Fear of COVID-19: A risk factor for PTSD in bereaved individuals?

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Abstract

Introduction: COVID-19 has been spreading rapidly throughout the world, accompanied by a wave of fear of contagion with the disease. High fear of COVID-19 has shown to be associated with high Posttraumatic Stress Disorder (PTSD) symptomatology in the general population. As the bereaved are at a high risk of developing PTSD, it is the aim of this study to determine whether fear of COVID-19 moderates the association between PTSD symptom levels in bereaved people at two measurement occasions, namely before (T1) and during (T2) the pandemic. To assess the severity of fear towards COVID-19, the newly developed Fear of COVID-19 Scale (FCV-19S) was used and validated.

Methods: At T1 and T2, data of 433 and 130 bereaved adults were collected. The final sample consisted of 127 participants who took part in both measurement occasions. To assess fear of COVID-19 and PTSD symptom levels, the FCV-19S and the Posttraumatic Stress Disorder Checklist for DSM-5 (PCL-5) were used. Data analyses included a Principal Component Analysis (PCA) and a multiple regression analysis with interaction term.

Results: The FCV-19S showed to have high reliability and validity as demonstrated by its internal consistency ($\alpha = .85$) and strong one-factor solution. The moderation analysis showed that fear of COVID-19 did not significantly affect the association between PTSD symptom levels at T1 and T2 ($\beta = .05$, $t(126) = .91$, $p = .36$).

Discussion: The psychometric testing demonstrated that the FCV-19S was a reliable and valid tool for assessing the severity of fear of COVID-19. Fear of COVID-19 did not show to be a risk factor for increased PTSD symptomatology in bereaved individuals during the COVID-19 pandemic. Further research is essential to determine how bereaved individuals fear COVID-19 in order to provide them with adequate mental health support during the current pandemic.

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Since December 2019, the Coronavirus Disease 2019 (COVID-19) has been spreading rapidly throughout the world, threatening people's physical and mental health (Cai et al., 2020) as well as endangering social and economic development across countries (Fernandes, 2020; Sharma et al., 2020). In March 2020, COVID-19 has been declared a pandemic, a public health crisis of international concern, by the World Health Organization (WHO) (Spoorthy et al., 2020; Zheng et al., 2020). According to the latest research, COVID-19 is caused by the novel coronavirus SARS-CoV-2 which originated in Wuhan, China (Zheng et al., 2020). Common clinical features of COVID-19 include fever, dry cough, sore throat and breathlessness among others (Singhal, 2020). In some individuals, these symptoms may progress to pneumonia, respiratory failure, multi organ dysfunction and death (Singhal, 2020; World Health Organization [WHO], 2020a). So far, a crude mortality ratio of 3-4% has been reported according to WHO statistics (WHO, 2020b, 2020c). In comparison, the mortality rate of a seasonal influenza is well below 0.1% (WHO, 2020c).

Alongside the pandemic, a wave of fear of COVID-19 has swept across the globe, fostered by coronavirus-related anxiety as well as the social and economic mayhem occurring on individual and societal levels (Kumar & Somani, 2020; Lee et al., 2020; Ren et al., 2020). The degree of fear of COVID-19 has shown to be strongly influenced by the probability of contracting the disease and the consequences derived from it (Yuen et al., 2020). The new Fear of COVID-19 Scale (FCV-19S) was developed to assess the severity of fear towards COVID-19 (Ahorsu et al., 2020). So far, validations from multiple countries demonstrated that the FCV-19S had a stable unidimensional structure with robust psychometric properties and thus is reliable and valid in assessing fear of COVID-19 (Ahorsu et al., 2020; Alyami et al., 2020; Bitan et al., 2020; Martínez-Lorca et al., 2020; Perz et al., 2020; Sakib et al., 2020; Satici et al., 2020; Soraci et al., 2020).

