

The Influence of Mindfulness on Covid-19-Related Psychological Distress

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Abstract

Due to the high risks associated with the Covid-19 virus, several measures all over the globe were put in place to keep the pandemic in check (e.g., lockdowns). These measures seem to increase people's stress levels (Lemenager et al., 2020; Serafini et al., 2020). One way to cope with stress is through traits like mindfulness (Jasbi et al., 2018; Grossman et al., 2004). Individuals with higher levels of mindfulness could experience less stress in response to Covid-19 by helping to disengage from rumination and negative emotions. Hence, the current study investigated if exposure to Covid-19-related news influences Covid-19-related distress and if a brief mindfulness intervention moderates this effect. Data was collected via a self-report survey experiment on trait mindfulness and stress resilience in 140 participants on Amazon mTurk. The participants received either a three-minute mindfulness intervention or an excerpt from an audiobook. Afterward, they were exposed to either a Covid-19-related or a non-Covid-related distressing news clip. Finally, attention and manipulation checks were given to the participants, and Covid-19-related distress was assessed. No support was found that there would be an increase in Covid-19-related distress after exposure to Covid-19 news, nor support for moderating effects of a brief mindfulness intervention. However, analysis of stress resilience and the control variables provided exciting insight and possibilities for future research.

The Covid-19 pandemic constitutes a global health crisis (Pollard et al., 2020). In addition to developing viral symptoms, Covid-19 leads to several adverse health outcomes. For example, research on Covid-19 exposure (being exposed to Covid-19-related information that is self-relevant) on negative emotions found that Covid-19 exposure leads to pervasive anxiety and uncontrollable fear (Serafini et al., 2020). Other adverse health outcomes include loneliness, frustration, and boredom. Furthermore, these outcomes lead to an overall decrease in subjective well-being, which increases people's risk of developing a psychiatric condition (Serafini et al., 2020). Since this pandemic and its containment measures (e.g., lockdowns) impact the whole world, it is crucial to understand factors that can prevent or improve adverse mental health outcomes due to Covid-19 stressors. Amongst such stressors could be the traumatic experiences associated with the pandemic.

This pandemic has also been referred to as a “collective trauma” experienced worldwide (Silver, 2020). Collective trauma is: “The psychological reactions to a traumatic event that affect an entire society [...] the recollection of a terrible event that happened to a group of people.” (Hirschberger, 2018). In addition to physical complaints like pain and cardiovascular symptoms (Sowder et al., 2018), traumas can lead to severe psychological complaints. Specifically, exposure to trauma leads to an increased risk of developing post-traumatic stress disorder (PTSD) (Breslau, 2009). Also, it increases the risk of developing an eating disorder, substance abuse (Sowder et al., 2018), depressive symptoms, and hyperarousal (Pérez et al., 2012). Therefore, Covid-19-related traumatic symptoms could lead to the development of a range of psychiatric conditions, which will cost society significant time and resources.

Several explanations exist on how such experiences could lead to adverse health outcomes, such as avoidance of trauma-related stimuli, emotional dysregulation, or numbing (Substance Abuse and Mental Health Services Administration, 2014). Furthermore, previous studies found that an abnormal stress response after trauma is a significant factor leading to

adverse health outcomes (Horowitz, 1993; McFarlane, 2010; Schultebrucks et al., 2019). Symptoms include increased heart rate, increased blood pressure, reduced stomach activity, and sweating (Mental health foundation, 2020). Experiencing stress over an extended period could be a significant causal factor in explaining how trauma negatively impacts our health (D'Andrea et al., 2011). Additionally, several measures to keep the pandemic in acceptable margins (e.g., quarantine and lockdowns) increase the stress response of individuals (Lemenager et al., 2020).

Still, only a minority of people experiencing stress develop a psychological disorder due to an excessive stress response. Several neural and inhibitory processes are involved in an individual's stress response, and animal studies show how impaired gene expressions and stress neurocircuits lead to differences in stress vulnerability (Ebner & Singewald, 2017). These differences in neurobiological mechanisms lead to individual differences in adaptation and perception of stressful stimuli. Furthermore, the previously mentioned implications of trauma (e.g., PTSD and eating disorder) have different treatment implications within their respective DSM-5 categories. Therefore, focusing on the immediate stress response to trauma appears to be a relevant target for treatment. Hence, it seems vital to concentrate on stress resulting from Covid-19 exposure (early after or during the pandemic) instead of distinct disorders resulting from this stress response.

One intervention with promising effects to help cope with stress is mindfulness. Mindfulness is defined as: "moment-to-moment, non-judgmental awareness, [...] that is, in the present moment [...]" (Kabat-Zinn, 2015). Mindfulness is positively associated with health-related outcomes, such as alleviating depressive symptoms and catastrophizing and increasing emotional processing/regulation and overall well-being (Bränström et al., 2011; Tomlinson et al., 2017). Most importantly for the current study, mindfulness alleviates excessive stress (Jasbi et al., 2018). In a meta-analysis using physical and mental health measures, mindfulness-based interventions consistently reduced stress in clinical and non-

clinical samples (Grossman et al., 2004). Hence, mindfulness seems not only a practical but also a widely applicable intervention to reduce stress.

