

**Psychological Predictors of Coronavirus Threat and Psychological Distress During a Pandemic**

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## **Psychological Predictors of Coronavirus Threat and Psychological Distress During a Pandemic**

### **Abstract**

Around the world, hundreds of millions of people had been infected by COVID-19, many have died worldwide, and the virus is still circulating. This has led to widespread anxiety and fear of getting the virus. The purpose of this paper is to investigate psychological factors related to coronavirus threat, fear of getting the virus. The sample ( $N = 333$ ) consists of adults living in Germany who responded to an online questionnaire on their psychological reactions to COVID-19. Most of the participants were female (66%) with an average age of 35.59 years ( $SD = 15.23$ ) and have a university degree (46%). Study variables included a measure of coronavirus threat, individual factors such as extent of worry, self-efficacy, and psychological distress. Against the background of stress appraisal theory, a theoretical model was put forth. Structural equation modeling was used to test the fit between the theoretical model and the data. Various indices of fit indicated an acceptable fit of the data to the model. Findings showed that worry was both directly and indirectly related to distress through coronavirus threat. While threat was positively associated with distress, self-efficacy led to lower distress. Practical implications of the results are discussed for both: mental health and interventions, so that psychological distress may be alleviated in a pandemic environment.

*Keywords:* coronavirus threat, psychological distress, worry, self-efficacy

## Introduction

A novel strain of coronavirus was identified by scientists in late December 2019 with symptoms such as fever, cough, and shortness of breath (Wang et al., 2020). By the time of the study conduction, in April 2020, over 1 million cases of COVID-19 had been reported worldwide with rapid growth, and more than 60.000 people have died due to this severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2; World Health Organization, 2020a). In March 2020, the World Health Organization assessed the risk of coronavirus as very high on a global level and declared the spread of COVID-19 as a pandemic.

In Germany, over 95.000 COVID-19 cases and more than 1.400 deaths had been reported to the Robert Koch Institute (2020, April 6th) with particularly severe disease progression in older and health-wise burdened people. An increasing number of COVID-19 cases and overloaded health care systems required an extensive shutdown of restaurants, cafes, schools, and shops unless considered an essential service. All this led to an (inter-)national economic downturn in a very short period (Fernandes, 2020). Consequently, many people became unemployed (Suhr, 2020), others were confronted with profound changes in the workplace with homes turning into schools and offices. Moreover, stock markets lost in value and the gross domestic product (GDP) was substantially reduced (McKibbin & Fernando, 2020). The health crisis did not solely impact the financial situation of people and economies, it had a severe impact on individuals physical and mental health. Manifold studies were conducted on pharmaceutical treatment, physiological mechanisms, and risk factors of COVID-19 (Cortegiani et al., 2020; Sohrabi et al. 2020; Yang et al., 2020), but fewer studies analyzed the profound impact of COVID-19 on individuals mental health (Lades et al., 2020), even though a considerable set of studies points to the psychosocial impact of quarantine and social distancing (Brooks et al., 2020; Harper et al., 2020). Quarantining and social distancing were strongly enforced by governmental decisions to mitigate the spread of coronavirus. Specifically, gatherings of more than two people were prohibited to prevent the interpersonal transmission of coronavirus (Bundesregierung, 2020, April 1<sup>st</sup>). In consequence to the rapid spread of the coronavirus, severe social restrictions as well as economic decline heightened

anxiety, worry, and fear of coronavirus-infection evolved amongst people (Arslan et al., 2020). For weeks, (social) media shared merely critical information on the novel, infectious virus. In part people responded with dysfunctional activities such as hoarding masks, toilet paper, and respirators (Garfin et al., 2020). Exposing individuals to extensive media reports on coronavirus may elevate anxiety and fear of coronavirus-infection. All the previously mentioned occurrences associated with coronavirus intensified the psychological distress of humans during the pandemic, although individual differences in psychological resources might influence this relationship in a way that people respond differently to the experience of a human health crisis.

Being in a global pandemic, a great deal of research world-wide has addressed this issue by now. Moreover, some existing knowledge on the psychological impact of COVID-19 has accumulated in systematic reviews and meta-analyses, which provide a more global perspective on the topic: Necho and colleagues (2021) conducted a review and meta-analysis including sixteen studies on the prevalence of anxiety, depression, and psychological distress among the overall population. The authors provided evidence that higher prevalence rates of anxiety, depression, and psychological distress evolved during the pandemic in the general population. Similarly, Bueno-Notivol and colleagues (2021) revealed in a meta-analysis (based on twelve studies) a 7 times higher prevalence rates of depression during the pandemic compared to that observed in 2017.

