The Iranian Corona Stress Study

Sadegh Sabouhi¹

Atefeh Vaezi²

Mohammad Reza Sharbafchi³

Amanda Aerni⁴

Dorothee Bentz⁴

David Coynel⁴

Dominique de Quervain⁴

Bernhard Fehlmann⁴

Virginie Freytag⁴

Christiane Gerhards⁴

Andreas Papassotiropoulos⁴

Nathalie Schick Tanz⁴

Thomas Schlitt⁴

Anja Zimmer⁴

Priska Zuber⁴

Corresponding author: Ehssan Amini⁴ (ehssan.amini@unibas.ch) (ORCID: 0000-0002-4221-6622)

Affiliation:

1. Student Research Committee, Isfahan University of Medical Sciences, Isfahan, Iran
2. Isfahan University of Medical Sciences, Isfahan, Iran
3. Department of Psychiatry, School of Medicine, Isfahan University of Medical Sciences
4. University of Basel, Transfaculty Research Platform Molecular and Cognitive Neurosciences, Faculty of Psychology and Medical Faculty, Birmanngasse 8, CH-4055 Basel, Switzerland

Abstract

Purpose: The COVID-19 pandemic and governmental counter measurements, confinement in particular, have changed the routines of everyday life of people all over the world. To assess the psychological consequences of daily life changes during COVID-19 pandemic in the Iranian population.

Method: We performed an anonymous online survey in the first 3 weeks of March 2020. Participants had to rate their stress levels and depressive symptoms during the last two weeks and before the pandemic retrospectively. The changes in psychological measurements and its association with socio-demographic factors and burdens due to confinement were assessed.

Results: Overall, among the 3210 subjects who participated in our study, we observed an increase in both stress levels and average depression score. However, about 23% of subjects reported a decrease in their stress levels during the pandemic. The burden of childcare at home, restrictions in private life, and the burden of thoughts about the future were positively correlated with changes in stress levels and depression scores. On the other hand, feeling relieved in the pandemic condition, and enjoying more family time associated with less change in stress levels and depression scores. Being religious and older age were identified as resilience factors, whereas being a student, seeking a job, and having a psychiatric disorder history were identified as risk factors for depression.

Conclusion: Stress levels and depressive symptoms have increased during COVID-19 pandemic and this increase is in relation to different social and personal burdens due to confinement strategy.

Keywords: Stress, Depression, Epidemiology, COVID-19

Introduction

In the last days of 2019, an outbreak of coronavirus 2019 (COVID-19) was announced in Wuhan, China. Soon, the disease spread all over the world and a few months later, on March 11, the WHO announced a pandemic crisis [1]. Considering the lack of vaccination or treatment against the virus, and its fast rate of dissemination, many countries applied different levels of social restrictions to control the pandemic. These restrictions, confinement strategies in particular, along with the pandemic itself may cause a negative psychological impact on societies. Acknowledging this, a recent position paper published in *Lancet Psychiatry* explored the psychological, social, and neuroscientific effects of this situation. The authors of this paper stated an urge to gather data on the mental health consequences of the COVID-19 pandemic [2]. In this regard, Luo et al. used data from 17 countries and reported a pooled prevalence of 33% for anxiety and 28% for depression during the pandemic [3], which is assumed to be higher in comparison with the situation before the pandemic. Iran, with a total population of about 84 million people, as one of the countries seriously impacted by this outbreak (95,646 residents tested positive (1135 cases/million) and 6,091 deaths linked to COVID-19 as of May 1st, 2020) [4] is no exception in this scenario. According to a study conducted during the last two weeks of March 2020, 68% of the Iranian participants reported moderate to severe anxiety levels based on a six-item version of the State-Trait Anxiety Inventory (STAI-6) [5]. Facing stressful situations can also trigger an adaptive stress response on an individual and a social level, which may lead to positive psychological effects. For example, a study after the first SARS epidemic in Hong Kong reported that about 65% of the participants cared more about their mental health, which in turn correlated with a decreased likelihood of negative mental health consequences such as post-traumatic stress disorder [6]. It is of paramount importance to understand the impact of COVID-19 on mental health and to gain insight into risk and resilience factors to effectively tackle arising public health issues from COVID-19 and probable subsequent outbreaks. This knowledge is crucial to successfully adapt current mental health services infrastructures, and policies. In the Iranian Corona Stress Study in conjunction with The Swiss Corona Stress Study [7], we investigated changes in the stress levels and depression scores in response to the COVID-19 outbreak and subsequent confinement policies. Furthermore, potential risk and resilience factors with regard to the development of depressive symptoms were investigated.

Material and Methods

Study design and participants

To assess the impact of COVID-19 and countermeasures on stress and depression levels, we conducted a cross-sectional nationwide study, based on a fully anonymous online survey. Each individual participated in the study at a single time point. Participants were asked to answer the questions based on their current situation or retrospectively based on their condition before the pandemic when applicable (i.e. questions about physical activity, stress levels, and depressive symptoms before pandemic). The survey went online on May 1st (70 days since the first case was reported in Iran) and was accessible until May 25. On average, there were 1723 new cases/day and 57 deaths/day in this period. Regarding restrictions, the Iranian government gradually lifted the lockdown measures during the survey period.