The toll on people's psychological well-being brought by fear of COVID-19 and the uncertainties surrounding future developments, mass deaths, social isolation and economic difficulties is becoming increasingly evident (Fernandes, 2020; Wind et al., 2020). Several studies reported that the COVID-19 pandemic and its consequences are directly associated with elevated rates of several mental health problems, including Posttraumatic Stress Disorder (PTSD), in both the general population and in high-risk groups like individuals with pre-existing psychological disorders (Ahmed et al., 2020; Carmassi et al., 2020; Dsouza et al., 2020; Mamun & Griffiths, 2020; Ornell et al., 2020; Sher, 2020; Shigemura et al., 2020). In line with this, Di Crosta and colleagues (2020) stated that fear of COVID-19 showed to be directly

associated with high PTSD symptomatology in a sample of 4121 Italians. In addition, one third of the participants of their study reported PTSD symptoms during the first peak of the COVID-19 pandemic (Di Crosta et al., 2020). Taking under consideration that fear is one of the main factors involved in the aetiology of PTSD (Beckers et al., 2013; Blechert et al., 2007), existing research has underlined that specifically fear of COVID-19 has shown to be a risk factor for PTSD symptomatology (Porcelli, 2020; Tang et al., 2020; Trnka & Lorencova, 2020).

One of the high-risk populations which might be especially vulnerable to the development or exacerbation of adverse mental health outcomes caused by the COVID-19 pandemic are the bereaved (Stroebe & Schut, 2021). After the loss of a loved one, most individuals undergo a painful, yet natural and not necessarily harmful grieving process (Jordan & Litz, 2014; Stroebe et al., 2007). Despite their sorrow, they have sufficient internal resources and external support to adequately cope with their grief and manage to readjust to a life without the deceased over time (Lenferink et al., 2019; Lundorff et al., 2017). However, a minority of the bereaved experiences a more complicated grieving process (Djelantik et al., 2020; Prigerson et al., 2009) and develops a broad range of severe mental health problems (Kristensen et al., 2012; Simon et al., 2007; Soydas et al., 2020). One of the most common mental disorders developed by bereaved people is PTSD (Baumann et al., 2020; Matthews et al., 2019; Onrust & Cuijpers, 2006; Xu et al., 2013). For bereaved individuals, the circumstances surrounding the current COVID-19 pandemic embed multiple and indirect sources of trauma, including social isolation and the deaths and illnesses of friends and loved ones (Carmassi et al., 2020; Dutheil et al., 2020; Lund et al., 2020). Faced with these potentially traumatizing events, individuals who lost a loved one prior to the pandemic might be disturbed in their grieving process and find themselves at an elevated risk of developing PTSD (Eisma & Tamminga, 2020; Masiero et al., 2020).

The first aim of the present study is to validate the FCV-19S by examining its psychometric properties. It is hypothesized that the FCV-19S will demonstrate that fear of COVID-19 is a valid, unidimensional construct. Secondly, this study aims at investigating whether fear of COVID-19 moderates the relationship between PTSD symptom levels before and during the COVID-19 pandemic in bereaved individuals. It is expected that high fear of COVID-19 strengthens the association between PTSD symptom levels in bereaved individuals before and during the COVID-19 pandemic. Gaining knowledge about this potential association is of great importance in order to develop strategies to provide adequate mental health support for the bereaved and reduce their risk of getting negatively affected by the current crisis.

Methods

Design

The study design is longitudinal, including two measurement occasions (T1 and T2) with a 6-month interval in-between. The data collection for T1 took place between November 2019 and March 2020, before the COVID-19 pandemic officially started, and was based on self-rated symptoms assessed with a questionnaire via telephone. T2 took place during the pandemic; self-assessment surveys were sent to the participants via email.

Participants

To meet the eligibility criteria for the study, participants (1) had to be older than 18 years, (2) had to be Dutch or German speaking and (3) had to have lost a loved one (partner, family member or friend) more than six months prior to participating in the study. Data of 433 and 130 bereaved individuals were collected at T1 and at T2, respectively. For the moderator analysis, participants who only took part in T1 or T2 were listwise excluded from the data set. The final sample consisted of 127 (29%) participants, including 20% males and 80% females, who took part in both measurement occasions. Participants' age ranged between 20 and 84 years ($M = 47.65$, $SD = 14.76$). Most of the participants were born in the Netherlands (62%) or Germany (31%). Overall, 60% have received university education, 24% vocational training and 16% high school education. The most frequent cause of death of a loved one was physical illness (73%), followed by suicides (16%), accidents (9%) and others (2%).

