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Increased generalized anxiety, depression and distress during the COVID-19 pandemic: a cross-sectional study in Germany

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ABSTRACT

Background Since the first cases of the novel coronavirus disease SARS-CoV-2 were reported in December 2019 in China, the virus has spread in most countries. The aim of the present study was to assess initial data on the mental health burden of the German public during the COVID-19 pandemic.

Methods A cross-sectional study was conducted in Germany and collected complete datasets from 15 704 German residents aged 18 years and over. Besides demographics, generalized anxiety (GAD-7), depression (PHQ-2) and psychological distress (DT) were assessed. Furthermore, COVID-19-related fear, trust in governmental actions to face COVID-19 and the subjective level of information regarding COVID-19 were covered.

Results Significantly increased symptoms were highly prevalent in all dimensions: generalized anxiety (44.9%), depression (14.3%), psychological distress (65.2%) and COVID-19-related fear (59%). Females and younger people reported higher mental burden. Trust in governmental actions to face COVID-19 and the subjective level of information regarding COVID-19 are negatively associated with mental health burden. However, the subjective level of information regarding COVID-19 is positively associated with increased COVID-19-related fear.

Conclusions The provision of appropriate psychological interventions for those in need and the provision of transparency and comprehensible information are crucial during the current pandemic.

Keywords COVID-19, COVID-19-related fear, depression, generalized anxiety, mental health

Introduction

In December 2019, the first cases of the novel coronavirus disease SARS-CoV-2 (COVID-19) were reported in Wuhan, China.[1] Since then, the virus rapidly spread across South East Asia and reached Central Europe, and nowadays infections are reported in almost all countries of the world.[2] In March 2020, the World Health Organization officially classified the spread of the virus as the first pandemic since H1N1 in 2009/2010 with now over 7.8 million reported infections.[2,3] So far, little is known about medications and vaccinations to effectively combat the virus[4]. Therefore, current priorities to face the pandemic lie on actions to slow down the spread of the virus.

These highly necessary actions 'to flatten the curve' are in most countries restrictive and thus a limitation to personal lives. In Germany, public facilities, educational institutions and borders to the neighboring countries were closed to prevent the emergence of infection chains. Furthermore, imposed contact prohibitions to enforce physical distancing and private quarantine affect most people in the country. However, these highly urgent measures to slow down the spread of the virus in order to prevent new infections have

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an enormous impact on the economy, public life and on each individual.

A recent review investigating the psychological burden caused by quarantine highlights the psychological strain on those who are not allowed to participate in social life.[5] The current literature on COVID-19 offers a wide range of different aspects of the pandemic, especially regarding the impact of the virus on people with chronic physical diseases.[6–8] In contrast, high-quality data concerning mental health issues in times of COVID-19 are still needed.[9,10] Already existing research focuses on mental health issues of frontline medical staff in China,[11,12] the impact of constant media coverage and its influence on peoples' mental health[13,14] and the change of the psychological burden over the course of time during the pandemic.[15] One recently published study investigates the impact of the COVID-19 pandemic on the mental health burden of the Chinese public.[16] More specific, this study shows high prevalence of generalized anxiety (35.1%), depression symptoms (20.1%) and poor sleep quality (18.2%) during the COVID-19 pandemic. It is worth noting that most research on mental health issues in times of COVID-19 is derived from Chinese samples and should be interpreted with caution when compared to Western populations. Given these circumstances, there is a strong need to collect high-quality data on the impact of the COVID-19 pandemic on the mental health of the Western population. Additionally, a recently published Lancet Psychiatry position paper highlighted this matter of public interest.[17] Therefore, the proposed study aims to fill this research gap.

