows the mean value of the respective variable over both groups. Column 4 shows the p-value from a t-test of the differences of the means of the respective variable across the treatment and control group. Standard errors are shown in parentheses.

B Figures

Figure B.1: Grades by Date



Note: This figure depicts the distribution of non-aggregated grade outcomes by official exam date. The x-axis shows the date. The y-axis shows the number of exams for which we observe an outcome written on a particular day.

C Additional Tables

Table C.1: Timeline

2019	April 1	Beginning of summer semester lecture period
	April 8 - 24	Recruitment of participants and baseline questionnaire
	April 25 - May 7	Applicants informed about treatment allocation
	May 15	Beginning of meditation course
	June 10 - 14	Pentecost holiday
	July 12	End of meditation course and of summer semester lecture period
	July 15 - 29	Follow-up questionnaire
	July 6 - 27	Exam period of summer semester
2020	Jan 25 - Feb 19	Exam period of winter semester

Note: This table shows key dates of the field phase of the experiment.

Table C.2: Sample Comparison - Demographics

	Faculty			Our Sample		
Program	Students (%)	Female (%)	Age	Students (%)	Female (%)	Age
BSc Business Administration	31.4	47.0	22.9	21.4	54.2	22.7
BSc Economics	13.3	32.3	23.2	11.2	40.0	23.4
BSc Economics w/ Social Sciences	2.7	44.0	22.4	6.7	33.3	22.3
BSc Social Sciences	12.9	53.0	23.8	18.8	59.5	23.3
BSc Health Economics	4.4	80.6	23.9	4.5	100	24
BSc Information Systems	6.7	19.9	23.4	10.3	34.8	24.1
MSc Busines Administration	11.0	46.6	25.3	10.7	54.2	25.3
MSc Economics	5.8	32.9	25.8	7.6	64.7	25.8
MSc Political Science	3.8	50.2	26.6	4	77.8	28.2
MSc Other Program	8.2	52.2	26.6	4.9	45.5	26.6
Overall	100	45.1	24.0	100	53.6	24.0
N	8181			224		

Note: This table compares the proportion of students overall, the proportion of women, and the mean age in different fields of study in the experimental sample and the universe of students at the Social Science Faculty of the University of Cologne.

Table C.3: Mental Health Outcomes

	(1) Stress (VA)	(2) Stress (FD)	(3) Anxiety (VA)	(4) Anxiety (FD)	(5) Depression (VA)	(6) Depression (FD)
Treat	-0.663***	-0.704***	-0.439***	-0.448***	-0.602***	-0.592***
	(0.124)	(0.144)	(0.119)	(0.132)	(0.114)	(0.126)
Stress (BL)	0.481***					
	(0.070)					
Anxiety (BL)			0.605***			
			(0.065)			
Depression (BL)					0.579***	
					(0.065)	
Prior Grade	-0.055		0.054		0.010	
	(0.072)		(0.070)		(0.064)	
Prior ECTS Credits	-0.002		-0.002		-0.002	
	(0.002)		(0.002)		(0.002)	
Study Program FE	Yes	No	Yes	No	Yes	No
Study Year FE	Yes	No	Yes	No	Yes	No
R^2	0.371	0.115	0.453	0.059	0.504	0.107
N	182	187	182	187	182	187

Note: This table shows OLS regressions on mental health outcomes elicited in the survey on the treatment dummy. Models (1), (3), and (5) use the post-intervention outcome as dependent variable and control for the baseline measure of the respective outcome, prior mean grade, prior total ECTS credits, study-program fixed effects (9 dummies), and study-year fixed effects (3 dummies). Models (2), (4), and (6) use the change in outcome (endline − baseline) as dependent variable and include no control variables. All models contain a constant. Heteroskedasticity robust standard errors are in parentheses. * $p < .1$, ** $p < .05$, *** $p < .01$

Table C.4: Non-Cognitive Skills Outcomes

	(1) Self-Control (VA)	(2) Self-Control (FD)	(3) Conscient. (VA)	(4) Conscient. (FD)	(5) Neurot. (VA)	(6) Neurot. (FD)
Treat	0.517***	0.490***	0.522***	0.470***	-0.353***	-0.403***
	(0.086)	(0.089)	(0.095)	(0.101)	(0.112)	(0.116)
Self-Control (BL)	0.758***					
	(0.043)					
Conscientiousness (BL)			0.711***			
			(0.047)			
Neuroticism (BL)					0.732***	
					(0.058)	
Prior Grade	-0.033		0.075		-0.068	
	(0.049)		(0.054)		(0.062)	
Prior ECTS Credits	0.003*		0.002*		-0.001	
	(0.001)		(0.001)		(0.002)	
Study Program FE	Yes	No	Yes	No	Yes	No
Study Year FE	Yes	No	Yes	No	Yes	No
R^2	0.701	0.140	0.655	0.104	0.537	0.061
N	182	187	182	187	182	187

Note: This table shows OLS regressions of non-cognitive skills outcomes elicited in the survey on the treatment dummy. Models (1), (3), and (5) use the post-intervention outcome as dependent variable and control for the baseline measure of the respective outcome, prior mean grade, prior total ECTS credits, study-program fixed effects (9 dummies), and study-year fixed effects (3 dummies). Models (2), (4), and (6) use the change in outcome (endline − baseline) as dependent variable and include no control variables. All models include a constant. Heteroskedasticity robust standard errors are in parentheses. * $p < .1$, ** $p < .05$, *** $p < .01$

Table C.5: Stroop Task and Mindfulness

	(1) Stroop Task (VA)	(2) Stroop Task (FD)	(3) Mindfulness (VA)	(4) Mindfulness (FD)
Treat	0.174	0.228*	0.644***	0.622***
	(0.120)	(0.136)	(0.120)	(0.136)
Stroop Task (BL)	0.546***			
	(0.077)			
Mindfulness (BL)			0.523***	
			(0.060)	
Prior Grade (stand.)	0.058		-0.039	
	(0.077)		(0.066)	
Prior ECTS Credits	-0.001		0.003	
	(0.002)		(0.002)	
Study Program FE	Yes	No	Yes	No
Study Year FE	Yes	No	Yes	No
R^2	0.405	0.015	0.431	0.101
N	182	187	182	187

Note: This table shows OLS regressions of the incentivized Stroop task and the mindfulness scale elicited in the survey on the treatment dummy. Models (1) and (3) use the post-intervention outcome as dependent variable and control for the baseline measure of the respective outcome, prior mean grade, prior total ECTS credits, study-program fixed effects (9 dummies), and study-year fixed effects (3 dummies). Models (2) and (4) use the change in outcome (endline − baseline) as dependent variable and do not include control variables. All models include a constant. Heteroskedasticity robust standard errors are in parentheses. * $p < .1$, ** $p < .05$, *** $p < .01$

