The association between facets of mindfulness and COVID-19 related distress

Boekhorst, M.G.B.M.; Duijndam, S.N.C.

The association between facets of mindfulness and COVID-19 related distress: A cross-sectional study

Myrthe G.B.M. Boekhorst [1], Stefanie Duijndam [*,1]

Department of Medical and Clinical Psychology, Tilburg University, and Center of Research on Psychological disorders and Somatic diseases (CoRPS), Tilburg, the Netherlands

A B S T R A C T

Objectives: Trait mindfulness could function as a protective factor against distress. The current study investigated the relationship of the five distinct facets of mindfulness and COVID-19 related distress.
Methods: An online self-report study was conducted in a Dutch sample ($N = 811$; $M_{age} = 49 \pm 17$; 54.5 % female) in February 2021. Dispositional mindfulness was assessed with the Five Facet Mindfulness Questionnaire, and the COVID Stress Scale was used to assess COVID-19 related distress.
Results: Multivariate regression analyses showed that *describing* and *non-judging* were inversely related to COVID-19 related distress. Specifically, *describing* was related to fewer socioeconomic worries, while *describing* and *non-judging* were negatively associated with traumatic stress symptoms. *Non-judging* was negatively associated with COVID-19-related compulsive checking.
Conclusions: The results indicate that individuals high in mindfulness traits describing and non-judging, experience less distress during the pandemic. Teaching mindfulness skills and practice could be helpful in global situations like pandemics.

1. Introduction

The coronavirus disease 2019 (COVID-19) pandemic represents a significant risk to population health. Worldwide, over 564 million individuals have been infected with the virus and >6.3 million have died (World Health Organization, 2022). Beyond the impact on physical health, the ongoing uncertainty related to the pandemic and the restrictions imposed by the governments of the world has also led to increased mental health related problems, including increased rates of stress and anxiety (Killgore et al., 2021; Magalhaes et al., 2021; Raihan, 2021).

A potential risk factor for the mental health consequences of COVID-19 could be enhanced fear related to the virus (Mertens, Gerritsen, et al., 2020; Taylor et al., 2020b). This COVID-19 related fear broadly expresses itself as the fear for physical consequences, such as health of self and others, supplies shortage, and/or prolonged restrictions (Mertens, Gerritsen, et al., 2020), but also fears about economic consequences, such as job loss or bankruptcies (Nicola et al., 2020). A combination of these specific fears can be defined as COVID-19 related distress (Taylor et al., 2020a), and includes fear of contamination, fear about economic

consequences, xenophobia related to COVID-19, traumatic stress symptoms, compulsive checking, and reassurance seeking. Several studies showed that during the early months of the pandemic, increased COVID-19 related distress was associated with increased levels of anxiety, stress, and depression (Bitan et al., 2020; Gallagher et al., 2020). In addition, individual differences exist in the level of COVID-19 related concerns and therefore in the vulnerability to the psychosocial effects of the pandemic (Mertens, Gerritsen, et al., 2020; Taylor et al., 2021; Vos et al., 2021). For example, individuals who have a high tendency to worry in general, have an increased chance of fear related to COVID-19 during the pandemic (Baiano et al., 2020).

Importantly, resilience to the psychosocial effects of pandemics should also be considered. One factor that can potentially influence psychological wellbeing during this period is mindfulness, defined as paying complete attention to experiences in the present moment, with a non-judgmental and accepting attitude (Brown & Ryan, 2003; Kabat-Zinn, 1990). Mindfulness can be described as a personality trait, which tends to be stable over time, but mindfulness can also be conceptualized as a state, which is momentary, and can be accomplished during mindfulness meditations (Kiken et al., 2015). State mindfulness can be

learned (e.g. through recurrent meditation), which over time, can lead to improved levels of trait mindfulness (Kiken et al., 2015). Over the years, research has demonstrated that trait mindfulness is associated with psychological health outcomes, such as lower levels of stress, anxiety and depression (for review see, Tomlinson et al., 2018). Studies also showed that trait mindfulness is related to use of better coping strategies and can act as a buffer against negative psychological outcomes from stressful life events (Bergomi et al., 2013; Sirois & Tosti, 2012; van Son et al., 2015; Weinstein et al., 2009). In particular, being attentive to the present moment has been associated with more engagement coping during the COVID-19 pandemic, while non-judgement and acceptance was associated with less disengagement coping (Götmann & Bechtoldt, 2021). In addition, a mindfulness based stress reduction training was found to improve mindfulness skills and enhance psychological well-being during the first lockdown of the COVID-19 pandemic (Accoto et al., 2021). These findings imply that mindfulness may be particularly beneficial for individuals during the COVID-19 pandemic, a stressful global situation already shown to be associated with increased levels of stress and anxiety.

Recent studies during the first onset of the COVID-19 pandemic have investigated mindfulness as a protective factor against general distress during this period, as well as stress specifically related to the pandemic. Studies have found that trait mindfulness was negatively associated with overall psychological distress (including depression and anxiety) during the early period of the COVID-19 pandemic (March–April 2020) in Italian adults (Conversano et al., 2020), as well as in American college students (Dillard & Meier, 2021). Fundamentally, studies have investigated trait mindfulness as a protective factor against COVID-19-specific stress, fear, and worries. Several of these studies have found that trait mindfulness was negatively associated with COVID-19 related worries (Dillard & Meier, 2021) and fear of COVID-19 (Yalcin et al., 2021). Moreover, trait mindfulness can also moderate the relationship between fear of the coronavirus and psychological distress (Vos et al., 2021). This research shows that trait mindfulness may act as a protective factor for mental health outcomes during the COVID-19 pandemic.

While these studies provide important information, they did not assess different facets of mindfulness but unidimensional trait mindfulness. It is important to consider these distinct facets of mindfulness, because of their unique contribution to psychological distress. *Acting with awareness* (focusing attention to the current moment), *non-judging* (not criticizing personal thoughts and feelings) and *non-reacting* (non-reactivity towards thoughts and feelings without being carried away by them) have been most consistently associated with lower levels of psychological distress in previous research (Baer et al., 2006; Bohlmeijer et al., 2011). *Observing* (ability to observe both internal and external experiences) and *describing* (using words to explain/describe experiences) on the other hand, have been related to other psychological constructs such as openness and positive mental health (Bohlmeijer et al., 2011). Nonetheless, in a Belgian sample of adolescents, it was found that non-reactive decentering was especially associated with lower levels of stress and worry during the pandemic (Kock et al., 2021). It is of importance to also gain an understanding of the possible protective character of these distinct facets of mindfulness in COVID-19 related anxiety and stress in adult populations.

To investigate this, an online self-report study was conducted in a Dutch sample in February 2021. During this month, the Netherlands was still in lockdown, which specifically meant that high schools, universities, non-essential stores, and the hospitality industry were closed, that travelling abroad was prohibited, and that a curfew was set at 9 pm. On average, 170 new hospitalizations per day were recorded in February 2021, and 53 people per day died due to the consequences of the coronavirus (Rijksinstituut voor Volksgezondheid en Milieu, 2021). This therefore gives us an indication of how facets of mindfulness and (COVID-19 related) distress are related in a time in which restrictions and the virus were still affecting normal life, but as opposed to previous research on this topic (e.g., Baiano et al., 2020; Belen, 2021; Conversano

et al., 2020; Dillard & Meier, 2021), was not influenced by the novelty of the pandemic. This gives us a unique insight in how these processes may work in a situation that is likely to happen again, if number of infections go up again and restrictions are newly imposed, enabling us to use this information to target psychological mechanisms in decreasing distress.