Other studies explain the psychological effects of coronavirus from a more distinctive point of view. For instance, Arslan and colleagues (2020) examined the role of mediators in coronavirus stress and psychological problems such as depression, somatization, and anxiety among Turkish adults. A structural model predicted significant effects of stress related to coronavirus on psychological problems, where optimism-pessimism and psychological inflexibility mediated the effect of coronavirus. Furthermore, optimism-pessimism predicted psychological problems through psychological inflexibility. Additionally, mental health was assessed in a relatively well-educated and financially secure sample of 3,545 German participants. Interestingly, the survey was conducted at the same time as our study which

was conducted in April 2020. Jung et al. (2020) report increased psychosocial distress, anxiety, and depression symptoms in COVID-19 patients compared to a reference sample, even though the extent of the symptoms was mild. In comparison to pre-pandemic times participants reported heightened insomnia, irritation, anger, aggression, and interpersonal violence. Another study, conducted by Harper and colleagues (2020), investigated the relationship between psychological predictors and virus-mitigating behavior. Significant relationships were found between fear of COVID-19, anxiety, depression, self-perceived risk of contracting coronavirus, and behavior change. Fear of coronavirus predicted more health-compliant behavior such as frequent handwashing. Further, age differences in behavior health changes as well as perceptions and worries related to coronavirus were examined in a study by Barber and Kim (2020). In this online-survey with 302 U.S. participants, risk perception of coronavirus was higher in older than younger adults. Despite this, interactions between age and gender were found. Older men were less worried and engaged in positive behavior changes than younger men. Older women were most likely to engage in behavior changes such as social distancing and avoiding public places.

Moreover, stressors, such as the threat of coronavirus, may be associated with psychological distress such as anxiety, fatigue, and depression as seen in previous research. Specifically, findings from research on severe acute respiratory syndrome (SARS-CoV-1), which caused an epidemic health crisis from 2002 to 2004, may contribute to the understanding of psychological reactions to the current pandemic due to its similarity in symptoms and fear of contagion (Lee-Baggley et al., 2004; Marjanovic et al., 2007). In contrast to SARS-CoV-2, little risk of contagion was posed to the public during the SARS-CoV-1 pandemic. Therefore, studies from groups exposed to infected patients, such as, nurses and other healthcare workers may provide more comparable findings. Studies with health-care workers during SARS-CoV-1 showed that that their stress levels were elevated compared to non-health care workers (Bai et al., 2004). Further, one year after the outbreak, increased levels of stress were reported

in SARS-CoV-1 survivors (Lee et al., 2007). Thus, the threat of contracting the coronavirus is expected to continue to be associated with higher levels of psychological distress.

Given the potential for harm by coronavirus, it is important to understand its psychological impact and to specify resources that may be helpful in alleviating the ensuing distress. In this regard it may be useful to refer to relatively recent research on the topic of economic stress, given its parallels with COVID-19 stress in three ways. First, both originated as a major societal disruption fairly recently, with the economic downturn called the “Great Recession” (Marjanovic et al., 2013) and occurring in 2008, and coronavirus declared a global pandemic in 2020 (World Health Organization, 2020b). Second, initially the public’s reactions to both societal upheavals were characterized by fear, anxiety, and uncertainty (Codagnone et al., 2021; Sperling, Bleich, & Reulbech, 2008). Third, as the events associated with each of these major disruptions unfolded, people learned that they were personally at risk for major losses and that the effects on them could be catastrophic. For example, as a result of the economic recession, individuals learned they could lose all their finances and thus their personal financial situation was threatened. During the pandemic, people were told that they were at considerable risk for catching the virus which could result in serious illness and even death for themselves and their families (Greenglass, Chiacchia, & Fiksenbaum, 2021). Thus, for both of these events which originated at the societal level, individuals learned that the consequences could be devastating for them personally.