The primary objective of the present study is to investigate the mental health burden of the German population during the COVID-19 pandemic. Subsequently, it is hypothesized that generalized anxiety symptoms, depression symptoms, psychological distress and COVID-19-related fear are increased. The secondary objectives refer to relations between peoples' trust in governmental actions to face COVID-19, the subjective level of information regarding COVID-19 and peoples' mental health burden. It is hypothesized that high level of trust in governmental actions to face COVID-19 and high subjective level of information regarding COVID-19 correlate negatively with generalized anxiety symptoms, depression symptoms, psychological distress and COVID-19-related fear.

The results of this study will provide important data on the mental health of the German population and on various factors related to mental health issues during the COVID-19 pandemic. Such data is relevant in order to build much needed evidence on current mental health issues and to provide important information regarding the need for targeted interventions to support the German public.

Methods

Study design and participants

Over the course of 8 weeks (10 March–5 May 2020), a cross-sectional online survey was distributed via online channels (e.g., online newspaper), social media and print media. The survey period covers different levels of governmental restrictions and their easing of those restrictions in public life in Germany.

The survey was accessed 18 895 times with a total of 15 704 participants completing the survey (83% completion rate). At the time of survey completion, a total of 15 037 respondents were residing in Germany and were at least 18 years old. Table 1 shows a summarized overview of the demographics included in the analysis. Of the 15 037 respondents included in this sample, 10 633 (70.7%) were female, 4353 (28.9%) were male and 51 (0.3%) were gender queer. 2076 (13.8%) of the participants were aged 18–24 years, 3725 (24.8%) were aged 25–34 years, 3 459 (23.0%) were aged 35–44 years, 2846 (18.9%) were aged 45–54 years, 2151 (14.3%) were aged 55–64 years and 780 (5.2%) were aged 65 year or older.

Ethics

Electronic informed consent was obtained prior to the start of the survey. Participation was voluntary, anonymous, and participants could withdraw from the study at any time. The proposed study was conducted in accordance with the Declaration of Helsinki, and the Ethics Committee of the University Hospitals Essen has approved the execution of the study (20-9307-BO).

Measures

The completion of the survey requires about 12 minutes. The survey consists of several modules, including demographic data, e.g., gender, age, marital status, having a child below the age of 18, educational level and occupational status.

Three validated measures were used in the survey to assess mental health burden, namely, Generalized Anxiety Disorder Scale-7 (GAD-7),[17] Patient Health Questionnaire-2 (PHQ-2),[18] and Distress Thermometer (DT).[19] The GAD-7 consists of seven items assessing the frequency of anxiety symptoms over the past 2 weeks on a 4-point Likert scale (0 = never to 3 = nearly every day). According to previous validation samples, sum scores of ≥5, ≥10 and ≥15 indicate mild, moderate and severe generalized anxiety symptoms.[18] The PHQ-2 consists of two items screening the frequency of depression symptoms over the past 2 weeks on a 4-point Likert scale (0 = never to 3 = nearly every day). A sum score of ≥3 points to major depression symptoms.[19] The

Table 1 Demographic characteristics

	N	%
Sex		
Female	10 633	70.7
Male	4353	28.9
Inter/diverse	51	0.3
Age		
18–24 years	2076	13.8
25–34 years	3725	24.8
35–44 years	3459	23.0
45–54 years	2846	18.9
55–64 years	2151	14.3
65–74 years	662	4.4
≥75 years	118	0.8
Marital status		
Single	4300	28.6
Married	6391	42.5
In a relationship	3129	20.8
Divorced/separated	922	6.1
Widowed	197	1.3
Other	98	0.7
Children		
Yes	4281	28.5
No	10 756	71.5
Educational level		
University education	6403	42.6
Higher education entrance		
Qualification	4921	32.7
Secondary education	2767	18.4
Lower secondary education	655	4.4
No qualification	47	0.3
Other	244	1.6
City size (population)		
100 00 residents	8396	55.8
20 000 residents	3417	22.7
5000 residents	1645	10.9
<5000 residents	1 579	10.5
Occupation		
Not employed	1544	10.3
Healthcare-related job	2159	14.6
Other	11 298	75.1
Illnesses		
Yes	5553	36.9
No	9484	63.1
Total	15 037	100.0

DT involves one visual analogue scale 0 = no distress to 10 = extreme distress experienced in the past week. Here, a score ≥4 indicates elevated psychological distress.[20] All instruments were previously validated within the German population and are commonly used in clinical and scientific practice. Furthermore, one item assessing COVID-19-related fear on a 7-point Likert-scale (1 = very low to 7 = extremely high) was implemented.