Table C.6: Secondary Outcomes without Controls

	(1) Stress (E)	(2) Anxiety (E)	(3) Depression (E)	(4) Self-Control (E)	(5) Conscientiousness (E)	(6) Neuroticism (E)	(7) Stroop Task (E)	(8) Mindfulness (E)
Treat	-0.656***	-0.522***	-0.661***	0.462***	0.437***	-0.352**	0.020	0.727***
	(0.139)	(0.142)	(0.139)	(0.143)	(0.143)	(0.144)	(0.147)	(0.137)
Constant	0.330***	0.262**	0.332***	-0.232**	-0.220**	0.177	-0.010	-0.365***
	(0.113)	(0.116)	(0.110)	(0.100)	(0.105)	(0.108)	(0.106)	(0.099)
R^2	0.108	0.068	0.110	0.054	0.048	0.031	0.000	0.133
N	187	187	187	187	187	187	187	187

Note: This table shows OLS regressions of the secondary outcomes on the treatment dummy without control variables. All models include a constant. Heteroskedasticity robust standard errors are in parentheses. * $p < .1$, ** $p < .05$, *** $p < .01$

Table C.7: Grade (intermediate)

	Secondary period Summer			Mid-Term period Winter			Both		
	(1) Grade (E)	(2) Grade (VA)	(3) Grade (FD)	(4) Grade (E)	(5) Grade (VA)	(6) Grade (FD)	(7) Grade (E)	(8) Grade (VA)	(9) Grade (FD)
Treat	0.047	0.276	0.375*	-0.160	0.209	0.357	-0.025	0.232	0.343**
	(0.195)	(0.196)	(0.194)	(0.272)	(0.307)	(0.274)	(0.186)	(0.170)	(0.171)
Prior Grade		0.475***			0.571***			0.508***	
		(0.111)			(0.201)			(0.095)	
Prior ECTS Credits		0.005			0.001			0.005**	
		(0.003)			(0.007)			(0.002)	
Study Program FE	No	Yes	No	No	Yes	No	No	Yes	No
Study Year FE	No	Yes	No	No	Yes	No	No	Yes	No
R^2	0.001	0.307	0.036	0.008	0.472	0.039	0.000	0.394	0.034
N	94	91	91	43	41	41	110	107	107

Note: This table shows OLS regressions of the mean grade of the intermediate term on the treatment dummy. Models (1) - (3) show regressions for the mean grade of the secondary exam period of the summer semester. Models (4) - (6) show regressions for the mean grade of the mid-term exam period of the winter semester. Models (7) - (9) show regressions for the mean grade over both the secondary exam period of the summer and the mid-term exam period of the winter semester. Models (1), (4), and (7) use the post-intervention outcome as dependent variable and do not include any control variables. Models (2), (5), and (8) use the post-intervention outcome as dependent variable and control for prior mean grade, prior total ECTS credits, study-program fixed effects (9 dummies), and study-year fixed effects (3 dummies). Models (3), (6), and (9) use the change in mean grade (intermediate grade [i.e., secondary summer, mid-term winter, or both] − baseline grade) as dependent variable and do not include any control variables. All models include a constant. Heteroskedasticity robust standard errors are in parentheses. * $p < .1$, ** $p < .05$, *** $p < .01$

Table C.8: ECTS Credits

	(1) Credits (immediate, E)	(2) Credits (immediate, VA)	(3) Credits (6 months, E)	(4) Credits (6 months, VA)
Treat	-1.181	-1.053	0.235	0.075
	(1.129)	(1.098)	(1.268)	(1.103)
Prior Grade		1.640***		1.326*
		(0.592)		(0.682)
Prior ECTS Credits		0.017		0.010
		(0.021)		(0.017)
Study Program FE	No	Yes	No	Yes
Study Year FE	No	Yes	No	Yes
R^2	0.006	0.265	0.000	0.364
N	186	182	132	129

Note: This table shows OLS regressions of the total ECTS credits acquired during a given exam period on the treatment dummy. Models (1) and (2) show regressions for the total ECTS credits acquired during the main summer semester exam period. Models (3) and (4) show regression for the total ECTS credits acquired during the main winter semester exam period. Models (1) and (3) use the ECTS credits acquired during the given exam period as dependent variable and do not contain any control variables. Models (2) and (4) use the ECTS credits acquired during the given exam period as dependent variable and control for prior mean grade, prior total ECTS credits, study program fixed effects (9 dummies), and study year fixed effects (3 dummies). All models contain a constant. Heteroskedasticity robust standard errors are in parentheses. * $p < .1$, ** $p < .05$, *** $p < .01$

Table C.9: Correlations of Grades (non-inv.), Non-Cognitive Skills and Concentration at Baseline

	(1)								
	Prior Grade	Stress (BL)	Anxiety (BL)	Depr. (BL)	Self-C. (BL)	Consc. (BL)	Neurot. (BL)	Stroop T. (BL)	Mindf. (BL)
Prior Grade	1								
Stress (BL)	0.0952	1							
Anxiety (BL)	0.0308	0.694***	1						
Depr. (BL)	0.247***	0.583***	0.608***	1					
Self-C. (BL)	-0.268***	-0.234***	-0.119*	-0.347***	1				
Consc. (BL)	-0.238***	-0.215***	-0.149**	-0.336***	0.703***	1			
Neurot. (BL)	-0.0914	0.646***	0.710***	0.450***	-0.154**	-0.196***	1		
Stroop T. (BL)	-0.214***	-0.105	-0.102	-0.0556	-0.0988	-0.122*	-0.0239	1	
Mindf. (BL)	-0.126*	-0.415***	-0.481***	-0.429***	0.402***	0.341***	-0.386***	-0.0690	1

All variables are unstandardized. Prior grade is the non-inverted, unstandardized average grade before the intervention including marks from failed exams, i.e. larger grades indicate worse grades. * $p < .1$, ** $p < .05$, *** $p < .01$

Table C.10: Study Behavior

	(1) Concentration	(2) Learning Strategies	(3) Study Self-Concept	(4) Exam Behavior
Treat	0.335***	0.232***	0.184***	0.158
	(0.071)	(0.073)	(0.068)	(0.117)
Concentration (BL)	0.477***			
	(0.056)			
Learning strategies (BL)		0.655***		
		(0.051)		
Study self-concept (BL)			0.667***	
			(0.062)	
Prior Grade	0.015	0.017	0.071*	0.187***
	(0.039)	(0.038)	(0.042)	(0.067)
Prior ECTS Credits	0.002	0.003**	0.002**	0.003
	(0.002)	(0.001)	(0.001)	(0.002)
Study Program FE	Yes	Yes	Yes	Yes
Study Year FE	Yes	Yes	Yes	Yes
R^2	0.440	0.565	0.568	0.123
N	182	182	182	182

Note: This table shows OLS regressions of study behaviors elicited in the endline survey on the treatment dummy. All models use the post-intervention outcome as dependent variable and control for the baseline measure of the respective outcome, prior mean grade, prior total ECTS credits, study-program fixed effects (9 dummies), and study-year fixed effects (3 dummies). All models include a constant. Heteroskedasticity robust standard errors are in parentheses. * $p < .1$, ** $p < .05$, *** $p < .01$