Given the potential for harm from both the economic recession and the pandemic, it is important to have a psychological concept as a bridge between the societal events, i.e., the coronavirus or the economic recession, and the consequences for the individual, i.e., illness and death for the former, and loss of one’s finances for the latter. A useful concept in this regard is stress appraisal, derived from the Transactional Theory of Stress (Lazarus & Folkman, 1984) which refers to the process of estimating the harm a stressor has already caused, or will cause in the future. Once a stressor or an event has been appraised, there is a secondary appraisal process where individuals evaluate their resources for coping with the threat (Lazarus & Folkman, 1984). Marjanovic et al. (2013) argue that during the economic

recession, people perceived that their personal financial situations had been adversely affected by the economic downturn and, as a result, they experienced financial threat, defined as a mixture of fear, uncertainty and cognitive preoccupation with the security of their personal finances. The Financial Threat Scale (FTS), a reliable and valid measure, was designed to measure these feelings (Marjanovic et al., 2013). In a similar vein, the Brief Coronavirus Threat Scale (BCTS), adapted from the Financial Threat Scale, is a measure of coronavirus threat and correlates positively with COVID-19 anxiety, thus attesting to its validity (Greenglass et al., 2021).

When dealing with stressors, psychological resources are important in alleviating the distress that people are experiencing. One of these resources is self-efficacy (Schwarzer & Warner, 2013) which is an individual strength that enables people to deal effectively with stressors including the pandemic. Benight and Bandura (2004) provide evidence, that self-efficacy buffers the negative effects of major stressors, such as disasters or terrorist attacks. If people believe in their ability to change situations, they will persist in doing so. Hence, people high in self-efficacy beliefs would perceive themselves as being more able to cope with the coronavirus threat and would therefore experience less psychological distress. Thus, it is expected that self-efficacy should reduce the threat of coronavirus as well as psychological distress.

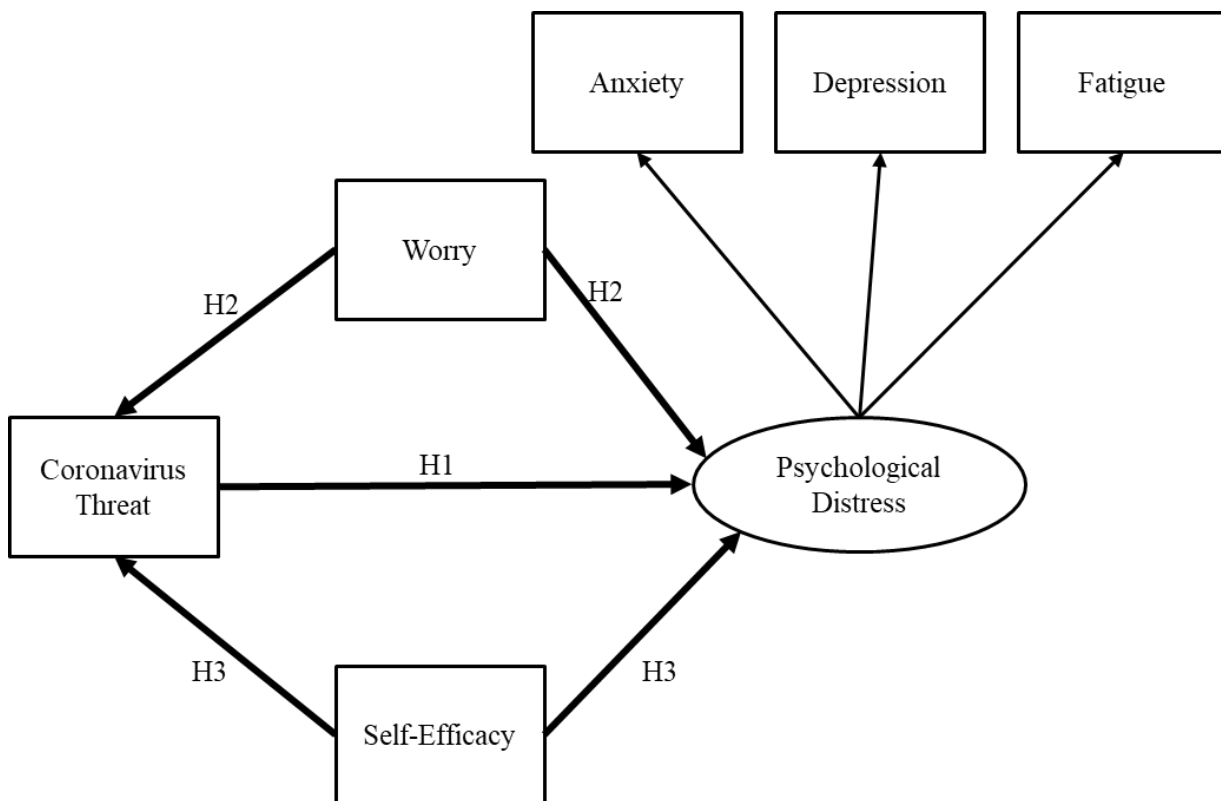
Person variables serve as individual predispositions that may modify reactions to coronavirus stressors such as the tendency to worry, which aims at avoidance of threatening events (Borkovec et al., 2004). Since worry is associated with constant alertness to potential threat (Bar-Haim et al., 2007), it is expected that individuals who tend to worry would be more threatened by coronavirus. Further, individuals who tend to worry have higher levels of anxiety and depression (Beck et al., 2001). Hence, worry is expected to heighten psychological distress, operationalized as anxiety, depression, and fatigue, particularly when worried about getting infected by coronavirus.