Instruments

The severity of PTSD symptoms was measured using the Dutch and German versions of the Posttraumatic Stress Disorder Checklist for DSM-5 (PCL-5), a 20-item self-report measure that assesses the 20 DSM-5 symptoms of PTSD (e.g. "Hoe vaak heeft u in de afgelopen maand last gehad van: "Herhaalde, storende en ongewenste herinneringen aan de stressvolle ervaring?; "Im letzten Monat, wie sehr waren Sie belastet durch: Wiederholte, beunruhigende und ungewollte Erinnerungen an das belastende Erlebnis?") (Krüger-Gottschalk et al., 2019; Van Praag et al., 2020). In the PCL-5, each item is rated using a 5-item likert scale, with 1 indicating the minimum score for each question and 5 the maximum score. Answer options include "not at all", "a little bit", "moderately", "quite a bit" and "extremely". The total score is calculated by adding up each item score (ranging from 20-100). The higher the score, the higher the PTSD symptom severity (Weathers et al., 2013). According to existing literature, the PCL-5 is a psychometrically sound measure, with strong internal consistency ($\alpha = .94$), test-retest reliability ($r = .82$), and convergent

(rs = .74 to .85) and discriminant (rs = .31 to .60) validity (Blevins et al., 2015). Cronbach's alphas for the PCL-5 items at T1 and at T2 were .90 and .92, respectively.

Additionally, fear of COVID-19 was assessed using the Dutch and German versions of the Fear of COVID-19 Scale (FCV-19S) which contains 7 items (e.g. "I am afraid of losing my life because of coronavirus-19."). The scale has been published in March 2020 with the objective of complementing the clinical efforts in the containment of COVID-19 by providing information on how individuals fear COVID-19 (Ahorsu et al., 2020). The participants indicate their level of agreement with the statements using a five-item likert scale. Answer options include "strongly disagree", "disagree", "neither agree nor disagree", "agree" and "strongly agree". The total score is calculated by adding up each item score (ranging from 7 to 35). The higher the score, the greater the fear of COVID-19 (Ahorsu et al., 2020).

Procedure

For participant recruitment, various strategies, including recruitment via social media platforms (e.g. Facebook), organizations and students' social networks, have been used. At T1, each participant took part in a telephone interview which was conducted by a master student of either Utrecht or Groningen University. All student interviewers were trained to perform the clinical interviews beforehand by experienced supervisors. Each interview included background- and loss-related questions as well as several self-rating questionnaires measuring traumatic grief, depression and PTSD among others. Six months later, at T2, the participants were sent a follow-up survey via email. The survey consisted of the same self-assessment instruments which were used in the interviews plus additional coronavirus-related scales which measured fear of COVID-19 among others. No reimbursement was given to the participants.

Analysis

Descriptive statistics were used to examine the demographic characteristics of participants in the sample. Internal consistency and reliability of the FCV-19S were measured using Cronbach's alpha, inter-item correlations and corrected item-total correlations. A Principal Component Analysis (PCA) was executed in order to investigate the dimensionality of the FCV-19S. Components yielding an eigenvalue > 1.0 were selected and scree plots were examined to confirm component selections. Lastly, to examine the hypothesized moderation model, a multiple regression analysis including an interaction was performed. The dependent variable (Y) was the severity of PTSD symptom levels at T2, the independent variable (X_1) was the severity of PTSD

symptom levels at T1 and the moderator variable (X_2) was the severity of fear of COVID-19 levels at T2. Total scores of the PCL-5 at T1, the FCV-19S and the PCL-5 at T2 were calculated. To alleviate multicollinearity and clarify regression coefficients, both predictor variables were mean-centered before being multiplied into an interaction term (PCL-5 total scores at T1 * FCV-19S total scores at T2) (Iacobucci et al., 2016). Finally, both mean-centered predictors and the interaction term were entered into a regression analysis. All analyses were conducted using the IBM SPSS Statistics software (IBM, 2020).