Mindfulness-based cognitive behavior therapy often uses the metacognitive theory of mindfulness (MCTM) as a theoretical basis for treatment (Jankowski & Holas, 2014; Shapiro et al., 2006). This theory suggests that mindfulness works by helping to disengage from rumination and negative emotions and relate to them differently. Individuals learn to observe thoughts as 'just thoughts' and increase their metacognitive awareness. According to Shapiro et al. (2006), evaluating negative thoughts from a decentered perspective assists in perceiving these thoughts as more impersonal and consequently less dangerous. Studies in the literature supporting this theory suggest that non-judgmental awareness elicited by mindfulness practice buffers psychological distress (Lau et al., 2017). Therefore, MCTM suggests that mindfulness could be a valuable tool to improve health-related outcomes associated with maladaptive cognitions.

Indeed, preliminary evidence indicates that mindfulness positively affects mental health during the Covid-19 pandemic. For example, Weis et al. (2020) investigated the effects of an eight-week mindfulness training on anxiety, stress, sleep duration, and self-comparison. The experiment consisted of four-week mindfulness-based group therapy for students. Participants improved on all health outcomes (stress, anxiety, and sleep problems) and their ability to focus and pay attention. Furthermore, the authors observed an increase in dysphoria in the control condition. This increase in dysphoria indicates that individuals' mental health states may suffer adverse consequences if nothing is done about Covid-19-related effects (e.g., social isolation). Nonetheless, individuals can overcome Covid-19-related negative health consequences once studies have identified them (Desai et al., 2021; Weis et al., 2020; Zheng et al., 2020). However, this research also showed how important it is to prevent such consequences of the pandemic actively.

A recent study investigated the direct effects of mindfulness on psychological distress during Covid-19. Conversano et al. (2020) recorded several demographic variables, Covid-19 related variables (exposure to Covid-19), and trait mindfulness in an online survey in Italy. Trait mindfulness proved the best predictor of psychological distress. The researchers concluded that high trait mindfulness enhances well-being and helps deal with stressful situations, such as the effects of the Covid-19 crisis. This study is in line with previous research, indicating that individuals high in trait mindfulness may be more resilient to stress (Mesmer-Magnus et al., 2017; Polizzi et al., 2018). Consequently, trait mindfulness may be a protective factor to stress specifically experienced during the Covid-19 pandemic.

However, the study conducted by Conversano et al. (2020) was non-experimental and therefore is limited in explaining the observed effects regarding their causal direction. Indeed, few experimental studies during the pandemic investigated the impact of mindfulness on psychological distress. Therefore, the current study investigated the effects of a brief mindfulness intervention on Covid-19-related psychological distress. In other words, the present study investigated the following research question: “What is the effect of mindfulness on psychological distress during the Covid-19 pandemic”.

After reviewing the arguments and evidence presented above, it was hypothesized that Covid-19 exposure would positively affect Covid-19-related psychological distress (Hypothesis 1). Furthermore, it was hypothesized that mindfulness would moderate this effect on Covid-19-related psychological distress (Hypothesis 2) (Figure 1). An experiment was conducted in which participants performed a brief mindfulness intervention and were exposed to Covid-19-related and relevant news. Hence, the study had a 2 (Mindfulness; experimental/control) x 2 (Covid-19 exposure: experimental/control) between-subject design. Further details of the experiment will be discussed in the following section.

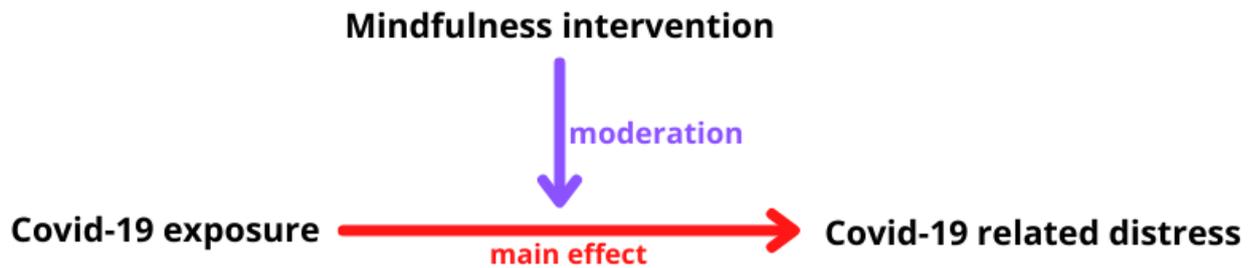


Figure 1. Expected main effect and moderation of independent Variables Covid-19 exposure and mindfulness intervention on Covid-19 related distress

Method

This chapter will discuss the methodology behind the current study in more detail. First, information about the participants will be provided. Next, the materials used and the procedure will be discussed. Finally, the performed data analyses will be explained.

Participants

The participants in the current study were users of the online platform Amazon mTurk. Individuals worldwide can register to participate in online research for monetary compensation on this platform. The present study is the first of its kind and therefore had no clear reference points for the expected effect size. Hence, a power analysis would not have been appropriate. However, the current study used the sample size of Conversano et al. (2020) (N=128) as a rough reference point due to moderate similarities between the two studies. In total, 190 participants completed the questionnaire. Exclusion criteria were incomplete data (24), failed attention checks (26), as well as extreme outliers on the dependent measures (3 SD or more divergence from the mean) (0). The final sample used for the analysis consisted of 140 participants, of which 86 were male (61.43%), 53 were female (37.86%), and one

person preferred not to disclose their gender (0.71%). The mean age observed ($M = 36.43$; $SD = 11.89$; range 21 - 70 years) was close to the mean age observed in the population of the US in the year 2020 at around 38.6 years (Statista, 2020). Furthermore, 111 participants were American (79.36%), 14 German (10%), 7 Indian (5%), and 8 participants from other countries (5.71%).

