



Coping with COVID-19 – Longitudinal analysis of coping strategies and the role of trait mindfulness in mental well-being

Alexander Götmann^{*}, Myriam N. Bechtoldt

EBS Universität für Wirtschaft und Recht, Oestrich-Winkel, Germany

ARTICLE INFO

Keywords:
COVID-19
Coping
Trait mindfulness
Longitudinal
Well-being
Savoring

ABSTRACT

Policy interventions intended to fight COVID-19 forced people to cope with several restrictions on their personal freedom. The present work addressed the question of how people dealt with stressors during a lockdown period and investigated the role of trait mindfulness and its subcomponents in coping and mental well-being. We recruited a sample of 93 participants to study coping reactions using a multi-wave study over a period of two-months with 13 measurement points. Multilevel analysis revealed that engagement-related coping such as problem-solving was positively related to well-being; the opposite was true for disengagement coping such as blaming. The mindfulness facet orientation towards experience (being open and accepting experiences without judgment) was negatively related to disengagement coping, while the facet self-regulated attention (awareness of the present moment) was positively related to engagement coping. Self-regulated attention but not orientation towards experience was associated with savoring positive aspects of COVID-related changes over time. Engagement-related coping mediated the effects of trait mindfulness on well-being. The findings point to the differential effects of subcomponents of trait mindfulness in the context of coping and mental well-being. Further implications are discussed.

1. Introduction

Coronavirus disease (COVID-19) has led to unprecedented policy interventions that have not only affected health systems but also people's daily life (e.g. Flaxman et al., 2020). The present work addresses the question of how people coped with stressors during a lockdown period. Our research contributes to the emerging literature on psychological consequences of COVID-19 in the following ways. First, we analyze affective, cognitive, and behavioral coping responses to this historical pandemic over a time frame of two months and identify strategies that were more beneficial than others; second, to the best of our knowledge, we are among the first to examine the role of trait mindfulness and its facets, self-regulated attention and orientation towards experience, in the management of COVID-19. Both, the evaluation of coping strategies and the analysis of antecedents of effective coping such as mindfulness, have important implications, as both individuals and organizations may benefit from information on specific intervention options.

Mental well-being significantly declined during the early stages of the COVID-19 pandemic in Germany (Zacher & Rudolph, 2021) and

other European countries such as Austria (Pieh et al., 2020) and the United Kingdom (O'Connor et al., 2020). These effects were found in work- and family contexts (Möhring et al., 2020). Along with these studies we focused on subjective well-being (i.e. affective evaluation of emotional experiences) in contrast to objective well-being (i.e. material and social attributes of peoples' life circumstances) (see Dodge et al., 2012). Savoring is one specific ability that contributes to positive affect and mental well-being (Quoidbach et al., 2010) as it involves recalling or anticipating positive experiences (Bryant, 2003). We specifically highlight the role of trait mindfulness in the context of coping and mental well-being, demonstrating that individual dispositions play a crucial role in explaining psychological consequences of the pandemic (see Modersitzki et al., 2020).

Mindfulness is a higher-order construct that encompasses two facets (Creswell, 2017): awareness of the present moment (e.g. through bodily sensations) and an orientation towards experience, that is, an attitude characterized by curiosity, openness, and non-judgment. While these two components describe transient states, people differ in how often they are aware of the present moment and open to their present experiences; those who are more often and more strongly so achieve higher

^{*} Corresponding author.

E-mail addresses: alexander.goetmann@ebs.edu (A. Götmann), myriam.bechtoldt@ebs.edu (M.N. Bechtoldt).

<https://doi.org/10.1016/j.paid.2021.110695>

Received 5 October 2020; Received in revised form 7 January 2021; Accepted 22 January 2021

Available online 28 January 2021

0191-8869/© 2021 Elsevier Ltd. All rights reserved.

scores in trait mindfulness.

Meta-analytic evidence suggests that trait mindfulness is positively associated with subjective well-being and life satisfaction (Mesmer-Magnus et al., 2017). However, only recently scholars have started to investigate the different pathways through which the positive effects of mindfulness on well-being may arise. We hypothesize that coping styles mediate the effect of mindfulness on well-being (e.g. Finkelstein-Fox et al., 2019).

Coping is defined as “thoughts and behaviors that people use to manage the internal and external demands of situations that are appraised as stressful” (Folkman & Moskowitz, 2004, p. 746). Coping strategies differ in that they reflect exposure to or withdrawal from stressors (Carver & Connor-Smith, 2010). So-called engagement coping aims to deal with the stressor or the emotions associated with it, whereas disengagement coping aims to escape the stress or the emotions associated with the source of stress. Engagement coping in the context of COVID-19 may comprise strategies such as problem-solving (e.g. planning to organize home-schooling for children), while disengagement coping comprises strategies such as avoidance (e.g. attempts to avoid thoughts related to COVID-19), denial (e.g. deny the existence of the virus) and withdrawal (e.g. isolating oneself).

Previous research revealed a positive association between trait mindfulness and engagement coping responses, such as beneficial reinterpretation and acceptance, and a negative association of trait mindfulness with denial and mental disengagement (Weinstein et al., 2009). Being aware of the present moment, with an open and non-judgmental attitude towards one’s experiences, means that negative feelings and cognitions are not denied or labeled as ‘unwanted’; on the contrary “they are welcomed into awareness and allowed to diminish as other experiences enter awareness.” (Lindsay & Creswell, 2017, p. 50). Thus, the attitude of orientation towards experience does not represent a state of passive resignation but rather an active one – a gentle invitation to experiences, even difficult ones. Also, the process of decentering (i.e. observing thoughts and feelings as arising events instead of personally identifying with them) is a core mechanism in mindfulness (Hayes-Skelton & Graham, 2013). Therefore, we hypothesized that mindfulness positively relates to engagement- and negatively relates to disengagement coping.