Results

Internal Consistency and Reliability of the FCV-19S

With .85, the Cronbach's alpha for the FCV-19S items demonstrated a strong internal consistency. Table 1 shows that the inter-item correlations among the seven items of the scale were moderate, ranging from $r = .35$ to $r = .74$, which suggests that they are all assessing the same construct. However, as the ideal inter-item correlation for a set of items should be between .20 and .40, the items with values higher than .40 may only be capturing a small bandwidth of the construct "fear of COVID-19" (Piedmont, 2014). Moreover, the corrected item-total correlations presented in Table 1 were high *(r*s $\geq$ .59) for all seven items, supporting the internal reliability of the scale. Taken together, the three indicators demonstrate that the FCV-19S has a strong internal consistency and reliability.

Principal Component Analysis (PCA) of the FCV-19S

The purpose of the PCA was to validate the FCV-19 Scale in a sample of Dutch and German speaking bereaved individuals. For the PCA, a Kaiser-Meyer-Olkin (KMO) Measure of .83 was obtained which indicates a good sampling adequacy and thus confirmed the validity of using a principal components extraction to analyse the data. The PCA yielded a single-factor solution, with an eigenvalue of 3.94 which accounted for 56% of the variance in the FCV-19S scores. The Scree Plot in Figure 1 showed no other factors with an eigenvalue > 1.0 and a clear bend after the first factor. As presented in Table 2, component loadings were all $\geq$ .70, indicating that the seven items strongly load on the factor. Overall, the results of the PCA revealed a strong one-factor solution for the FCV-19 in a Dutch and German speaking sample, confirming unidimensionality.

Means and Correlations

Table 3 shows the means, standard deviations, correlations, minimum and maximum values for the main variables of interest. On average, participants showed low PTSD levels at T1 ($M = 32.96$, $SD = 11.00$) and T2 ($M = 31.66$, $SD = 10.99$). Mean PTSD levels decreased from T1 to T2, indicating a slight, significant mean difference in PTSD symptomatology, $t(126) = 1.99$, $p < .05$.

The mean score of the FCV-19S was 12.39 ($SD = 4.49$) and the highest achieved score 24 out of 35. Intermediate and upper scores of the FCV-19S were not represented in the sample. Taken together, the values indicate that fear of COVID-19 was low among most participants.

Looking at the results of the correlations analyses, a significant positive association between PTSD symptom levels at T1 and PTSD symptom levels at T2 was found ($r = .75$, $p < .01$). Moreover, fear of COVID-19 was positively associated with PTSD symptom levels at both T1 ($r = .21$, $p < .05$) and T2 ($r = .22$, $p < .05$).

Moderator Analysis

The results of the moderator analysis are presented in Table 4. The interaction term was non-significant ($\beta = .05$, $t(126) = .91$, $p = .36$), indicating that the severity of fear of COVID-19 did not significantly affect the association between PTSD symptom levels at T1 and T2. Moreover, fear of COVID-19 had no significant direct effect on PTSD symptom levels at T2 ($\beta = .08$, $t(126) = 1.49$, $p = .14$). However, PTSD symptom levels at T1 had a significant direct effect on PTSD symptom levels at T2 ($\beta = .74$, $t(126) = 12.63$, $p < .001$). Therefore, participants with higher PTSD symptom levels at T1 are expected to have higher PTSD symptom levels at T2. Most of the variance (60%) of PTSD symptom levels at T2 was explained by PTSD symptom levels at T1, $R^2 = .60$, $F(126) = 188.62$, $p < .01.$.

Discussion

The devastating impact of the COVID-19 pandemic continues to be felt across multiple occupational, social, economic, and geographic boundaries all over the world. Excessive fear of COVID-19 has shown to have the potential to lead to mental health suffering and the

development of severe mental health problems like PTSD (Di Crosta et al., 2020; Sakib et al., 2020). To further investigate the effect of fear of COVID-19 on people's mental health, the Fear of COVID-19 Scale (FCV-19S) was developed (Ahorsu et al., 2020). The first aim of the present study was to evaluate the psychometric properties of the FCV-19S in a Dutch and German sample. The results indicated that the scale has good internal consistency and reliability as well as a stable unidimensional structure. These findings are consistent with previous validation studies with national samples from Iran (Ahorsu et al., 2020), Israel (Bitan et al., 2020), Italy (Soraci et al., 2020), Spain (Martínez-Lorca et al., 2020), Bangladesh (Sakib et al., 2020), Turkey (Satici et al., 2020), Saudi Arabia (Alyami et al., 2020) and the US (Perz et al., 2020).