The purpose of this paper was to investigate psychological factors associated with coronavirus threat and how it relates to psychological distress outcomes such as anxiety, depression, and fatigue.

Figure 1 presents the theoretical model that guided this research. In this model, the threat due to coronavirus is seen as being related to psychological distress, a latent variable, operationalized as anxiety, depression and fatigue about coronavirus. Worry is related to more psychological distress and more coronavirus threat, and self-efficacy is related to less coronavirus threat and less psychological distress.

**Figure 1**

*Theoretical Model: Coronavirus Threat, Worry, Self-Efficacy and Distress*



## Method

### Participants and Procedure

The study obtained all required ethics approval. The required sample size was determined on a priori power calculations. A total of 333 German participants responded to an online questionnaire in April 2020. The mean age was 35.59 years ( $SD = 15.23$ ). Further sociodemographic characteristics of



the sample are presented in Table 1. The sample consisted of 66% female and 34% male participants. The majority were married or cohabitating with a partner, a fourth of the sample were single, a minority were separated or divorced and 1.4 % reported they were widowed. In terms of highest level of education, almost half of the participants (45.9%) had a university degree, 20.1% reported they had completed middle school and 16.7% have completed high school, 6.8% reported an apprenticeship as their highest education, 5% reported to be a student at school and 5.4% reported to have other highest degrees. In sum, the majority were not university students. Regarding coronavirus, 4 participants reported having had coronavirus and 62 participants reported they had not had coronavirus, whereas 17 participants did not know whether they have coronavirus or not. Concerning the coronavirus diagnosis of others, one- fifth of the participants (21.5%) reported knowing close others who had been infected with coronavirus, while another fifth was uncertain about the diagnosis of others. Approximately one half of the participants did not know someone close who had coronavirus. Further, 23 participants reported they had been quarantined for coronavirus in the last few months, whereas 271 participants reported they had not been quarantined.

**Table 1**

*Sociodemographic characteristics of the sample*

Measure	n	%
Gender		
Female	195	66.3
Male	99	33.7
Marital status		
Married or common law	204	69.9
Separated or divorced	12	4.1
Single	72	24.7
Widowed	4	1.4
Highest level of education		
Student at School	15	5.1
Low/Middle School	59	20.1
Apprenticeship	20	6.8
High School	49	16.7
University Degree	135	45.9
Other	16	5.4

Measure	n	%
Student at university		
Yes	63	21.5
No	230	78.5
Coronavirus diagnosis - Self		
Yes	4	4.8
No	62	74.7
I do not know	17	20.5
Coronavirus diagnosis - Others		
Yes	67	21.5
No	176	56.4
I do not know	69	22.1
Quarantine		
Yes	23	7.8
No	271	92.2

For the present study, data were collected online using SoSci Survey (Leiner, 2019). Participants were recruited through social media sites and advertisements on websites of the university. The survey has been conducted anonymously and lasted 10-15 minutes on average. In total 333 participants took part and none were deleted from the analyses. Further, no incentives were offered for participation in the study.

### Measures<sup>1</sup>

The *Brief Coronavirus Threat Scale* (BCTS) consists of five items on uncertainty, risk, perceived threat, worry, and cognitive preoccupation with individual feelings about coronavirus (Chiacchia et al., 2021). Items are endorsed along a five-point scale, ranging from 1 = *Not at all* to 5 = *Extremely/A great deal*. A sample item is, “How much do you feel threatened [about the coronavirus]?”. Further, *General Health* (GH) was assessed with a single item. Participants respond to the item, “How would you describe your health in general?” on a five-point scale. Response options range from 1 = *Excellent* to 5 = *Poor*, with higher scores reflecting lower levels of general health. *Self-Monitoring* (SM) is an unpublished instrument developed for the purpose of this study. The SM-scale consists of seven items assessing the extent to which individuals monitor their own behavior due to coronavirus. Participants were asked to respond how often they have taken their temperature, gone to a doctor or another health care professional, paid close attention to any coughing/sneezing/feelings of fatigue they might have, called a

coronavirus hotline or had been tested for coronavirus. Response options to “How often have you done each of the following to determine if you might have coronavirus?” range from 1 = *Not at all* to 5 = *A great deal*.