The survey was publicized using media releases by the Isfahan University of Medical Sciences, social media (i.e. WhatsApp, Telegram, Instagram, Twitter), and interviews on online news websites. Individuals who were older than 14 years, could read Persian, and lived in Iran during the study's period were eligible for the study.

Consent, procedure and outcomes

Informed consent was obtained from all participants in the first webpage of the survey. On this page, the objectives of the study, its procedure, anonymity, and confidentiality terms were explained. By declaring informed consent at the bottom of the page, participants were directed to the survey. On average it took 15 minutes to fill out the survey. In the end, participants received recommendations respecting mental health well-being and stress management such as performing physical activities or mindfulness exercises.

Survey translation and measurements

The design of the Iranian Stress Study online survey was guided by the Swiss Corona Stress Study survey design[7]. The survey consists of three sections covering socio-demographic factors, burdens due to the pandemic and confinement, and psychological measurements (i.e. stress and depression). In the first two section of the questionnaire we collected socio-demographic and burden related data. Afterward, the following outcomes of interest were assessed: *stress levels and depressive symptoms before the COVID-19 pandemic (i.e. February 5th -19th 2020, rated retrospectively) and during the past two weeks of the lockdown (counted from the date the survey was filled out)*. Stress levels were assessed using a single 6-point Likert scale question ranging from 0 (not at all) to 5 (extremely strong). Depressive scores were assessed by the Patient Health Questionnaire 9 (PHQ-9), a 9-item self-administered questionnaire to screen for the presence and severity of depression. Each item is scored based on a Likert system from *not at all (0 points)* to *nearly every day (3 points)*. The total score of PHQ-9 is ranged between 0 and 27. Based on total scores, participants were categorized as having no or minimal depression (0-4), mild depression (5-9), moderate depression (10-14), moderately severe depression (15-19), and severe depression (20-27).

We used an existing Persian translation of the PHQ-9 (see [8] for English and [9] for Persian version). The remaining items of the survey were translated from German to Persian, then face validity and cultural adaptation of the Persian version were checked and approved by an expert panel. Finally, all items were translated back to

German by the Basel University Language Center and reviewed by the Swiss study team to confirm the Iranian and Swiss Corona Stress Study questionnaires are equivalent.

Statistical Analyses

We used R version 3.6.2 for data analysis. We applied linear models in combination with ANOVAs for nominal variables, Spearman's rank correlations for ordinal variables, and Pearson correlations for interval variables. For stress and depression, a difference score was calculated by subtracting the score before the pandemic from the score during the pandemic (we refer to the difference score as *the change in stress or depression*, respectively). Therefore, positive values indicate an increase in stress/depression scores during the pandemic as compared to before the outbreak. The statistical models consisted of one dependent variable (one of the main outcome variables) and one independent variable. For linear models, the strength of the relationships was obtained by extracting the correlation value ' r ' from each corresponding linear model (i.e. normalized regression coefficient). We only report relationships with at least a small effect size ($|r| \geq 0.1$). The change in the number of participants reporting moderately severe to severe depression symptoms (PHQ-9 score ≥ 15) before and during the pandemic was further compared using McNemar's chi-squared test.

Risk and resilience factors analysis

We defined 'vulnerable' individuals as those reporting PHQ scores ≥ 15 during the pandemic (corresponding to 'Moderately Severe' and 'Severe' categories) while having a PHQ score < 15 before the pandemic. 'Resilient' subjects were defined as participants reporting PHQ scores ≤ 4 ('None-Minimal') both before and during the pandemic. To identify risk and resilience factors, we first applied Chi-square tests comparing the distribution of demographic factors between each defined subset (resilient or vulnerable) and all remaining individuals. Variables showing at least small effect sizes (Cramer's $V \geq 0.1$) were further investigated under a logistic regression model.

Only associations with an odds ratio (OR) corresponding to at least a small effect Cohen's d ($\log(OR) * \frac{\sqrt{3}}{\pi} > 0.2$) were interpreted. Marginal effects from logistic regression were obtained using the `ggeffect` command in the R package `ggeffects`. To avoid individual variable categories with low frequencies in these analyses, some demographic variables were regrouped as follows: *occupational status* (*working in a sector affected by pandemic restrictions*, *working in a sector not affected by pandemic restrictions*, *retired or disabled*, *housekeeper*, *job seeking*, *student*); *age group* (*14-24*, *25-34*, *35-44*, *45-54*, ≥ 55); *education* (*with a university degree*, *without university degree*); *household* (*living alone*, *not alone*). Besides, as only a small portion of participants ($N = 21$) reported their sex different from 'male' or 'female', data from these participants were excluded from the final analysis to maintain statistical power. For comparing the effect of age, sex, having child(ren), religiosity, and prior psychiatric disorders history on the probability to belong to the resilient group, we evaluated the effect of each variable in the logistic regression model employing Nagelkerke pseudo- R^2 , comparing the full model to the model without the considered variable (only variables with Nagelkerke pseudo- $R^2 \geq 0.01$ were interpreted).