Secondly, the present study aimed at investigating whether fear of COVID-19 influences the relationship between PTSD symptom levels in bereaved individuals before and during the pandemic. As fear is one of the main factors involved in the aetiology of PTSD (Becker et al., 2013), it was expected that high fear of COVID-19 would strengthen the association between PTSD symptom levels in bereaved individuals before and during the pandemic. The results of the moderator analysis showed that the severity of PTSD symptomatology in bereaved individuals before the pandemic had a significant impact on the severity of their PTSD symptomatology during the pandemic. However, fear of COVID-19 did not moderate this relationship, nor did it have a direct effect on PTSD symptom levels at T2. Therefore, fear of COVID-19 did not appear to be a risk factor for increased PTSD symptomatology in bereaved individuals. The variance of PTSD symptom levels T2 was mainly explained by PTSD symptom levels at T1 as sole predictor variable. As the research field on fear of COVID-19 is only yet developing, evidence for an association between fear of COVID-19 and PTSD is still scarce. Apart from Di Crosta and colleagues (2020) who identified fear of contagion with COVID-19 to be a predictor for high PTSD symptomatology in the general Italian population, Tang and colleagues (2020) discovered that extreme fear of COVID-19 can be a risk factor for PTSD and depressive symptomatology in Chinese college students. Additionally, a study from Pakistan found that fear of COVID-19 puts frontline nurses at risk of secondary trauma and traumatic distress (Khattak, Saeed, Rehman, & Fayaz, 2020). The findings of the moderator analysis could not confirm these earlier findings. One reason for the lack of association between fear of COVID-19 and PTSD symptomatology in the present study might be that PTSD symptoms were assessed in relation to a loss which the participants suffered prior to the pandemic. Di Crosta and colleagues (2020), Tang and colleagues (2020) and Khattak and colleagues (2020), on the other hand, measured posttraumatic distress in relation

to the COVID-19 pandemic as specific traumatic event. Consequently, the mental health of individuals who have lost a loved one due to COVID-19 might be more strongly adversely affected by fear of COVID-19 than the formerly bereaved. A notion which future research should investigate.

Further observations of the correlations between the main variables of interest illuminated a significant and positive correlation between fear of COVID-19 and PTSD symptom levels before and PTSD symptom levels during the pandemic. Another indication that the relationship between fear of COVID-19 and PTSD symptomatology in bereaved individuals should be further researched.

The findings of the present study should be viewed in light of some limitations. First, whereas the participant pool comprised a relatively small convenience sample of Dutch and German speaking bereaved individuals with the majority being female, results may not be representative of the general bereaved population. Replications with larger and more gender-balanced bereaved as well as non-bereaved samples would be useful to confirm the results. Secondly, the findings of present study were based on self-report data that can be influenced by factors such as social desirability, memory recall, and other common method biases. Studies using other methodologies are recommended (e.g. in-depth qualitative interviews, diary studies). Third, although the longitudinal design of the present study is one of its strengths, only 30% of the participants who took part at T1 also took part at T2 which might have resulted in an attrition bias. One reason for the high number of losses to follow-up is that the T2 data collection was still ongoing when the data analysis for this study was performed. Moreover, the communication with participants at T2 solely took place via email and not via phone. Therefore, some emails might have been spam-filtered or overlooked by participants. Next, the PCA was not run on the Dutch and German sample separately as the sample sizes in both samples were too small. Hence, no inferences can be drawn regarding validity and reliability of each version of the FCV-19S separately. Lastly, the FCV-19S mainly assesses own fear of contagion with COVID-19. However, apart from the fear of falling ill and dying due to COVID-19, people were found to also fear the social and economic consequences of the COVID-19 pandemic, including being dismissed from work, not being able to earn and assure their livelihoods due to the quarantine regime, being socially excluded and stigmatized for being associated with the disease and being separated from loved ones and caregivers (Porcelli, 2020; Trnka & Lorencova, 2020). As the bereaved in current sample have lost a loved one prior to the pandemic, they might for example have low fear of getting infected themselves but instead fear

being separated from their loved ones or losing another loved person due to COVID-19 even stronger. Such fear of COVID-19 can so far not be assessed with the FCV-19S. Thus, there is a need for further tools to assess different types of fear of COVID-19 in order to better understand how specific population groups like the bereaved fear COVID-19.