*Self-Efficacy Scale* (SE) was designed to assess self-efficacy in relation to thoughts about coronavirus. An existing self-efficacy scale by Jerusalem and Schwarzer (1992) was modified and employed in the context of coronavirus self-efficacy. Participants were asked to indicate the extent to which they agree with the items, when thinking about coronavirus. A sample item is, “I am confident that I can deal efficiently with it [coronavirus].”. Response options range from 1 = *Not at all* to 4 = *Exactly true*. The *Avoidance Scale* (AV) was developed by the researchers for the purpose of this study and consists of ten items. Participants indicate their avoidance behavior due to coronavirus in traveling to infected areas, eating in restaurants, shaking hands or hugging, traveling by subway, eating in food courts, going to work/school, large gatherings of people, traveling by plane, touching one’s own face, people coughing or sneezing. Similarly, participants indicate on a *Positive Behavior Scale* (PB) with nine items the extent to which they engage in positive behavior as wearing a mask, wearing gloves, washing hands, using hand sanitizer, eating a balanced diet, exercising regularly, getting enough sleep, taking vitamins/supplements and googling symptoms. Response options range from 1 = *Not at all* to 5 = *A great deal* in both measures. A shortened version of the *Profile of Mood States* (POMS) by Shacham (1983) was used to assess the feelings about coronavirus. Four subscales with 26 items were administered: tension-anxiety, depression-dejection, anger-hostility, and fatigue-inertia. The responses were rated on a five-point scale from 1 = *Not at all* to 5 = *Extremely*. Another single item was used by the researchers to assess *Worry*. Participants indicated on a five-point scale ranging from 1 = *Not at all* to 5 = *Extremely*, how much they worry in general. High scores reflect high levels of worry.

*Sociodemographic Background Information*. Participants respond to the item “Do you have, or have you had coronavirus?” with “Yes”, “No” or “I do not know”. *Coronavirus of Others* (CO) was measured with a single item, which was developed by the researchers. Participants respond to the item,

“Does (did) anyone close to you have coronavirus?” with “Yes”, “No” or “I do not know”. Another measure was developed to assess if participants had been quarantined for coronavirus in the last months. The response format consists of the dichotomous options “Yes” or “No”. Demographics of the participants included gender, age, marital status, highest level of education, and student status.

## **Results**

### **Statistical Analyses**

Correlational analyses were conducted and Structural Equation Modeling (SEM) was used to test the fit between the theoretical model and the data.

### **Correlational Analyses**

Table 2 presents Cronbach’s Alphas for composite measures which were all greater than .75. Table 2 also reports Pearson correlations, means, and standard deviations. Intercorrelations were computed among age, components of positive behavior measures, self-reported health, degree of self-monitoring and coronavirus threat. Significant positive correlations were found between age and avoidance of people who were coughing or sneezing. Similarly, avoidance of others who were coughing or sneezing was positively related to online searches for symptoms of coronavirus. Wearing gloves was positively related to age and avoidance of coughing or sneezing people. Likewise, wearing masks was positively related to age, avoidance of coughing or sneezing people and wearing gloves. Positive reframing was related to a lower usage of gloves and masks. Further, poorer health was related to being older, more frequently use of gloves and masks and less positive reframing. Self-monitoring behavior was positively related to age, avoidance of coughing or sneezing people, observing symptoms of coronavirus on the internet, wearing gloves and masks as well as poorer health. In addition, threat of coronavirus was related to being older, more avoidance of coughing or sneezing people, more observance of symptoms on the internet, higher usage of gloves and masks, less positive reframing, poorer health, and more self-monitoring.

To summarize, older participants were more fearful of getting COVID-19 and were more likely to engage in behaviors to protect themselves from contracting the virus. Further, there was a tendency for people to engage in more than one kind of protective behavior, i.e., wearing gloves and masks along with avoidance of people who may have had virus symptoms.