Results

Population and descriptive statistics

In total, data from 3210 participants were included in the final analysis. Although participants took part in the study from all 31 states of the country, most participants were from Isfahan (37.4%) and Tehran (23.3%), which are the third and the first most populated provinces respectively and contribute to approximately 23% of Iran's population.

The mean age of the participants was 34.1 (SD = 10.9) and 63.8% were female, (According to the last Iranian Population and Housing Census, the Iranian population had a mean age of 31.1 years and male to female ratio of 1.03 as of the year 2016[10]), 4.5% lived alone and 45.4% had one or several children. In accordance with educational level, 74.7% had a degree in higher education. High school and university students comprised 26.8% of participants. Regarding occupational status, 7.2% of the study population were seeking a job, while 48.8% reported having a job. Among those with a job, 19.0% worked in sectors that were affected by reduced working hours or closure due to the government's policy. In accordance with religiosity, 54.1% of participants reported being religious.

Concerning COVID-19 disease, 86.8% of participants had been symptom-free and not tested for the disease, 68.8% of participants knew someone with COVID-19 disease personally, and 45.8% knew someone who deceased because of it.

Regarding pre-existing health conditions, 604 (18.8%) subjects reported to have a medical history of a chronic physical condition and 31.7% had a history of psychiatric disorder/disease (the most prevalent being depression [20.1%] and anxiety disorders [16.3%]). For further details see table 1.

Change in stress levels

Stress levels among participants had increased during pandemic (difference score: mean = 0.20, median = 0, SD = 1.36; before the pandemic: mean = 2.89, median = 3, SD = 1.44; during the pandemic: mean = 3.10, median = 3, SD = 1.63, see Figure 1). In total, 29.9% of participants experienced an increase in stress levels, 47.3% reported the same level of stress both before and during pandemic and 22.8% had perceived less stress than before (Figure 2).

No significant correlation was observed between the change in stress levels and sociodemographic variables. The following impacts of COVID-19 restrictions show the strongest association with stress levels change: the burden of child care ($r = 0.21$), the burden due to thoughts about the future ($r = 0.20$), the burden due to living alone ($r = 0.19$), and limitations in personal freedom ($r = 0.17$). On the other hand, change in stress levels was negatively correlated with feeling more relieved during pandemic ($r = -0.24$) as well as with confidence in overcoming the COVID-19 crisis ($r = -0.16$). For further details see table 2.

A positive correlation was observed between stress levels change and change in depression score ($r = 0.40$). Stress levels were also correlated to depression score both before ($r = 0.43$) and after ($r = 0.58$) pandemic.

Change in depression score

On average the total PHQ-9 score increased during pandemic (difference score: mean = 2.45, median = 1, SD = 5.44; before pandemic: mean = 5.41, median = 4, SD = 5.10; during the pandemic: mean = 7.86, median = 6, SD = 6.55). Overall, 54.8% of participants reported an increase in depression score, while 21.4% had the same score as before, and 23.8% had a lower depression score during pandemic (Figure 3). Based on participants retrospective assessment of their depressive symptoms 191 (6.0%) of them were in the moderately severe or severely depressed category (PHQ-9 score ≥ 15) before pandemic, this number almost tripled to 526 (16.4%) during pandemic (McNemar's test p -value $< 5.9e-57$; Cohen's $g = 0.38$; Figure 4).

The depression score increased more in participants who reported having a psychiatric disorder history ($r = 0.13$). Confinement impacted the depression score in several ways. *The burden due to Living alone* ($r = 0.31$), *the burden of childcare at home* ($r = 0.30$), *the burden due to thoughts about the future* ($r = 0.28$), and *the burden due to restrictions in spending time with others in private life* ($r = 0.25$) are the items with the highest effect size. *Changing the regularity of meals and sleeping time* are also accompanied by an increase in depression score with an effect size of $r = 0.27$ and $r = 0.22$, respectively. On the other hand, changes in depression score negatively correlate with *feeling relieved* ($r = -0.36$) and *enjoying more family time* ($r = -0.20$) in the confinement situation. For more information see table 3.

Risk factors for the development of clinically-relevant depressive symptoms during the pandemic

During the pandemic 388 (12.1%) participants shifted from lower categories of depression (PHQ-9 score < 15) to a clinically-relevant depression score (moderately severe or severe category; PHQ-9 score ≥ 15). To identify potential risk factors, we compared these 'vulnerable participants' to other participants in terms of socio-demographic and medical history. Having a prior history of psychiatric disorders was more prevalent in vulnerable participants (Cramer's $V = 0.20$); among prior psychiatric disorders, history of depression (Cramer's $V = 0.17$), and anxiety disorder (Cramer's $V = 0.16$) are noteworthy. The occupational status also played a role in this group with a Cramer's V effect size of 0.15.

We included these variables in a logistic regression model and found that there are more vulnerable cases among participants with a psychiatric disorder history (OR: 3.2, 95% CI [2.5-4]). Considering contrasts for occupational status, there was a higher risk for students and those who are seeking for a job to be in the vulnerable group (table 4).