Material

This section is subdivided into pre-manipulation, manipulation, and post-manipulation.

1. Pre-manipulation

The first measure was deployed to control for baseline levels of mindfulness. Trait-mindfulness was operationalized via the Mindfulness Attention Awareness Scale (MAAS) (15 items) (Brown & Ryan, 2003). The item range was on a 6-point Likert scale (“1=Almost Never” to “6=Almost Always”). All items on the scale are reversed (R). For example, items on the MAAS are: “I find it difficult to focus on what is happening in the present.” Hence, high scores on the MAAS indicated low levels of mindfulness. ($\alpha = .87$) (Barajas & Garra, 2014) (present study: $\alpha = .95$) (Appendix 6).

Similarly, the next measure was deployed to control baseline levels of resilience to stress before the mindfulness intervention. Therefore, the Brief Resilience Scale (BRS) was administered to control for individuals’ stress susceptibility (Smith et al., 2008). The BRS consists of 6 items. Participants rate their agreement with the items on a 5-point Likert scale (“1=Strongly Disagree” to “5=Strongly Agree”). For example, items on the BRS are: “I have a hard time making it through stressful events.” High scores on the BRS represented higher levels of resilience ($\alpha = .80-.91$) (Kyriazos et al., 2018) (present study: $\alpha = .64$) (Appendix 7).

2. Manipulation

After the pre-measurements, participants were exposed to the mindfulness intervention (experimental manipulation) or the audiobook (control). The mindfulness intervention was a 3-minute clip narrated by a soft female voice. Similar approaches have been used to induce mindfulness via a brief exercise (Howarth et al., 2019; Owens et al., 2020; Schumer et al., 2018). For example, in the clip, the listener is encouraged to rest comfortably sitting down, making sure to have a straight back and breathe deeply in and out while being aware of their breath (Appendix 8). The effectiveness of the mindfulness intervention to influence state mindfulness was confirmed beforehand on a small test sample consisting of ten individuals who were approached in person¹. State mindfulness was measured via the State Mindfulness Scale (SMS) (Tanay & Bernstein, 2013). The SMS consists of 22 items, like, for example: “I felt closely connected to the present moment.”. The items were answered on a 6-point Likert scale (“1=Strongly disagree” to “6=Strongly agree”). Hence, high scores on the SMS indicated high levels of state mindfulness ($\alpha = .92$; Tanay & Bernstein, 2013).

The control video was also an approximately 3-minute-long audiobook clip. It was a sample from the audiobook “Five Finger” written by Tony H. Latham. Previous studies also used audiobooks as a control condition for a mindfulness exercise (Bennett et al., 2018; Economides et al., 2018) since similar auditory stimulation is provided without mindfulness induction. The audiobook clip describes a scene where the main character gets woken by a call from a woman. She gives him news about a shooting and a truck relevant to the main character, who appears to be a deputy (Appendix 8).

Participants were again divided into two groups following the first manipulation: the Covid-19 exposure video (experimental manipulation) or the US news report (control). The experimental video is an approximately 2-minute-long clip describing the current state of

¹ The results of the paired-sample t-test indicated a large and significant difference between the mindfulness intervention and the control video on SMS ($t(9) = 3.61$; $p = .006$; $d = 1.14$, 95% CI [.31, 1.93]). This means that the mindfulness intervention scored significantly higher on mean scores on state mindfulness (SMS) than the control video (audiobook).

Covid-19, specifically the Omicron variant, which emerged only recently at the time of the present research. For example, in the video, Dr. Tedros Adhanom Ghebreyesus of the World Health Organization (WHO) discusses the new Omicron Covid-19 variant, rapidly spreading “like a Tsunami,” as well as national and European record numbers of Covid-19 infections. In the background, the video shows individuals with medical masks and clips of people getting vaccinated (Appendix 9).

The control video was a 2-minute-long news clip from the US which showed and explained the current state of winter storms in the US. For example, power outages due to the snowstorms, “treacherous” conditions for cars, and canceled flights are discussed and shown in the video. This video was chosen because it was also news with negative valence, and it was related to the largest user base of mTurk (Americans) (Appendix 9).

Afterward, participants completed an attention check to confirm they were actively paying attention to either of the clips. They were asked: “Which of the following statements about the clip you just watched is true?”. Answer possibilities were: “It discusses mainly Covid-19 Omicron” for the experimental condition or “It discusses Snowstorms in the US” for the control condition (Appendix 9).