**Table 2**

*Descriptive statistics, reliabilities of measures and intercorrelations between age, positive behavior, health monitor, and coronavirus threat*

Measure	1	2	3	4	5	6	7	8	9
1. Age	–								
2. Avoiding coughing or sneezing people	.14*	–							
3. Googling symptoms	.07	.14*	–						
4. Wearing gloves	.20**	.16**	.06	–					
5. Wearing masks	.17**	.14*	.16**	.40**	–				
6. Positive reframing	-.11	.05	.07	-.19**	-.13*	–			
7. Health <sup>a</sup>	.17**	.04	.04	.14*	.20**	-.13*	–		
8. Self-monitoring	.18**	.14*	.32**	.16**	.25**	-.07	.26**	–	
9. Coronavirus threat	.19**	.19**	.18**	.30**	.24**	-.25**	.31**	.41**	–
<i>M</i>	35.59	3.79	2.44	1.69	1.64	2.67	1.78	1.45	2.75
<i>SD</i>	15.23	1.22	1.21	1.06	1.06	0.86	0.88	0.55	0.75
$\alpha$	–	–	–	–	–	0.87	–	0.78	0.85

*Note.* \* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ . <sup>a</sup>The higher the number, the poorer the health.

Pearson Product-Moment Correlations, means, standard deviations and internal consistency reliabilities (Cronbach's Alphas) for the variables in the structural equation model are reported in Table 3. All reliabilities of the composite variables were greater than 0.75. Coronavirus threat was related to higher levels of worry. Self-efficacy was negatively correlated with coronavirus threat and was related to less worry. Higher anxiety was related to more worry, greater coronavirus threat and lower self-efficacy.

Depression was related to more worry, anxiety and coronavirus threat, but was negatively related to self-efficacy. Thus, with higher levels of self-efficacy, depression was lower. In addition, fatigue was related to more coronavirus threat, worry, anxiety and depression.

**Table 3**

*Intercorrelation matrix, descriptive statistics and reliabilities of variables*

Measure	1	2	3	4	5	6
1. Worry <sup>a</sup>	–					
2. Coronavirus threat	.61**	–				
3. Self-efficacy	-.28**	-.36**	–			
4. Anxiety	.60**	.63**	-.41**	–		
5. Depression	.50**	.46**	-.34**	.64**	–	
6. Fatigue	.43**	.40**	-.29**	.64**	.66**	–
<i>M</i>	2.20	2.75	2.97	2.27	1.75	1.83
<i>SD</i>	0.84	0.75	0.54	0.83	0.72	0.84
<i>α</i>	–	0.85	0.79	0.87	0.87	0.87

Note. \* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ . <sup>a</sup>Reliabilities were not reported for worry since it is a single item. <sup>a</sup>Response alternatives were 1 = *Not at all* and 5 = *Extremely*.