Resilience factors with regard to depressive symptoms

A total of 994 (31.0%) subjects have been categorized as having non or minimal depressive symptoms (PHQ-9 ≤ 4) both before and after the pandemic. We considered this group as the "resilient group" and compared it to all other participants in terms of socio-demographic factors and medical history. Resilient participants were significantly different from other participants in terms of psychiatric disorder history (Cramer's $V = 0.24$), age group (Cramer's $V = 0.20$), occupational status (Cramer's $V = 0.18$), being religious (Cramer's $V = 0.14$), having child(ren) (Cramer's $V = 0.13$), and sex (Cramer's $V = 0.11$) (Table 5).

We performed a logistic regression model with all the significant variables identified above. Only the effects of age, religiosity, and psychiatric disorder history remained significant (Nagelkerke pseudo- $R^2 < 1\%$).

The logistic regression model showed that there were more resilient participants among those with no psychiatric disorder history (OR = 3.5, 95% CI [2.9-4.3]). It also indicated a higher resilience rate among those who reported being religious (OR = 1.5, 95% CI [1.3-1.8]). According to the age group, those with an age of 55 or higher showed higher resilience compared to other age groups (OR = 2.9, 95% CI [1.8-4.6] against 35-44 age group; Figure 5).

Discussion

Key findings

In this study, we assessed how the COVID-19 pandemic and following confinement strategies impacted mental health and well-being in the Iranian population. We observed an increase in both averages of depression scores and stress levels among the study population. This increase correlates with various burdens triggered by confinement policies and fear of COVID-19 infection. On the other hand, enjoying more family time, feeling relieved in this period, and being confident to survive the pandemic without problem have a negative association with changes in the average depression and stress scores. Additionally, we were able to identify several risk and resilience factors: being a student, seeking a job, and a psychiatric disorder history are risk factors, whereas higher age, negative psychiatric disorder history and being religious are resilience factors.

Changes in stress levels and depression score

Stress levels and depression scores among participants increased on average. This result is in line with most studies assessing psycho-behavioral changes during this pandemic [11]. In recent studies conducted in Iran, Wong et al. reported 68% of participants having/suffering from moderate to severe anxiety using the State-Trait Anxiety Inventory [5] while in another one, Maarefvand et al. observed an above-average mean score of stress (3.3 out of 5) in 3787 participants [12]. Regarding depression scores, the same trend can be seen. In two meta-analyses the prevalence of depression was estimated to be 23-33%, which is higher than the normal prevalence range before the pandemic [3,13]. Our study supports these findings with an increase in mean scores of depression and a 10% increase in the prevalence of moderately severe and severe depression during the pandemic crisis. Comparing this study to the Swiss Corona Stress Study [7], the average stress levels and depression scores before and during the pandemic were higher in the Iranian sample, but interestingly, despite all the cultural and economic differences, the changes in these scores followed the same pattern in both studies. Considering the stressful situation of a pandemic we expected the worsening of mental health in our participants, but to our surprise, we also found a reduction in stress and depression for a considerable number of participants in both the Iranian and Swiss populations. This might result from an adaptive stress response in these participants. This response has been seen in previous crises at both individual and social levels. In a similar condition to the COVID-19 crisis, after the first SARS epidemic in Hong Kong in 2003, Lau et al. reported that about 60% of subjects cared more about their families after the epidemic, over 65% of them paid more attention to their mental health and up to 40% spent more time relaxing and exercising, and these behavioral changes were accompanied by fewer psychological problems [6]. Notably, 23% of the participants in our study reported being highly relieved in the current situation, which might be due to a reduction of daily stressors compared to before the pandemic. Furthermore, over 18% of the participants reported enjoying the possibility of having more family time due to confinement. Both variables were negatively associated with the change in stress levels and depression scores both in our study and also in the Swiss study. Thus, it can be supposed that such a break in today's stressful life can act in favor of mental well-being, at least for some individuals.

Risk and resilience factors

Although no socio-demographic variable was observed to be associated with stress levels change, being a student or seeking a job were identified as a risk factor in the 'vulnerable group'. Universities and schools were closed due to governmental counter measurements and many classes took place in online platforms all of a sudden which was a big change for the educational system. On the other hand, due to economic effects of the pandemic, many companies and industries had to reduce their workforce, leading to a significant decrease in job opportunities and employment all over the world [14]. These factors caused a high level of uncertainty about the future and economic concerns for students and those who are seeking jobs. Uncertainty is a known source of stress [15] and the professional future being unpredictable can be an extra burden for these participants. Moreover, it was also shown in our study that both of these factors (e.g. economic consequences and worries about the future) were associated with a higher level of stress and depression per se. In line with this, Cao et al. (2020) reported economic worry as a risk factor to increase anxiety in a Chinese population [16].

Psychiatric disorder history is the only item that plays a role both as a risk and a resilience factor. It is a well-known fact that those with a positive psychiatric disorder history are more vulnerable in challenging situations [17]. This effect was also observed in other studies assessing psychological risk factors during the COVID-19 pandemic [18,19]. This highlights again the importance of excessive attention to this part of the society when it comes to maintaining mental health in challenging situations.