The main objective of the current study is to assess the association between dispositional mindfulness and COVID-19 related distress in a general population of adults. We predicted that mindfulness would be negatively associated with COVID-19 related anxiety and stress, and that acting with awareness, non-judging, and non-reacting traits specifically predict lower levels of this type of anxiety and stress. A secondary objective is to investigate how facets of mindfulness predict general anxiety and stress during this period. Given that the repeated and long-term restrictions make life more difficult, this could lead to more general distress instead of specifically COVID-19 related distress for some individuals. We expect that the above-mentioned facets also directly predict lower levels of general distress.

2. Materials and methods

2.1. Participants

The participants of this study comprised a non-random selection of 852 adults from the general Dutch population that were included in February 2021. Quota sampling was used to ensure that an equal number of men and women were included in the following six age decades: 18–30, 31–40, 41–50, 51–60, 61–70 and, 71 and above. Inclusion criteria of the study were a sufficient understanding of the Dutch language and being 18 years or older. No specific exclusion criteria were stipulated. Of the 852 participants who completed informed consent, 40 dropped-out before study completion, and one participant had missing data on the main outcome measure, therefore were removed from the dataset (see Fig. 1). Data from 811 participants were included for all study variables. Based on this final sample, 442 (54.5 %) reported being female, 367 (45.3 %) male, and 2 (0.2 %) other. The average age of this sample was 49.17 (SD = 16.85; Range 18–89), and the majority have completed higher education (vocational education, college, or university; 50.7 %) (Table 1).

2.2. Procedure

Research assistants at Tilburg University were responsible for collecting an equal number of questionnaires from each age (range 18–90) and sex subgroup, as part of a second-year bachelor's course of the Psychology Program. These research assistants approached participants either personally or via phone. After explaining the purpose of the study, participants received an informed consent form and a questionnaire in Dutch, either digitally (www.qualtrics.com) or on paper. The questionnaires did not contain any explicit identifiers but were coded by number for data collection tracking purposes. Researchers of the Medical and Clinical Psychology department at Tilburg University checked the data to ensure completeness and correctness. Approval of this study was obtained from the Ethics Review Board of the school Social and Behavioral Sciences of Tilburg University (Protocol number: RP55), and all participants provided informed consent before participation according to the Declaration of Helsinki.

2.3. Measures

Demographic questions include age, sex, partner status (married or being in a stable relationship), education, chronic somatic condition (e.g., cardiovascular disease), and COVID-19 infection.

2.3.1. Mindfulness

We used the 24-item Five Facet Mindfulness Questionnaire Short Form (FFMQ-SF; Bohlmeijer et al., 2011) to assess dispositional
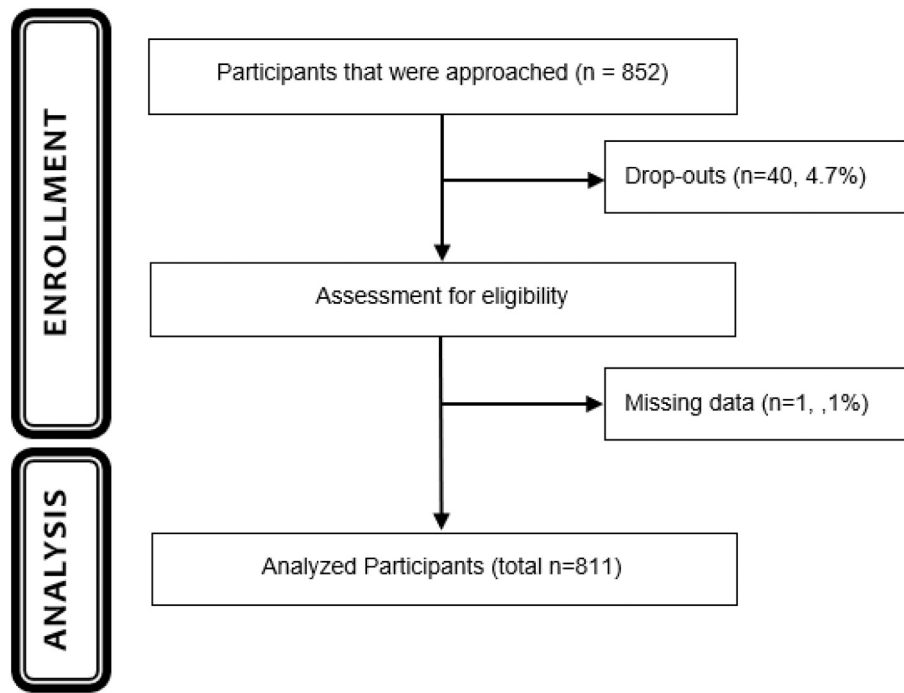
Fig. 1. Flow-chart of inclusions and exclusions of all participants in the study.

Table 1
Characteristics of the sample.

	N	%	Mean (SD)	Range
Age			49.2 (16.8)	18–89
Sex				
Female	442	54.5		
Male	367	45.3		
Other	2	0.2		
Education level				
Low	397	49.0		
High	411	50.7		
Marital status				
Partner	640	78.9		
No partner	171	21.1		
Chronic illness				
Yes	313	38.6		
No	498	61.4		

Note. SD = standard deviation; higher education is vocational education, college, or university; chronic illness included cardiovascular diseases, asthma or other lung diseases, diabetes, cancer, and gastrointestinal diseases.

mindfulness. The scale consists of five subscales, each assessing a different facet of mindfulness, namely (1) observing (4 items), (2) describing (5 items), (3) acting with awareness (5 items), (4) nonjudging (5 items) and (5) non-reacting (5 items). For each item, participants were asked to indicate how this applied to them in general, on a five-point Likert scale (1 = "never or very rarely true" through 5 = "very often or always true"). Examples of items from each subscale respectively are: (1) "generally, I pay attention to sounds, such as clocks ticking, birds chirping, or cars passing," (2) "I'm good at finding the words to describe my feelings," (3) I find it difficult to stay focused on what's happening in the present moment (reversed coding), (4) "I tell myself that I shouldn't be feeling the way I'm feeling," (reversed coding) and, (5) "I watch my feelings without getting carried away by them." Both the total and subscale scores of the FFMQ-SF were used, with higher scores indicating greater levels of mindfulness. The Cronbach's alpha was 0.82 for the total score, and 0.74, 0.79, 0.80, 0.75, and 0.66 for subscales 1 to 5, respectively.

2.3.2. Fear of the coronavirus

The Fear of the Coronavirus Questionnaire (FCQ; Mertens, Gerritsen, et al., 2020) was used to assess the degree to which individuals experience fear due to the coronavirus. Participants were asked to rate their level of agreement with each statement on a 5-point Likert scale (1 = "strongly disagree" through 5 = "strongly agree"). The possible total score ranged between 8 and 40, with a higher score indicating more fear. Examples of items are: "I am very worried about the coronavirus", and "I am constantly following all news updates regarding the virus". The internal consistency of the FCQ was acceptable in this sample (Cronbach's alpha = 0.78).