Table C.11: Health Behavior

	(1) Coffee/Tea	(2) Alcohol	(3) Smoking	(4) Medication	(5) Getting Up	(6) Sleeping Late	(7) Relaxation	(8) Health Index
Treat	-0.203**	-0.062	-0.034	-0.102	0.104	-0.435***	0.505***	0.423***
	(0.093)	(0.120)	(0.085)	(0.152)	(0.127)	(0.130)	(0.126)	(0.114)
Coffee/Tea (BL)	0.788***							
	(0.052)							
Alcohol (BL)		0.680***						
		(0.063)						
Smoking (BL)			0.832***					
			(0.047)					
Medication (BL)				0.387***				
				(0.140)				
Getting up (BL)					0.530***			
					(0.077)			
Sleeping late (BL)						0.504***		
						(0.067)		
Relaxation (BL)							0.495***	
							(0.070)	
Health index (BL)								0.656***
								(0.050)
Prior Grade	-0.045	-0.114*	-0.023	0.018	-0.001	-0.051	-0.034	0.064
	(0.054)	(0.067)	(0.042)	(0.071)	(0.067)	(0.068)	(0.064)	(0.059)
Prior ECTS Credits	0.001	-0.001	-0.001	0.001	-0.003	-0.003*	0.001	-0.001
	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Study Program FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Study Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.652	0.493	0.738	0.179	0.325	0.362	0.399	0.530
N	182	182	182	182	182	182	182	182

Note: This table shows OLS regressions of health behaviors elicited in the endline survey on the treatment dummy. All models use the post-intervention outcome as dependent variable and control for the baseline measure of the respective outcome, prior mean grade, prior total ECTS credits, study-program fixed effects (9 dummies), and study-year fixed effects (3 dummies). All models include a constant. Heteroskedasticity robust standard errors are in parentheses. * $p < .1$, ** $p < .05$, *** $p < .01$

Table C.12: Channels for the Immediate Grade

	(1) Δ Grade (immediate)	(2) Δ Grade (immediate)
Δ Stress	-0.087	-0.070
	(0.107)	(0.110)
Δ Anxiety	0.093	0.004
	(0.118)	(0.132)
Δ Depression	0.104	0.122
	(0.110)	(0.121)
Δ Conscientiousness	-0.202*	-0.263**
	(0.104)	(0.116)
Δ Neuroticism	-0.004	0.002
	(0.127)	(0.126)
Δ Stroop Tast	-0.021	0.032
	(0.085)	(0.088)
Δ Mindfulness	0.068	0.069
	(0.090)	(0.093)
Δ Study Behavior (Overall)	0.148	
	(0.244)	
Δ Health Behavior (Overall)	-0.164*	
	(0.089)	
Δ Study Behavior (Concentration)		0.022
		(0.084)
Δ Study Behavior (Strategy)		0.171
		(0.113)
Δ Study Behavior (Self Concept)		-0.010
		(0.136)
Δ Health Behavior (Coffee/Tea)		-0.143
		(0.104)
Δ Health Behavior (Alcohol)		0.028
		(0.085)
Δ Health Behavior (Smoking)		-0.031
		(0.109)
Δ Health Behavior (Medication)		0.018
		(0.065)
Δ Health Behavior (Getting Up)		0.041
		(0.070)
Δ Health Behavior (Sleeping Late)		0.149**
		(0.072)
Δ Health Behavior (Relaxation)		-0.238**
		(0.091)
Constant	-0.016	-0.020
	(0.074)	(0.075)
R^2	0.049	0.112
N	149	149

Note: This table shows OLS regressions of the change in grade in the main summer semester exam period (summer semester grade − baseline grade) on the change in stress, anxiety, depression, conscientiousness, neutroticism, performance in the Stroop task, and mindfulness. Model (1) contains the change in the overall study behavior index and the overall health behavior index as additional regressors, while Model (2) contains the change in the disaggregated health and study behavior measures as additional regressors. All models include a constant. Heteroskedasticity robust standard errors are in parentheses. * $p < .1$, ** $p < .05$, *** $p < .01$

Table C.13: Channels for the Six-Month Grade

	(1) Δ Grade (6 months)	(2) Δ Grade (6 months)
Δ Stress	-0.111	-0.088
	(0.114)	(0.122)
Δ Anxiety	-0.115	-0.137
	(0.185)	(0.181)
Δ Depression	0.138	0.156
	(0.149)	(0.153)
Δ Conscientiousness	0.170	0.111
	(0.173)	(0.162)
Δ Neuroticism	0.238	0.194
	(0.152)	(0.133)
Δ Stroop Task	0.062	0.052
	(0.115)	(0.120)
Δ Mindfulness	0.208*	0.227*
	(0.117)	(0.130)
Δ Study Behavior (Overall)	-0.251	
	(0.267)	
Δ Health Behavior (Overall)	0.019	
	(0.125)	
Δ Study Behavior (Concentration)		-0.032
		(0.094)
Δ Study Behavior (Strategy)		-0.012
		(0.189)
Δ Study Behavior (Self Concept)		-0.081
		(0.140)
Δ Health Behavior (Coffee/Tea)		0.114
		(0.143)
Δ Health Behavior (Alcohol)		-0.098
		(0.125)
Δ Health Behavior (Smoking)		0.204
		(0.158)
Δ Health Behavior (Medication)		0.087
		(0.099)
Δ Health Behavior (Getting Up)		0.189*
		(0.099)
Δ Health Behavior (Sleeping Late)		-0.151
		(0.102)
Δ Health Behavior (Relaxation)		-0.171
		(0.110)
Constant	-0.000	-0.025
	(0.100)	(0.101)
R^2	0.098	0.208
N	102	102

Note: This table shows OLS regressions of the change in grade in the main winter semester exam period (winter semester grade − baseline grade) on the change in stress, anxiety, depression, conscientiousness, neutroticism, performance in the Stroop task, and mindfulness. Model (1) contains the change in the overall study behavior index and the overall health behavior index as additional regressors, while Model (2) contains the change in the disaggregated health and study behavior measures as additional regressors. All models include a constant. Heteroskedasticity robust standard errors are in parentheses. * $p < .1$, ** $p < .05$, *** $p < .01$

D Heterogeneity Analyses

Table D.1: Six-Month Effects by Direction of Immediate Effects

	If immediate absolute change is positive			If immediate absolute change is negative		
	(1)	(2)	(3)	(4)	(5)	(6)
	Grade (6 months, VA)	Grade (6 months, VA)	Grade (6 months, FD)	Grade (6 months, VA)	Grade (6 months, VA)	Grade (6 months, FD)
Treat	0.542**	0.566***	0.761***	0.022	0.246	0.206
	(0.199)	(0.197)	(0.214)	(0.296)	(0.278)	(0.226)
Prior Grade		0.249			0.777***	
		(0.180)			(0.152)	
Prior ECTS Credits		0.004			0.004	
		(0.003)			(0.005)	
Study Program FE	No	Yes	No	No	Yes	No
Study Year FE	No	Yes	No	No	Yes	No
R^2	0.082	0.382	0.121	0.000	0.562	0.016
N	74	71	71	50	50	50