We identified being religious as a resilience factor in our study on the Iranian population. This association was not observed in the Swiss study [7]. In scientific literature, the relationship between religiosity and depressive symptoms is discussed controversially [20]. However, to get a better understanding of religiosity's impact on psychosocial well-being, it should be interpreted in the context of socio-cultural aspects of the population. To our knowledge, there is no study assessing religiosity's effect on mental health among Iranian general population, but a small number of studies assessed this association in college students, confirming a negative correlation between religiosity and depressive symptoms [21].

We also found that participants aged 55 or higher were more resilient than younger ones. Reviewing recent similar studies, results are quite controversial regarding the effect of age [11]. In a review, studying psychological resilience to disasters, this controversy is highlighted: age is introduced to be a risk factor in some and a resilience factor in other studies [22]. Two studies investigating the Iranian population's mental health during the COVID-19 pandemic, report younger age groups to be more susceptible to stress and anxiety [5,12]. The focus of these studies is on anxiety and stress, whereas resilience factors in our study are defined based on the depression scores. Therefore, these results cannot be directly compared to each other. However, considering the high correlation between stress levels and depression scores in our study, a common trend can be seen among all three studies: older age groups are less affected by the COVID-19 crisis with regard to stress and depression.

Strengths and limitations

In this study, we benefited from a reasonable number of participants with various socio-demographic characteristics who participated from all over the country. Various kinds of burdens due to the pandemic and confinement were included in this study, which enabled us to have a discriminatory appraisal on the sources of possible stressors. Most studies investigating the impact of COVID-19 on mental health conducted so far have

compared mental health indicators with a reference population. In most cases, this reference population is different from the study's participants in terms of socio-demographic characteristics which makes further interpretations less precise. However, in our study, by comparing the same population before and during the pandemic, we were able to have a more accurate perspective of the issue.

Despite these strengths, several limitations should be taken into account when interpreting data. First, our study population is not representative of the Iranian general population due to several reasons: This study was publicized and conducted on an online platform, thus excluding people who did not have access to the internet. It is noteworthy that this group predominantly includes people from lower socioeconomic levels and those living in rural areas and small cities. Moreover, due to sampling methods and media platforms used for advertising the survey, our participants were mostly from a higher educational level, which is not proportionate to the Iranian general population. Further, we used a single question to measure stress levels instead of a known valid questionnaire to make the survey more convenient for participants. It should be considered that we cannot discuss concepts such as the clinical relevance of stress levels using this measurement. Finally, we cannot exclude a possible recall bias, which may have led those being more affected by the situation to report their prior state in an unrealistic manner [23].

Prospect

The COVID-19 pandemic is not the first and will probably not be the last of its kind. In such crises, health systems focus more on immediate harms like mortality. However, psychological harms caused by the situation and policies (such as confinement) have to be taken into account. In this study, we tried to shed light on the psychological states and probable risk and resilience factors in Iran. Considering that our data is not completely representative of the general population, more and larger studies are still needed to be conducted. Moreover, it should be considered that most studies so far have used an online platform and therefore have missed a considerable part of the population with no proper access to the internet or electronic devices. Future studies should also include this part of the population.

Role of funding source

This research received no specific grant from any funding agency, commercial or not-for-profit sectors.

Declaration of interest

None.

Ethical Consideration

The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008. All procedures involving human subjects/patients were approved by by the Ethics Committee of Isfahan University of Medical Sciences, Iran (IR.MUI.MED.REC.1399.069). In respect to anonymity, only the day of participation was recorded in Survey, while IP-addresses and timestamps were not recorded.

Data availability

The data that support the findings of this study are available on request from the corresponding author (E.A.).

Author contribution

All authors had contribution in designing, data gathering and manuscript preparation). D.D., V.F., D.C., N.S., T.S. and E.A contributed in analyzing process. All authors had full access to all the data in the study and had final responsibility for the decision to submit for publication.

Acknowledgment

We would like to acknowledge Isfahan Student Research Committee and specifically Amir-reza Manteghinejad for designing and maintaining the Iranian Corona Stress Study website; Dr. Asad Omid and Dr. Bitu Shadbakht for their great help in survey adaptation for Iranian culture; Basel University Language Center for their help in the survey translation process; BaniShow startup and Babak Rajabi for their kind help in advertising the survey, and last but not the least all participants for their time and contribution in our study.

Figures

Figure 1: Distribution of stress levels before and during pandemic.

Figure 2: Distribution of change in stress levels.

Figure 3: Distribution of change in depression score (PHQ-9)

Figure 4: Distribution of depression score category before and during pandemic.

Figure 5: Resilience rates by age group. Plot of marginal effects estimated from Logit regression model on ‘resilience’. Error bars represent 95% confidence intervals.

