Original Article

Relationships Between Mindfulness Facets and Mental and Physical Health in Meditating and Nonmeditating University Students

Constance Karing[1], Lara Oeltjen[2], and Andreas Beelmann[1]

[1]Department of Research Synthesis, Intervention and Evaluation, Institute of Psychology, Friedrich-Schiller-University Jena, Germany
[2]Department of Methodology and Evaluation Research, Institute of Psychology, Friedrich-Schiller-University Jena, Germany

Abstract: *Background*: Little is known about the relations of the mindfulness facets to mental and physical health among meditators and nonmeditators. *Aim*: The main purpose of the present study was to investigate the relationship between the mindfulness facets and mental as well as physical health of university students with and without meditation experience using attentional control, body awareness, nonattachment, and emotion regulation as mediators. *Method*: Data were collected from a sample of 508 university students (meditators: *n* = 195, nonmeditators *n* = 313). Path analysis models were used to examine the associations between the mindfulness facets, all candidate mediators and the outcome variables mental and physical health complaints. Additionally, a bootstrapping procedure was used to test the significance of the indirect effects. *Results*: Results showed that the associations between the mindfulness facets, the proposed mediators, and mental and physical health complaints were similar between students with and without meditation experience. Nonattachment and body awareness were the most important mediators. *Limitations*: Only self-report questionnaires were used in the study, and the majority of the sample was women and enrolled in health and social science studies. *Conclusion*: The results indicated that the investigation of mindfulness at the facet level is worthwhile. The study helps to clarify the associations between the mindfulness facets and mental as well as physical health among students with and without meditation experience. Further, mindfulness mediators should be examined in intervention studies.

Keywords: mindfulness, mental health, physical health, mediators, mediation analysis

3wRecent studies have found that rates of mental disorders (e.g., depression, anxiety disorders) increased among young adults in the last years (e.g., Auerbach et al., 2018; Eissler et al., 2020). Similar findings were reported for physical health problems (e.g., back pain; GBD, 2017; Ramdas & Jella, 2018). Numerous studies have found that such problems among university students can heighten the risk of drop-out, lower academic achievement, and lower study satisfaction (e.g., Litmanen et al., 2014; Stallman, 2010). Therefore, prevention strategies that promote healthy coping skills, as well as physical and mental health, are required on university campuses (Bai et al., 2020). There is good evidence that assets such as mindfulness can be beneficial for students' health (e.g., Halladay et al., 2019). Mindfulness is defined as the ability to maintain a moment-by-moment nonjudgmental awareness (Kabat-Zinn, 2003). Thus, mindfulness allows individuals to pay attention to both internal (e.g., bodily sensations, thoughts) and external (e.g., social interactions) stimuli and to observe those stimuli in a manner that does not evoke judgment (Glomb et al., 2011). Several studies have shown that trait mindfulness, as a general tendency to be mindful (Kiken et al., 2015; Medvedev et al., 2016), is linked to an array of mental and physical health outcomes among student samples (e.g., Baer et al., 2006; Bodenlos et al., 2015). Trait mindfulness had a positive effect on the reduction of physical symptoms, symptoms of anxiety and depression (e.g., Murphy et al., 2012; Webb et al., 2013). Moreover, systematic reviews and meta-analyses with a focus on student samples have reported that mindfulness, as well as physical and mental health, can be improved through mindfulness-based interventions (e.g., Bamber & Schneider, 2016; Halladay et al., 2019). Further, in a meta-analysis, Sedlmeier et al. (2018) found that meditation

experience had a positive impact on effect sizes. Several studies have shown that participants with meditation experience obtained higher scores on mindfulness, adaptive emotion regulation (e.g., reappraisal), attention, and well-being than participants without meditation experience (Badart et al., 2018; Josefsson et al., 2011; Roemer et al., 2009; Soler et al., 2014). Miyata et al. (2015) found that compared with nonmeditators, meditation practitioners had lower scores on depression, whereas Parmentier et al. (2019) showed that meditation practice did not reduce anxiety and depression directly but did affect both of them indirectly by fostering mindfulness.