Hypothesis 1. Trait mindfulness was positively (negatively) related to engagement (disengagement) coping during the COVID-19 crisis.

While numerous coping strategies exist in the literature, the distinction between engagement and disengagement coping appears “to have greatest importance” (Carver & Connor-Smith, 2010, p. 687), as empirical evidence suggests that engagement coping typically predicts better physical and mental health, whereas disengagement coping typically predicts poorer outcomes (Compas et al., 2001). More specifically, previous empirical research found that coping focused on primary control (e.g. problem-solving, planning) and secondary control (e.g. acceptance and positive reappraisal) are associated with less psychological distress (Folkman & Moskowitz, 2004), while strategies focused on disengagement (e.g. avoidance of the situation) are associated with higher psychological distress (Litman & Lunsford, 2009). We therefore hypothesized:

Hypothesis 2. Engagement (disengagement) coping strategies were positively (negatively) related to mental well-being during the COVID-19 crisis.

Based on Hypotheses 1 and 2 we derived a mediation hypothesis, arguing that coping mediates the association between trait mindfulness and well-being: Previous research indicated that participants who attended a mindfulness training reported in a six-year follow-up study higher levels of well-being along with decreases in avoidance coping and increases in problem-focused coping (De Vibe et al., 2018). Thus, participants scoring high in trait mindfulness are more likely to observe thoughts and emotions as they occur (i.e. in the present moment) instead

of engaging in past- or future-oriented negative or distorted thinking patterns (e.g. rumination, thought suppression) (Weinstein et al., 2009). Being in the present moment allows for a fuller level of attention during stressful experiences, which is essential for effective regulatory processes (Larsen, 2000).

Hypothesis 3. Engagement (disengagement) coping positively (negatively) mediates the effects of trait mindfulness on well-being.

We additionally explored whether either of the two mindfulness facets (self-regulated attention and orientation towards experience) would be more significant. To identify the specific impact of mindfulness on coping and well-being, we controlled for both dispositional resilience and depressive mood. Resilience comprises positive self-convictions to be able to master stress and the ability to adapt to adverse circumstances (Comas-Díaz et al., 2018). As such it is different from mindfulness, which comprises non-judgmental attention to the here and now. Previous studies found a moderately high association between trait mindfulness and resilience (Montero-Marin et al., 2015). About 12–32% of the population in developed countries suffer from negative mood states and emotional dysregulation that impair mental well-being and increase stress (Haller et al., 2014). Meta-analytic evidence suggests a strong negative relationship between trait mindfulness and depression (Mesmer-Magnus et al., 2017). We therefore additionally controlled for non-clinical depressive mood.

2. Method

2.1. Participants and procedure

The investigation period of our research project covered two months and started on March 26, 2020, just days after the German federal and state governments initiated the first lockdown for its citizens with several severe and unprecedented restrictions of private and public life: People were encouraged to reduce contact with people outside their own household, meetings of more than two people outside the same household were banned in public spaces, non-essential businesses had to close, holiday travel was prohibited and borders partially closed. By then, there had been a total of 18,610 confirmed COVID-19 cases and 55 deaths in Germany (RKI, 2020, March 22).

From the end of March until the end of April, participants received every four days an online link that asked them to fill out a questionnaire of about 5 min length. As at the end of April several restrictions were lifted in Germany, we extended the intervals between measurements to a maximum of eight days in May. The final assessment was conducted on May 29, 2020. Of the total 13 measurement points, participants finalized on average 6.6 questionnaires ($Mdn = 7$; $SD = 4.19$). The first survey assessed trait mindfulness, trait resilience, depressive mood, and demographics (see details in Measures), and the subsequent surveys each assessed coping, well-being, and savoring.

Students, employees, and alumni of a private business school located in Germany were invited by email to participate in a study on COVID-19. We aimed at a sample size of close to 100 participants given that comparable empirical studies investigating the role of mindfulness, coping and emotional well-being used sample sizes between 65 and 157 participants (e.g. Finkelstein-Fox et al., 2019; Weinstein et al., 2009). All instruments for the study were administered in English to avoid exclusions of participants due to language issues.¹ Participation in this study was voluntary and each participant signed an informed consent upfront to study participation. In total, 106 participants registered via an online-link for this research project, of whom 93 (59% female) completed the initial assessment. The remaining 13 individuals did not respond to the

¹ Since the language of teaching and working at the Business School is English, participants in this study had the necessary language skills to participate in the surveys.

initial assessment questionnaire and did not further participate.

Participants' age was between 18 and 65 ($M = 33.93$ years; $SD = 12.99$). The sample comprised 36 students (38.7%), 35 alumni (37.6%), and 22 university employees (23.7%).

2.2. Measures

2.2.1. Trait mindfulness

We used a short form of the Five Facets of Mindfulness Questionnaire Scale (FFMQ) with 20 items adapted from Baer et al. (2006), which together constitute two dimensions of mindfulness: self-regulated attention and orientation towards experience (Tran et al., 2013). The response scale ranged from 1 (never or very rarely true) to 6 (very often or always true). *Self-regulated attention* ($\alpha = 0.74$) comprised three facets: *observing* (e.g. "I pay attention to sensations, such as the wind in my hair or sun on my face"), *describing* (e.g. "I can usually describe how I feel at the moment in considerable detail.") and *non-reacting* (e.g. "When I have distressing thoughts or images, I feel calm soon after."). *Orientation towards experience* ($\alpha = 0.79$) consisted of two facets: *acting with awareness* (e.g. "I find it difficult to stay focused on what's happening in the present."; reversed) and *non-judging* (e.g. "When I have distressing thoughts or images, I judge myself as good or bad, depending what the thought/image is about."; reversed).

2.2.2. Coping

We measured coping strategies with 9 items adapted from Perrez and Reicherts (1992); all items are listed in Table 1.