2.3.3. Corona-related distress

To measure corona-related distress, the COVID Stress Scale (CSS; Taylor et al., 2020b) was used. The CSS is a 36-item scale, divided into five subscales: (1) COVID danger and contamination fears (12 items, e. g., "I am worried about catching the virus"; "I am worried that people around me will infect me with the virus"), (2) COVID fears about economic consequences (6 items, e.g., "I am worried about grocery stores running out of food"), (3) COVID xenophobia (6 items, e.g., "I am worried that foreigners are spreading the virus because they're not as clean as we are"), (4) COVID traumatic stress symptoms (6 items, e.g., "I thought about the virus when I didn't mean to"), and (5) COVID compulsive checking and reassurance seeking (6 items, e.g., "Searched the Internet for treatments for COVID-19"). The subscales 1 to 3 are rated on a 5-point Likert scale from 1 (not at all) to 5 (extremely), and the subscales 4 and 5 are rated from 1 (never) to 5 (always). Cronbach's alpha yielded 0.93 for the total score, and 0.91, 0.89, 0.89, 0.87, and 0.75 for subscales 1 to 5, respectively.

2.3.4. Perceived stress

The 10-item Perceived Stress Scale (PSS; Cohen et al., 1983), is a self-report measure of global perceived stress. Items are rated on a 5-point Likert scale ranging from 0 = Never to 4 = Always, with a total score ranging from 0 to 40. Higher scores indicate greater levels of perceived stress. Example items are: "In the last month, how often have you been upset because of something that happened unexpectedly?", and "In the last month, how often have you found that you could not cope with all

the things that you had to do?". The internal consistency of the PSS was good in this sample (Cronbach's alpha = 0.85).

2.3.5. Anxiety

To assess the presence and severity of anxiety-related symptoms, the 7-item Generalized Anxiety Disorder scale (GAD-7; Spitzer et al., 2006) was used. Participants rate the occurrence of each DSM-IV-TR anxiety symptom over the past two weeks on a four-point Likert scale ranging from 0 (not at all) to 3 (nearly every day). An example item is: "Over the last two weeks, how often have you been bothered by feeling nervous, anxious, or on edge". Total scores range from 0 to 21, with higher scores indicating greater severity of anxiety. Internal consistency was good for this sample (Cronbach's alpha = 0.89).

2.4. Data analysis

Analyses were conducted using SPSS version 24. First, descriptive statistics of the variables of interest were run, and Pearson's correlations were calculated to assess the relationship between the variables of interest. Based on the significance of the correlation ($p < .05$), it was determined which independent (mindfulness facets) or dependent (COVID-19 related fear subscales) variables were included in the next step of the analyses. Second, to examine the relationship between the trait mindfulness facets and COVID-19 related fear, multivariate regression analyses were performed. The covariates age, sex, education, marital status, chronic condition, and COVID-19 infection were included in each model. Lastly, the COVID-19 related fear variables were replaced by global perceived stress and generalized anxiety to assess their association with the mindfulness facets, separately.

3. Results

First, Pearson r correlations were calculated to assess the relationship between the variables of interest (see Table 2). Most mindfulness facet scores were significantly negatively correlated with the CSS subscales, except for Observing (p's > .05). All five mindfulness facets significantly and negatively correlated with the PSS and the GAD-7. The total score of the FCQ did not correlate with any of the mindfulness facets and was therefore excluded from the main analyses.

Multiple linear regression analyses with a Bonferroni adjusted alpha of 0.007 (0.05/8) were conducted to assess the association between the five facets of mindfulness and the different components of COVID-19 stress, as well as general perceived stress and symptoms of anxiety. Assumptions regarding multicollinearity were met in all regression models, with appropriate tolerance and Variance Inflation Factor values.

3.1. Facets of mindfulness and COVID-19 related stress

In the multiple linear regression analysis predicting the Total Score of the CSS, 11.2 % of the variance was explained, and the total model was significant (F (10, 789) = 9.96, $p < .001$). The mindfulness facets describing ($\beta = -0.12$, $p = .002$), and non-judging ($\beta = -0.12$, $p = .003$), were (negatively) related to total distress about COVID-19. In addition, age ($\beta = 0.16$, $p < .001$) and level of education ($\beta = -0.10$, $p = .003$) were significant predictors of total CSS scores with higher age and a lower level of education related to more distress (Table 3).

With respect to the subscale Danger and Contamination, 8.2 % of the variance was explained. The total model was significant, F (10, 793) = 7.07, $p < .001$. All mindfulness facets were unrelated to this subscale of the CSS (Table 3). Older age ($\beta = 0.15$, $p < .001$) and lower level of educational ($\beta = -0.11$, $p = .002$) were the only covariates to significantly relate with more COVID-19 related worries.

In the multiple linear regression analysis predicting Economic Consequences, 7.9 % of the variance was explained, and the total model was significant (F (10, 793) = 6.77, $p < .001$). The only mindfulness facet (negatively) related to distress about economic consequences was

Table 2
Correlations between facets of mindfulness, COVID-19 related distress, perceived stress, generalized anxiety, and covariates, mean scores and ranges (N = 811).

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
1. FFMQ-SF: observing	–													
2. FFMQ-SF: describing	0.220**	–												
3. FFMQ-SF: acting with awareness	0.113**	0.351**	–											
4. FFMQ-SF: non-judging	0.031	0.347**	0.431**	–										
5. FFMQ-SF: non-reacting	0.397**	0.358**	0.196**	0.173**	–									
6. Fear of Coronavirus (FCQ)	<0.001	–0.027	–0.044	–0.062	–0.044	–								
7. CSS: Total	–0.015	–0.215**	–0.147**	–0.174**	–0.143**	0.607**	–							
8. CSS: Danger and contamination	–0.010	–0.162**	–0.083*	–0.126**	–0.110**	0.659**	0.896**	–						
9. CSS: Economic consequences	–0.060	–0.235**	–0.121**	–0.113**	–0.113**	0.258**	0.614**	0.418**	–					
10. CSS: Traumatic stress	–0.033	–0.202**	–0.178**	–0.192**	–0.192**	0.326**	0.665**	0.462**	0.430**	–				
11. CSS: Compulsive checking	0.001	–0.109**	–0.151**	–0.169**	–0.054	0.319**	0.631**	0.417**	0.347**	0.516**	–			
12. CSS: Xenophobia	0.024	–0.131**	–0.075*	–0.066	–0.092**	0.382**	0.698**	0.532**	0.351**	0.259**	0.225**	–		
13. Perceived Stress (PSS)	–0.192**	–0.358**	–0.451**	–0.469**	–0.361**	0.039	0.248**	0.154**	0.234**	0.314**	0.234**	0.095**	–	
14. Generalized Anxiety (GAD7)	–0.098**	–0.288**	–0.443**	–0.426**	–0.296**	–0.012	0.217**	0.135**	0.217**	0.288**	0.216**	0.056	0.765**	–
Mean (SD)	13.9 (3.2)	18.2 (3.4)	18.2 (3.6)	17.6 (3.8)	16.1 (3.3)	23.9 (5.4)	19.3 (15.5)	10.6 (7.9)	1.0 (2.4)	1.6 (2.8)	2.7 (3.2)	3.3 (4.3)	12.0 (6.5)	3.2 (3.7)
Range	4–20	6–25	5–25	2–25	2–25	8–40	0–113	0–48	0–20	0–18	0–18	0–24	0–35	0–21

Note: FFMQ-SF, Five Facet Mindfulness Questionnaire–Short Form; CSS, Covid Stress Scale; FCQ, Fear of Coronavirus Questionnaire; PSS, Perceived Stress Scale; GAD7, Generalized Anxiety Disorder Scale-7; SD, standard deviation.
* $p < .05$.
** $p < .01$ (two-tailed).

Table 3
Multiple regression predicting COVID Stress (*N* = 811).