3. Post-manipulation

As a manipulation check to (dis)confirm if the manipulation elicited the desired emotions, participants received the Discrete Emotion Questionnaire (DEQ) after watching the Covid-19-related/control video (Harmon-Jones et al., 2016). They were asked, “While watching the previous video, to what extent did you experience these emotions?” Only four subscales on the most relevant emotions to the present context (negative emotions related to Covid-19) were included, namely, anger (e.g., mad), disgust (e.g., revulsion), fear (e.g., terror), and anxiety (e.g., worry). All items were answered on a 7-point Likert scale (“1=not at all” to “7=an extreme amount”). Hence, high scores on the scales indicated high levels of the

respective emotion. Cronbach's alphas for the subscales in previous studies were: $\alpha = .97$ (Anger), $\alpha = .88$ (Disgust), $\alpha = .92$ (Fear), and $\alpha = .90$ (Anxiety) (Harmon-Jones et al., 2016) and $\alpha = .93$ (Anger), $\alpha = .91$ (Disgust), $\alpha = .92$ (Fear), and $\alpha = .93$ (Anxiety) in the present study (Appendix 10). Another test sample of 10 individuals completed the DEQ for Covid-19 exposure (experimental/control) and a neutral news clip (neutral) to confirm differences in baseline levels of emotion experienced during a news clip without negative valence². The neutral video was a clip about agriculture news. In the clip, a new autonomous tractor was presented, and the reporter also talked about a new strategic plan for soybean checkoff (Appendix 10).

Lastly, to operationalize Covid-19-related distress, participants filled out the Covid-19-related public distress (CORPD) questionnaire (Feng et al., 2020). The CORPD consists of 14 items, including statements like: "If I were infected with COVID-19, I might not be able to recover from it." The item range was on a 5-point Likert scale ("1=Strongly disagree" to "6=Strongly agree") ($\alpha = .89$ (Feng et al., 2020) (present study: $\alpha = .93$) (Appendix 11).

Procedure

An online survey was constructed using Qualtrics. A post was placed on mTurk, where participants could sign up for the study and find a link to the survey initially on mTurk and were then redirected to the platform Qualtrics. The participants would then view and confirm a briefing on the study and informed consent. They were made aware that data storing and processing would be anonymous. Next, participants were directed to another page where all pre-measurements were recorded (demographics, stress susceptibility (BRS), and

² The results of the paired-sample t-tests indicated a large and significant difference between the experimental video and the neutral video AND the control video and the neutral video on Anger ($t(9) = 4.40$; $p = .002$; $d = 1.39$, 95% CI [.39, 2.01] AND $t(9) = 3.95$, $p = .003$; $d = 1.25$, 95% CI [.49, 2.26]), Disgust ($t(9) = 4.31$, $p = .002$, $d = 1.36$, 95% CI [.47, 2.22] AND $t(9) = 2.86$; $p = .019$; $d = .91$, 95% CI [.14, 1.63]), Fear ($t(9) = 3.86$; $p = .004$; $d = 1.22$ 95% CI [.37, 2.03] AND $t(9) = 3.87$, $p = .004$, $d = 1.23$ 95% CI [.37, 2.04]), and Anxiety ($t(9) = 5.31$; $p < .001$; $d = 1.53$, 95% CI [.68, 2.65] AND $t(9) = 4.55$; $p = .001$; $d = 1.44$ 95% CI [.52, 2.32]). This means that the experimental (Covid-19) as well as the control video (US snowstorm news) scored significantly higher on mean scores on Anger, Disgust, Fear and Anxiety compared to the neutral video (Agriculture news).

trait mindfulness (MAAS)), after which they were asked specific Covid-19 stress-related questions on behalf of other research (Pfeiffenberger, 2022). Afterwards, participants were randomly assigned to into one of four groups (Mindfulness/Covid; Mindfulness/Control; Control/Covid; Control/Control (MCov, CCov, MC, CC)). Participants were asked to pay close attention to the experimental and the control videos as there may be questions about them later on. First, they received their intervention (mindfulness intervention/control). Next, they received the news video related to their group membership (Covid-19/control), after which they had to complete the attention check. Finally, participants completed the DEQ subscales, followed by questions about Covid-19-related psychological distress (CORPD) (full survey: see Appendix 1-11). After the survey was finished, the participants were debriefed and redirected to mTurk. The complete study lasted approximately 15 minutes, and reimbursement of 1.25\$ was provided after completion of the study.

Data Analysis

Initially, the current study conducted a two-way analysis of variance (ANOVA) to investigate differences in the control variable MAAS (quantitative) in the four experimental groups (MCov, CCov, MC, CC). Additionally, a linear regression analysis investigated if MAAS was associated with the dependent variable CORPD.

The main analysis had a 2 (Mindfulness; experimental/control) x 2 (Covid-19 exposure: experimental/control) between-subject design on the dependent variable Covid-related distress (CORPD). All scales were only applied once, and the participants were randomly assigned to only one of the four groups. All scores on pre-and post-manipulation measurements were computed as mean scores for all items for each scale. Following the data collection, a two-way analysis of covariance (ANCOVA) was conducted to test both hypotheses, which predicted that there would be a main effect of Covid-19 exposure (experimental/control), as well as interaction effects between the independent variable Covid-

19 exposure (experimental/control) and Mindfulness (experimental/control) on the dependent variable CORPD (quantitative). The BRS (quantitative) was included to control for baseline levels of stress susceptibility.

Subsequently, four two-way ANOVAs were conducted to investigate the effectiveness of the experimental manipulation of Covid-19 exposure (experimental/control) on four subscales of the DEQ (Anger, Disgust, Fear, and Anxiety).