Tables

Table 1: socio-demographic characteristics of participants

<i>Category</i>	<i>N</i>	<i>%</i>
<i>Age group</i>		
14-24	686	21.4
25-34	1146	35.7
35-44	819	25.5
45-54	407	12.7
55	152	4.8
<i>Gender</i>		
Male	1140	35.5
Female	2049	63.8
No Information	21	0.7
<i>Province</i>		
Isfahan	1202	37.4
Tehran	748	23.3
Khoozestan	114	3.6
Fars	110	3.4
Khorasan-Razavi	104	3.2
Alborz	89	2.8
Others	843	26.3
<i>Living condition</i>		
Alone	144	4.5
With partner	431	13.4
With partner and child(ren)	1176	36.6
With parent(s)	1309	40.8
In a shared flat	37	1.2
In a residential institute	35	1.1
Other	26	0.8
<i>Number of child(ren)</i>		

None	1751	54.6
1	538	16.8
2	677	21.1
3	188	5.9
≥4	55	1.7
<i>Religiosity</i>		
Religious	1736	54.1
Not religious	1474	45.9
<i>Highest level of education</i>		
No official education	26	0.8
Primary education	90	2.8
Highschool education / college	700	21.8
Bachelor	1013	31.6
Master	769	24.0
Doctorate	612	19.1
<i>Occupational status</i>		
Highschool / college student	121	3.7
University student	739	23.0
Working	1566	48.8
Housekeeper	401	12.5
Seeking a job	231	7.2
Retired or disabled	152	4.7
<i>Medical conditions history</i>		
None	2606	81.2
Cardiovascular disease	169	5.3
Respiratory disease	245	7.6
Hepatorenal disease	158	5.0
Immunodeficiency / immunosuppression	94	3.0
Diabetes	65	2.0
Cancer	27	0.8
<i>Prior psychiatric disorder history</i>		
None	2193	68.3
Depression	646	20.1
Schizophrenia	6	0.2

Post-traumatic stress disorder	154	4.8
Anxiety disorder	523	16.3
Obsessive compulsive disorder	263	8.2
Other	66	2.0
<i>COVID-19 test</i>		
Not tested and healthy	2786	86.8
Not tested with flu like symptoms	195	6.1
Tested negative	175	5.5
Tested positive	17	0.5
Tested positive and recovered	37	1.2
<i>Quarantine and isolation</i>		
Self-isolation (because of suspicious symptoms or positive test)	312	9.7
Self-quarantine (because of contact with a known/suspicious case of COVID-19 disease)	329	10.2
<i>Staying at home due to confinement</i>		
Voluntarily abstain from going out of house.	2028	63.2
Used to abstain from going out of house but back to work after lockdown lift	800	24.9
Never stayed at home even during confinement	382	11.9
<i>Encounter with COVID-19</i>		
Know someone with COVID-19 disease	2210	68.8
Know someone who died due to COVID-19	1469	45.8

Table 2: Stress levels change in relation to other factors during pandemic ($|r| \geq 0.1$)

<i>Rank</i>	<i>Variable</i>	<i>N</i>	<i>r</i>	<i>P value</i>
<i>Fear of COVID-19 disease</i>				
1	Fear of contracting COVID-19 disease	3210	0.16	1.86E-20
2	Fear of death due to COVID-19 disease	3210	0.15	2.81E-18
3	Fear of losing someone close due to COVID-19 disease	3210	0.15	7.05E-18
4	Fear that someone close contract COVID-19 disease	3210	0.12	4.52E-12
<i>Burdens due to confinement</i>				
1	Burden of childcare	339	0.21	6.86E-05
2	Burden due to thinking about future	3210	0.20	5.47E-30
3	Burden due to living alone in confinement situation	144	0.19	2.01E-02
4	Burden due to restrictions in personal freedom	3210	0.17	3.96E-23
5	Burden due to the changes in working situation	3210	0.15	2.28E-18
6	Burden due to limitations in private life	3210	0.14	2.86E-16
7	Increase in conflicts at home	3066	0.12	7.15E-12
8	Burden due to restrictions in cultural activities	3210	0.12	5.70E-11
9	Burden due to financial consequences of confinement	3210	0.11	1.53E-09
10	Burden due to limitations in spending time with colleagues in professional life	3210	0.11	1.85E-09
11	Burden to changes in education system	3210	0.10	3.54E-09
<i>Relief and confidence</i>				
1	Feeling relieved in the actual situation	3210	-0.24	5.05E-43
2	Confidence of surviving the pandemic without problem	3210	-0.16	1.39E-19
3	Enjoying more family time due to confinement	3210	-0.11	7.04E-10
<i>Changeable behaviors during pandemic</i>				
1	Frequency of checking information about COVID-19	3210	0.10	1.18E-08
2	Change in regularity of meals	3210	0.10	1.61E-08

Table 3: Depression score change in relation to other factors during pandemic ($|r| \geq 0.1$)