Despite these limitations, the findings of the present study provide new information about the impact of the COVID-19 pandemic on the mental health of people who were bereaved before the pandemic, by identifying whether they are at high risk of developing PTSD due to fear of contagion with COVID-19. This information may help mental health professionals with the further process of determining risk groups for fear of COVID-19. Furthermore, it is essential that future research focuses on the development and implementation of specific protocols and programs to prevent and reduce adverse pandemic-related mental health outcomes in the general bereaved population. Given the restrictive lockdown and quarantine regulations, many individuals who have lost a loved one due to COVID-19 do not get the chance to experience a regular grief cycle and instead are forced to rapidly adjust to the situation and recover themselves (Mortazavi et al., 2020). Therefore, mental health professionals need to provide adequate mental health support to newly bereaved. Otherwise, they might face an upcoming wave of unresolved bereavement, depression, and PTSD (Mortazavi et al., 2020).

Overall, the results highlighted in the present study show that FCV-19S has good internal consistency and reliability as well as a stable unidimensional structure in a Dutch and German speaking bereaved sample. Moreover, fear of COVID-19 did not moderate PTSD symptom levels in bereaved individuals before and during the COVID-19 pandemic.

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Tables and Figures

Table 1

Measures of Internal Consistency and Reliability of the Dutch and German Versions of the Fear of COVID-19 Scale (FCV-19S) (N = 127)

FCV-19S Item	Inter-Item Correlation Range	Corrected Item-Total Correlation
1. I am most afraid of coronavirus-19.	.41 - .62	.66
2. It makes me uncomfortable to think about coronavirus-19.	.35 - .62	.67
3. My hands become clammy when I think about coronavirus-19.	.38 - .68	.59
4. I am afraid of losing my life because of coronavirus-19.	.38 - .53	.62
5. When watching news and stories about coronavirus on social media, I become nervous or anxious.	.40 - .57	.64
6. I cannot sleep because I am worrying about getting coronavirus.	.41 - .74	.66
7. My heart races or palpitates when I think about getting coronavirus.	.35 - .74	.63

Table 2

Results from a Principal Component Analysis of the Fear of COVID-19 Scale (FCV-19S) (N = 127)

FCV-19S Item	Factor loading
1. I am most afraid of coronavirus-19.	.74
2. It makes me uncomfortable to think about coronavirus-19.	.74
3. My hands become clammy when I think about coronavirus-19.	.73
4. I am afraid of losing my life because of coronavirus-19.	.72
5. When watching news and stories about coronavirus-19 on social media, I become nervous or anxious.	.75
6. I cannot sleep because I am worrying about getting coronavirus-19.	.80
7. My heart races or palpitates when I think about getting coronavirus-19.	.79

Table 3

Mean, Standard Deviation, Minimum, Maximum and Spearman's Rho Correlations of Main Variables of Interest

Variable	*M*	*SD*	Min.	Max.	N	1	2	3
1. PTSD levels T1	32.96	11.00	20	63	127	-		
2. PTSD levels T2	31.66	10.99	20	61	127	.75**	-	
3. Fear of COVID-19	12.39	4.49	7	24	127	.21*	.22*	-

* $p < 0.05$. ** $p < 0.01$.

Table 4

Moderator Analysis: PTSD Symptom Levels and Fear of COVID-19 (N = 127)

Variable	B	SE	β	t	p	F	df	R^2	$adj.\ R^2$
General Model						65.03	3	.78	.60
(Constant)	31.53	.63		50.07	< .001				
PTSD levels T1	.74	.06	.74	12.63	< .001	188.62	1	.78	.60
Fear of COVID-19	.22	.15	.09	1.49	.14	10.88	1	.28	.07
PTSDT1 * FCV-19 [a]	.01	.01	.05	.91	.36	7.90	1	.24	.05

[a] = Interaction Term of PTSD levels at T1 and Fear of COVID-19.

Figure 1

Scree Plot of Principal Component Analysis of the FCV-19 Scale