The instruction read "Think about the area in your life where you have noticed the most significant changes due to COVID-19 during the past few days. Think about a specific situation. How did you deal with this situation?" The scale ranged from 1 (not at all) to 6 (very often). We factor analyzed the responses to derive coping strategies since even samples with below 100 participants yield stable results if communalities are consistently high (>0.6) (MacCallum et al., 1999; see Appendix A for details). Table 1 shows the pattern matrix, standardized loadings, and the communalities for each item.

The first coping dimension was *problem-solving*, which represented engagement coping responses and consisted of the following two items: "I made clear to myself what is at stake and what I should do." and "I got my emotions under control by perceiving the emotions without letting them overwhelm me." Factor loadings were >0.80 with an internal consistency of $\alpha = 0.72$.² The second dimension was *distraction & denial*, which represented disengagement coping and consisted of three items, e.g.: "I faded out, stopped paying attention or looked for distractions". Factor loadings ranged from 0.72 to 0.85, with an internal consistency of $\alpha = 0.73$. The third dimension was *blaming*, which also represented disengagement coping and consisted of two items denoting blaming others or oneself. Factor loadings were $>.80$ with an internal consistency of $\alpha = 0.74$.

2.2.3. Well-being

Participants described their well-being with two bipolar items from Wilhelm and Schoebi (2007): *discontent* versus *content*, and *unwell* versus *well* (6-point scale; $\alpha = 0.81$).

Savoring. To complement the well-being measure, we also openly asked participants about positive aspects of the changes caused by COVID-19: At the beginning, the middle, and at the end of the research study (early April, end of April, and end of May) participants responded to the open question "What, if anything, did you appreciate about your current way of life during the past few days?". Approximately half of the participants provided written answers and made in total 355 comments. The largest category was *personal life* (56.7% of all comments, e.g. being

healthy, more time for hobbies), followed by *family life* (27%, e.g. more time with children) and *work* (16.3%, e.g. less commuting due to home office).

2.2.4. Control variables

We measured *resilience* with the four-item scale of Connor and Davidson (2003) (e.g. "I can achieve goals despite obstacles" ($\alpha = 0.78$)) and *depressive mood* with the four-item scale of Kroenke et al. (2001), e.g. "Little interest or pleasure in doing things." ($\alpha = 0.68$). The scales ranged from 1 (strongly disagree) to 6 (strongly agree).

2.3. Analytical strategy

To investigate the effects of trait mindfulness on coping strategies and well-being we performed multilevel analyses with the lme4 package in R (Bates et al., 2015). We applied hierarchical linear modeling with two levels (time, coping and well-being nested in persons); level 1 variables (e.g. coping) reflect variation within participants, while level 2 predictors (e.g. mindfulness) describe variation between participants. We introduced coping also on level 2 to be able to decompose within and between participants' effects (see Schunck, 2013). Predictors on level 1 (level 2) were person-mean centered (grand-mean centered). We used Multilevel Structural Equation Modeling (MSEM) with lavaan (Rosseel, 2012) to assess multilevel mediation.

3. Results

Table 2 presents descriptive statistics and intercorrelations between study variables aggregated across measurement points.

Age was positively correlated with distraction & denial ($r = 0.23$, $p < 0.05$), and women reported less self-regulated attention than men ($r = -0.33$, $p < 0.01$). Furthermore, trait resilience ($r = 0.39$, $p < 0.01$) and depressive mood ($r = -0.33$, $p < 0.01$) were significantly related to orientation towards experience. Students reported lower trait mindfulness ($r = -0.31$, $p < 0.01$), while alumni reported higher trait mindfulness ($r = 0.24$, $p < 0.05$). Employees engaged more in savoring ($r = 0.27$, $p < 0.05$). Accordingly, we controlled for role (students/alumni/employees), gender, and age in addition to trait resilience and depressive mood for our analysis. We also controlled for measurement points to capture time-related fluctuations of well-being and coping over the course of the pandemic.

Notably, trait mindfulness was not only positively correlated with mental well-being ($r = 0.23$, $p < 0.05$) but also with savoring ($r = 0.35$, $p < 0.01$): People scoring high on mindfulness mentioned more positive aspects about changes related to COVID-19. The positive association was due to self-regulated attention ($r = 0.41$, $p < 0.01$) but not orientation to experience ($r = 0.08$, ns.). Regressing savoring on self-regulated attention and orientation towards experience while controlling for the above mentioned variables, we found a significant positive effect of self-regulated attention ($b = 1.15$, $SE = 0.21$, $p < 0.001$) and a significant negative relationship with orientation towards experience ($b = 0.48$, $SE = 0.15$, $p = 0.002$). This result confirms the observation from the correlation analysis.

To formally test Hypothesis 1, we regressed engagement coping (problem-solving) and disengagement coping (distraction & denial, blaming) on trait mindfulness and the two facets of trait mindfulness, respectively. Table 3 displays the results.

Above and beyond the effects of time and other control variables³ described above, we found a significant positive effect of trait mindfulness on the coping strategy problem-solving ($b = 0.60$, $SE = 0.17$, $p < 0.001$). The positive effect was driven by the facet self-regulated

² Cronbach's Alpha values for repeated measures (coping and mental well-being) were derived from the average aggregated scores over time.

³ We report all analysis for Hypothesis 1 also without the control variables in Table A1 in the Appendix A. We found no major differences between the models regarding the effects of mindfulness on coping strategies.

Table 1

Pattern matrix of principal component analysis (PCA) with oblique rotation for coping dimensions.