<i>Rank</i>	<i>Variable</i>	<i>N</i>	<i>r</i>	<i>P value</i>
<i>Socio demographic factors</i>				
1	Previous psychiatric disorder/disease	3210	0.13	2.03E-14
2	Age	3210	-0.10	5.80E-08
<i>Fear of COVID-19 disease</i>				
1	Fear of death due to COVID-19 disease	3210	0.21	1.21E-32
2	Fear of contracting COVID-19 disease	3210	0.21	6.45E-32
3	Fear that someone close contract COVID-19 disease	3210	0.19	1.01E-26
4	Fear of losing someone close due to COVID-19 disease	3210	0.18	1.49E-25
<i>Burdens due to confinement</i>				
1	Burden due to living alone in confinement situation	144	0.31	1.49E-04
2	Burden of childcare	339	0.30	1.57E-08
3	Burden due to thinking about future	3210	0.28	3.38E-58
4	Burden due to limitations in private life	3210	0.25	3.85E-45
5	Burden due to restrictions in personal freedom	3210	0.23	8.27E-41
6	Burden due to limitations in spending time with colleagues in professional life	3210	0.21	4.81E-34
7	Increase in conflicts at home	3066	0.21	8.02E-32
8	Burden due to changes in education system	3210	0.21	6.83E-33
9	Burden due to the changes in working situation	3210	0.20	2.57E-31
10	Burden due to restrictions in cultural activities	3210	0.19	2.64E-27
11	Being overwhelmed by the switch to digital media/classes/teaching	3210	0.16	4.66E-20
12	Increase in domestic violence exposure	3210	0.14	1.59E-15
13	Burden due to financial consequences of confinement	3210	0.13	8.43E-14
14	Burden of paying attention to 2-meter safety distance	3210	0.12	2.85E-11
15	Fear of famine	3210	0.11	9.11E-10
<i>Relief and confidence</i>				
1	Feeling relieved in the actual situation	3210	-0.35	8.08E-95
2	Confidence of surviving the pandemic without problem	3210	-0.19	5.46E-27
3	Enjoying more family time due to confinement	3210	-0.20	7.02E-30
<i>Changeable behaviors during pandemic</i>				
1	Change in regularity of meals	3210	0.27	8.93E-56

2	Change in sleep schedule	3210	0.23	1.87E-38
3	Consumption of tranquilizers/sleeping pills	500	0.22	1.22E-06
4	Food consumption	3174	0.19	1.98E-44
5	Frequency of checking information about COVID-19	3210	0.14	1.56E-16
6	Increase in mobile phone / computer / telephone usage to maintain social contact	3210	0.14	9.56E-16

Table 4: Logistic regression for vulnerable categories.

Variable	Reference category	OR [CI] ¹
Occupational status (Working-Affected ²)	Working- Not affected ³	1.4 [0.9;2.1]
Occupational status (Job seeking)	Working- Not affected	2.6 [1.8;3.9] *
Occupational status (Student)	Working- Not affected	2.1 [1.6;2.7] *
Occupational status (Retired/Disabled)	Working- Not affected	0.9 [0.4;1.6]
Occupational status (House keeper)	Working- Not affected	1.7[1.2;2.4] *
Prior psychiatric disorders history (Yes)	No	3.2 [2.6;4] *

1.Odds ratio and 95% confidence intervals obtained from logit regression model comparing ‘resilient’ participants to others.

2. Participants who worked in a sector which were affected by shorter working time or closure due to limitations.

3. Participants whose work was not affected by limitations.

* effect size (Cohen’s d ($\log(OR) * \sqrt{3/\pi}$) > 0.2

Table 5: Logistic regression for resilient category

Variable	Reference category	OR [CI] ¹
Gender (Male)	Female	1.4 [1.1;1.6]
Age (14-24)	35-44	0.7 [0.5;0.9] *
Age (25-34)	35-44	1.1 [0.8;1.3]
Age (45-54)	35-44	1.5 [1.1;1.9]
Age (≥ 55)	35-44	2.9 [1.8;4.6] *
Religiosity (religious)	Not religious	1.5 [1.3;1.8] *
Have child(ren) (Yes)	No child(ren)	1.1 [0.9;1.4]
Occupational status (Working-Affected ²)	Working- Not affected ³	0.9 [0.7;1.2]
Occupational status (Job seeking)	Working- Not affected	0.5 [0.3;0.7] *
Occupational status (Student)	Working- Not affected	0.9 [0.7;1.2]
Occupational status (Retired/Disabled)	Working- Not affected	0.9 [0.7;1.2]
Occupational status (House keeper)	Working- Not affected	1.7[1.2;2.4] *
Psychiatric disorder history (Yes)	No	0.3 [0.2;0.3] *

1. Odds ratio and 95% confidence intervals obtained from logit regression model comparing ‘resilient’ participants to others.