Note: This table shows OLS regressions of the mean grade of the main winter semester exam period on the treatment dummy. Models (1) - (3) focus on students whose immediate average grade was higher than at baseline while models (4) - (6) focus on students whose immediate average grade was lower than at baseline. Models (1) and (4) use the post-intervention outcome as dependent variable and do not include control variables. Models (2) and (5) use the post-intervention outcome as dependent variable and control for prior mean grade, prior total ECTS credits, study-program fixed effects (9 dummies), and study-year fixed effects (3 dummies). Models (3) and (6) use the change in mean grade (winter-semester grade − baseline grade) as dependent variable and do not include control variables. All models include a constant. Heteroskedasticity robust standard errors are in parentheses. * $p < .1$, ** $p < .05$, *** $p < .01$

Table D.2: Effects by Independent Practice

	(1)	(2)	(3)	(4)
	Grade (immediate, VA)	Grade (immediate, FD)	Grade (6 months, VA)	Grade (6 months, FD)
Treat	-0.401	-0.390	-0.269	-0.310
	(0.306)	(0.327)	(0.413)	(0.385)
TreatXIndep. Practice	0.175	0.347	0.893**	0.969**
	(0.355)	(0.371)	(0.445)	(0.420)
Indep. Practice	-0.039	-0.062	-0.307	-0.252
	(0.166)	(0.194)	(0.239)	(0.253)
Prior Grade (stand.)	0.461***		0.543***	
	(0.079)		(0.108)	
Prior ECTS Credits	0.005*		0.003	
	(0.002)		(0.002)	
Study Program FE	Yes	No	Yes	No
Study Year FE	Yes	No	Yes	No
F-test	0.160	0.807	0.000	0.000
R^2	0.296	0.008	0.346	0.090
N	177	177	121	121

Note: This table shows OLS regressions of the grades the treatment dummy. Models (1) and (3) use the mean grade of the main summer- and winter-semester exam periods, respectively, as dependent variables. Models (2) and (4) use the change in grade (summer grade - baseline grade and winter grade - baseline grade, respectively) as dependent variables. All models except (2) and (4) control for prior mean grade, prior total ECTS credits, study-program fixed effects (9 dummies), and study-year fixed effects (3 dummies). All models additionally contain a dummy "Own practice" equal to 1 for those students who indicated in the endline questionnaire that they practiced meditation on their own during the period of the meditation course and an interaction term of this dummy and the treatment dummy. All models include a constant. The row F-test shows p-values for F-tests of the linear combination of the coefficients of "Treat" and "TreatXIndep. Practice" in the respective model. Heteroskedasticity robust standard errors are in parentheses. * $p < .1$, ** $p < .05$, *** $p < .01$

E Robustness Checks

Table E.1: Robustness Checks with Matching Samples for Immediate and Six-Month Grade Outcomes

	(1) Grade (immediate, E)	(2) Grade (immediate, VA)	(3) Grade (immediate, FD)	(4) Grade (6 months, E)	(5) Grade (6 months, VA)	(6) Grade (6 months, FD)
Treat	-0.378**	-0.339*	-0.228	0.167	0.304**	0.332**
	(0.181)	(0.177)	(0.188)	(0.180)	(0.153)	(0.165)
Prior Grade		0.527***			0.593***	
		(0.095)			(0.097)	
Prior ECTS Credits		0.001			0.005	
		(0.003)			(0.003)	
Constant	0.096	0.259	0.101	-0.035	-0.776	-0.030
	(0.121)	(0.439)	(0.122)	(0.127)	(0.783)	(0.110)
Study Program FE	No	Yes	No	No	Yes	No
Study Year FE	No	Yes	No	No	Yes	No
R^2	0.039	0.329	0.014	0.008	0.428	0.037
N	111	108	108	111	108	108

Note: This table shows OLS regressions of the mean grade on the treatment dummy. Models (1) - (3) show regressions for the mean grade over the main summer-semester exam period, given that a grade for the main winter-semester exam period is observed for the student. Models (4) - (6) show regressions for the mean grade over the main winter-semester exam period, given that a grade for the main summer-semester exam period is observed for the student. Models (1) and (4) use the post-intervention outcome as dependent variable and do not include control variables. Models (2) and (5) use the post-intervention outcome as dependent variable and control for prior mean grade, prior total ECTS credits, study-program fixed effects (9 dummies), and study-year fixed effects (3 dummies). Models (3) and (6) use the change in mean grade (intermediate grade [i.e., main exam period summer or winter] − baseline grade) as dependent variable and do not include control variables. All models include a constant. Heteroskedasticity robust standard errors are in parentheses. * $p < .1$, ** $p < .05$, *** $p < .01$

Table E.2: Grades (Estimated with Inverse Probability Weighting)

	(1) Grade (immediate)	(2) Grade (6 months)
ATE		
r1vs0.Treat	-0.267**	0.370**
	(0.126)	(0.144)
POmean		
Treat=0	0.144*	-0.165
	(0.086)	(0.114)
TME1		
Prior Grade (stand.)	-0.128	-0.111
	(0.113)	(0.151)
Prior ECTS Credits	0.000	-0.001
	(0.004)	(0.004)
Constant	1.173	0.533
	(0.851)	(0.892)
Study Program FE	Yes	Yes
Study Year FE	Yes	Yes
N	177	121

Note: This table shows probit regressions for grade outcomes using inverse probability weighting. Model (1) uses the summer semester and Model (2) uses the winter-semester grade as dependent variable. Both models control for prior mean grade, prior total ECTS credits, study-program fixed effects (9 dummies), and study-year fixed effects (3 dummies). Heteroskedasticity robust standard errors are in parentheses. * $p < .1$, ** $p < .05$, *** $p < .01$

Table E.3: Mental Health Outcomes (Estimated with Inverse Probability Weighting)

	(1) Stress	(2) Anxiety	(3) Depression
ATE			
r1vs0.Treat	-0.646***	-0.410***	-0.581***
	(0.114)	(0.112)	(0.106)
POmean			
Treat=0	0.332***	0.237**	0.300***
	(0.095)	(0.099)	(0.094)
TME1			
Stress (BL)	-0.013		
	(0.099)		
Anxiety (BL)		-0.090	
		(0.099)	
Depression (BL)			-0.062
			(0.098)
Prior Grade (stand.)	-0.045	-0.051	-0.059
	(0.111)	(0.111)	(0.113)
Prior ECTS Credits	-0.002	-0.002	-0.002
	(0.003)	(0.003)	(0.003)
Constant	1.613**	1.629**	1.610**
	(0.722)	(0.725)	(0.723)
Study Program FE	Yes	Yes	Yes
Study Year FE	Yes	Yes	Yes
N	182	182	182