	No.	Item	Problem-solving	Distraction & Denial	Blaming
			Factor loadings		Communalities
Engagement coping	1.	... I made clear to myself what is at stake and what I should do.	0.825		0.769
	2.	... I got my emotions under control by perceiving the emotions without letting them overwhelm me.	0.867		0.642
Disengagement coping	3.	... I tried to withdraw from the situation.		0.845	0.734
	4.	... I faded out, stopped paying attention or looked for distractions.		0.815	0.760
	5.	... I behaved passively or waited for something to happen.		0.721	0.534
	6.	... I suppressed my emotions.		0.547	0.329
	7.	... I blamed or reproached others for the situation, took my frustration out on them.			0.663
	8.	... I blamed or reproached myself for the situation.			0.811
	9.	... I got my emotions under control by drinking alcohol or smoking.			0.443

Note. Item 6 and 9 were excluded from further analyses due to low factor loadings and the cross-loading of item 6.

attention ($b = 0.61$, $SE = 0.12$, $p < 0.001$) while orientation towards experience had no effect on the coping strategy problem-solving ($b = -0.02$, $SE = 0.10$, $p = 0.864$).

While we found no effect of trait mindfulness ($b = -0.30$, $SE = 0.19$, $p = 0.123$) on the disengagement coping strategy distraction and denial, orientation towards experience had a negative, marginally significant relationship with this coping strategy ($b = -0.24$, $SE = 0.12$, $p = 0.053$). Trait mindfulness was negatively related to the disengagement coping strategy blaming ($b = -0.53$, $SE = 0.18$, $p = 0.003$). This effect was mainly associated with the trait mindfulness facet orientation towards experience ($b = -0.30$, $SE = 0.11$, $p = 0.009$) but not self-regulated attention ($b = -0.24$, $SE = 0.14$, $p = 0.087$).

Thus, people with high scores in orientation towards experience reported that they less often used coping strategies involving distraction and denial as well as blaming oneself or others for the circumstances. In sum, our results indicate that trait mindfulness played an important role in explaining coping styles; self-regulated attention predicted more engagement coping (i.e. problem-solving), whereas orientation towards experience predicted less disengagement coping (i.e. distraction, denial and blaming).

To test [Hypothesis 2](#), we regressed well-being on between-participants effects of coping while controlling for within-participants' effects of time and coping (Level 1) and several control variables such as depressive mood.⁴ [Table 4](#) displays the results.

In accordance with our hypothesis, people who reported using problem-solving more than other participants had higher levels of well-being ($b = 0.32$, $SE = 0.09$, $p = 0.001$). Moreover and as expected, we found a negative relationship between the disengagement coping strategy blaming and well-being ($b = -0.18$, $SE = 0.09$, $p = 0.050$). However, we found no evidence that the disengagement coping strategy distraction and denial influenced well-being ($b = -0.05$, $SE = 0.08$, $p = 0.509$). Overall, the results support the hypothesized positive relationship between engagement coping and well-being, and they partially support the expected negative association between disengagement coping and well-being.

To test [Hypothesis 3](#), we used multilevel mediation modeling. As displayed in [Fig. 1](#), trait mindfulness positively predicted problem-solving and negatively predicted disengagement coping. Furthermore and as expected, problem-solving mediated the effect of trait mindfulness on well-being ($b = 0.21$, $SE = 0.08$, $p = 0.005$); the two disengagement coping strategies distraction and denial ($b = 0.03$, $SE = 0.04$, $p = 0.49$) and blaming ($b = 0.10$, $SE = 0.05$, $p = 0.07$) did not mediate the effect of mindfulness. Similar results occurred when using the two

facets of trait mindfulness: There was a significant indirect effect of self-regulated attention on well-being via problem-solving ($b = 0.18$, $SE = 0.07$, $p = 0.006$), but no effect via distraction and denial ($b = 0.01$, $SE = 0.01$, $p = 0.646$) and blaming ($b = 0.03$, $SE = 0.03$, $p = 0.329$). As displayed in [Fig. 1c](#) we found no significant indirect effect of the trait mindfulness facet orientation towards experience on well-being. In sum, our results provided partial support for the hypothesized effect: We found evidence that engagement coping positively mediated the effects of trait mindfulness on well-being.

4. Discussion

For most people in the Western hemisphere, COVID-19 has led to unprecedented changes and restrictions of personal freedom. We used a longitudinal multi-wave study design with 13 measurement points to understand how people dealt with these changes and which dispositional resources predicted higher well-being over a time frame of two months.

First, we showed that mindfulness predicted more savoring: Amid severe restrictions limiting their personal freedom, people scoring high on trait mindfulness were able to identify more positive aspects of the changes imposed on them due to COVID-19. These findings are in line with recent empirical evidence that trait mindfulness seems to protect individuals against psychological distress caused by COVID-19 social distancing and quarantining ([Conversano et al., 2020](#)).

Second, we showed that the coping strategy problem solving positively predicted higher well-being during a lockdown period, whereas blaming did the opposite; there were no effects of distraction and denial. These non-effects might also be due to the study period, which spanned eight weeks. Future research should analyze the effects of distraction and denial over a longer period than two months to inspect long-term effects.

Third, we showed that mindfulness predicts coping, and we furthermore disentangled the differential effects of the two facets of trait mindfulness: Self-regulated attention positively predicted engagement coping, whereas orientation towards experience was negatively associated with disengagement coping. The latter finding is in line with previous mindfulness research from clinical psychology that established the notion that in particular orientation towards experience was responsible for lower levels of depression and anxiety and had strong negative relationships with substance use ([Carpenter et al., 2019](#)).

Finally, we found that the effects of self-regulated attention on well-being were mediated by engagement coping. It seems that more mindful individuals are more likely to choose adaptive coping responses such as problem-solving, which in turn contribute to higher levels of well-being. These findings complement previous research that found present-moment awareness to facilitate adaptive stress responses independent of individual affective states and the severity of experienced threat

⁴ We report all analysis for [Hypothesis 2](#) with (Model 4a) and without the two control variables trait resilience and depressive mood (Model 4b). We found no major differences regarding the effects of coping strategies on well-being.

Table 2
Means, standard deviations, and intercorrelations of study variables.