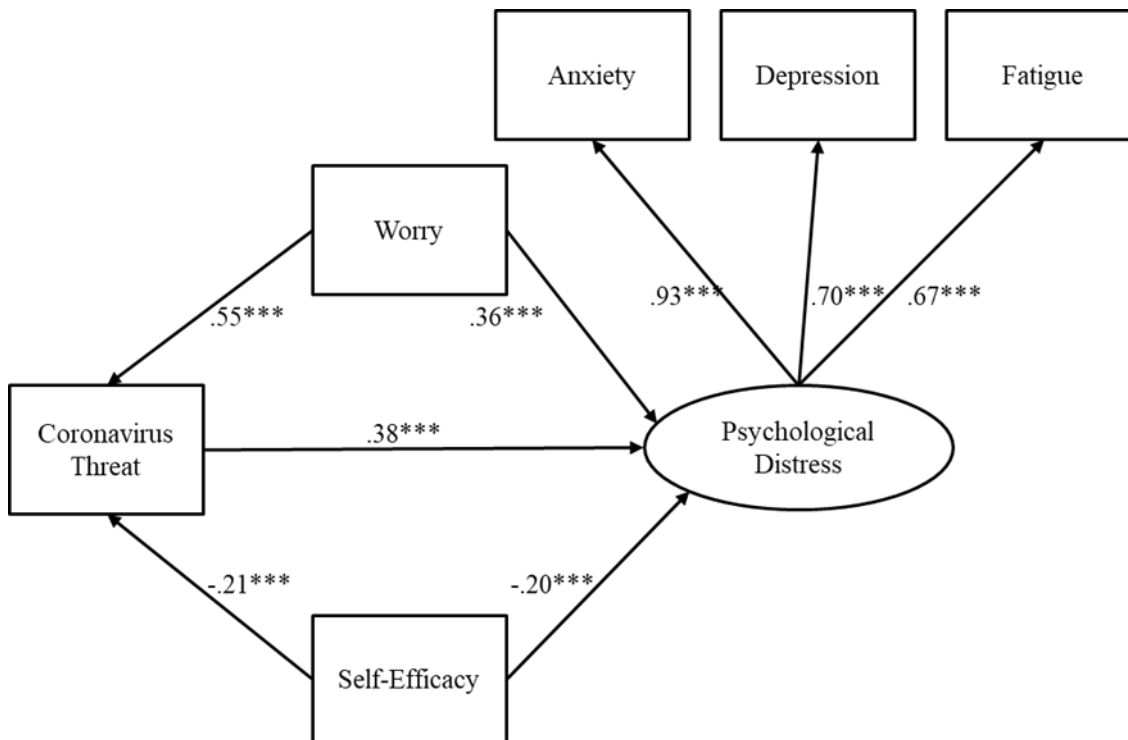
### Testing the theoretical model

The fit between the data and the theoretical model was tested through structural equation modeling (SEM) (Figure 2), using AMOS version 26.0 (Arbuckle, 2019). In this approach relations between manifest and latent variables can be measured and errors as well as covariance-variance structures can be modeled. Only cases without missing data were included into the analysis, hence SEM was performed on 333 participants. A model is considered to have an acceptable fit, if the  $\chi^2$  statistic is non-significant, the Goodness of Fit (GFI), Adjusted Goodness of Fit (AGFI), Tucker-Lewis Index (TLI), and Comparative Fit Index (CFI) are greater than .95, and the Root Mean Square Error of Approximation (RMSEA) is below .08 (Kline, 2015). The chi-square test was non-significant ( $\chi^2 (5, N = 333) = 7.63, df = 5, p = .18$ ). Further, GFI (.99), AGFI (.97), TLI (.99), CFI (.99) and RMSEA (.04) were

all highly satisfactory. Post-hoc modifications were not indicated. The fit indices indicated that our hypothesized model was a satisfactory fit with the data.

**Figure 2**

*Structural Model: Coronavirus Threat, Worry, Self-Efficacy and Distress*



*Note.* Coefficients presented are standardized linear regression coefficients.  $^{***} p < .001$ .

In a SEM with correlated residual the maximum likelihood method of parameter estimation was used to test the hypothesis. Examination of the standardized path coefficients shows that worry predicted coronavirus threat and psychological distress, a latent variable composed of anxiety, depression, and fatigue. Thus, the more individuals worry, the more they feel psychologically distressed and threatened by coronavirus. In addition, self-efficacy was significantly related to lower threat due to coronavirus. Self-efficacy was also related to lower levels of psychological distress. That is, the stronger the self-efficacy beliefs, the less the psychological distress and the lower the coronavirus threat. In turn, coronavirus threat was positively related to psychological distress.

## Discussion

The current global COVID-19 pandemic has caused a world-wide human health crisis. It has been responsible for countless deaths worldwide (World Health Organization, 2020a) and it has led to widespread anxiety and fear of getting coronavirus (Necho et al., 2021). The purpose of this research is to investigate psychological factors related to the threat of coronavirus during a lockdown in Germany. Based on the Transactional Theory of Stress (Lazarus & Folkman, 1984), a theoretical model was put forth that included stressors, psychological resources, and personal variables and examined their relationship to psychological distress. (Figure 1). It was expected that coronavirus threat would be associated with higher psychological distress, operationalized as anxiety, depression, and fatigue. Further, worry was expected to be positively related to higher levels of psychological distress and coronavirus threat. In turn, self-efficacy was expected to be associated with lower levels of psychological distress and coronavirus threat.

Structural Equation Modeling (SEM) was used to test the fit between the data and the theoretical model and standardized path coefficients were employed to examine the relationships among variables. (Figure 2). Indices of fit showed an acceptable fit of the data to the model. In support of the first hypothesis, coronavirus threat was related to psychological distress, a latent variable composed of anxiety, depression, and fatigue. This finding is consistent with current research by Wang and colleagues (2020), who report that the rapid and highly infectious outbreak of coronavirus causes anxiety, depression, fatigue as well as other stress reactions in individuals. Severe changes in daily life routines due to COVID-19 such as working, studying, and/or teaching from home, heightened media exposure to the crisis, limit social interactions for an indefinite period of time, and may result in greater risk of getting coronavirus. Moreover, all of this is associated with higher levels of distress (Garfin et al., 2020; Wang et al., 2020).