Note: This table shows probit regressions for mental health outcomes outcomes using inverse probability weighting. All models control for the baseline outcome of the respective dependent variable as well as prior mean grade, prior total ECTS credits, study-program fixed effects (9 dummies), and study-year fixed effects (3 dummies). Heteroskedasticity robust standard errors are in parentheses. * $p < .1$, ** $p < .05$, *** $p < .01$

Table E.4: Non-Cognitive Skills and Concentration (Estimated with Inverse Probability Weighting)

	(1) Self-control	(2) Conscientiousness	(3) Neuroticism	(4) Stroop Task	(5) Mindfulness
ATE					
r1vs0.Treat	0.499***	0.499***	-0.327***	0.188*	0.629***
	(0.083)	(0.088)	(0.105)	(0.114)	(0.110)
POmean					
Treat=0	-0.215***	-0.218***	0.198**	-0.079	-0.301***
	(0.076)	(0.083)	(0.090)	(0.095)	(0.088)
TME1					
Self-Control (BL)	-0.055				
	(0.104)				
Conscientiousness (BL)		-0.073			
		(0.103)			
Neuroticism (BL)			0.011		
			(0.100)		
Stroop Task (BL)				-0.062	
				(0.101)	
Mindfulness (BL)					0.099
					(0.097)
Prior Grade (stand.)	-0.036	-0.031	-0.044	-0.030	-0.061
	(0.112)	(0.112)	(0.111)	(0.112)	(0.112)
Prior ECTS Credits	-0.002	-0.002	-0.002	-0.002	-0.002
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Constant	1.624**	1.579**	1.603**	1.570**	1.533**
	(0.715)	(0.723)	(0.723)	(0.721)	(0.720)
Study Program FE	Yes	Yes	Yes	Yes	Yes
Study Year FE	Yes	Yes	Yes	Yes	Yes
N	182	182	182	182	182

Note: This table shows probit regressions for non-cognitive skills and concentration outcomes using inverse probability weighting. All models control for the baseline outcome of the respective dependent variable as well as prior mean grade, prior total ECTS credits, study-program fixed effects (9 dummies), and study-year fixed effects (3 dummies). Heteroskedasticity robust standard errors are in parentheses. * $p < .1$, ** $p < .05$, *** $p < .01$

Table E.5: Grades (Estimated with Imputed Missings)

	(1) Grade (immediate)	(2) Grade (6 months)
Treat	-0.190*	0.221**
	(0.111)	(0.088)
Prior Grade (stand.)	0.559***	0.734***
	(0.065)	(0.054)
Prior ECTS Credits	0.004**	0.001
	(0.002)	(0.001)
Constant	-0.048	-0.545***
	(0.222)	(0.203)
Study Program FE	Yes	Yes
Study Year FE	Yes	Yes
R^2	0.408	0.583
N	219	219

Note: This table shows OLS regressions for grade outcomes imputing missing immediate and six-month grades. For those observations for whom we have a baseline grade but do not observe a grade immediately (six months) after the end of the meditation course, we assume that the treatment effect was zero and that both concerned treatment and control group students underwent the same grade change that the control group students for whom we observe immediate (six-month) grades experienced on average. Model (1) uses the summer semester and Model (2) uses the winter-semester grade as dependent variable. Both models control for prior mean grade, prior total ECTS credits, study-program fixed effects (9 dummies), and study-year fixed effects (3 dummies). Heteroskedasticity robust standard errors are in parentheses. * $p < .1$, ** $p < .05$, *** $p < .01$

Table E.6: Mental Health Outcomes (Estimated with Imputed Missings)

	(1) Stress	(2) Anxiety	(3) Depression
Treat	-0.615***	-0.405***	-0.543***
	(0.106)	(0.099)	(0.097)
Stress (BL)	0.542***		
	(0.061)		
Anxiety (BL)		0.658***	
		(0.055)	
Depression (BL)			0.615***
			(0.060)
Prior Grade (stand.)	-0.041	0.047	-0.004
	(0.059)	(0.056)	(0.052)
Prior ECTS Credits	-0.002	-0.003*	-0.003
	(0.002)	(0.002)	(0.002)
Constant	0.140	-0.185	0.532*
	(0.289)	(0.262)	(0.286)
Study Program FE	Yes	Yes	Yes
Study Year FE	Yes	Yes	Yes
R^2	0.426	0.524	0.532
N	219	219	219

Note: This table shows OLS regressions for mental health outcomes imputing missing outcomes due to a missing endline questionnaire. For those observations for whom we do not observe an outcome we assume that the treatment effect was zero and that both concerned treatment and control group students underwent the same change in the respective scale that the control group students for whom we observe that outcome experienced on average. All models control for prior mean grade, prior total ECTS credits, study-program fixed effects (9 dummies), and study-year fixed effects (3 dummies). Heteroskedasticity robust standard errors are in parentheses. * $p < .1$, ** $p < .05$, *** $p < .01$

Table E.7: Secondary Outcomes (Estimated with Imputed Missings)

	(1) Self-Control	(2) Conscientiousness	(3) Neuroticism	(4) Stroop Task	(5) Mindfulness
Treat	0.467***	0.462***	-0.330***	0.153	0.594***
	(0.073)	(0.080)	(0.092)	(0.100)	(0.106)
Self-Control (BL)	0.775***				
	(0.038)				
Conscientiousness (BL)		0.752***			
		(0.041)			
Neuroticism (BL)			0.772***		
			(0.049)		
Stroop Task (BL)				0.630***	
				(0.064)	
Mindfulness (BL)					0.575***
					(0.052)
Prior Grade (stand.)	-0.012	0.065	-0.055	0.051	-0.040
	(0.040)	(0.045)	(0.050)	(0.062)	(0.053)
Prior ECTS Credits	0.003**	0.002**	-0.001	-0.001	0.003**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Constant	-0.352	-0.641***	0.103	-0.282	-0.434
	(0.223)	(0.228)	(0.208)	(0.190)	(0.421)
Study Program FE	Yes	Yes	Yes	Yes	Yes
Study Year FE	Yes	Yes	Yes	Yes	Yes
R^2	0.736	0.689	0.606	0.480	0.481
N	219	219	219	219	219

Note: This table shows OLS regressions for non-cognitive skills and concentration outcomes imputing missing outcomes due to a missing endline questionnaire. For those observations for whom we do not observe an outcome we assume that the treatment effect was zero and that both concerned treatment and control group students underwent the same change in the respective scale that the control group students for whom we observe that outcome experienced on average. All models control for prior mean grade, prior total ECTS credits, study-program fixed effects (9 dummies), and study-year fixed effects (3 dummies). Heteroskedasticity robust standard errors are in parentheses. * $p < .1$, ** $p < .05$, *** $p < .01$

F Invitation, Registration, Questionnaires, and Session Content

Figure F.1: Invitation Text (translated from German)

Subject: Course "Fundamentals of Mindfulness Meditation" now open for bachelor's and master's students

Dear Students,

we are pleased to offer an 8-week course during the summer semester in which you can learn the basics of **mindfulness meditation**.