No.	Variable	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Demographics																		
1.	Age	33.93	12.99															
2.	Gender ^a	0.41	0.50	−0.01														
3.	Children ^b	0.32	0.47	0.63**	0.12													
4.	Employee ^c	0.23	0.43	0.37**	−0.21*	0.27**												
5.	Alumni ^c	0.37	0.49	0.38**	0.20	0.28**	−0.43**											
6.	Students ^c	0.38	0.49	−0.72**	0.00	−0.49**	−0.44**	−0.61**										
Coping outcomes																		
7.	Well-being	4.58	0.72	0.14	0.02	0.16	0.09	0.04	−0.07									
8.	Savoring	2.97	2.75	−0.02	0.05	−0.10	0.27*	−0.02	−0.25	0.16								
Coping dimensions																		
9.	Problem- solving	4.48	0.78	0.09	−0.05	0.00	0.06	0.04	−0.10	0.33**	0.34**							
10.	Distraction & Denial	2.65	0.82	−0.23*	−0.05	−0.19	−0.06	−0.18	0.24*	−0.34**	−0.22	−0.22*						
11.	Blaming	1.88	0.76	−0.18	−0.16	−0.02	−0.10	−0.02	0.11	−0.37**	−0.39**	−0.25*	0.34**					
Mindfulness																		
12.	Trait mindfulness	4.30	0.48	0.27**	−0.17	0.23*	0.06	0.24*	−0.31**	0.23*	0.35**	0.47**	−0.27*	−0.35**				
13.	Self-regulated attention	4.25	0.62	0.17	−0.33**	0.09	0.13	0.17	−0.29**	0.10	0.41**	0.50**	−0.07	−0.12	0.79**			
14.	Orientation towards experience	4.37	0.73	0.24*	0.14	0.28**	−0.06	0.17	−0.14	0.26*	0.08	0.13	−0.36**	−0.42**	0.64**	0.04		
Controls																		
15.	Trait resilience	4.99	0.65	−0.03	0.17	−0.01	−0.08	0.10	−0.03	0.24*	0.23	0.34**	−0.18	−0.30**	0.40**	0.21*	0.39**	
16.	Depressive mood	2.13	0.85	−0.40**	−0.05	−0.33**	−0.15	−0.28**	0.41**	−0.41**	−0.09	−0.11	0.37**	0.32**	−0.15	0.06	−0.33**	−0.08

^a Gender coded 1 for “male” and 0 for “female”.

^b Children coded 1 for “yes” and 0 for “no”.

^c Role: 1 for “yes”, 0 for “no”.

* $p < 0.05$, two-tailed.

** $p < 0.01$, two-tailed.

Table 3
Multilevel regression of engagement- and disengagement coping on trait mindfulness.

			Coping strategies																							
			(1) Problem-solving								(2) Distraction & Denial								(3) Blaming							
			Model 1a				Model 1b				Model 2a				Model 2b				Model 3a				Model 3b			
			b	SE	t	p	b	SE	t	p	b	SE	t	p	b	SE	t	p	b	SE	t	p	b	SE	t	p
	Predictor																									
	Intercept	4.48	0.35	12.94	<0.001	4.29	0.33	12.92	<0.001	2.69	0.40	6.76	<0.001	2.60	0.40	6.42	<0.001	2.34	0.36	6.42	<0.001	2.28	0.37	6.12	<0.001	
Level 1	Time ^a	0.02	0.01	2.77	0.006	0.02	0.01	2.76	0.006	−0.01	0.01	−2.32	0.020	−0.01	0.01	−2.33	0.020	−0.01	0.01	−1.48	0.139	−0.01	0.01	−1.48	0.138	
Level 2	Mindfulness	0.60	0.17	3.57	<0.001					−0.30	0.19	−1.54	0.123					−0.53	0.18	−3.00	0.003					
	- Self-regulated attention					0.61	0.12	4.96	<0.001					−0.06	0.15	−0.41	0.682					−0.24	0.14	−1.71	0.087	
	- Orientation towards experience					−0.02	0.10	−0.17	0.864					−0.24	0.12	−1.93	0.053					−0.30	0.11	−2.60	0.009	
	Controls																									
	Age	−0.00	0.01	−0.29	0.770	0.00	0.01	0.02	0.983	0.00	0.01	0.02	0.982	0.00	0.01	0.16	0.875	−0.00	0.01	−0.18	0.856	−0.00	0.01	−0.08	0.938	
	Gender ^b	0.02	0.15	0.14	0.889	0.17	0.15	1.12	0.261	−0.10	0.18	−0.56	0.575	−0.03	0.18	−0.16	0.873	−0.36	0.16	−2.22	0.027	−0.31	0.17	−1.82	0.069	
	Student ^c	0.05	0.23	0.21	0.832	0.16	0.22	0.76	0.449	0.08	0.26	0.29	0.771	0.13	0.27	0.50	0.614	−0.31	0.24	−1.30	0.192	−0.27	0.24	−1.12	0.264	
	Employee ^c	0.12	0.18	0.68	0.496	0.08	0.17	0.49	0.622	−0.02	0.21	−0.08	0.938	−0.03	0.21	−0.16	0.876	−0.31	0.19	−1.63	0.103	−0.33	0.19	−1.69	0.092	
	Depressive mood	−0.05	0.09	−0.57	0.572	−0.13	0.09	−1.52	0.129	0.30	0.10	2.91	0.004	0.26	0.11	2.42	0.016	0.27	0.09	2.91	0.004	0.25	0.10	2.50	0.013	
	Trait resilience	0.22	0.13	1.63	0.103	0.26	0.13	2.04	0.042	−0.15	0.15	−0.97	0.333	−0.13	0.15	−0.83	0.405	−0.16	0.14	−1.11	0.266	−0.14	0.14	−1.01	0.315	
ICC		0.58				0.58				0.655				0.65				0.62				0.62				
Marginal R ²		0.176				0.228				0.150				0.159				0.201				0.205				
Observations L1/L2		84/491				84/491				84/491				84/491				84/491				84/491				

Note. Level 1 = within-participants predictors; Level 2 = between-participants predictors. ICC = intraclass correlation coefficient.