2. Participants who worked in a sector which were affected by shorter working time or closure due to limitations.

3. Participants whose work was not affected by limitations.

* effect size (Cohen’s d ($\log(OR) * \sqrt{3/\pi}$) > 0.2

References

1. WHO announces COVID-19 outbreak a pandemic <https://www.who.int/dg/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020>.
2. Holmes EA, O'Connor RC, Perry VH, Tracey I, Wessely S, Arseneault L, Ballard C, Christensen H, Cohen Silver R, Everall I, Ford T, John A, Kabir T, King K, Madan I, Michie S, Przybylski AK, Shafran R, Sweeney A, Worthman CM, Yardley L, Cowan K, Cope C, Hotopf M, Bullmore E (2020) Multidisciplinary research priorities for the COVID-19 pandemic: a call for action for mental health science. *Lancet Psychiatry* 7 (6):547-560. doi:10.1016/S2215-0366(20)30168-1
3. Luo M, Guo L, Yu M, Jiang W, Wang H (2020) The psychological and mental impact of coronavirus disease 2019 (COVID-19) on medical staff and general public - A systematic review and meta-analysis. *Psychiatry Res* 291:113190. doi:10.1016/j.psychres.2020.113190
4. COVID-19 situation report, Islamic Republic of Iran. <https://covid19.who.int/region/emro/country/ir>.
5. Wong LP, Alias H, Danaee M, Ziaee M, Adebí F, Ziaee A, Mohajer S, HajiAliBeigloo R, Nia MN, Jamei F, Mazlom SR (2020) Uncovering psychobehavioral implications of SARS-CoV-2 infection in Iran. *Transbound Emerg Dis*. doi:10.1111/tbed.13662
6. Lau JT, Yang X, Tsui HY, Pang E, Wing YK (2006) Positive mental health-related impacts of the SARS epidemic on the general public in Hong Kong and their associations with other negative impacts. *J Infect* 53 (2):114-124. doi:10.1016/j.jinf.2005.10.019
7. de Quervain D, Aerni A, Amini E, Bentz D, Coyne D, Gerhards C, Fehlmann B, Freytag V, Papassotiropoulos A, Schickel N (2020) The Swiss Corona Stress Study.
8. Kroenke K, Spitzer RL (2002) The PHQ-9: a new depression diagnostic and severity measure. *Psychiatric annals* 32 (9):509-515
9. Dadfar M, Kalibatseva Z, Lester D (2018) Reliability and validity of the Farsi version of the Patient Health Questionnaire-9 (PHQ-9) with Iranian psychiatric outpatients. *Trends Psychiatry Psychother* 40 (2):144-151. doi:10.1590/2237-6089-2017-0116
10. Findings of the 2016 National Population and Housing Census. (2016) Statistical Center of Iran. <https://www.amar.org.ir/english/Population-and-Housing-Censuses>.
11. Vindegaard N, Benros ME (2020) COVID-19 pandemic and mental health consequences: Systematic review of the current evidence. *Brain Behav Immun*. doi:10.1016/j.bbi.2020.05.048
12. Maarefvand M, Hosseinzadeh S, Farmani O, Safarabadi Farahani A, Khubchandani J (2020) Coronavirus Outbreak and Stress in Iranians. *Int J Environ Res Public Health* 17 (12). doi:10.3390/ijerph17124441
13. Salari N, Hosseini-Far A, Jalali R, Vaisi-Raygani A, Rasoulpoor S, Mohammadi M, Rasoulpoor S, Khaledi-Paveh B (2020) Prevalence of stress, anxiety, depression among the general population during the COVID-19 pandemic: a systematic review and meta-analysis. *Global Health* 16 (1):57. doi:10.1186/s12992-020-00589-w
14. Nicola Cantore FH, Alejandro Lavopa, Keno Haverkamp, Andrea Laplane, Niki Rodousakis (2020) Coronavirus: the economic impact – 10 July 2020. <https://www.unido.org/stories/coronavirus-economic-impact-10-july-2020>.
15. Greco V, Roger D (2003) Uncertainty, stress, and health. *Personality and Individual differences* 34 (6):1057-1068
16. Cao W, Fang Z, Hou G, Han M, Xu X, Dong J, Zheng J (2020) The psychological impact of the COVID-19 epidemic on college students in China. *Psychiatry Res* 287:112934. doi:10.1016/j.psychres.2020.112934
17. Burcusa SL, Iacono WG (2007) Risk for recurrence in depression. *Clin Psychol Rev* 27 (8):959-985. doi:10.1016/j.cpr.2007.02.005
18. Pfefferbaum B, North CS (2020) Mental Health and the Covid-19 Pandemic. *New England Journal of Medicine* 383 (6):510-512. doi:10.1056/NEJMp2008017

19. Ozdin S, Bayrak Ozdin S (2020) Levels and predictors of anxiety, depression and health anxiety during COVID-19 pandemic in Turkish society: The importance of gender. *Int J Soc Psychiatry* 66 (5):504-511. doi:10.1177/0020764020927051
20. Braam AW, Koenig HG (2019) Religion, spirituality and depression in prospective studies: A systematic review. *J Affect Disord* 257:428-438. doi:10.1016/j.jad.2019.06.063
21. Forouhari S, Hosseini Teshnizi S, Ehrampoush MH, Mazloomi Mahmoodabad SS, Fallahzadeh H, Tabei SZ, Nami M, Mirzaei M, Namavar Jahromi B, Hosseini Teshnizi SM, Ghani Dehkordi J, Kazemitabae M (2019) Relationship between Religious Orientation, Anxiety, and Depression among College Students: A Systematic Review and Meta-Analysis. *Iran J Public Health* 48 (1):43-52
22. Rodriguez-Llanes JM, Vos F, Guha-Sapir D (2013) Measuring psychological resilience to disasters: are evidence-based indicators an achievable goal? *Environ Health* 12:115. doi:10.1186/1476-069X-12-115
23. Coughlin SS (1990) Recall bias in epidemiologic studies. *J Clin Epidemiol* 43 (1):87-91. doi:10.1016/0895-4356(90)90060-3