Trust in governmental actions to face COVID-19 (I think Germany is well prepared to face COVID-19; I think all government measures are being taken to combat COVID-19; I have confidence in the governmental system in Germany) and the *subjective level of information regarding COVID-19* (I feel informed about COVID-19; I feel informed about measures to avoid an infection with COVID-19; I understand the health authorities' advice regarding COVID-19) were assessed using a 7-point Likert-scale (1 = complete disagreement to 7 = complete agreement). The reliability for both scales was tested using Cronbach's α as an indication of internal consistency. The scales trust in governmental actions to face COVID-19 and subjective level of information regarding COVID-19 showed high internal consistency with Cronbach's α =0.825 and Cronbach's α =0.801.The scale–scale correlation was r = 0.464, $P < 0.001$.

Statistical analysis

The data analysis was performed using SPSS Statistics 26 Software (IBM, Armonk, NY). First, sum scores for the GAD-7 and PHQ-2 and mean scores for the two scales were calculated. Descriptive statistics were conducted for characteristics of participants including socio-demographics and scores of psychometric tools. Considering the present sample size, a normal distribution of the variables was assumed, and *Pearson* correlations have been conducted. The level of significance was set at $\alpha = 0.05$ (two-sided tests).

Results

Prevalence of generalized anxiety symptoms, depression symptoms, psychological distress and COVID-19-related fear

The prevalence of general anxiety symptoms, depression symptoms, psychological distress and COVID-19-related fear, stratified by gender and age, is shown in Tables 2 and 3. Overall prevalence for elevated general anxiety symptoms (sum scores of ≥5) was reported from 44.9% (N = 6748) of the participants. Almost one-third (28.1%, N = 4226) of the respondents reached a sum score of ≥5. Moreover 9.8% (N = 1476) and 7% (N = 1046) reached a sum score of ≥10 and ≥15, respectively. Sum scores for depression symptoms of ≥3 were reported from 14.3% (N = 2157). A score of ≥4 for experienced psychological distress was reported from 65.2% (N = 9799) of the respondents. Participants

Table 2 Prevalence of generalized anxiety symptoms, depression symptoms, psychological distress and COVID-19-related fear stratified by gender

	Total	*Sex*		
	(N = 15 037)	*Female (N = 10 633)*	*Male (N = 4353)*	*Inter/diverse (N = 51)*
GAD-7				
<5	8289 (55.1%)	5413 (50.9%)	2853 (65.5%)	23 (45.1%)
≥5	4226 (28.1%)	3173 (29.8%)	1037 (23.8%)	16 (31.4%)
≥10	1476 (9.6%)	1199 (11.3%)	272 (6.2%)	5 (9.8%)
≥15	1046 (7.0%)	848 (8.0%)	191 (4.4%)	7 (13.7%)
PHQ-2				
<3	12 880 (85.7%)	9025 (84.9%)	3822 (87.8%)	33 (64.7%)
≥3	2157 (14.3%)	1608 (15.1%)	531 (12.2%)	18 (35.3%)
DT				
<4	5238 (34.8%)	3423 (32.2%)	1797 (41.3%)	18 (35.3%)
≥4	9799 (65.2%)	7210 (67.8%)	2556 (58.7%)	33 (64.7%)
COVID-19-related fear				
<5	6170 (41.0%)	3942 (37.1%)	2199 (50.5%)	29 (56.9%)
≥5	8867 (59.0%)	6691 (62.9%)	2154 (49.5%)	22 (43.1%)

Note: GAD-7 = Generalized Anxiety Disorder Scale-7, sum scores of ≥5, ≥10 and ≥15 indicate mild, moderate and severe generalized anxiety symptoms, respectively; PHQ-2 = Patient Health Questionnaire-2, sum scores of ≥3 indicate major depression symptoms; DT = Distress Thermometer, a score ≥4 indicates elevated psychological distress. COVID-19-related fear, ≥5 indicate elevated COVID-19-related fear.