^a Time refers to the 13 measurement points in the study.

^b Gender coded 1 for “male” and 0 for “female”.

^c Participant status: 1 for “yes” 0 for “no”.

Table 4
Multilevel regression analysis of well-being over time on coping strategies and trait mindfulness.

		Well-being							
		Model 4a				Model 4b			
	Predictor	b	SE	t	p	b	SE	t	p
	Intercept	4.13	0.29	14.50	<0.001	4.21	0.27	15.54	<0.001
Level 1	Time ^a	−0.00	0.01	−0.00	0.999	−0.00	0.01	−0.06	0.950
	Problem solving	0.11	0.07	1.54	0.124	0.11	0.07	1.55	0.122
	Distraction & denial	−0.13	0.07	−1.69	0.091	−0.13	0.07	−1.70	0.089
	Blaming	−0.04	0.07	−0.59	0.558	−0.04	0.07	−0.59	0.557
	Problem solving	0.31	0.09	3.57	<0.001	0.32	0.09	3.68	<0.001
	Distraction & Denial	−0.13	0.08	−1.50	0.133	−0.06	0.08	−0.68	0.494
	Blaming	−0.26	0.09	−2.96	0.003	−0.19	0.09	−2.25	0.024
Level 2	Age	0.02	0.01	2.61	0.009	0.01	0.01	2.06	0.040
	Gender ^b	−0.10	0.12	−0.86	0.390	−0.07	0.11	−0.61	0.541
	Student ^c	0.27	0.18	1.46	0.143	0.35	0.17	2.02	0.043
	Employee ^c	−0.12	0.15	−0.82	0.411	−0.08	0.14	−0.55	0.580
	Depressive mood					−0.25	0.07	−3.41	0.001
	Trait resilience					0.05	0.10	0.51	0.612
ICC		0.34				0.34			
Marginal R ²		0.18				0.22			
Observations L1/L2		84/491				84/491			

Note. Level 1 = within-participants predictors; Level 2 = between-participants predictors. ICC = intraclass correlation coefficient.

^a Time refers to the 13 measurement points in the study;

^b Gender coded 1 for “male” and 0 for “female”.

^c Group status: 1 for “yes” 0 for “no”.

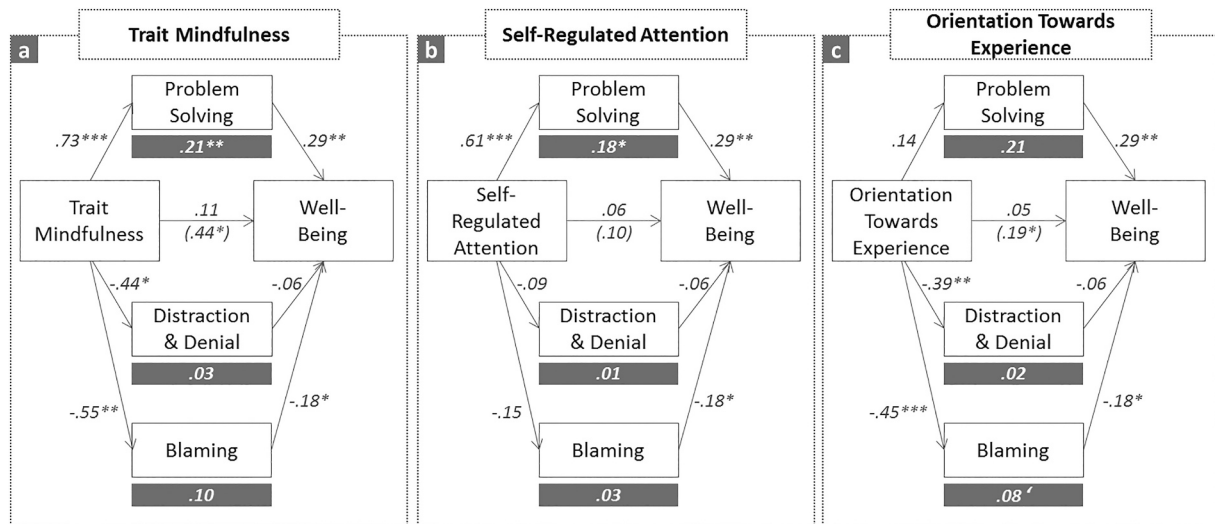


Fig. 1. Mediation model linking trait mindfulness, (dis)engagement coping and well-being. Path values represent unstandardized coefficients. Values in parentheses represent the total effect of trait mindfulness (facets of trait mindfulness) on well-being. Values in grey boxes represent the indirect effects of trait mindfulness (facets of trait mindfulness) on well-being via (dis)engagement coping. * $p < 0.10$. ** $p < 0.05$. *** $p < 0.01$. **** $p < 0.001$.

(Donald et al., 2016). The positive effect of mindfulness on well-being thus works through active engagement-coping, but not through disengagement-coping. Thus, to feel well, one must actively engage in coping with stressors; it is not enough to simply not use less functional strategies.

4.1. Theoretical and practical implications

Our work has both theoretical and practical implications. The results highlight the importance to differentiate facets of trait mindfulness in future research, as they have differential effects on emotional dynamics, coping, and well-being. We propose trait mindfulness as a potential antecedent of engagement coping that may be fruitful for further investigations in the context of research on coping and well-being.