Only a small number of studies have investigated the roles of the mindfulness facets in predicting mental and physical health among student samples. Five mindfulness facets have been identified, including acting with awareness (i.e., attending to present moment experiences), describing (i.e., labeling internal experiences in words), nonjudging (i.e., being nonevaluative toward thoughts and feelings), nonreactivity (i.e., letting thoughts and feelings to come and go without immediately reacting to them), and observing (i.e., noticing both internal and external experiences; Baer et al., 2006, 2008). Bodenlos et al. (2015) reported that these five facets of mindfulness were differentially related to health in a college student sample. They found that observing was negatively associated with physical health, whereas acting with awareness and nonjudging were positively related to emotional well-being. There was no association between describing and nonreactivity, and health outcomes. In contrast, Baer et al. (2008) showed that describing, nonjudging, nonreactivity, and acting with awareness were negatively related to physical and mental symptoms in a university student sample. Again, higher levels of observing were related to more psychological symptoms.

Although the association between mindfulness and various health outcomes has been well-studied, the underlying mechanisms are still not fully understood (Valikhani et al., 2019). Hölzel et al. (2011) proposed four mechanisms that may be responsible for the positive effects of mindfulness on health: attention regulation (i.e., focusing of attention on a chosen object and returning attention to the object, whenever distraction occurs), body awareness (i.e., the ability to notice subtle sensations like sensory experiences of breathing), emotion regulation (i.e., a wide range of strategies for altering emotional responses like reappraisal, rumination), and nonattachment (i.e., release from mental fixations). Only a few studies have investigated the mediating role of some of these variables among nonclinical samples. These studies focused on general mindfulness and mental health. For example, Coffey and Hartman (2008) investigated the two mediating variables emotion regulation strategies and nonattachment in a student sample. The authors found that both emotion regulation strategies and nonattachment significantly mediated the association between overall mindfulness and mental health. Moreover, Freudenthaler et al. (2017) found that emotion regulation partially mediated the relationship between overall mindfulness and depressive as well as anxiety symptoms among the general population, whereas the link between the mindfulness facet observe was fully mediated. In both studies, higher mindfulness was related to better emotion regulation, which in turn was linked to lower depressive and anxious symptomatology. So far, only two studies (Burzler et al., 2019; Tran et al., 2014) investigated the mediating role of these four variables, as proposed by Hölzel et al. (2011). The study of Tran et al. (2014) investigated the influences of these mediating variables on the relations between two higher factors of mindfulness, self-regulated attention and orientation to experience, and mental health among experienced meditators, whereas Burzler et al. (2019) examined these associations among the general population. In both studies, emotion regulation strategies, body awareness, and nonattachment were the key mediators through which mindfulness was associated with mental health. Differences were found in the direction and strength of some of these relations. Thus, Burzler et al. (2019) assume that meditation experience alters the strength and directions of these relationships, but not the mechanisms of mindfulness. However, none of the studies have examined the mediating role of these four variables to explain the relationships between the different mindfulness facets and mental as well as physical health.

Against this background, the role of meditation experience was investigated. We examined, first, whether there was a difference between meditating and nonmeditating university students' extent of mindfulness, attentional control, body awareness, emotion regulation, nonattachment, and mental as well as physical health complaints. Based on previous findings (e.g., Badart et al., 2018; Miyata et al., 2015; Roemer et al., 2009; Sedlmeier et al., 2018), we expected that students with meditation experience reported a higher level of mindfulness, attentional control, reappraisal, body awareness, nonattachment, and a lower level of mental and physical health problems, and rumination than students without meditation experience (Hypothesis 1). Second, we investigated the associations between the mindfulness facets, the proposed mediators, and mental and physical health complaints among meditating and nonmeditating students. Thus, a mediation path model with associations between the five mindfulness facets, the candidate mediators, and mental and physical health complaints was tested in a sample with meditation experience and a sample without meditation experience. We examined whether the relationship between the mindfulness facets, the proposed mediators, and mental and

physical health complaints were similar in both groups. According to previous results (e.g., Burzler et al., 2019; Tran et al., 2014), we hypothesized that mindfulness mediators would be the same between students with and without meditation experience (Hypothesis 2).

Method

Participants

Data of 508 students from different universities in Germany were used in this study. The majority were women (76.2%). The mean age of the students was 23.05 years (SD = 3.45). Sixty-two percent of students were undergraduate students. The majority of the students were enrolled in health and social science studies (61.6%, predominantly: psychology, medicine, social work, educational science, sociology), business studies (19.7%) or arts and media studies (9.4%). There was no significant difference between the different studies on meditation experience, $F(3, 493) = 0.48$, $p = .700$. However, a significant difference was found for age, $F(3, 493) = 10.04$, $p < .001$. Business science students were older than students who were enrolled in health and social science studies (business science: $M = 24.57$, $SD = 2.68$, health and social science studies: $M = 22.47$, $SD = 3.60$).