COVID-19-related fear were studied using a 7-point Likert scale, while scores between 5 and 7 indicate elevated COVID-19-related fear. More respondents (59%, $N = 8867$) reported to have heightened COVID-19-related fear.

Associations of trust in governmental actions to face COVID-19 and subjective level of information regarding COVID-19 with mental health parameters

Participants' trust in governmental actions to face COVID-19 and subjective level of information regarding COVID-19 were studied using 7-point Likert scales. Each scale consists of three items. Almost half of the participants reported high trust in governmental actions to face COVID-19, and most participants felt well informed regarding COVID-19 (scores between 5 and 7), 48.2 and 90.4%, respectively. Considering trust in governmental actions to face COVID-19, we found significant negative correlations between generalized anxiety symptoms ($r = -0.153$, $P < 0.001$), depression symptoms ($r = -0.117$, $P < 0.001$) and psychological distress ($r = -0.154$, $P < 0.001$). No significant correlation between trust in governmental actions to face COVID-19 and COVID-19-related fear ($r = -0.013$,$P = 0.104$) was observed. Significant negative correlations between the subjective level of information regarding COVID-19 and generalized anxiety symptoms ($r = -0.102$, $P < 0.001$), depression symptoms ($r = -0.096$, $P < 0.001$) and psychological distress ($r = -0.097$, $P < 0.001$) were observed. Furthermore, a positive correlation between the subjective level of information regarding COVID-19 and COVID-19-related fear was observed ($r = 0.107$, $P < 0.001$).

Discussion

Main finding of this study

The present study is assessing the mental health burden during the COVID-19 pandemic in Germany. This study shows high prevalence of generalized anxiety symptoms, depression symptoms, psychological distress and COVID-19-related fear. Furthermore, trust in governmental actions to face COVID-19 and the subjective level of information regarding COVID-19 were negatively associated with generalized anxiety symptoms, depression symptoms and psychological distress. In contrast, trust in governmental actions to face COVID-19 is not associated with COVID-19-related fear, but the subjective level of information regarding COVID-19 is positively associated with COVID-19-related fear.

Table 3 Prevalence of generalized anxiety symptoms, depression symptoms, psychological distress and COVID-19-related fear stratified by age