Our paper is of practical importance, as dealing with stress and hardships during times of a pandemic is challenging for individuals and institutions alike. We show that non-judgmental, focused attention, a core facet of mindfulness, helped people savor the positive aspects of changes brought about by COVID-19. In this way, practicing mindfulness has similar effects to cognitive reappraisal (Lazarus & Folkman, 1984). But whereas cognitive reappraisal helps reinterpret individual events, practicing mindfulness seems to cultivate a positive attitude towards events and change in general – a beneficial effect that goes beyond cognitive reappraisal. Furthermore, self-regulated attention predicted a problem-solving approach to dealing with stressors that in turn increased mental well-being. As mindfulness is a disposition that increases through regular practice (e.g. meditation), we recommend that organizations offer such programs or at least inform employees about

existing training formats or phone applications (e.g. Calm) to aid with valuable tools for influencing coping responses and increasing mental well-being.

4.2. Limitations and recommendations for future research

Our research design used self-reports of participants. While standard practice in psychological research, responses of participants regarding their recall of emotions are known to be partly biased (Conner & Barrett, 2012). However, we addressed this challenge explicitly by asking participants to recall aspects that were important and relevant to them. Empirical evidence suggests that personal relevance reduces recall bias, in particular for negative emotions (Ottenstein & Lischetzke, 2020). We also incorporated a longitudinal research design with several measurement points to minimize common method variance associated with designs that rely on cross-sectional data.

Although our sample size was small, simulation studies on multilevel modeling demonstrated that a sample size of more than 50 participants on level 2 leads variance components and standard errors to be unbiased and accurate (Maas & Hox, 2005).

Also, further research is needed to investigate moderator effects. For example, future research might investigate to what extent our findings would hold with people from non-academic backgrounds or with non-permanent employment contracts (e.g. freelancers), as economic conditions (e.g. job security) may be important moderators for dealing with adversity and stressful situations.

4.3. Conclusion

The present work contributes to the emerging literature on psychological reactions to the COVID-19 pandemic. We show that acceptance of the associated uncertainties and restrictions on personal freedom significantly help to cope with them. Cultivating this attitude is possible through self-directed practice. This insight may be of value for decision- and policy-makers implementing health programs (not only) in times of a pandemic.

CRedit authorship contribution statement

Alexander Götmann: Conceptualization, Methodology, Software, Formal analysis, Investigation, Resources, Data curation, Writing – original draft, Writing – review & editing, Visualization. **Myriam N. Bechtoldt:** Conceptualization, Methodology, Validation, Formal analysis, Resources, Writing – review & editing, Supervision.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.paid.2021.110695>.