Procedure

Students were recruited in 2019 via universities' mailing lists, flyers, and social networking websites. They were asked to complete an online survey. The online survey contained an introductory page to the study, contact information of the researcher, and confirming of anonymous and voluntary participation. All procedures performed in the present study were approved by the Ethics Committee of the Friedrich-Schiller-University of Jena and in accordance with the ethical standards of the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Measures

Mindfulness

The Five-Facet Mindfulness Questionnaire (FFMQ-D; Michalak et al., 2016) is a 39-item scale assessing trait mindfulness on five subscales: Observe (e.g., "I notice the smells and aromas of things"), Describe (e.g., "Even when I'm feeling terribly upset, I can find a way to put it into words"), Acting with Awareness (e.g., reverse-scoring item: "When I do things, my mind wanders off and I'm easily distracted"), Nonjudging (e.g., reverse-scoring item: "I criticize myself for having irrational or inappropriate emotions"), and Nonreactivity (e.g., "I perceive my feelings and emotions without having to react to them"). Tran et al. (2014) and Burzler et al. (2019) used the same measure for assessing mindfulness. Participants responded to items on a 5-point Likert scale (1 = *never true*; 5 = *always true*). Cronbach's α for describing .88, observing .75, acting with awareness .83, nonjudging .90, and nonreactivity .84.

Mediators

Attentional control was measured with the Attentional Control Scale (Derryberry & Reed, 2002) consisting of 20 items. Participants rated items such as "My concentration is good even if there is music in the room around me" on a 4-point Likert scale (1 = *almost never*; 4 = *always*) with higher scores indicating greater attentional control. The internal consistency for the scale was .82.

Body awareness was assessed with the body awareness scale of the Scale of Body Connection (SBC; Price & Thompson, 2007), we used the same measure as Tran et al. (2014) and Burzler et al. (2019). This 12-item scale measures the ability to experience inner body sensations (i.e., tension, breathing). Participants responded to items such as "If there is tension in my body, I am aware of the tension" on a 5-point Likert scale (1 = *not at all*; 5 = *all of the time*) with higher scores indicating higher levels of body awareness. Cronbach's α was .86.

Nonattachment was measured with the 7-item Nonattachment Scale (Sahdra et al., 2015). We used the same measure as Tran et al. (2014) and Burzler et al. (2019) but the short-version of the Nonattachment Scale (Sahdra et al., 2015). Sahdra et al. (2015) defined nonattachment as a flexible and balanced way of relating to experiences without suppressing or clinging to such experiences. Items were rated on a 6-point Likert scale (1 = *disagree strongly*; 6 = *agree strongly*) with higher scores indicating greater nonattachment. Example items included, "When pleasant experiences end, I am fine on moving on to what comes next"; "I can let go of regrets and feelings of dissatisfaction about the past." Cronbach's α was .79.

Emotional regulation was assessed with reappraisal and rumination from the Heidelberg Form for Emotion Regulation Strategies (HFERST; Izadpanah et al., 2019). Reappraisal is defined as the reinterpretation of a stressful situation in a way that modulates one's emotional impact, whereas rumination is defined as the tendency to repetitively focusing on one's problems, concerns, and negative emotions (Hermann et al., 2017; Watkins, 2008). The items are scored on a 5-point Likert scale (1 = *never*; 5 = *always*) with higher scores indicating a more frequent use of the respective strategies. Example items of the subscales are as follows: reappraisal (4 items, e.g., "When I feel bad, I try to see the positive aspects of a situation"; α = .85),

and rumination (4 items, e.g., "I remember past conflicts often and think about what I could have done differently"; α = .74).

Mental and Physical Health Complaints

Mental health complaints were measured with a brief screening scale for anxiety and depression (PHQ-4; Löwe et al., 2010). Khubchandani et al. (2016) showed that the PHQ-4 is a reliable and valid screening instrument for depression and anxiety among students. This 4-item scale consists of two core criteria for depressive disorders (e.g., "Feeling down, depressed, or hopeless") and two core criteria for generalized anxiety disorder (e.g., "Feeling nervous, anxious, or on edge") (Kroenke et al., 2009). Items were rated on a 4-point Likert scale (1 = *not at all*; 4 = *nearly every day*) with higher scores indicating greater mental health complaints. The internal consistency for the scale was .91.