	Total	*Age—categories in years*						
	(N = 15 037)	*18–24 (N = 2076)*	*25–34 (N = 3725)*	*35–44 (N = 3459)*	*45–54 (N = 2846)*	*55–64 (N = 2151)*	*65–74 (N = 662)*	*≥75 (N = 118)*
GAD-7								
<5	8289 (55.1%)	915 (44.1%)	2045 (54.9%)	1836 (53.1%)	1645 (57.8%)	1306 (60.7%)	461 (69.6%)	81 (68.7%)
≥5	4226 (28.1%)	618 (29.8%)	1026 (27.5%)	1035 (29.9%)	772 (27.1%)	593 (27.6%)	154 (23.3%)	28 (23.7%)
≥10	1476 (9.8%)	307 (14.8%)	377 (10.1%)	347 (10.0%)	262 (9.2%)	147 (6.8%)	29 (4.4%)	7 (5.9%)
≥15	1046 (7.0%)	236 (11.4%)	277 (7.4%)	241 (7.0%)	167 (5.9%)	105 (4.9%)	18 (2.7%)	2 (1.7%)
PHQ-2								
<3	12 880 (85.7%)	1 529 (73.7%)	3 202 (86.0%)	3 005 (86.9%)	2 520 (88.5%)	1 912 (88.9%)	606 (91.5%)	106 (89.8%)
≥3	2 157 (14.3%)	547 (26.3%)	523 (14.0%)	454 (13.1%)	326 (11.5%)	239 (11.1%)	56 (8.5%)	12 (10.2%)
DT								
<4	5 238 (34.8%)	676 (32.6%)	1282 (34.4%)	1024 (29.6%)	986 (34.6%)	831 (38.6%)	367 (55.4%)	72 (61.0%)
≥4	9799 (65.2%)	1400 (67.4%)	2443 (65.6%)	2435 (70.4%)	1860 (65.4%)	1320 (61.4%)	295 (44.6%)	46 (39.0%)
COVID-19-related fear								
<5	6170 (41.0%)	930 (44.8%)	1709 (45.9%)	1348 (39.0%)	1115 (39.2%)	795 (37.0%)	232 (35.0%)	41 (34.7%)
≥5	8867 (59.0%)	1146 (55.2%)	2016 (54.1%)	2111 (61.0%)	1731 (60.8%)	1356 (63.0%)	430 (65.0%)	77 (65.3%)

Note: GAD-7 = Generalized Anxiety Disorder Scale-7, sum scores of ≥5, ≥10 and ≥15 indicate mild, moderate and severe generalized anxiety symptoms, respectively; PHQ-2 = Patient Health Questionnaire-2, sum scores of ≥3 indicate major depression symptoms; DT = Distress Thermometer, a score ≥4 indicates elevated psychological distress. COVID-19-related fear, ≥5 indicate elevated COVID-19-related fear.

The prevalence of at least mild generalized anxiety symptoms was 44.9% within the investigated sample. 16.8% of the current sample had moderate generalized anxiety symptoms, which is strongly increased compared to previously published studies in Germany with 6.0 and 5.9% prevalence of moderate anxiety symptoms, respectively.[18,21] In fact, moderate anxiety symptoms (GAD-7 score of ≥10) were associated with a positive likelihood ratio for the presence of a generalized anxiety disorder of 5.1.[22] Moreover, severe generalized anxiety symptoms (GAD-7 score ≥15) were observed in 7% of the respondents. Compared to the normative sample (1%) and a new population-based study (1.2%), the prevalence of severe generalized anxiety symptoms is seven times higher.[18,21] Applying a cut-off score of ≥9, which was used in a recently published study in China, the German population shows a much lower prevalence of generalized anxiety symptoms than the Chinese population in times of COVID-19 (20 vs. 35.1%).[16] These results underline the importance of high-quality data from different populations to assess the impact of COVID-19 on the mental health in different countries. One explanation for these differences could be the significantly lower number of deaths caused by COVID-19 in Germany compared to China.[2] In addition, cultural peculiarities as well as available information on COVID-19 and its consequences may explain the different prevalence of generalized anxiety symptoms.

Compared to representative German samples, increased prevalence of depression symptoms (14.3 vs. 5.6%) as well as psychological distress (65.2 vs. 39%) was observed.[20,23] Additionally, more than half (59%) of the respondents reported elevated COVID-19-related fear. Considering the heightened prevalence, it is clear to say that the mental health burden is increased in the German public during the COVID-19 pandemic. Elevated generalized anxiety symptoms, depression symptoms and psychological distress were more likely to occur in females and younger people, which is consistent to existing literature regarding the prevalence of mental health burden in Germany.[18–20] In contrast, existing literature on the mental health burden in China during the COVID-19 outbreak, where similar psychometric instruments were used, no difference between genders could be observed, but younger people also reported more anxiety symptoms.[16]