Further, examinations of the standardized path coefficients in our results revealed that worry predicted coronavirus threat as well as psychological distress. In line with the second hypothesis, it was



found that the more individuals worry, the more they feel psychologically distressed and threatened by coronavirus. Unfortunately, worry amplified the fear of coronavirus and psychological distress in our study. Nevertheless, the relationship between worry and psychological distress is consistent with the existing literature which reports that individuals who tend to worry report higher levels of anxiety and depression (Beck et al., 2001). However, the relationship between worry and fear of coronavirus is not consistent with current research. For instance, Mertens and colleagues (2020) conducted a regression model of fear of coronavirus, where only health anxiety served as a significant predictor, while worry and intolerance of uncertainty were not significant predictors. Thus, further research is needed to examine the relationship between worry and coronavirus threat. These results may be relevant for addressing specific concerns in psychological interventions relevant to the coronavirus outbreak.

Consistent with the third hypothesis, higher self-efficacy beliefs were related to less psychological distress and lower levels of coronavirus threat. Approaching the current situation as a challenge to be overcome, lessens stress and fear associated with coronavirus. Findings from previous research coincide with present results that self-efficacy is a beneficial resource for mental health in various traumatic experiences such as natural disasters, technical catastrophes and terrorist attacks (Benight & Bandura, 2004). Despite the well-established effect of self-efficacy on mental health (Schwarzer & Warner, 2013), little is known about the role of self-efficacy during the COVID-19 pandemic. In this way, our study contributes to the growing literature on COVID-19, psychological distress and mental health, particularly the role of self-efficacy in ameliorating mental health during the pandemic.

Although this study provides insight into coronavirus threat, worry, psychological distress, and self-efficacy among German adults during the lockdown in 2020, a few limitations of the study are identified. Since results are based on self-report data from a cross-sectional design, two major limitations arise: First, the underlying design does not allow for inferring causality from the findings. A useful direction for future research would be longitudinal investigations to explore how the study variables change over time during different waves of the pandemic. Secondly, the self-reporting nature of the

study raises the possibility of participant bias and social desirability, which may threaten the construct validity of the findings. Future research may address this issue by incorporating and combining other types of measurement, such as external report and physiological measurements, for example (Morgado et al., 2017).

Even though this study has some limitations, various practical and research implications for improving individual's psychological well-being during a pandemic may be derived from the present results. Longitudinal data may provide novel insights and causality to the relationship between threat of coronavirus and psychological distress in individuals. Further, our findings indicate that fostering self-efficacy as a psychological resource in times of a global pandemic may mitigate the threat of coronavirus and psychological distress. Fostering the belief in one's own abilities is a way of activating and strengthening psychological resources for promoting health and performance during pandemic circumstances as previous studies have already shown (Schwarzer & Warner, 2013; Benight & Bandura, 2004). Taken together, high self-efficacy can serve as a protective factor against anxiety, depression, fatigue, and threat of coronavirus during times of social isolation.

The results of the present structural equation analysis support the idea that coronavirus threat was indirectly related to psychological distress through worry and self-efficacy, such that worry was positively associated with higher levels of distress, while self-efficacy led to lower distress. In conclusion, this paper adds to the rapidly growing literature on coronavirus through focusing on the specific relationship between threat of coronavirus and psychological distress. Additionally, this research contributes to our understanding of how a global health crisis impacts individual's mental well-being and points to a factor that lessens distress and coronavirus threat. Considering previous findings and the present results, we suggest that resources such as self-efficacy are key to promoting psychological well-being during a global health crisis. Furthermore, we suggest that worry, as a person variable, should be further investigated to help policy makers and health care workers mitigate elevated levels of

coronavirus threat and psychological distress. To summarize, our findings may serve as a guide for future interventions to help people cope with the continuing challenges of coronavirus.

### **Declaration of Interest Statement**

We have no known conflict of interest to disclose.

### Footnotes

1. Measures for this study were from the online unpublished questionnaire designed by E. Greenglass and D. J. Chiacchia in March, April, 2020. The items were translated from English to German for the purpose of this study.

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