Results

Assumption Checks

The test for normality was significant for CORPD ($p < .001$) and BRS ($p < .001$). However, the current study had many participants, and the normality test is very sensitive. Furthermore, skewness (CORPD (-.63), BRS (.31)) and kurtosis (CORPD (-.22), BRS (1.4)) were both in acceptable margins (Ryu, 2011; Sánchez Rosas, 2015). Visually the histograms also seemed sufficiently normal. Furthermore, ANOVAs are relatively robust against violations of the assumption of normality (Finch, 2005), and therefore it was decided to continue with the planned analyses. Finally, another assumption of ANOVAs would be that the variance among groups is equal. However, Levene's test for homogeneity of variance was significant ($p = \sim .02$) for the dependent measure CORPD. Nonetheless, as previously mentioned, ANOVAs are relatively robust to assumption violations, and the p-value was close to .05 (non-significant). Therefore, it was decided to proceed with the analysis as planned, though the results need to be interpreted with caution.

Mean			
Mindfulness Clip	MAAS	BRS	CORPD
Mindfulness	3,44	3,05	3,35
Control	3,30	3,38	3,21
Total	3,38	3,20	3,29
COVID-19 Clip			
Covid Exposure	3,49	3,18	3,32
Control	3,27	3,22	3,26
Total	3,38	3,20	3,29

Table 1 Mean Scores in the research population.

Control variable (Trait Mindfulness)

Before testing the two hypotheses, a two-way ANOVA was conducted to investigate if trait mindfulness (MAAS) was similar across all four groups: (MCov, CCov, MC, CC). This showed no significant interaction effect Mindfulness x Covid-19 exposure ($F(1, 136) = 3.175$, $p = .077$), nor any significant effects of Mindfulness ($F(1, 136) = .671$, $p = .414$) and Covid-19 exposure ($F(1, 136) = .976$, $p = .325$) on trait mindfulness (MAAS). Thus, trait mindfulness (MAAS) did not differ between the four experimental groups (MCov, CCov, MC, CC).

Additionally, a linear regression analysis investigated if covariate trait mindfulness (MAAS) was associated with the dependent variable Covid-19-related distress (CORPD). The overall model fit showed $R^2 = .359$ (explained variance). The predictor (MAAS) was significant on CORPD ($F(1, 138) = 77.22$, $p < .001$, $b = -.452$). This means that participants scoring higher on trait mindfulness (MAAS) scored significantly lower on Covid-19 related distress (CORPD). For a more in-depth analysis of this association, see Pfeiffenberger (2022).

Main analysis

The main analysis was a two-way ANCOVA to measure the effect of the independent variables (Mindfulness (experimental/control) and Covid-19 exposure (experimental/control)) and the covariate BRS on the dependent variable CORPD. This analysis was performed to investigate hypotheses 1 and 2. The results showed no statistically significant effects of Mindfulness ($F(1, 135) < .001, p = .985$) nor for the Covid-19 exposure video ($F(1, 135) = .037, p = .824$). This means that neither of the two experimental manipulations influenced participants' Covid-19-related distress (CORPD). However, the results did show a small but significant effect of the covariate BRS ($F(1, 135) = 13.907, p < .001, partial\ eta2 = .093$). This means that participants with higher stress resilience (BRS) scored lower on Covid-19-related distress (CORPD). Finally, the results showed no statistically significant two-way interaction between Mindfulness intervention and Covid-19 exposure (Hypothesis 2) ($F(1, 135) = .425, p = .516$). This means that the mindfulness intervention was not moderating the effect of Covid-19 exposure on participants' scores on Covid-19 related distress (CORPD). Table 1 presents the mean scores on all surveys in the research population.

Manipulation check (Emotions)

The DEQ was divided into the four categories previously mentioned (Anger, Disgust, Anxiety, and Fear). Subsequently, four two-way ANOVAs were conducted to gain insight into the effectiveness of the Covid-19 exposure (experimental/control). This showed a non-significant effect of Covid-19 exposure on Anger ($F(1, 138) = 3.198, p = .076$), Disgust ($F(1, 138) = 3.123, p = .079$) and Fear ($F(1, 138) = 1.804, p = .181$). The effect of Covid-19 exposure on anxiety was small, but significant ($F(1, 138) = 4.076, p = .045, partial\ eta2 = .029$). This means that participants scored higher on Anxiety in the experimental condition

compared to the control condition. However, no statistical differences between the two conditions were observed for Anger, Disgust, and Fear.

Discussion

Covid-19 is continuing to constitute a global health crisis in the current times and is negatively impacting the health of the world (Pollard et al., 2020; Serafini et al., 2020). Hence, shedding light on the effects of interventions targeting the negative health consequences of Covid-19 is crucial. The current study aimed to investigate the potential moderating effect of a brief mindfulness intervention on the relationship between Covid-19 exposure and Covid-19-related distress. The present study is one of the first to explore this relationship in an experimental setup. No support was found that there would be an increase in Covid-19-related distress after exposure to Covid-19-related news, nor was this effect moderated by a brief mindfulness intervention. However, preexisting stress resilience levels, as well as state-mindfulness, were associated with Covid-19-related distress.

The current results showed no effect of Covid-19 exposure on Covid-19-related psychological distress (Hypothesis 1). However, a recent meta-analysis found that Covid-19 exposure via Covid-19-related news and information raises disease concerns and preventive measures. Furthermore, the study found that exposure to Covid-19-related news increases individuals' uncertainty-related response. The authors suggested that this response is constituted, among other things, by negative emotions, which in turn can lead to an increased stress response (Chu et al., 2022). Indeed, previous studies found that either reading about or listening to Covid-19-related news raises individuals' stress responses (Aslan & Pekince, 2020; Kaligis et al., 2020). Hence, the null effects on Covid-19-related distress stand in contrast to several previous findings.