Please note: The course is now open to WiSo faculty **master's students** as well! The application deadline has been extended to April 24!

The course is based on the ***Mindfulness Based Stress Reduction (MBSR)*** program. This program has been successfully used worldwide in corporate, university, and healthcare settings, among others, to effectively reduce stress, promote mental and physical health, and enhance performance.

Participation in the course is **free of charge**, as the entire course is financed by Techniker Krankenkasse (regardless of which health insurance company someone is insured with).

The course will be given by two experienced meditation teachers and will take place **once a week** starting **May 15, 2019**. There will be 6 course groups that will meet for one hour each **Wednesday** or **Friday** at the following times in a seminar room in the SSC building:

- 2:00 pm-3:00 pm

- 3:15 pm-4:15 pm

- 4:30 pm-5:30 pm

The course consists of the weekly meeting, where meditation and relaxation techniques are learned, and **daily** home **exercises**, where the techniques are practiced and deepened independently.

Since the course is scientifically evaluated and very expensive, **regular attendance** and **high motivation** are essential for participation.

The number of places in the course is limited and only students of the WiSo faculty can apply for it. Places are allocated by lottery. More details on the application page.

The course will be scientifically evaluated by a team of researchers led by Jun.-Prof. Dr. Lea Cassar. For this reason, we rely on all students to participate in an online survey when applying for a course place, as well as **a survey at the end of the semester**. Please see the registration page for more information.

If you are interested in taking a course, we would appreciate it if you apply to participate by **April 24** at the following website:

https://unikoelnwiso.eu.qualtrics.com/jfe/form/SV_cGB9wExtZWMbl1b

Some browser plugins prevent the page from displaying properly. If this happens, please disable them temporarily.

Best regards,

Jun.-Prof. Dr. Lea Cassar

Figure F.2: Registration Page (Translated from German)

Course description "Basics of Mindfulness Meditation"

Mindfulness is a state of mind that involves being aware of the present moment as best we can. That means looking at things as they are right now, without judging them and without actively intervening.

This sounds relatively unspectacular, but in reality it is not that easy. Because most of the time our mind is very busy - we think about the past, we make plans, we worry and think about everything that still has to be done.

With mindfulness we get back in touch with ourselves and draw strength from the present moment. We can look at problems with more distance and gain clarity for new decision-making possibilities and actions. We develop a better feeling for physical and psychological signals, for our stress reactions and stress limits.

Mindfulness is a key competence for healthy living and one's own personal development, especially when it comes to coping with the diverse demands of everyday life at university and at work, while remaining productive and at the same time satisfied and healthy in the long term.

In this 8-week course, you will learn meditation and relaxation techniques that allow you to deal with stress and stressful situations in a more mindful way.

What will participants take away from the course?

- The basics of mindfulness meditation
- Learning formal mindfulness exercises and how to apply them in everyday life
- Improving body awareness and learning to consciously relax
- Improving understanding and regulation of emotions
- Better insight into stress-reinforcing thought patterns and the ability to gradually dissolve them

What are the positive effects of practicing mindfulness?

- Better concentration
- More clarity and objectivity even in difficult situations
- More calmness and composure in dealing with stress
- Increased effectiveness with less effort at the same time
- Higher well-being

The course is based on the concept of Mindfulness Based Stress Reduction (MBSR) according to Jon Kabat-Zinn. This program was developed in the 1970s in the USA and is now successfully used worldwide in organizations, educational institutions, in health care and in psychotherapy for many people suffering from stress. Meanwhile, numerous international studies prove the positive effects of MBSR on mental and physical health as well as effectiveness.

The course is scientifically evaluated by a research team led by Jun.-Prof. Dr. Lea Cassar. For this purpose, all course applicants fill out an online questionnaire once directly at the time of application as well as at the end of the summer semester. They should plan about 20 minutes for each of these.

Course Schedule

The course will take place from May 15 to July 12, 2019 in the SSC building and will consist of one hour per week. In addition, there will be daily exercises to do at home.

To help us plan, please click on all times that are compatible with your schedule and when you could attend the course:

Wednesdays	2:00 pm-3:00 pm ☐	Fridays	2:00 pm-3:00 pm ☐
	3:15 pm-4:15 pm ☐		3:15 pm-4:15 pm ☐
	4:30 pm-5:30 pm ☐		4:30 pm-5:30 pm ☐

Figure F.2: Registration Page (Translated from German, continued)

Personal Information

First Name:

Last Name:

Email Address:

Gender:

Year of birth:

Matriculation number:

Programm of study:

Semester of study:

In which courses do you plan to take an exam this summer semester?:

Conditions of Participation

1. Participation in the course is free of charge, but there is only a limited number of places available. These will be allocated among the applicants by lottery and taking into account the lectures taken and time availability in the summer semester 2019.
2. How course applicants answer the questionnaire has no influence on the allocation of places. However, only applicants who have completely filled out the questionnaire and the application can participate in the allocation of places.
3. All course applicants, regardless of whether or not they have been awarded a place, agree to take part in an online survey lasting approximately 20 minutes at the end of the summer semester. They will receive appropriate financial compensation for doing so.
4. Participation in the course is voluntary and at the participant's own responsibility. Withdrawal is possible at any time without giving reasons by sending an e-mail to lcassar@uni-koeln.de.

Privacy Policy

1. All course applicants, regardless of whether you have received a place or not, agree that their examination results from their current course of study from previous semesters as well as from the academic year 2019/2020 will be stored by Jun.-Prof. Dr. Lea Cassar in the IT network of the University of Cologne for research purposes until the end of the study. After that, the data will be deleted.
2. All course applicants, regardless of whether they have received a place or not, agree that Jun.-Prof. Dr. Lea Cassar will link the data from the registration and the two surveys with the applicants' examination data in the IT network of the University of Cologne and then process it in anonymized form with the other two researchers involved in the study (Dr. Mira Fischer, WZB Berlin, and Dr. Vanessa Valero, University of Zurich) for the purpose of scientific research.
3. Consent for data processing can be revoked at any time by emailing lcassar@uni-koeln.de.

Last but not least: For the scientific evaluation it is important that participants attend the course until the end. All course applicants declare to intend to attend the complete course if they get a place.

☐ YES. I have read and agree to the course description, conditions of participation, and privacy policy. I hereby apply for a place on the course. (Continue to questionnaire.)

☐ NO. I do not agree and do not wish to apply for a place.

If you have any questions, please contact Jun.-Prof. Dr. Lea Cassar (lcassar@uni-koeln.de).