	CSS: Total score				CSS: Danger and contamination				CSS: Economic consequences			
	B (SE)	β	t	95 % CI	B (SE)	β	t	95 % CI	B (SE)	β	t	95 % CI
FFMQ-SF: observing	0.16 (0.17)	0.03	0.90	[−0.19, 0.50]	0.05 (0.09)	0.02	0.51	[−0.13, 0.23]	0.01 (0.03)	0.01	0.78	[−0.05, 0.06]
FFMQ-SF: describing	−0.56 (0.18)	−0.12	−3.13*	[−0.91, -0.21]	−0.24 (0.09)	−0.10	−2.52	[−0.42, −0.05]	−0.12 (0.03)	−0.17	−4.29*	[−0.17, −0.06]
FFMQ-SF: acting with awareness	−0.35 (0.17)	−0.08	−2.06	[−0.68, -0.02]	−0.08 (0.09)	−0.04	−0.93	[−0.22, 0.09]	−0.03 (0.03)	−0.05	−1.29	[−0.09, 0.02]
FFMQ-SF: non-judging	−0.48 (0.16)	−0.12	−3.01*	[−0.79, -0.17]	−0.20 (0.08)	−0.10	−2.44	[−0.37, −0.04]	−0.03 (0.03)	−0.05	−1.15	[−0.08, 0.02]
FFMQ-SF: non-reacting	−0.27 (0.18)	−0.06	−1.55	[−0.62, 0.07]	−0.10 (0.09)	−0.04	−1.05	[−0.28, 0.08]	−0.05 (0.03)	−0.06	1.68	[−0.10, 0.01]
Male sex	0.48 (1.05)	0.02	0.45	[−1.59, 2.55]	0.33 (0.55)	0.02	0.61	[−0.75, 1.42]	0.11 (0.16)	0.02	0.67	[−0.21, 0.43]
Age	0.14 (0.04)	0.16	4.11*	[0.07, 0.21]	0.07 (0.02)	0.15	3.97*	[0.11, 0.77]	0.01 (0.01)	0.09	2.18	[<0.01, 0.02]
Marital status: partner	−1.98 (1.32)	−0.05	−1.50	[−4.56, 0.60]	−0.25 (0.69)	−0.01	−0.36	[−1.61, 1.11]	−0.29 (0.20)	−0.05	−1.43	[−0.69, 0.11]
High level of education	−4.63 (1.53)	−0.10	−3.01*	[−7.64, -1.61]	−2.44 (0.81)	−0.11	3.03*	[−4.03, −0.86]	−0.30 (0.24)	−0.05	−1.28	[−0.77, 0.16]
Chronic illness	1.38 (1.12)	0.04	1.22	[−0.83, 3.59]	0.75 (0.59)	0.05	1.28	[−0.41, 1.91]	0.26 (0.18)	0.06	1.51	[−0.08, 0.61]

Note: B, unstandardized regression coefficient; SE, standard error; β, standardized regression coefficient; CI, Confidence Interval; FFMQ-SF, Five Facet Mindfulness Questionnaire–Short Form; CSS, COVID-19 Stress Scale.

* *p* < .007 (Bonferroni adjusted alpha (0.05/8)).

Describing (β = −0.17, *p* < .001; Table 3).

In the multiple linear regression analysis predicting Xenophobia, 8.0 % of the variance was explained, and the total model was significant (*F* (10, 790) = 6.88, *p* < .001). None of the facets of mindfulness were significantly related to xenophobia. Nonetheless, higher age (β = 0.17, *p* < .001) and a low level of education (β = −0.14, *p* < .001) were significantly related to higher levels of xenophobia (Table 4).

Regarding the Traumatic Stress subscale of the CSS, the total model was significant (*F* (10, 793) = 8.56, *p* < .001, R² = 0.10). Greater levels of describing (β = −0.11, *p* = .004), and non-judging (β = −0.12, *p* = .002) were significantly associated with less COVID related traumatic stress. In addition, being male was a significant predictor of lower traumatic stress (Table 4). Other mindfulness facets or covariates were unrelated to COVID-19 related traumatic stress.

Regarding the CSS subscale Compulsive Checking, the total model was significant (*F* (10, 792) = 4.81, *p* < .001), and explained 5.7 % of the variance. The mindfulness facet non-judging (β = −0.13, *p* = .001) was significantly and inversely associated with compulsive checking related to COVID-19 (Table 4). Other mindfulness facets or covariates were unrelated to COVID-19 related compulsive checking.

3.2. Facets of mindfulness and general distress

Next, we examined the relationship between facets of mindfulness and general distress (stress and anxiety). In the multiple linear regression analysis predicting perceived stress, 43.3 % of the variance was explained, and the total model was significant (*F* (10, 791) = 60.34, *p* < .001). All mindfulness facets (except describing) were (negatively)

Table 4
Multiple regression predicting COVID-19 related stress (*N* = 811).

	CSS: Xenophobia				CSS: Traumatic stress				CSS: Compulsive checking			
	B (SE)	β	t	95 % CI	B (SE)	β	t	95 % CI	B (SE)	β	t	95 % CI
FFMQ-SF: observing	0.09 (0.05)	0.07	1.77	[−0.01, 0.19]	−0.01 (0.03)	−0.01	−0.25	[−0.07, 0.06]	0.03 (0.04)	0.03	0.74	[−0.05, 0.10]
FFMQ-SF: describing	−0.09 (0.05)	−0.07	−1.78	[−0.19, 1.37]	−0.10 (0.03)	−0.11	−2.88*	[−0.16, −0.03]	−0.03 (0.04)	−0.03	−0.83	[−0.11, 0.04]
FFMQ-SF: acting with awareness	−0.09 (0.05)	−0.08	−1.87	[−0.18, 0.004]	−0.07 (0.03)	−0.09	−2.33	[−0.13, −0.01]	−0.07 (0.04)	0.08	−2.04	[0.14, 0.003]
FFMQ-SF: non-judging	−0.03 (0.05)	−0.02	−0.54	[−0.11, 0.06]	−0.09 (0.03)	−0.12	−3. 18*	[−0.15, −0.04]	−0.11 (0.03)	−0.13	−3.31*	[−0.18, 0.05]
FFMQ-SF: non-reacting	−0.09 (0.05)	−0.07	−1.83	[−0.19, 0.01]	−0.03 (0.03)	−0.04	−0.95	[−0.10, 0.03]	0.01 (0.04)	0.01	0.13	[−0.07, 0.08]
Male sex	0.78 (0.30)	0.09	2.59	[0.19, 1.37]	−0.71 (0.20)	−0.13	−3.62*	[−1.09, −0.32]	−0.15 (0.22)	−0.02	−0.66	[−0.59, 0.29]
Age	0.04 (0.01)	0.17	4.46*	[0.03, 0.06]	0.02 (0.01)	0.11	2.90	[0.01, 0.03]	−0.004 (0.01)	−0.02	−0.52	[−0.02, 0.01]
Marital status: partner	−0.23 (0.38)	−0.02	−0.61	[−0.97, 0.51]	−0.45 (0.24)	−0.07	−1.86	[−0.93, 0.03]	−0.72 (0.28)	−0.09	−2.58	[−1.27, -0.17]
High level of education	−1.75 (0.44)	−0.14	−3.99*	[−2.61, -0.89]	0.03 (0.28)	<0.01	0.09	[−0.53, 0.58]	−0.11 (0.33)	−0.01	−0.34	[−0.75, 0.53]
Chronic illness	−0.23 (0.32)	−0.03	−0.72	[−0.86, 0.40]	0.10 (0.21)	0.02	0.49	[−0.31, 0.51]	0.42 (0.24)	0.06	1.76	[−0.05, 0.89]

Note: B, unstandardized regression coefficient; SE, standard error; β, standardized regression coefficient; CI, Confidence Interval; FFMQ-SF, Five Facet Mindfulness Questionnaire–Short Form; CSS, COVID-19 Stress Scale.