Physical health complaints were assessed with six items (e.g., headache, back pain, dizziness) that were adapted from a scale by Hurrelmann et al. (2003). Items were rated on a 4-point Likert scale (1 = *not at all*; 4 = *nearly every day*) with higher scores indicating greater physical health complaints. Cronbach's α was .78.

Meditation Experience

The practice of meditation was assessed with the following items: "Do you have meditation experience?" (also including meditation through yoga); "Since when do you meditate?" (year); "How many times a week do you meditate?" (number per week). One hundred ninety-five (38.4%) had meditation experience and meditated on average 2.03 (*SD* = 2.10) days per week. Forty-one percent of the students meditated for more than 2 years.

Statistical Analyses

All analyses were performed with the R statistical program (R version 4.0.2; R Core Team, 2020). First, multivariate and univariate analyses of variance (MANOVA, ANOVA) were conducted to compare the two groups (students with meditation experience and without meditation experience) on the different constructs included in the model. Second, multigroup path models were used to test if all candidate mediators (attentional control, body awareness, emotion regulation, nonattachment) mediated the associations between the mindfulness facets and the outcome variables mental and physical complaints. Mediation analysis was carried out with the lavaan package in R (Rosseel, 2012). Missing data were ranging from 4% for the measure of nonattachment and 12% for the measure of body awareness. In order to account for missing data, models were estimated with the Full-Information Maximum Likelihood (FIML). As data were not multivariate normal distributed

($W = 0.938$, $p < .001$), maximum likelihood estimation was applied with the Yuan-Bentler correction for the test statistics. The significance of the indirect effects was tested using a bootstrapping procedure and the estimation of 99% bootstrapped confidence intervals (CIs). Standard errors were estimated using a bootstrapping procedure. A model was specified where all parameter estimates were freely estimated in each group (*unconstrained model*). Next, we examined whether the model was equivalent in students with meditation experience and students without meditation experience. Therefore, a *constrained model* was specified where all path estimates were fixed to be invariant across the two groups. Several model indices were used to determine the goodness-of-fit of each model: the chi-square (χ^2) statistic with degrees of freedom, the chi-square index divided by the degrees of freedom (χ^2/df), the root mean square error of approximation (RMSEA), the comparative fit index (CFI), and the Tucker-Lewis-Index (TLI) (Schermelleh-Engel et al., 2003). For interpretation, a good fit is indicated by a χ^2/df index close or less than 2 (acceptable fit: ≤ 3), RMSEA values lower than .05 (acceptable fit: lower than .08), CFI and TLI values of .97 and higher (acceptable fit: $\geq .95$) (Schermelleh-Engel et al., 2003). The models were compared using the χ^2 difference test (Byrne, 2014), and the changes in CFI which is less sensitive to sample size than $\Delta\chi^2$ (Cheung & Rensvold, 2002). According to Cheung and Rensvold (2002), the cut-off value for ΔCFI is smaller than −.01.

Results

The descriptive statistics and correlations among the investigated variables are presented in Table 1.

MANOVA and ANOVA were conducted to compare groups with and without meditation experience on the investigated variables. Results from the MANOVA showed a significant effect of group, $V = .08$, $F(12, 434) = 3.23$, $p < .001$. Univariate analyses (ANOVAs) with Bonferroni-Holm correction showed significant group differences for the mindfulness facet observing, body awareness, and reappraisal (see Table 2). Students with meditation experience had a higher level of the mindfulness facet observing, and a higher level of body awareness and reappraisal than students without meditation experience.