Submit

Table F.3: Questionnaire

Variable Name	Text	Categories	Pre	Post
First name	First name	[open field]	x	x
Last name	Last name	[open field]	x	x
Matriculation no.	Matriculation number	[open field]	x	x
Gender	Gender	1- Male; 2- Female; 3- Diverse	x	
Year of birth	In which year were you born?	[open field]	x	
Bachelor	Are you currently enrolled as a Bachelor's student at the WiSo faculty?	1- Yes; 2- No	x	
Bachelor program	In which Bachelor's program are you enrolled?	1- Business Administration; 2- Economics; 3- Economics Social Science; 4- Social Sciences; 5- Health Economics; 6- Information Systems; 7- other	x	
Master	Are you currently enrolled as a Master's student at the WiSo faculty?	1- Yes; 2- No	x	
Master program	In which Master's program are you enrolled?	1- M.Sc. International Management / CEMS MIM; 2- M.Sc. Business Administration; 3- M.Sc. Economics; 4- M.Sc. Health economics; 5- M.Sc. Information Systems; 6- M.A. Political Science; 7- M.Sc. Sociology and Social Research; 8- M.Ed. Business education	x	
Semester	In which semester are you? (in your current degree program)	1st; 2nd; 3rd; 4th; 5th; 6th; 7th; 8th (being 8th or higher)	x	
Mindfulness	Below are a number of statements about your everyday experiences. Please indicate on the scale below how often or rarely each experience has happened to you in the last 2 weeks. Your answers should reflect your true experiences, and not depend on your expectations of yourself. 1- I could experience an emotion and only realize it later. 2- I find it hard to focus on what is going on. 3- I tend not to notice feelings of physical tension or discomfort until they really grab my attention. 4- It seems like I'm functioning "automatically" without really being aware of what I am doing. 5- I rush through activities without paying attention to them. 6- I catch myself listening to others with one ear while doing something else at the same time. 7- I find myself absorbed in thoughts of the future or the past. 8- I nibble, not realizing that I am eating.	1- Almost never; 2- Very rarely, 3 - Rarely 4- Often; 5- Very often, 6 - Almost always	x	x

Table F.3: Questionnaire (continued)

Variable Name	Text	Categories	Pre	Post
Stress	The following questions are about how often you feel stressed during the last 2 weeks. 1- In the last two weeks, how often have you been upset because of something that happened unexpectedly? 2- In the last two weeks, how often have you felt that you were unable to control the important things in your life? 3- In the last two weeks, how often have you felt nervous and stressed? 4- In the last two weeks, how often have you felt confident about your ability to handle your personal problems? 5- In the last two weeks, how often have you felt that things were going your way? 6- In the last two weeks, how often have you found that you could not cope with all the things that you had to do? 7- In the last two weeks, how often have you been able to control irritations in your life? 8- In the last two weeks, how often have you felt that you were on top of things? 9- In the last two weeks, how often have you been angered because of things that happened that were outside of your control? 10- In the last two weeks, how often have you felt difficulties were piling up so high that you could not overcome them?	1- Never; 2- Almost never; 3- Sometimes; 4- Fairly often; 5- Very often	x	x
Anxiety	Over the last 2 weeks, how often have you been bothered by any of the following problems? 1- Feeling nervous, anxious or on edge. 2- Not being able to stop or control worrying. 3- Worrying too much about different things. 4- Trouble relaxing. 5- Being so restless that it is hard to sit still. 6- Becoming easily annoyed or irritable. 7- Feeling afraid as if something awful might happen.	1- Not at all; 2- Several days; 3- More than half the days; 4- Nearly everyday	x	x
Depression	Over the last 2 weeks, how often have you been bothered by any of the following problems? 1- Little interest or pleasure in doing things. 2- Feeling down, depressed, or hopeless. 3- Trouble falling or staying asleep, or sleeping too much. 4- Feeling tired or having little energy. 5- Poor appetite or overeating. 6- Feeling bad about yourself - or that you are a failure or have let yourself or your family down. 7- Trouble concentrating on things, such as reading the newspaper or watching television. 8- Moving or speaking so slowly that other people could have noticed. Or the opposite - being so fidgety or restless that you have been moving around a lot more than usual. 9- Thoughts that you would be better off dead or of hurting yourself in some way.	0- Not at all; 1- Several days; 2- More than half the days; 3- Nearly everyday	x	x

Table F.3: Questionnaire (continued)

Variable Name	Text	Categories	Pre	Post
Self-control	Please indicate how much each of the following statements reflects how you typically are. 1- I am good at resisting temptation. 2- I have a hard time breaking bad habit. 3- I am lazy. 4- I say inappropriate things. 5- I do certain things that are bad for me, if they are fun. 6- I refuse things that are bad for me. 7- I wish I had more self-discipline. 8- People would say that I have iron self-discipline. 9- Pleasure and fun sometimes keep me from getting work done. 10- I have trouble concentrating. 11- I am able to work effectively toward long-term goals. 12- Sometimes I can't stop myself from doing something, even if I know it is wrong. 13- I often act without thinking through all the alternatives.	1- Not at all; 2- Slightly; 3- Moderately; 4-?; 5- Very much	x	x
Conscientiousness	How true the following are about you. 1- Does a thorough job. 2- Can be somewhat careless. 3- Is reliable. 4- Tends to be disorganized. 5- Tends to be lazy. 6- Perseveres until the task is finished. 7- Does things efficiently. 8- Make plans and follows through with them. 9- Is easily distracted.	1-Disagree, 2- Rather Disagree; 3- Neutral; 4- Rather Agree 5- Agree	x	x
Neuroticism	How true the following are about you. 1- Is depressed, blue 2- Is relaxed, handles stress well. 3- Can be tense. 4- Worries a lot. 5- Is emotionally stable, not easily upset. 6- Remains calm in tense situations. 7- Gets nervous easily.	1-Disagree, 2- Rather Disagree; 3- Neutral; 4- Rather Agree 5- Agree	x	x
Study behavior	How exactly do these statements currently apply to you? 1- I usually rightfully estimate how much time I need to complete a task. 2- Every day, I know what things I have to do and how far I can handle them. 3- If I cannot keep up with my work, I often give up. 4- I always make the same mistakes. 5- I distribute my work and my learning evenly throughout the semester. 6- I often dig with thoughts while learning. 7- I consciously gather my concentration before I start learning. 8- I regularly check my messages on my smartphone while I'm learning. 9- I set up my learning place in a quiet place without distractions. 10- I usually start learning only when the pressure is very high. 11- It is easy for me to concentrate on learning for a long time. 12- I am sure that I can learn all the skills to be successful in my studies. 13- I like to study. 14- I am always attentive in lectures. 15- I am not a good student. 16- I am nervous before exams. 17- I find it easy to manage time well while writing an exam. 18- I panic easily when I can't solve an exam problem. (Statements 16-18 only contained in post-intervention questionnaire.)	1-Disagree, 2- Rather Disagree; 3- Neutral; 4- Rather Agree 5- Agree	x	x

Table F.3: Questionnaire (continued)