* *p* < .007 (Bonferroni adjusted alpha (0.05/8)).

related to perceived stress: observing ($\beta = -0.09$, $p = .002$), acting with awareness ($\beta = -0.19$, $p < .001$), non-judging ($\beta = -0.30$, $p < .001$), and non-reacting ($\beta = -0.19$, $p < .001$). Furthermore, lower age ($\beta = -0.21$, $p < .001$), and being female ($\beta = -0.11$, $p < .001$), were significantly related to higher levels of perceived stress (Table 5).

Regarding symptoms of generalized anxiety, the total model was significant ($F (10, 789) = 48.25$, $p < .001$), and explained 37.9 % of the variance. The mindfulness facets acting with awareness ($\beta = -0.22$, $p < .001$), non-judging ($\beta = -0.25$, $p < .001$) and non-reacting ($\beta = -0.18$, $p < .001$), were significantly and inversely associated with symptoms of generalized anxiety. Moreover, lower age ($\beta = -0.24$, $p < .001$) was significantly related to higher levels of generalized anxiety (Table 5).

4. Discussion

The aim of this study was to gain an understanding of the possible protective ability of the five distinct facets of mindfulness in COVID-19 related anxiety and stress. Our results showed that even though all facets were inversely related to general perceived stress, greater levels of *describing*, and *non-judging* were specifically associated with less COVID-19 related distress. These results therefore indicate that individuals high in these mindfulness traits experience less distress during the pandemic. These findings corroborate previous research demonstrating a negative association of unidimensional trait mindfulness with psychological stress during the pandemic (Conversano et al., 2020), as well as with COVID-19 related worries (Dillard & Meier, 2021; Vos et al., 2021). The results of the current study further demonstrate that distinct facets of mindfulness are especially associated with fever levels of COVID-19 related distress.

4.1. Facets of mindfulness and COVID-19 related stress

Our results showed that individuals with higher levels of the mindfulness facets, *describing*, and *non-judging*, were found to experience less COVID-19 related stress. These findings are in line with previous studies showing consistent negative associations between these facets of mindfulness and psychological stress pre-pandemic (Brown et al., 2015). However, this relative importance of *describing* and *non-judging* is not consistent across studies as *acting with awareness*, *observing*, and *non-reacting* have also found to be substantially associated with lower symptoms of psychological stress, unrelated to COVID-19 (Bohlmeijer et al., 2011; Brown et al., 2015). Nonetheless, specifically *non-judging* has been an important facet most consistently related to lower levels of psychological distress (Carpenter et al., 2019), and it is therefore not surprising that the non-judgmental and accepting stance towards inner experiences are also important for COVID-19 related stress. Even so, the results of the current study also indicate that individuals with more *describing* skills may be less vulnerable to worries about COVID-19.

Bergin and Pakenham (2016) suggested that describing is an important facet of mindfulness as a buffer in the association between specific stressors and psychological adjustment. Given that the COVID-19 pandemic is a specific source of stress, our results may indicate that enhanced describing skills could facilitate positive adjustment (less distress) during the pandemic. Furthermore, *describing* is also an important aspect in communication (Jones & Hansen, 2015). It is important to note that especially during stressful events (e.g., COVID-19), better communication could lead to enhanced problem solving and more support from others, which in turn could lower the vulnerability to experiencing anxiety (or COVID-19 related fear) as a result from stress (Bergin & Pakenham, 2016). Seemingly, *describing* and *non-judging* are important mindfulness facets to take into consideration when treating COVID-related anxiety.

In addition to *describing* being an important facet in decreasing COVID-19 related distress, our results also showed that high levels of this mindfulness trait predicted less worry about the socioeconomic consequences of the pandemic, perhaps through facilitating better communication about socioeconomic worries, and acting as a buffer against psychological distress. However, it is important to note that the focus of this subscale of the CSS is on fear of running out of supplies, rather than actual socioeconomic consequences of the pandemic (Mertens et al., 2021), such as fear of losing jobs or financial worries. Given that running out of supplies had mostly been a concern at the start of the pandemic (Kassas & Nayga, 2021), it makes sense that this subscale of the CSS becomes less important as the pandemic progresses.

In the current study, we also examined traumatic stress symptoms associated with COVID-19, such as nightmares, having trouble sleeping, and intrusive thoughts, which are considered the psychological consequences of the pandemic (Mertens et al., 2021; Taylor et al., 2020a). Our results showed that individuals with higher levels of *describing* and *non-judging* were less likely to experience these symptoms. These findings are in line with previous research demonstrating that these distinct facets of dispositional mindfulness have been related to fewer (post)traumatic stress symptoms in general, unrelated to COVID-19. Nonetheless, it is important to note that these findings regarding distinct facets of mindfulness have been inconsistent across studies (e.g., Chopko & Schwartz, 2013; Vujanovic et al., 2009). However, the findings of the current study could suggest that individuals with higher levels on the *non-judgement* and *describing* facets can cope more optimally with stressors, such as the COVID-19 pandemic. Firstly, *non-judgement* can help in the acceptance of current or ongoing experiences as they are, during stressful events such as the COVID-19 pandemic, without judging personal emotional responses or experiences. Perhaps, in turn, this may lead to fewer traumatic symptoms related to the COVID-19 pandemic. Furthermore, in previous research, the facet *describing* has been related to more positive emotional reappraisal in various samples (Hanley & Garland, 2014). Our findings could indicate that describing your internal

Table 5
Multiple regression predicting perceived stress and generalized anxiety ($N = 811$).

	Perceived stress				Generalized anxiety			
	B (SE)	β	t	95 % CI	B (SE)	β	t	95 % CI
FFMQ-SF: observing	−0.19 (0.06)	−0.09	−3.12*	[−0.30, −0.07]	0.01 (0.04)	0.01	0.23	[−0.06, 0.08]
FFMQ-SF: describing	−0.16 (0.06)	−0.08	−2.62	[−2.08, −0.67]	−0.05 (0.04)	−0.05	−1.43	[−0.12, 0.02]
FFMQ-SF: acting with awareness	−0.35 (0.06)	−0.19	−6.03*	[−0.46, −0.23]	−0.23 (0.03)	−0.22	−6.73*	[−0.29, −0.16]
FFMQ-SF: non-judging	−0.52 (0.05)	−0.30	−9.61*	[−0.62, −0.41]	−0.25 (0.03)	−0.25	−7.84*	[−0.31, −0.19]
FFMQ-SF: non-reacting	−0.38 (0.06)	−0.19	−6.39*	[−0.50, −0.27]	−0.20 (0.04)	−0.18	−5.76*	[−0.27, −0.14]
Male sex	−1.37 (0.36)	−0.11	−3.84*	[−2.08, −0.67]	−0.57 (0.21)	−0.08	−2.71	[−0.00, −0.16]
Age	−0.08 (0.01)	−0.21	−6.80*	[−0.10, −0.06]	−0.05 (0.01)	−0.24	−7.65*	[−0.07, −0.04]
Marital status: partner	−0.71 (0.45)	−0.04	−1.58	[−1.58, 0.17]	−0.68 (0.26)	−0.08	−2.56	[−1.20, −0.16]
High level of education	−1.02 (0.53)	−0.05	−1.95	[−2.05, 0.01]	0.09 (0.31)	0.01	0.29	[−0.52, 0.70]
Chronic illness	0.50 (0.38)	0.04	1.30	[−0.25, 1.25]	0.51 (0.23)	0.07	2.29	[0.07, 0.96]

Note: B, unstandardized regression coefficient; SE, standard error; β, standardized regression coefficient; CI, Confidence Interval; FFMQ-SF, Five Facet Mindfulness Questionnaire–Short Form.
* $p < .007$ (Bonferroni adjusted alpha (0.05/8)).

experiences with words (i.e., emotions, thoughts, sensations) is an important skill to cope with the psychological consequences of the pandemic.