We conducted a multigroup path analysis, to analyze the fit between the *unconstrained model* and the sample data. This model provided an acceptable fit to the data, at $\chi^2(10, n = 508) = 22.47$, $p = .013$, $\chi^2/df = 2.24$, RMSEA = .070 (90% [.032, .108]), CFI = .991, TLI = .895. Next, the *constrained model* was tested where the path estimates were fixed to be invariant across the two samples. This means that we examined whether the model was similar

Table 1. Descriptive statistics and bivariate correlations for students

Variables	1	2	3	4	5	6	7	8	9	10	11	12
1. Observing	1.00											
2. Describing	.28**	1.00										
3. Nonjudging	−.01	.24**	1.00									
4. ActAware	.06	.31**	.47**	1.00								
5. Nonreactivity	.23**	.22**	.29**	.18**	1.00							
6. AttenControl	.05	.36**	.33**	.47**	.40**	1.00						
7. Body awareness	.47**	.21**	.00	.05	.13*	.12*	1.00					
8. Nonattachment	.24**	.25**	.36**	.33**	.52**	.46**	.26**	1.00				
9. Rumination	.24**	−.06	−.40**	−.27**	−.29**	−.29**	.11*	−.25**	1.00			
10. Reappraisal	.26**	.24**	.22**	.17**	.51**	.31**	.30**	.43**	.02	1.00		
11. Mental Comp	−.04	−.22**	−.40**	−.43 **	−.27**	−.32**	.31**	−.34**	.19**	−.22**	1.00	
12. Physical Comp	−.02	−.17**	−.33**	−.31**	−.14**	−.25**	−.19**	−.24**	.24**	−.09*	.23**	1.00
M	27.55	27.57	25.78	25.34	20.48	41.53	35.63	29.89	14.44	12.71	6.40	11.28
SD	5.15	6.26	7.18	5.63	4.85	7.89	9.04	5.78	3.04	3.37	3.62	3.81

Note. n = 508. ActAware = acting with awareness; AttenControl = attentional control; Mental Comp = mental health complaints; Physical Comp = physical health complaints; M = mean; SD = standard deviation. $**p < .01$; $*p < .05$.

Table 2. Comparisons of meditating and nonmeditating students on the variables measured in this study

Variable	Meditators M (SD)	Nonmeditators M (SD)	F	p_{adj}	Cohen's d [95% CI]
Mindfulness facets					
Observing	28.47 (4.89)	26.71 (5.23)	12.53	.004	0.32 [0.13, 0.50]
Describing	28.27 (5.99)	27.04 (6.14)	4.29	.257	0.12 [−0.06, 0.30]
Acting with awareness	25.50 (5.81)	25.19 (5.65)	0.31	1.000	0.02 [−0.16, 0.20]
Nonjudging	26.88 (7.32)	25.11 (7.08)	6.36	.089	0.19 [0.01, 0.37]
Nonreactivity	20.78 (4.82)	20.31 (4.93)	1.06	1.000	0.07 [−0.11, 0.25]
Attentional control	42.42 (7.42)	40.89 (8.14)	3.96	.266	0.18 [−0.01, 0.37]
Body awareness	37.46 (8.90)	34.43 (8.94)	12.18	.004	0.34 [0.15, 0.53]
Emotion regulation					
Reappraisal	13.45 (3.27)	12.31 (3.40)	12.83	.004	0.35 [0.16, 0.54]
Rumination	14.32 (3.19)	14.54 (2.92)	0.47	1.000	0.06 [−0.25, 0.13]
Nonattachment	30.70 (5.42)	29.26 (5.92)	6.69	.085	0.19 [0.01, 0.37]
Mental health complaints	6.16 (3.51)	6.56 (3.78)	1.17	1.000	0.07 [−0.25, 0.12]
Physical health complaints	11.31 (3.86)	11.32 (3.80)	0.01	1.000	0.01 [−0.19, 0.18]

Note. Summary of ANOVA results; p_{adj} = p values adjusted for simultaneous inference by Bonferroni-holm method; CI = confidence intervals

for students with meditation experience and without meditation experience. According to the χ^2 difference test, the constrained model did not deteriorate the χ^2 significantly in comparison with the unconstrained model, $\Delta\chi^2(45, n = 508) = 53.26, p = .186$. The constrained model had a good fit to the data, at $\chi^2(55, n = 508) = 75.17, p = .037, \chi^2/df = 1.37$, RMSEA = .038 (90% CI [.013, .057]), CFI = .985, TLI = .969. Furthermore, the value of ΔCFI (ΔCFI = −.006) was smaller than the critical value, suggesting no significant differences between the two samples in respect to the path coefficients. Thus, the constrained model was used for the following analyses. Figure 1 and Table 3 display the path estimates for the constrained model. For students