Variable Name	Text	Categories	Pre	Post
Health behavior	Please rate a few more statements about your current habits. 1- I get up at the same time every morning., 2- I consciously relax., 3- I drink alcohol. 4- I drink coffee or tea to stay awake. 5- I take medication to be more efficient. 6- I go to bed late in the evening and then get tired the next day. 7- I smoke.	1-Never; 2- Hardly ever; 3- Occasionally; 4- Rather Regularly; 5- Very Regularly	x	x
Stroop task	(20 items of the type: "Click on the answer that matches the color of the following word: Blue" on separate screens. Students were instructed that among the people with the greatest number of correct answers the three fastest would be paid 20 euros.)	(Correct answer involved clicking on the color in which the word (e.g. "Blue") was written, which could be any of black, blue, yellow, green, or red.)	x	x
Experience	Do you have experience with meditation?	1- No, no experience.; 2- Yes, I have meditated, but not regularly. I do not meditate at the moment.; 3- Yes, I meditated regularly, but I do not meditate at the moment.; 4- Yes, I meditate sometimes.; 5- Yes, I meditate (almost) every week.; 6- Yes, I meditate (almost) every day.	x	
Motivation	What motivation is most important to your desire to learn mindfulness meditation? Please choose an option.	1- I am curious.; 2- I want to improve my concentration.; 3- I want to learn to better relax.; 4- I want to learn to deal better with my emotions.; 5- I want to loose weight.; 6- I want to be more productive	x	
Father's education	Does your father have a university degree?	1- Yes; 2- No	x	
Mother's education	Does your mother have a university degree?	1- Yes; 2- No	x	
Future interest	Would you like to be informed by e-mail if another mindfulness course is offered at the University of Cologne?	1- Yes; 2- No		x
Liked course	How did you like the course "Fundamentals of Mindfulness Meditation"?	1- Very much; 2- Much; 3- Rather less; 4- Not at all; 5- I don't know		x (T)
Learned course	How much did you learn on the course?	1- Very much; 2- Much; 3- Rather less; 4- Nothing at all; 5- I don't know		x (T)

Table F.3: Questionnaire (continued)

Variable Name	Text	Categories	Pre	Post
Recommend course	Would you recommend participation in the course to other students?	1- Definitely; 2- Probably; 3- Probably not; 4- Definitely not; 5- I don't know		x (T)
Exercises first half	During the FIRST HALF of the course, how often did you do the exercises on your own?	1- (Almost) daily, about three times per day; 2- (Almost) daily, about once a day; 3- On at least half of the days, about three times per day; 4- On at least half of the days, about once a day; 5- Irregularly, about three times per day; 6- Irregularly, about once a day; 7- Rarely; 8- Never		x (T)
Exercises second half	During the SECOND HALF of the course, how often did you do the exercises on your own?	1- (Almost) daily, about three times per day; 2- (Almost) daily, about once a day; 3- On at least half of the days, about three times per day; 4- On at least half of the days, about once a day; 5- Irregularly, about three times per day; 6- Irregularly, about once a day; 7- Rarely; 8- Never		x (T)
Excercises now	Are you currently continuing to do the exercises?	1- Yes; 2- No		x (T)
Own practice	In the last two months, how often have you meditated on your own (i.e., beyond or independent of the course exercises)? [treatment group]; In the last two months, how often have you meditated on your own? [control group]	1- (Almost) every day; 2- (Almost) every week; 3- Sometimes; 4- Never		x
App	Are you currently using a meditation app?	1- Yes; 2- No		x
Friends	Are you friends with students who have taken the "Fundamentals of Mindfulness Meditation" course?	1- Yes; 2- No		x (C)
Course materials	Have any participants in the "Fundamentals of Mindfulness Meditation" course shared course materials with you?	1- Yes; 2- No		x (C)
Comments	Anything else you would like to tell us? - Otherwise, simply leave the field blank.	[open field]		x

Note: This table lists the items contained in the pre- and/or post-intervention questionnaire. The column "Variable name" contains the name used in the analysis. The column "Text" contains the item text shown to participants. The column "Categories" contains the answer categories available to participants. Columns "Pre" and "Post" indicate whether the variable was contained in the pre- and/or post-intervention questionnaire, respectively. T = only contained in treatment group questionnaire; C = only contained in control group questionnaire.

Table F.4: Sessions of the Meditation Course

	Group session	Individual exercises
Week 1	- time out - introduction to the course, motivation to participate in the course, introduction of participants - topics of teacher's talk: mindfulness, focus on the body, present moment awareness - body scan - exchange of thoughts	- time out (3 times per day) - body scan (once a day)
Week 2	- time out - exchange of experiences in the last week - topics of teacher's talk: somatic markers, the body as a resource, listening to the body, dealing with unpleasant emotions and pain - body scan - exchange of thoughts	- time out (3 times per day) - body scan (once a day) - observing the body in everyday life – stopping to pay attention to sensations
Week 3	- time out - exchange of experiences in the last week - topics of teacher's talk: attitudes while practicing meditation (beginner's mind, non-intentionality, not judging, letting go, not grasping, trust, benevolence/compassion), sitting posture - sitting meditation, observing the breath - exchange of thoughts	- time out (3 times per day) - body scan or sitting meditation (once a day, alternating) - observing judgments in stressful situations
Week 4	- time out - exchange of experiences in the last week - topics of teacher's talk: stress, triggers and responses, judgement, expectations towards ourselves, autopilot, creating a gap between triggers and responses, introduction to yoga - yoga (standing) - exchange of thoughts	- time out (3 times per day) - body scan or sitting meditation (once a day, alternating) - observing the arising of stress and stress-related thoughts in everyday life; stress diary
Week 5	- time out - exchange of experiences in the last week - topics of teacher's talk: judgements are thoughts, dealing with thoughts (not identifying with and observing thoughts) - sitting meditation - exchange of thoughts	- time out (3 times per day) - sitting meditation, yoga or body scan (once a day, alternating) - observing thoughts that trigger difficult emotions in every day life

Table F.4: Sessions of the Meditation Course (continued)

	Group session	Individual exercises
Week 6	- time out - exchange of experiences in the last week - topics of teacher's talk: dealing with emotions (observing and not ignoring emotions, not identifying with emotions) - guided self-reflection using RAIN method (recognize, allow, investigate, nurture) by Tara Brach - sitting meditation, observing with compassion and kindness - exchange of thoughts	- time out (3 times per day) - sitting meditation, yoga or body scan (once a day, alternating) - observing (difficult) emotions in everyday life with kindness
Week 7	- time out - exchange of experiences in the last week - topics of teacher's talk: mindful communication - practice of mindful communication in pairs - exchange of thoughts	- time out (3 times per day) - sitting meditation, yoga or body scan (once a day, alternating) - integrating new skills into everyday life
Week 8	- time out - exchange of experiences in the last week - topics of teacher's talk: tips on integrating new skills into everyday life, cultivating gratitude and self-esteem - sitting meditation - exchange of experiences and thoughts with respect to the course	- time out (3 times per day) - sitting meditation, yoga or body scan (once a day, alternating) - integrating new skills into everyday life

Note: This table lists the contents of the sessions of the meditation course that took place weekly and lasted 60 minutes, and the individual exercises that participants were asked to do daily and that were accompanied by written handouts and audio recordings to follow along.