Non-judging was related to lower levels of COVID-19 related compulsive checking and reassurance seeking (e.g., looking up information online or asking doctors about more information on COVID-19). Checking behavior may lead to the person encountering new, fear-evoking information (e.g., fake news, conspiracy theories), which in turn could lead to enhanced worrying. Indeed, some findings suggest that looking up additional information through different media sources during the COVID-19 pandemic (Chao et al., 2020; Garfin et al., 2020; Mertens, Duijndam, et al., 2020), and earlier pandemics (e.g., Van den Bulck & Custers, 2009), is related to increased fear of the virus. These checking behaviors seem to be the opposite of acceptance of current or ongoing experiences as they are (*non-judgement*) (Bohlmeijer et al., 2011), and could therefore explain why this facet is negatively related to compulsive checking and reassurance seeking.

In our study, mindfulness was unrelated to fear of foreigners who might be carrying the virus (i.e., COVID-19 related xenophobia). Xenophobia refers to negative attitudes towards foreigners and was found an important structural determinant of health (Suleman et al., 2018). In our sample, the levels of xenophobia were very low (more than half of the sample scored ≤2 on a scale of 0 to 24), possibly because at the time of data collection the country was in lockdown and therefore transmissions of the virus were less likely to come from outside of the Netherlands. This skewness may have affected our regression model, which could explain our results.

4.2. Facets of mindfulness related to general stress and anxiety

With respect to general anxiety and stress levels, the mindfulness facets *acting with awareness*, *non-judging*, and *non-reacting* were predictive of both lower stress and anxiety levels and *observing* was also inversely related to perceived stress in the current study. These findings are in line with previous findings (Bergin & Pakenham, 2016; Brown et al., 2015; Carpenter et al., 2019). These associations were much stronger than the relationship between mindfulness and COVID-19 related distress, which may suggest that some of the worries about COVID-19 decrease over time, especially as the current study was conducted in February 2021, almost one year after the first national lockdown. For example, due to its novelty, worries about shortage of supplies, contamination, and dangerousness, were much more pronounced at the beginning of the pandemic compared to six months later (Mertens, Duijndam, et al., 2020). In addition, as people try to pick up their lives again, but restrictions are making that difficult, this could lead to more general distress and anxiety instead of fear specifically related to COVID-19. Interventions aiming at relieving both COVID-19 related distress and more general psychological distress during this pandemic are therefore warranted, and given the results of this study, mindfulness-based interventions could be provided to reduce this distress (Bergomi et al., 2013). Interestingly, the facet *describing* was not significantly associated with general stress and anxiety, while it was most consistently associated with COVID-19 related distress. This is possibly explained by the idea that *describing* is especially relevant in specific stressful events, such as the pandemic (Bergin & Pakenham, 2016), and to a lesser degree in more general situations.

Not only were the mindfulness facets significantly related to less COVID-19 related stress, also several demographic variables showed to be related. Our study showed that older age was related to more COVID-19 related distress, but with less general stress. Given that age is one of the main risk factors for serious illness or death due to COVID-19 (Esai Selvan, 2020), it is not surprising that it is related to enhanced COVID-19 related distress. In addition, the restrictions imposed on the population affect the daily lives of younger adults (i.e., working from home, not being able to go to school or university, resulting in loneliness) differently than older adults (Carbone et al., 2021; Varma et al., 2021), which

may result in more general distress in the younger population (e.g., Ribeiro et al., 2021; Rutland-Lawes et al., 2021; Varma et al., 2021; Xiong et al., 2020). Furthermore, women showed higher scores on traumatic stress symptoms, and general stress, which is in line with previous research showing women to be more vulnerable towards (COVID-19 related) mental health problems (Ribeiro et al., 2021; Taylor et al., 2020a; Xiong et al., 2020). Mindfulness based stress reduction training could therefore be particularly beneficial for women during high-stress situations such as pandemics (Accoto et al., 2021). Lastly, we found that higher educated individuals reported less COVID-19 related distress (specifically xenophobia, and danger and contamination), which is in line with previous research (Kunzler et al., 2021; Liu et al., 2021; Taylor et al., 2020a).

4.3. Limitations and future research

These results are qualified by a few limitations. First, given the cross-sectional and observational nature of the data, we are unable to make definitive claims about causal associations between trait mindfulness and COVID-19 related distress. It is therefore also possible that distress leads to changes in mindfulness facets during the COVID-19 pandemic. Second, participants were recruited by quota sampling, which may have resulted in a more biased sample. Last, the sample of our study may not be representative of the entire population, given that the majority was highly educated. However, the sample did represent an (almost) equal distribution of men and women, across different age groups. Another strength is the inclusion of the five facets of mindfulness, instead of the unidimensional mindfulness construct, giving us more insight into specific characteristics that may be related to COVID-19 related distress.

The results of the current study could suggest that mindfulness may be a coping mechanism during the pandemic. These results may implicate the importance of mindfulness interventions, especially for those who are more anxious during the pandemic, as well as those who experience higher levels of COVID-19 related fear. Online interventions could help, given that these are practical, easily accessible, and do not require travel. This is especially convenient during the pandemic and specifically during a lockdown. Online mindfulness-based interventions have shown positive effects on symptoms of stress and anxiety pre-pandemic (Spijkerman et al., 2016) as well as an improvement in anxiety symptoms (Simonsson et al., 2021) and enhancement in psychological wellbeing (Accoto et al., 2021) during the pandemic. Future research could focus on the implementation of these online interventions for those individuals experiencing COVID-19 related fear.

5. Conclusion

To conclude, the results indicate that individuals high in the mindfulness traits *describing* and *non-judging*, experience less (COVID-19 related) distress during the pandemic. Given that mindfulness can be enhanced with practice, teaching these skills using e-Health interventions could potentially lead to increased resilience to the psychosocial effects of stressful global situations like pandemics.

Funding

Declaration of competing interest

None.

Data availability

Data will be made available on request.

Acknowledgements

References

Accoto, A., Chiarella, S. G., Raffone, A., Montano, A., de Marco, A., Mainiero, F., Rubbino, R., Valzania, A., & Conversi, D. (2021). Beneficial effects of mindfulness-based stress reduction training on the well-being of a female sample during the first total lockdown due to COVID-19 pandemic in Italy. *International Journal of Environmental Research and Public Health, 18*(11), 5512. https://www.mdpi.com/1660-4601/18/11/5512 https://www.mdpi.com/1660-4601/18/11/5512.