with meditation experience and without meditation experience, the mindfulness facets observing, describing, acting with awareness, and nonreactivity had a significant effect on attentional control. Nonreactivity and acting with awareness were strongly associated with attentional control. However, attentional control was not a significant predictor of mental and physical health complaints. Observing had a significant positive effect on body awareness, and body awareness was a significant predictor of mental and physical health complaints. Notably, observing had the strongest association with body awareness compared to the other relations of observing. Further, observing, nonjudging, acting with awareness, and nonreactivity were related to
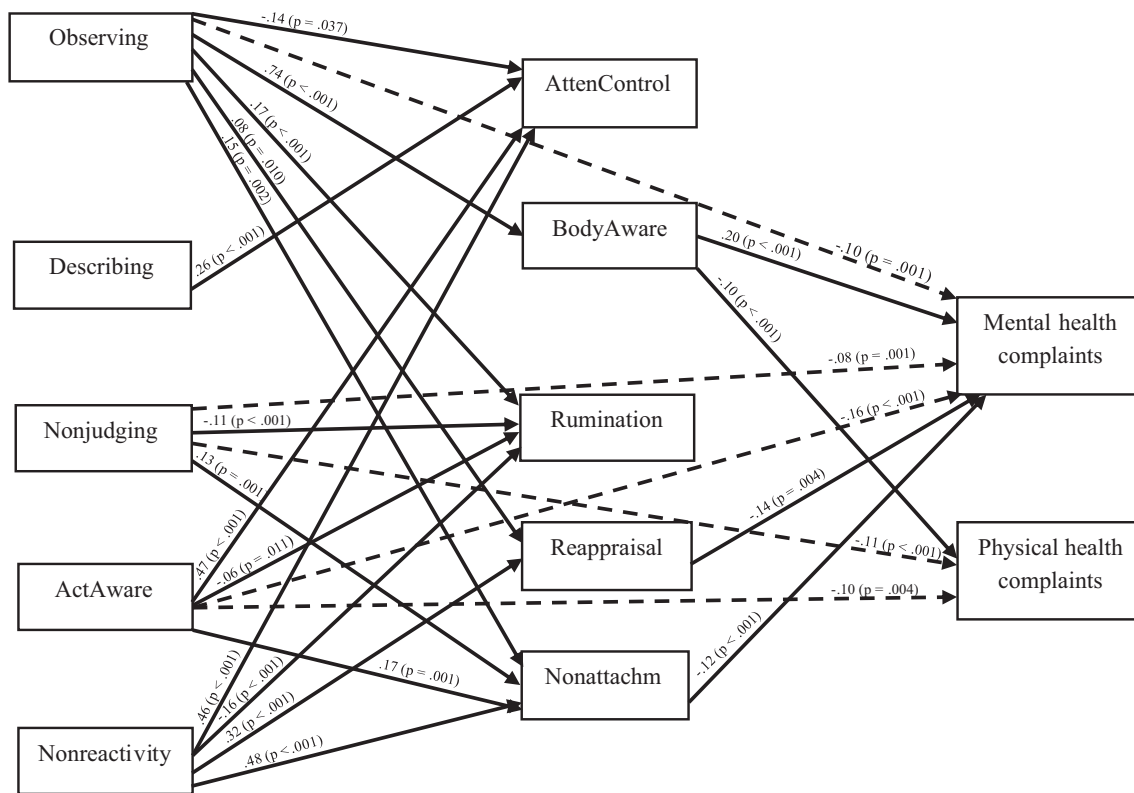
Figure 1. Path model (constrained) of the associations of mindfulness with mediators of mindfulness, and mental and physical complaints. The coefficients are standardized path coefficients. For reasons of clarity, *only significant paths* are shown. ActAware = acting with awareness; AttenControl = attentional control; BodyAware = Body awareness; Nonattachm = nonattachment.

rumination. The associations were of similar magnitude. However, rumination was no significant predictor of mental and physical health complaints. The mindfulness facets observing and nonreactivity were positively associated with reappraisal, which in turn was negatively associated with mental health complaints. Notably, nonreactivity had the strongest relation to reappraisal. In addition, observing, nonjudging, acting with awareness, and nonreactivity had a significant positive effect on nonattachment. Nonreactivity was strongly associated with nonattachment. There was a significant negative effect of nonattachment on mental health complaints. Furthermore, there were still direct effects of observing, nonjudging, and acting with awareness on mental and/or physical health complaints. Thus, the results indicate that the effects of acting with awareness and nonjudging on physical and mental health complaints as well as the effect of observing on mental health complaints were partially mediated. However, the effect of describing on mental health complaints was fully mediated.