A first explanation for the null findings regarding the first hypothesis could be that the current study used an untested news clip which might have been ineffective in evoking

stressful emotions. Also, the analysis of the emotions suggests that Covid-19 exposure did not elicit more negative emotions than the control clip, except for anxiety. However, since the control condition was also designed to evoke negative emotions, this observation is within the expectations of the current study. Furthermore, the present study observed in the pre-test for the emotions that both the Covid-19 video and the control video were eliciting more negative emotions than a neutral clip. Hence, this explanation seems less likely. A second explanation could be that previous studies used more general stress measurements and not Covid-19-related stress measures. It might be that Covid-19-related stress is a more stable stress variable than individuals' general stress response. Hence, Covid-19-related distress might be hard to influence, even if the information presented is directly related to the pandemic.

Furthermore, the current results showed no effect of the mindfulness intervention on Covid-19-related psychological distress (Hypothesis 2). So far, previous studies have shown that mindfulness could effectively reduce psychological distress during the Covid-19 pandemic (Conversano et al., 2020; Weis et al., 2020). Furthermore, the present results contrast with findings that observed a positive effect of mindfulness on sleep quality and reductions in anxiety, stress, and self-comparison of individuals during Covid-19 (Desai et al., 2021; Weis et al., 2020; Zheng et al., 2020). Also, MCTM would predict a decrease in stress and negative emotions after a mindfulness intervention. To be more specific, MCTM would indicate that by observing thoughts as just thoughts and non-judgmental awareness, mindfulness helps to disengage from rumination. (Jankowski & Holas, 2014; Lau et al., 2017; Shapiro et al., 2006). Hence, the current results are also not in line with MCTM.

In contrast to the main analysis, the analysis of the control variable showed that trait mindfulness was associated with Covid-19-related distress. This is again in line with MCTM and the prediction that mindfulness helps buffer psychological distress and negative emotions. Furthermore, it is in line with previous studies on the effects of mindfulness on adverse health consequences (Desai et al., 2021; Weis et al., 2020; Zheng et al., 2020). However, it stands in

contrast to the current finding that the mindfulness intervention did not affect Covid-19-related distress. Nonetheless, these opposing findings are not necessarily incompatible and alternative explanations for the results will be elaborated on in the subsequent section.

A first explanation for the null findings on the second hypothesis could be that participants were not paying continuous attention to the mindfulness manipulation. This was hard to control because the study was conducted online. However, participants failing the attention check were removed from the final analysis. Furthermore, studies on attention checks showed that they help improve data quality (Abbey & Meloy, 2017), making this alternative explanation less plausible. A second explanation can be found when observing the baseline levels of resilience to stress. In the main analysis, the only observed main effect was stress resilience on Covid-19-related distress. However, this effect was small. Other studies are in line with this finding but usually found medium (Lai & Yue, 2014) or large effects of stress resilience on stress-related measures (Kunzler et al., 2018; Smith et al., 2008). Therefore, Covid-19-related distress may be less susceptible to stress resilience and, by extension, stress resilience enhancing interventions overall. Hence, a more potent mindfulness intervention might be necessary to buffer Covid-19-related distress.

This might also explain why previous studies found the effects of (long-term) mindfulness interventions on stress and other adverse health consequences during Covid-19 (Desai et al., 2021; Weis et al., 2020; Zheng et al., 2020). Furthermore, it might explain why the current study found correlations between trait mindfulness and Covid-19-related distress. Even though previous studies observed the effects of brief mindfulness interventions on stress, these effects seem to be stable, albeit small (Schumer et al., 2018). Therefore, Covid-19-related distress might be more resistant to change via a brief intervention and might require longer and more spaced-out mindfulness sessions to take significant effect. This conclusion would indicate that not brief but somewhat more extended mindfulness

interventions divided over several points in time could help prevent mental health problems during a pandemic.

The current study has to acknowledge several limitations. Firstly, data collection was conducted in an online format. It can be emphasized again that attention checks were put in place, and control variables were included to avoid extensive issues due to the online format. However, it remains inherently difficult to control for continuous attention throughout the experiment, which might have impacted the effectiveness of the mindfulness exercise. Secondly, the current study was investigating only a specific point in time. Because Covid-19 and its impact are ever-changing, changes over time might influence the current results. Data collection was conducted between the 17th of February and the 25th of March 2022. During this time, another piece of news besides Covid-19 emerged and took over western media. Namely, the still ongoing armed conflict between Russia and Ukraine. The Russian invasion of Ukraine started on the 24th of February and was anticipated by governments and the public several weeks ahead (Wikipedia, 2022).

This armed conflict is a limitation for the current study because the observed null effect of Covid-19 exposure on Covid-19-related distress is not necessarily due to problems with the initial manipulation or the attention participants were paying. Instead, it suggests the potential presence of a period effect. A period effect is: “a change which occurs at a particular time, affecting all age groups and cohorts uniformly” (Blanchard et al., 1977). Since the beginning of the Russia Ukraine conflict, news about Covid-19 was relatively scarce. Furthermore, recent studies about the psychological impact of this conflict showed that in western countries like Germany, Poland, Great Britain, and the US, there was an increase in perceived threat and negative emotions relating to the war (Moshagen, & Hilbig, 2022). Since most of the current sample was collected in the US and Germany, it is possible that the perceived threat of war and associated negative emotions were “overshadowing” the negative emotions elicited by the Covid-19 exposure.