Correlation analyses were carried out to assess whether a high level of trust in governmental actions to face COVID-19 and a high subjective level of information regarding COVID-19 are associated with reduced mental health burden. Less than half (48.2%) of our sample reported high trust in the government's actions to combat COVID-19,

and 90.4% felt well informed about COVID-19. Trust in governmental actions to face COVID-19 and the subjective level of information regarding COVID-19 were negatively associated with generalized anxiety symptoms, depression symptoms and psychological distress. These findings are consistent with previous published findings on the impact of governmental statements on mental health during the COVID-19 pandemic.[15] This points to the inevitable need and responsibility for the government and the media to provide clear and comprehensible information to the public.[13,14] No association between trust in governmental actions to face COVID-19 and COVID-19-related fear could be observed. Moreover, a positive correlation between the subjective level of information regarding COVID-19 and COVID-19-related fear occurred. This suggests that people who feel well informed about COVID-19 have an increased COVID-19-related fear. One possible explanation could be that COVID-19-related fear is not an anxiety in the pathological sense, but a more rational response that can be explained by the growing number of infection cases in the world. In-line with this, previous research suggested that a heightened frequency of risk-elevating news during the Ebola virus disease might contribute to public concerns in relations to infectious diseases.[24]

What is already known on this topic

Recently published literature on the psychological impact caused by the COVID-19 pandemic on people's mental health has shown increased depression and anxiety symptoms, poor sleep quality and distress.[9,11,12,16] Especially frontline medical staff in China report poor mental health during the ongoing pandemic.[11,12] A longitudinal study conducted in China revealed that the perceived psychological impact on mental health persists up to 1 month after the outbreak of the virus.[25] Still most of the studies investigating the mental health burden during the COVID-19 pandemic are derived from Asian samples.

What this study adds

This study offers first data on the mental health burden of the German public during the ongoing COVID-19 pandemic. The data suggest that the observed increased prevalence of generalized anxiety symptoms, depression symptoms and psychological distress in the German population is related to the ongoing pandemic and its consequences for the public. Therefore, appropriate interventions are crucial to support burdened people and prevent manifestations of mental illnesses. Such interventions should be implemented in public health strategies.[26] During the current pandemic, low-threshold tele-medical approaches offer great advantages in providing anonymous and effective support to many people.[27] Nevertheless, already existing e-mental health approaches to support burdened people in times of COVID-19 need to be further evaluated.[28]

The main strength of this study is that it is one of the largest to date to assess the mental health aspects of people during the COVID-19 pandemic in the Western hemisphere. In fact, this is the first study so far addressing the mental health issues in Germany during the COVID-19 pandemic. Furthermore, the completion rate (83%) is high when compared with the average completion rates in online survey studies.[29] This reflects the public interest in mental health during the COVID-19 pandemic.

Limitations of this study

However, limitations need to be considered. The data are driven from a cross-sectional study design. Therefore, it is inappropriate to draw causal conclusions from the data. In addition, an online survey was used to collect the data, which was distributed via online and analogue channels. Thus, the possibility of selection bias should be considered. It is important to note that two scales, namely, trust in governmental actions to face COVID-19 and the subjective level of information regarding COVID-19, could not be validated beforehand. Nevertheless, post hoc validation of the established scales showed high internal consistency.

Conclusion

To conclude, the results of this study suggest a high prevalence of generalized anxiety symptoms, depression symptoms, psychological distress and COVID-19-related fear during the ongoing pandemic in Germany. Despite significantly increased prevalence of generalized anxiety symptoms in the German population, data on anxiety symptoms in the Chinese population appear to be even more elevated. High trust in governmental actions to face COVID-19 and a highly subjective level of information regarding COVID-19 are associated with low mental health burden. Therefore, maintaining trust in governmental actions to face COVID-19 as well as providing transparency and understandable information regarding COVID-19 is important for governmental authorities during the pandemic. Lastly, establishing appropriate and low-threshold interventions to support mentally burdened people is crucial.

Declaration of competing interest

The authors declare that they have no competing interests.

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