Next, to test the indirect effects directly in the multivariate mediation model a bootstrapping approach was used. Significant indirect effects are presented in Table 4. Body awareness and nonattachment were significant mediators.

Body awareness was a significant mediator in the relationship between observing and mental health complaints as well as physical health complaints. The indirect effect for mental health complaints was positive via body awareness, while the indirect effect for physical health complaints was negative. Nonattachment mediated the effects of observing, nonjudging, acting with awareness, and nonreactivity on mental health complaints. The indirect effects on mental health complaints were negative.

Discussion

The present study aimed to determine whether there were differences between students with meditation experience and students without meditation experience on the investigated variables. Further, the study examined the relationships between the mindfulness facets, the proposed mediators, and the mental and physical health of these two groups. Our results only partially confirmed our first hypothesis. Compared with the students without meditation experience, meditating students reported significantly higher scores on the mindfulness facet observing, and higher scores on body awareness, and reappraisal. These

Table 3. Nonsignificant path coefficients of associations between mindfulness facets, mediators, and outcome variables mental and physical complaints

Regressions	Standardized path coefficients	p
Mental health complaints		
Attentional control	−.022	.290
Rumination	−.029	.601
Describing	−.035	.128
Nonreactivity	−.017	.625
Physical health complaints		
Attentional control	−.024	.390
Reappraisal	.075	.252
Observing	.052	.178
Describing	−.013	.659
Nonreactivity	.001	.884
Attentional control		
Nonjudgment	.043	.361
Body awareness		
Describing	.114	.115
Nonjudgment	−.040	.538
Acting with awareness	.000	1.000
Nonreactivity	.049	.606
Rumination		
Describing	.012	.553
Reappraisal		
Describing	.034	.172
Nonjudgment	.013	.543
Acting with awareness	.032	.274
Nonattachment		
Describing	.029	.430

Note. For reasons of clarity significant paths are shown in Figure 1 and nonsignificant paths are shown in this table.

findings are in line with the results of previous studies that reported higher scores on body awareness, and adaptive emotion regulation (e.g., reappraisal) (Cebolla et al., 2018; Roemer et al., 2009). However, our findings differ from those of Miyata et al. (2015), who found that meditators had lower scores on depression than nonmeditators. There were differences between the present study and the investigation of Miyata et al. (2015) in terms of the frequency of meditation practice, which could explain the different outcomes. The meditators in the study of Miyata et al. (2015) meditated every day, whereas the meditating students in our study meditated two times a week on average. Further, our results on mindfulness, except for observing, differ from those reported by Pang and Ruch (2019), who found that current meditators scored higher in all mindfulness facets than nonmeditators. However, most of the meditators in the study of Pang and Ruch (2019) meditated more days per week than our meditating students. Thus, the frequency of meditation practice may be a key

component. Further research should pay attention to the role of the frequency of meditation practice.

In line with our hypothesis and previous findings (Burzler et al., 2019; Tran et al., 2014), the relations between the mindfulness facets, the mediating variables, and mental and physical health complaints were similar between students with and without meditation experience. Particularly, we found that nonattachment and body awareness were the most important mediators. Nonattachment appeared to be of importance for the relations between the facets of mindfulness and mental health. Consistent with and extending previous findings (e.g., Tran et al., 2014), we found that higher levels of the mindfulness facets of observing, nonjudging, acting with awareness, and nonreactivity were related to higher nonattachment, which in turn was associated with lower mental health complaints. Notably, we found that nonreactivity was strongest associated with nonattachment. Coherently, previous studies (e.g., Sahdra et al., 2016) found that nonattachment was most closely associated with the nonreactivity facet of mindfulness in the FFMQ (Baer et al., 2006). Altogether, these findings point out that when taking a mindful stance toward experience, it is the ability to let go of the need to control that experience that has an impact on mental health (e.g., Whitehead et al., 2019). Noteworthy, it has been discussed that nonattachment can be developed through interventions that include meditation (e.g., mindfulness interventions) but it has also been assumed that any kind of practice (e.g., spiritual, psychotherapeutic, post-traumatic growth) that involves letting go of fixations can promote nonattachment (Sahdra et al., 2010; Whitehead et al., 2019). This needs further investigation in the future.