In conclusion, the current study could not find support for the hypothesis that exposure to Covid-19-related news would positively affect Covid-19-related psychological distress, nor for the hypothesis that a brief mindfulness intervention would moderate this effect. Nonetheless, the findings brought exciting suggestions for the observed null results and relevant implications for future research. For example, future research will hopefully investigate the idea that longer and spaced-out interventions might be necessary to prevent mental health issues. Understanding the complicated and unfamiliar consequences and psychological interventions relating to the Covid-19 crisis remains essential. Regardless of the outcome, studies like the current one will continue to help improve and understand those interventions for a psychologically healthier and less distressing future.

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Appendix

1. Information Letter & Informed Consent

Information Letter

This study looks at the effects of social media influence during the current Covid-19 pandemic. The aim is to better understand how much stress we perceive through frequent engagement in social media while being in a global health crisis. Since many people tended to increase their social media use during the pandemic, this has grown in importance. Furthermore, we investigate tools that may help to reduce the perceived stress that is caused by social media engagement. By participating in this study, you may help the process of finding ways to limit the amount of Covid-19 stress that most of us are experiencing. Your contribution is valuable, and, hence, we plead for honesty in your answers since all data is treated anonymously. You may leave the study at any point if necessary for personal reasons.



Informed Consent

The Psychology Department at Utrecht University supports the practice of the protection of human participants in research. The following will provide you with information about the experiment that will help you in deciding whether or not you wish to participate. If you agree to participate, please be aware that you are free to withdraw at any point throughout the duration of the experiment without any penalty.

In this study, we will ask you to answer a variety of questionnaires, in addition to performing a brief 3-minutes exercise guided by video. All information you provide will remain confidential and will not be associated with your name. If for any reason during this study you do not feel comfortable, you may leave, and your information will be discarded. Your participation in this study will require approximately 15 minutes. If you have any further questions concerning this study, please feel free to contact us through email:

PHILIPP ESSLINGER at p.esslinger@students.uu.nl or PHILIPP PFEIFFENBERGER at j.p.pfeiffenberger@students.uu.nl.

Please indicate by ticking the box below that you understand your rights and agree to participate in the experiment.

Your participation is solicited, yet strictly voluntary. All information will be kept confidential, and your name will not be associated with any research findings.

Yes

No



2. Demographics

0%  100%

What is your gender?

- Male
- Female
- Non-binary / third gender
- Prefer not to say

How old are you?

18 26 34 43 51 59 67 75 84 92 100

Age



What is the highest level of school you have completed or the highest degree you have received?

- Less than high school degree
- High school degree or equivalent (e.g., GED)
- Some college but no degree
- Associate degree
- Bachelor degree
- Graduate degree
- Other (please specify)

What is your nationality (e.g. American, Canadian, German...)?

3. Social media engagement scale (for analysis, see: Pfeiffenberger, 2022)

Ni, X., Shao, X., Geng, Y., Qu, R., Niu, G., & Wang, Y. (2020). Development of the social media engagement scale for adolescents. *Frontiers in Psychology, 11*.

<https://doi.org/10.3389/fpsyg.2020.00701>

Below you will find several statements regarding social media use. Please indicate on a scale of 1 (strongly disagree) to 5 (strongly agree) how much you agree with the following statements:

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
Using social media is my daily habit.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I browse social media whenever I have time.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Even if it is late, I will take a look at social media before sleep.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I often use social media to relax in habit.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I get fulfilled from the attention and comments of others on social media.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The support and encouragement of others on social media is very important to me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Using social media, I am satisfied with the relationship between myself and my friends.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Compared to the real world, social media makes me feel more comfortable.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel bored when I can't use social media.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Compared to the real world, I am happier when I socialize on social media.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel anxious when I can't use social media.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



4. Fear of missing out (Pfeiffenberger, 2022)

Liu, H., Liu, W., Yoganathan, V., & Osburg, V. (2021). COVID-19 information overload and Generation Z's social media discontinuance intention during the pandemic lockdown. *Technological Forecasting and Social Change*, 166, 120600. <https://doi.org/10.1016/j.techfore.2021.120600>

The following questions will be on COVID-19 related experiences.

Please indicate on a scale of 1 (strongly disagree) to 7 (strongly agree) how much you agree with the following statements:

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
I fear others are having more rewarding experiences than me during lockdown.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I fear my friends are having more rewarding experiences than me during lockdown.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I get worried when I find out my friends are having fun without me during lockdown.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



**5. Perceived COVID-19 information overload on social media (PIO)
(Pfeiffenberger, 2022)**

Liu, H., Liu, W., Yoganathan, V., & Osburg, V. (2021). COVID-19 information overload and Generation Z's social media discontinuance intention during the pandemic lockdown. *Technological Forecasting and Social Change, 166*, 120600.
<https://doi.org/10.1016/j.techfore.2021.120600>

The following questions will be on COVID-19 related experiences.
Please indicate on a scale of 1 (strongly disagree) to 5 (strongly agree)
how much you agree with the following statements:

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
I cannot handle all the COVID-19-related information on social media effectively.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am not certain that the information about COVID-19 on social media fits my needs well to make better decisions (e.g., measures applied, health advice and psychological well-being).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



6. Mindfulness Attention Awareness Scale (MAAS)

Below is a collection of statements about your everyday experience. Using the 1-6 scale below, please indicate how frequently or infrequently you currently have each experience. Please answer according to what really reflects your experience rather than what you think your experience should be. Please treat each item separately from every other item.