References

- Baer, R. A., Smith, G. T., Hopkins, J., Krietemeyer, J., & Toney, L. (2006). Using self-report assessment methods to explore facets of mindfulness. *Assessment*, 13(1), 27–45.
- Bates, D., Mächler, M., Bolker, B., & Walker, S. (2015). Linear mixed effects models using lme4. *Journal of Statistical Software*, 67, 1–48.
- Bryant, F. (2003). Savoring Beliefs Inventory (SBI): A scale for measuring beliefs about savouring. *Journal of Mental Health*, 12(2), 175–196.
- Carpenter, J. K., Conroy, K., Gomez, A. F., Curren, L. C., & Hofmann, S. G. (2019). The relationship between trait mindfulness and affective symptoms: A meta-analysis of the Five Facet Mindfulness Questionnaire (FFMQ). *Clinical Psychology Review*, 74, 101785.
- Carver, C. S., & Connor-Smith, J. (2010). Personality and coping. *Annual Review of Psychology*, 61, 679–704.
- Comas-Figal, L., Luthar, S., Maddi, S., O'Neill, H. K., & Saakvitne, K. (2018). *Tedeschi, R. American Psychological Association (APA): The Road to Resilience*. Retrieved from www.apa.org/helpcenter/road-resilience.aspx.
- Compas, B. E., Connor-Smith, J. K., Saltzman, H., Thomsen, A. H., & Wadsworth, M. E. (2001). Coping with stress during childhood and adolescence: Problems, progress, and potential in theory and research. *Psychological Bulletin*, 127(1), 87.
- Conner, T. S., & Barrett, L. F. (2012). Trends in ambulatory self-report: The role of momentary experience in psychosomatic medicine. *Psychosomatic Medicine*, 74(4), 327.
- Connor, K. M., & Davidson, J. R. (2003). Development of a new resilience scale: The Connor-Davidson resilience scale (CD-RISC). *Depression and Anxiety*, 18(2), 76–82.
- Conversano, C., Di Giuseppe, M., Miccoli, M., Ciacchini, R., Gemignani, A., & Orrù, G. (2020). Mindfulness, age and gender as protective factors against psychological distress during Covid-19 pandemic. *Frontiers in Psychology*, 11.
- Creswell, J. D. (2017). Mindfulness interventions. *Annual Review of Psychology*, 68, 491–516.
- De Vibe, M., Solhaug, I., Rosengrave, J. H., Tyssen, R., Hanley, A., & Garland, E. (2018). Six-year positive effects of a mindfulness-based intervention on mindfulness, coping and well-being in medical and psychology students: results from a randomized controlled trial. *PLoS One*, 13(4), Article e0196053.
- Dodge, R., Daly, A. P., Huyton, J., & Sanders, L. D. (2012). The challenge of defining wellbeing. *International Journal of Wellbeing*, 2(3).
- Donald, J. N., Atkins, P. W., Parker, P. D., Christie, A. M., & Ryan, R. M. (2016). Daily stress and the benefits of mindfulness: Examining the daily and longitudinal relations between present-moment awareness and stress responses. *Journal of Research in Personality*, 65, 30–37.
- Finkelstein-Fox, L., Park, C. L., & Riley, K. E. (2019). Mindfulness' effects on stress, coping, and mood: A daily diary goodness-of-fit study. *Emotion*, 19(6), 1002–1013.
- Flaxman, S., Mishra, S., Gandy, A., Unwin, H. J. T., Mellan, T. A., Coupland, H., Whittaker, C., Zhu, H., Berah, T., Eaton, J. W., Monod, M., Imperial College COVID-19 Response Team, Ghani, A. C., Donnelly, C. A., Riley, S., Vollmer, M. A. C., Ferguson, N. M., Okell, L. C., & Bhatt, S. (2020). Estimating the effects of non-pharmaceutical interventions on COVID-19 in Europe. *Nature*, 584(7820), 257–261.
- Folkman, S., & Moskowitz, J. T. (2004). Coping: Pitfalls and promise. *Annual Review of Psychology*, 55, 745–774.
- Haller, H., Cramer, H., Lauche, R., Gass, F., & Dobos, G. J. (2014). The prevalence and burden of subthreshold generalized anxiety disorder: A systematic review. *BMC Psychiatry*, 14(1), 128.
- Hayes-Skelton, S. A., & Graham, J. R. (2013). Decentering as a common link among mindfulness, cognitive reappraisal, and social anxiety. *Behavioural and Cognitive Psychotherapy*, 41(3), 317.
- Kroenke, K., Spitzer, R. L., & Williams, J. B. (2001). The PHQ-9: Validity of a brief depression severity measure. *Journal of General Internal Medicine*, 16(9), 606–613.
- Larsen, R. J. (2000). Toward a science of mood regulation. *Psychological Inquiry*, 11(3), 129–141.
- Lazarus, R., & Folkman, S. (1984). *Stress, appraisal, and coping*. New York: Springer.
- Lindsay, E. K., & Creswell, J. D. (2017). Mechanisms of mindfulness training: Monitor and Acceptance Theory (MAT). *Clinical Psychology Review*, 51, 48–59.
- Litman, J. A., & Lunsford, G. D. (2009). Frequency of use and impact of coping strategies assessed by the COPE Inventory and their relationships to post-event health and well-being. *Journal of Health Psychology*, 14(7), 982–991.
- Maas, C. J., & Hox, J. J. (2005). Sufficient sample sizes for multilevel modeling. *Methodology*, 1(3), 86–92.
- MacCallum, R. C., Widaman, K. F., Zhang, S., & Hong, S. (1999). Sample size in factor analysis. *Psychological Methods*, 4(1), 84.
- Mesmer-Magnus, J., Manapragada, A., Viswesvaran, C., & Allen, J. W. (2017). Trait mindfulness at work: A meta-analysis of the personal and professional correlates of trait mindfulness. *Human Performance*, 30(2–3), 79–98.
- Moderitski, N., Phan, L. V., Kuper, N., & Rauthmann, J. F. (2020). Who is impacted? Personality predicts individual differences in psychological consequences of the COVID-19 pandemic in Germany. *Social Psychological and Personality Science*, 1–21.
- Möhrling, K., Naumann, E., Reifenscheid, M., Wenz, A., Rettig, T., Krieger, U., ... Blom, A. G. (2020). The COVID-19 pandemic and subjective well-being: Longitudinal evidence on satisfaction with work and family. *European Societies*, 1–17.
- Montero-Marín, J., Tops, M., Manzanera, R., Piva Demarzo, M. M., Alvarez de Mon, M., & García-Campayo, J. (2015). Mindfulness, resilience, and burnout subtypes in primary care physicians: The possible mediating role of positive and negative affect. *Frontiers in Psychology*, 6, 1895.
- O'Connor, R. C., Wetherall, K., Cleare, S., McClelland, H., Melson, A. J., Niedzwiedz, C. L., ... Watson, B. (2020). Mental health and well-being during the COVID-19 pandemic: Longitudinal analyses of adults in the UK COVID-19 Mental Health & Wellbeing study. *The British Journal of Psychiatry*, 1–8.
- Ottenstein, C., & Lischetzke, T. (2020). Recall bias in emotional intensity ratings: Investigating person-level and event-level predictors. *Motivation and Emotion*, 44(3), 464–473.
- Perrez, M., & Reicherts, M. (1992). *Stress, coping, and health: A situation-behavior approach: Theory, methods, applications*. Hogrefe & Huber Publishers.
- Pieh, C., Budimir, S., & Probst, T. (2020). The effect of age, gender, income, work, and physical activity on mental health during coronavirus disease (COVID-19) lockdown in Austria. *Journal of Psychosomatic Research*, 136, 110186.
- Quoidbach, J., Berry, E. V., Hansenne, M., & Mikolajczak, M. (2010). Positive emotion regulation and well-being: Comparing the impact of eight savoring and dampening strategies. *Personality and Individual Differences*, 49(5), 368–373.
- RKI. (2020, March 22). Coronavirus disease 2019 (COVID-19) – Daily situation report of the Robert Koch Institute. https://www.rki.de/DE/Content/InfAZ/N/Neuartiges_Coronavirus/Situationsberichte/2020-03-22-en.pdf?__blob=publicationFile.
- Rosseel, Y. (2012). Lavaan: An R package for structural equation modeling and more. Version 0.5–12 (BETA). *Journal of Statistical Software*, 48(2), 1–36.

- Schunck, R. (2013). Within and between estimates in random-effects models: Advantages and drawbacks of correlated random effects and hybrid models. *The Stata Journal*, 13 (1), 65–76.
- Tran, U. S., Glück, T. M., & Nader, I. W. (2013). Investigating the Five Facet Mindfulness Questionnaire (FFMQ): Construction of a short form and evidence of a two-factor higher order structure of mindfulness. *Journal of Clinical Psychology*, 69(9), 951–965.
- Weinstein, N., Brown, K. W., & Ryan, R. M. (2009). A multi-method examination of the effects of mindfulness on stress attribution, coping, and emotional well-being. *Journal of Research in Personality*, 43(3), 374–385.
- Wilhelm, P., & Schoebi, D. (2007). Assessing mood in daily life. *European Journal of Psychological Assessment*, 23(4), 258–267.
- Zacher, H., & Rudolph, C. W. (2021). Individual differences and changes in subjective wellbeing during the early stages of the COVID-19 pandemic. *American Psychologist*, 76(1), 50–62.