Body awareness mediated the effect of observing on mental health complaints. Study results showed that high levels of observing were related to higher levels of body awareness, which in turn were associated with heightened mental symptoms. Our findings differ from those of Quezada-Berumen et al. (2014), who found that observing was a positive predictor of body awareness among nonmeditators and meditators. However, body awareness was associated with less depression and anxiety but only in the meditator sample. Nevertheless, our results are in line with the findings of Bednar et al. (2020). They found that the factor which included body awareness and observing was significantly positively related to depression among meditators, and significantly positively associated with anxiety among nonmeditators. Notably, the meditators in the study of Bednar et al. (2020) had similar meditation experiences as the meditating students of our sample. Thus, future research should focus more on the role of the frequency of meditation practice. Another unexpected result of our study was that high levels of observing were related to higher levels of body awareness, which in turn were

Table 4. Indirect effects of mindfulness facets on mental and physical health complaints (bootstrap analysis, n = 1,000 bootstrap samples)

Independent variables	Mediator	Point estimate	99% CI
Mental health complaints			
Observing	Body awareness	.148	[.096, .208]
Observing	Nonattachment	−.017	[−.040, −.002]
Nonjudging	Nonattachment	−.015	[−.034, −.004]
Acting with awareness	Nonattachment	−.020	[−.045, −.004]
Nonreactivity	Nonattachment	−.056	[−.104, −.018]
Physical health complaints			
Observing	Body awareness	−.074	[−.122, −.037]

Note. Values are standardized coefficients. Effects are statistically significant because the 99% confidence interval (CI) does not include the value zero.

associated with lower physical symptoms. Rudkin et al. (2018), Bednar et al. (2020) as well as Baer et al. (2006) suggested that unexpected associations of the FFMQ Observing scale might be due to the similarity of item content of the observing scale and the SBC Body Awareness scale. Thus, further research should investigate the utility of other methods to assess mindfulness and the mechanisms of mindfulness (Bednar et al., 2020; Rudkin et al., 2018).

Attentional control and emotional regulation strategies were no significant mediators in our study. Similar findings for attentional control were reported in a study among nonmeditators by Burzler et al. (2019) and in a study among meditators by Tran et al. (2014), where attentional control was also no mediator for the link between mindfulness and mental health. Contrary to previous studies (e.g., Burzler et al., 2019; Tran et al., 2014) which have found that some emotion regulation strategies mediated the relationship between mindfulness and mental health among the general population and meditators, we found that reappraisal and rumination were no significant mediators. This could be due to methodological and conceptual differences. In the studies by Burzler et al. (2019) and Tran et al. (2014), the Difficulties in Emotion Regulation Scale (DERS, reverse-scored; Gratz & Roemer, 2004) was used to assess the ability in emotion regulation. Both studies found that acceptance of emotions, impulse control, assessment to emotion regulation strategies and emotional clarity were significant mediators, whereas emotional awareness and engaging in goal-directed behavior did not mediate the effect of mindfulness on mental health among meditators or nonmeditators. Thus, only certain emotion regulation strategies seem to be important for the link between mindfulness and mental health.

Limitations and Future Directions

When considering the findings of the current study, a number of limitations warrant mention. First, only self-report questionnaires were used in the current study that

limits the validity of the findings. Second, majority of the students were enrolled in health and social science studies and majority of the sample was women, which limits the generalizability of the results to other studies and men. Third, given the cross-sectional study design, causal associations between mindfulness facets, the mediating variables, and mental and physical health complaints cannot be concluded. Future studies should use a longitudinal or experimental approach to investigate the possible causal mechanisms that explain the relationship between the facets of mindfulness and physical and mental health.

In sum, the current study sheds further light on mediators of the relation between mindfulness facets and mental and physical health among students with and without meditation experience. Our results indicate that the investigation of mindfulness at the facet level is worthwhile. We found different associations between specific facets of mindfulness, the proposed mediators, and mental as well as physical health. Moreover, analyses of the current data revealed that the general pattern was similar for students with and without meditation experience. To investigate the possible causal role, the investigated mediators should be further examined in longitudinal and intervention studies.

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ORCID

Constance Karing
https://orcid.org/0000-0002-0107-3450

Constance Karing
Department of Research Synthesis, Intervention and Evaluation
Institute of Psychology
Friedrich-Schiller-University Jena
Humboldtstr. 26
07743 Jena
Germany
constance.karing@uni-jena.de