	Almost Never	Very Infrequently	Somewhat infrequently	Somewhat frequently	Very Frequently	Almost Always
I could be experiencing some emotion and not be conscious of it until sometime later.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I break or spill things because of carelessness, not paying attention, or thinking of something else.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I find it difficult to stay focused on what's happening in the present.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I tend to walk quickly to get where I'm going without paying attention to what I experience along the way.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I tend not to notice feelings of physical tension or discomfort until they really grab my attention.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I forget a person's name almost as soon as I've been told it for the first time.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It seems I am "running on automatic," without much awareness of what I'm doing.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I rush through activities without being really attentive to them.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I get so focused on the goal I want to achieve that I lose touch with what I'm doing right now to get there.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I do jobs or tasks automatically, without being aware of what I'm doing.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I find myself listening to someone with one ear, doing something else at the same time.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I drive places on 'automatic pilot' and then wonder why I went there.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I find myself preoccupied with the future or the past.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I find myself doing things without paying attention.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I snack without being aware that I'm eating.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



7. Brief Resilience Scale (BRS)

Below you will find several questions on Resilience. Please indicate how much you agree with each item below on a scale of 1 (Strongly disagree) to 5 (Strongly agree):

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
I tend to bounce back quickly after hard times.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have a hard time making it through stressful events.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It does not take me long to recover from a stressful event.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is hard for me to snap back when something bad happens.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I usually come through difficult times with little trouble.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I tend to take a long time to get over set-backs in my life.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



8. Mindfulness intervention & Control

On the following page, we will ask you to listen to an audio-clip. Please ensure that you are in a quiet situation where you can focus on the audio and where you won't be disturbed (e.g. using headphones). Please pay close attention to the audio-clip, as the survey may ask questions later related to this exercise.





Timing

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Click Count 0 clicks

OR



Timing

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Click Count	0 clicks



Experimental Manipulations, Video Links:

Mindfulness:

https://www.youtube.com/watch?v=wPoj5log_7M&t=80s

Control (Five Fingers by Tony H. Latham):

https://www.youtube.com/watch?v=MZdzwsF-ieA&ab_channel=TonyLatham

9. COVID-19 Video & Control

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You just completed an exercise, which is commonly used in attention trainings. On the next page, you will watch another video. Pay close attention to the video, as we may again ask questions later.



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Which of the following statements about the clip you just watched is true?

- It discusses mainly Covid-19 Alpha
- It discusses mainly Covid-19 Delta
- It discusses mainly Covid-19 Omicron



OR



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Which of the following statements about the clip you just watched is true?

- It discusses Snowstorms in the US
- It discusses Snowstorms in England
- It discusses Snowstorms in France



Experimental Manipulations, Video Links:

Covid-19 Exposure:

https://www.youtube.com/watch?v=XpEIpyEiqyQ&ab_channel=TheSun

Control (US Snow Storms):

https://www.youtube.com/watch?v=MzJ_xVtYsLk&ab_channel=BBCNews

(Pre-Test: Agriculture neutral news clip):

<https://www.youtube.com/watch?v=yDMBEyrtciI&t=28s>

10. Discrete Emotion Questionnaire (Anger, Disgust, Fear, and Anxiety)

While watching the previous video, to what extent did you experience these emotions?

	Not at all	Slightly	Somewhat	Moderately	Quite a bit	Very much	An extreme amount
Anger	<input type="radio"/>						
Mad	<input type="radio"/>						
Pissed off	<input type="radio"/>						
Rage	<input type="radio"/>						
Grossed out	<input type="radio"/>						
Revulsion	<input type="radio"/>						
Sickened	<input type="radio"/>						
Nausea	<input type="radio"/>						
Terror	<input type="radio"/>						
Scared	<input type="radio"/>						
Fear	<input type="radio"/>						
Panic	<input type="radio"/>						
Worry	<input type="radio"/>						
Anxiety	<input type="radio"/>						
Dread	<input type="radio"/>						
Nervous	<input type="radio"/>						



11. Covid-19 related psychological distress (CORPD)

The following questions will be on COVID-19 related experiences.

Please indicate on a scale of 1 (strongly disagree) to 5 (strongly agree) how much you agree with the statement RIGHT NOW.

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
If I were infected with COVID-19, I might not be able to recover from it.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When talking to a stranger, I would suspect that s/he might be infected with COVID-19.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I'm afraid to travel to places hard-hit by COVID-19.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When I see an increase in the number of COVID-19 patients on the news, I feel anxious.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When I see someone sneeze, I suspect s/he might be infected with COVID-19.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I think frequent hospital visits would make it easier to be infected with COVID-19.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I fear to see the doctors and nurses who had worked in COVID-19 isolation wards.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I think frequent use of air, train, bus and other public transport would make it easier to be infected with COVID-19.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When I notice someone running a fever, I suspect s/he might be infected with COVID-19.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When I see someone vomiting, I suspect s/he might be infected with COVID-19.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I fear to live nearby a COVID-19 isolation hospital.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When I see someone coughing, I suspect s/he might be infected with COVID-19.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When I see someone without a mask, I suspect s/he might be infected with COVID-19.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I suspect there were novel coronavirus in the air when there were people around.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



0%  100%

We thank you for your time spent taking this survey.
Your response has been recorded.