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. https://doi.org/10.1177/1073191105283504

Baiano, C., Zappullo, I., Group, t. L., & Conson, M. (2020). Tendency to worry and fear of mental health during Italy's COVID-19 lockdown. *International Journal of Environmental Research and Public Health, 17*(16), 5928. https://www.mdpi.com/1660-4601/17/16/5928.

Belen, H. (2021). Fear of COVID-19 and mental health: The role of mindfulness in during times of crisis. *International Journal of Mental Health and Addiction, 1*–12. https://doi.org/10.1007/s11469-020-00470-2

Bergin, A. J., & Pakenham, K. I. (2016). The stress-buffering role of mindfulness in the relationship between perceived stress and psychological adjustment. *Mindfulness, 7*(4), 928–939. https://doi.org/10.1007/s12671-016-0532-x

Bergomi, C., Strohle, G., Michalak, J., Funke, F., & Berking, M. (2013). Facing the dreaded: Does mindfulness facilitate coping with distressing experiences? A moderator analysis. *Cognitive Behaviour Therapy, 42*(1), 21–30. https://doi.org/10.1080/16506073.2012.713391

Bitan, D. T., Grossman-Giron, A., Bloch, Y., Mayer, Y., Shiffman, N., & Mendlovic, S. (2020). Fear of COVID-19 scale: Psychometric characteristics, reliability and validity in the Israeli population. *Psychiatry Research, 289*, Article 113100. https://doi.org/10.1016/j.psychres.2020.113100

Bohlmeijer, E., ten Klooster, P. M., Fledderus, M., Veehof, M., & Baer, R. (2011). Psychometric properties of the five facet mindfulness questionnaire in depressed adults and development of a short form. *Assessment, 18*(3), 308–320. https://doi.org/10.1177/1073191111408231

Brown, D. B., Bravo, A. J., Roos, C. R., & Pearson, M. R. (2015). Five facets of mindfulness and psychological health: Evaluating a psychological model of the mechanisms of mindfulness. *Mindfulness, 6*(5), 1021–1032. https://doi.org/10.1007/s12671-014-0349-4 (N Y).

Brown, K. W., & Ryan, R. M. (2003). The benefits of being present: Mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology, 84*(4), 822–848. https://doi.org/10.1037/0022-3514.84.4.822

Carbone, E., Palumbo, R., Sella, E., Lenti, G., Di Domenico, A., & Borella, E. (2021). Emotional, psychological, and cognitive changes throughout the COVID-19 pandemic in Italy: Is there an advantage of being an older adult? *Frontiers in Aging Neuroscience, 13*(9), Article 712369. https://doi.org/10.3389/fnagi.2021.712369

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*, Article 101785. https://doi.org/10.1016/j.cpr.2019.101785

Chao, M., Xue, D., Liu, T., Yang, H., & Hall, B. J. (2020). Media use and acute psychological outcomes during COVID-19 outbreak in China. *Journal of Anxiety Disorders, 74*. https://doi.org/10.1016/j.janxdis.2020.102248, 102248-102248.

Chopko, B. A., & Schwartz, R. C. (2013). The relation between mindfulness and posttraumatic stress symptoms among police officers. *Journal of Loss and Trauma, 18*(1), 1–9. https://doi.org/10.1080/15325024.2012.674442

Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior, 24*(4), 385–396. https://doi.org/10.2307/2136404

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*(1900). https://doi.org/10.3389/fpsyg.2020.01900

Dillard, A. J., & Meier, B. P. (2021). Trait mindfulness is negatively associated with distress related to COVID-19. *Personality and Individual Differences, 179*, Article 110955. https://doi.org/10.1016/j.paid.2021.110955

Esai Selvan, M. (2020). Risk factors for death from COVID-19. *Nature Reviews Immunology, 20*(7). https://doi.org/10.1038/s41577-020-0351-0, 407-407.

Gallagher, M. W., Zvolensky, M. J., Long, L. J., Rogers, A. H., & Garey, L. (2020). The impact of COVID-19 experiences and associated stress on anxiety, depression, and functional impairment in American adults. *Cognitive Therapy and Research, 44*(6), 1043–1051. https://doi.org/10.1007/s10608-020-10143-y

Garfin, D. R., Silver, R. C., & Holman, E. A. (2020). The novel coronavirus (COVID-2019) outbreak: Amplification of public health consequences by media exposure. *Health Psychology, 39*(5), 355–357. https://doi.org/10.1037/hea0000875

Götmann, A., & Bechtoldt, M. N. (2021). Coping with COVID-19 - Longitudinal analysis of coping strategies and the role of trait mindfulness in mental well-being. *Personality and Individual Differences, 175*. https://doi.org/10.1016/j.paid.2021.110695, 110695-110695.

Hanley, A. W., & Garland, E. L. (2014). Dispositional mindfulness co-varies with self-reported positive reappraisal. *Personality and Individual Differences, 66*, 146–152. https://doi.org/10.1016/j.paid.2014.03.014

Jones, S. M., & Hansen, W. (2015). The impact of mindfulness on supportive communication skills: Three exploratory studies. *Mindfulness, 6*(5), 1115–1128. https://doi.org/10.1007/s12671-014-0362-7

Kabat-Zinn, J. (1990). *Full catastrophe living: Using the wisdom of your body and mind to face stress, pain, and illness.* Delacorte.

Kassas, B., & Nayga, R. M. (2021). Understanding the importance and timing of panic buying among US Households during the COVID-19 pandemic. *Food Quality and Preference, 93*(10), Article 104240. https://doi.org/10.1016/j.foodqual.2021.104240

Kiken, L. G., Garland, E. L., Bluth, K., Palsson, O. S., & Gaylord, S. A. (2015). A state to a trait: Trajectories of state mindfulness in meditation during intervention predict changes in trait mindfulness. *Personality and Individual Differences, 81*, 41–46. https://doi.org/10.1016/j.paid.2014.12.044

Killgore, W. D. S., Cloonan, S. A., Taylor, E. C., & Dailey, N. S. (2021). Mental health during the first weeks of the COVID-19 pandemic in the United States. *Frontiers in Psychiatry, 12*, Article 561898. https://doi.org/10.3389/fpsyt.2021.561898

Kock, M., Kuppens, P., Van der Gucht, K., & Raes, F. (2021). Mindfulness may buffer psychological distress in adolescents during the COVID-19 pandemic: The differential role of mindfulness facets. *Psychologica Belgica, 61*(1), 356–376. https://doi.org/10.5334/pb.1093

Kunzler, A. M., Rothke, N., Gunthner, L., Stoffers-Winterling, J., Tuscher, O., Coenen, M., Rehfuess, E., Schwarzer, G., Binder, H., Schmucker, C., Meerpohl, J. J., & Lieb, K. (2021). Mental burden and its risk and protective factors during the early phase of the SARS-CoV-2 pandemic: Systematic review and meta-analyses. *Globalization and Health, 17*(1), 29. https://doi.org/10.1186/s12992-021-00670-y. Article 34.

Liu, S. Y., Haucke, M. N., Heinzel, S., & Heinz, A. (2021). Long-term impact of economic downturn and loneliness on psychological distress: Triple crises of COVID-19 pandemic. *Journal of Clinical Medicine, 10*(19), 11. https://doi.org/10.3390/jcm10194596. Article 4596.

Magalhaes, E., Stoner, A., Palmer, J., Schranze, R., Grandy, S., Amin, S., & Cheng, N. (2021). An assessment of mental health outcomes during the COVID-19 pandemic. *Community Mental Health Journal.* https://doi.org/10.1007/s10597-021-00876-9

Mertens, G., Duijndam, S., Lodder, P., & Smeets, T. (2020). Pandemic panic? Results of a 6-month longitudinal study on fear of COVID-19. *PsyArXiv.* https://doi.org/10.31234/osf.io/xtu3f

Mertens, G., Duijndam, S., Smeets, T., & Lodder, P. (2021). The latent and item structure of COVID-19 fear: A comparison of four COVID-19 fear questionnaires using SEM and network analyses. *Journal of Anxiety Disorders, 81*, Article 102415. https://doi.org/10.1016/j.janxdis.2021.102415

Mertens, G., Gerritsen, L., Duijndam, S., Salemink, E., & Engelhard, I. M. (2020). Fear of the coronavirus (COVID-19): Predictors in an online study conducted in March 2020. *Journal of Anxiety Disorders, 74*. https://doi.org/10.1016/j.janxdis.2020.102258, 102258-102258.

Nicola, M., Alsafi, Z., Sohrabi, C., Kerwan, A., Al-Jabir, A., Iosifidis, C., Agha, M., & Agha, R. (2020). The socio-economic implications of the coronavirus pandemic (COVID-19): A review. *International Journal of Surgery, 78*, 185–193. https://doi.org/10.1016/j.ijsu.2020.04.018

Raihan, M. M. H. (2021). Mental health consequences of COVID-19 pandemic on adult population: A systematic review. *Mental Health Review Journal, 26*(1), 42–54. https://doi.org/10.1108/mhrj-07-2020-0044

Ribeiro, F., Schroder, V. E., Kruger, R., Leist, A. K., & Consortium, C.-V. (2021). The evolution and social determinants of mental health during the first wave of the COVID-19 outbreak in Luxembourg. *Psychiatry Research, 303*(8), Article 114090. https://doi.org/10.1016/j.psychres.2021.114090

Rijksinstituut voor Volksgezondheid en Milieu. (2021). Coronadashboard. Retrieved 13 August from https://coronadashboard.rijksoverheid.nl/.

Rutland-Lawes, J., Wallinheimo, A. S., & Evans, S. L. (2021). Risk factors for depression during the COVID-19 pandemic: A longitudinal study in middle-aged and older adults. *Bjpsych Open, 7*(5), 7. https://doi.org/10.1192/bjo.2021.997. Article e161.

Simonsson, O., Bazin, O., Fisher, S. D., & Goldberg, S. B. (2021). Effects of an eight-week, online mindfulness program on anxiety and depression in university students during COVID-19: A randomized controlled trial. *Psychiatry Research, 305*, Article 114222. https://doi.org/10.1016/j.psychres.2021.114222

Sirois, F. M., & Tosti, N. (2012). Lost in the moment? An investigation of procrastination, mindfulness, and well-being. *Journal of Rational-Emotive & Cognitive-Behavior Therapy, 30*(4), 237–248. https://doi.org/10.1007/s10942-012-0151-y

Spijkerman, M. P., Pots, W. T., & Bohlmeijer, E. T. (2016). Effectiveness of online mindfulness-based interventions in improving mental health: A review and meta-analysis of randomised controlled trials. *Clinical Psychology Review, 45*, 102–114. https://doi.org/10.1016/j.cpr.2016.03.009

Spitzer, R. L., Kroenke, K., Williams, J. B., & Löwe, B. (2006). A brief measure for assessing generalized anxiety disorder: The GAD-7. *Archives of Internal Medicine, 166*(10), 1092–1097. https://doi.org/10.1001/archinte.166.10.1092

Suleman, S., Garber, K. D., & Rutkow, L. (2018). Xenophobia as a determinant of health: An integrative review. *Journal of Public Health Policy, 39*(4), 407–423. https://doi.org/10.1057/s41271-018-0140-1

Taylor, S., Landry, C. A., Paluszek, M. M., Fergus, T. A., McKay, D., & Asmundson, G. J. G. (2020a). COVID stress syndrome: Concept, structure, and correlates. *Depression and Anxiety, 37*(8), 706–714. https://doi.org/10.1002/da.23071

Taylor, S., Landry, C. A., Paluszek, M. M., Fergus, T. A., McKay, D., & Asmundson, G. J. G. (2020b). Development and initial validation of the COVID Stress Scales. *Journal of Anxiety Disorders, 72*, Article 102232. https://doi.org/10.1016/j.janxdis.2020.102232

Taylor, S., Paluszek, M. M., Landry, C. A., Rachor, G. S., & Asmundson, G. J. G. (2021). Predictors of distress and coping during pandemic-related self isolation: The relative importance of personality traits and beliefs about personal threat. *Personality and Individual Differences, 176*(6), Article 110779. https://doi.org/10.1016/j.paid.2021.110779

Tomlinson, E. R., Yousaf, O., Vitterso, A. D., & Jones, L. (2018). Dispositional mindfulness and psychological health: A systematic review. *Mindfulness, 9*(1), 23–43. https://doi.org/10.1007/s12671-017-0762-6

Van den Bulck, J., & Custers, K. (2009). Television exposure is related to fear of avian flu, an ecological study across 23 member states of the European Union. *European Journal of Public Health, 19*(4), 370–374. https://doi.org/10.1093/eurpub/ckp061

van Son, J., Nyklicek, I., Nefs, G., Speight, J., Pop, V. J., & Pouwer, F. (2015). The association between mindfulness and emotional distress in adults with diabetes: Could mindfulness serve as a buffer? Results from Diabetes MILES: The Netherlands. *Journal of Behavioral Medicine, 38*(2), 251–260. https://doi.org/10.1007/s10865-014-9592-3

Varma, P., Junge, M., Meaklim, H., & Jackson, M. L. (2021). Younger people are more vulnerable to stress, anxiety and depression during COVID-19 pandemic: A global cross-sectional survey. *Progress in Neuro-Psychopharmacology and Biological Psychiatry, 109*, Article 110236. https://doi.org/10.1016/j.pnpbp.2020.110236

Vos, L. M. W., Habibovic, M., Nyklicek, I., Smeets, T., & Mertens, G. (2021). Optimism, mindfulness, and resilience as potential protective factors for the mental health consequences of fear of the coronavirus. *Psychiatry Research, 300*, Article 113927. https://doi.org/10.1016/j.psychres.2021.113927

Vujanovic, A. A., Youngwirth, N. E., Johnson, K. A., & Zvolensky, M. J. (2009). Mindfulness-based acceptance and posttraumatic stress symptoms among trauma-exposed adults without axis I psychopathology. *Journal of Anxiety Disorders, 23*(2), 297–303. https://doi.org/10.1016/j.janxdis.2008.08.005

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. https://doi.org/10.1016/j.jrp.2008.12.008

World Health Organization. (2022). WHO coronavirus disease (COVID-19) dashboard. Retrieved 22 July from https://covid19.who.int/.

Xiong, J., Lipsitz, O., Nasri, F., Lui, L. M. W., Gill, H., Phan, L., Chen-Li, D., Iacobucci, M., Ho, R., Majeed, A., & McIntyre, R. S. (2020). Impact of COVID-19 pandemic on mental health in the general population: A systematic review. *Journal of Affective Disorders, 277*, 55–64. https://doi.org/10.1016/j.jad.2020.08.001

Yalcin, I., Can, N., Calisir, O. M., Yalcin, S., & Colak, B. (2021). Latent profile analysis of COVID-19 fear, depression, anxiety, stress, mindfulness, and resilience. *Current Psychology, 1–11*. https://doi.org/10.1007/s12144-021-01667-x