Psychology Research and Behavior Management

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ORIGINAL RESEARCH

The Psychological Impact of COVID-19 on Residents of Saudi Arabia

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Purpose: This study aimed to determine the stress levels and identify various factors responsible for causing high-stress scores during the COVID-19 pandemic in the Saudi population.

Patients and Methods: This cross-sectional study was conducted at Imam Abdulrahman Bin Faisal University, Dammam, from June 2020 until December 2020 on 4052 respondents from the Eastern province of Saudi Arabia. An online survey was used to collect information about various stress factors. The psychological impact of COVID-19 was measured by using the COVID-19 impact event scale (COVID-19 IES), whereas general stress levels were assessed by K10 Kessler Psychological Distress Scale (K10).

Results: The psychological impact of the COVID-19 outbreak revealed that 35.4% of participants suffered from moderate or severe psychological impact (score>33); 19.7% had a mild psychological impact (scores24–32), whereas 44.9% reported minimal psychological impact (score <23). The factors significantly associated with higher stress scores and COVID-19 IES included male gender, low monthly income, having a private business, living in apartments/residential complexes, poor general health status, visit hospital/doctor in the past three months, presence of chronic disease, direct/indirect contact with someone diagnosed with/suspected to have COVID-19, contact with surfaces/tools infected with COVID-19, getting screened or quarantined for COVID-19, follow-up of the latest news about COVID-19 and knowledge of a greater number of people infected and died with COVID-19 ($p < 0.05$). In contrast, being an elementary school student, having 4–10 children, observing various protective measures, and staying home for 4–12 hours were associated with lower COVID-19 IES ($p < 0.05$).

Conclusion: During the initial six months of the COVID-19 outbreak in Saudi Arabia, 35.4% participants suffered from moderate to the severe psychological impact. This study identified various factors responsible for high COVID-19 IES and K10 stress scores. These findings can help formulate psychological interventions for improving the stress scales in vulnerable groups during the COVID-19 pandemic.

Keywords: COVID-19, stress, psychological impact, Saudi Arabia

Introduction

In December 2019, a cluster of pneumonia cases with a new virus emerged in Wuhan, China. [1] The virus started to propagate gradually through other countries and shortly constituted a worldwide health concern. On 11th February 2020, the novel virus was named of COVID-19 by the WHO, and on 13th March 2020 was declared a pandemic. [1] Locally, the novel virus's first case was announced in Saudi Arabia on the 2nd of March 2020. [2] The number of confirmed cases started to grow exponentially and affect Saudi residents' daily lives. [3]

The Saudi government took several actions to limit the spread of infection by encouraging people to stay at home and following preventative measures.[4] On March 8th, the government introduced online teaching to all students to limit direct human-to-human interactions. In addition, numerous activities including meetings, traveling, and gatherings were postponed throughout the country.[5–7] On March 23, a curfew was applied to all cities in Saudi Arabia between 7 p.m.

Received: 3 February 2022
Accepted: 29 April 2022
Published: 13 May 2022

to 6 a.m. Moreover, the curfew was extended to 24 hours on April 2nd in five cities and four governorates (the cities of Riyadh, Dammam, Tabuk, Dhahran, and Alhafoof and the governorates of Jeddah, Taif, Qatif, and AlKhobar) and was modified to start at 3 p.m. on the rest of the cities, the curfew was fully lifted on June 21, 2020, while schools and universities continued the online teaching.[5–8]

The worldwide strict preventative regulations affected the psychological state of citizens of all countries and stress has been reported to be increased. Stress can be defined as the perception of a threat that results in feelings of discomfort, tense emotions, and difficulty in coping.[9] A study conducted in Saudi Arabia during the early months of the pandemic demonstrated high levels of stress and anxiety. The majority of respondents stayed at home for 20–24h to avoid getting infected and were concerned about their family members contracting the infection.[4] Review articles by Xiong J also concluded a strong relationship between the COVID-19 pandemic and high levels of psychological stress.[10] Moreover, a study in the United States demonstrated other factors causing stress, including the news about the severity of how contagious the virus is, the uncertainty of the quarantine period, and changes in the social and personal care routines.[11]

On the other hand, some studies suggested that the levels of stress during the pandemic were reduced. Personal control using positive coping strategies was adapted. Acceptance, humor, and planning strategies were used.[12] In addition, quarantine allowed people to get enormous support from their families and friends by sharing the same concerns. People had more time to rest and relax to preserve their mental health.[13] Moreover, studies have shown that living with parents in urban areas with a stable income was a protective factor against anxiety, depression, and stress.[14]

Despite the available data on COVID-19, certain aspects of this global pandemic got more attention than others. With the emergence of a new infection, more attention is directed towards uncovering the pathogenesis of this organism, mode of transmission, and possible treatment modalities rather than studying the mental health ramifications.[15,16] However, studies have been conducted on the mental health and psychological impact of COVID-19, but most of them have small sample sizes compared to ours.[17,18]

To conclude, the effect of the pandemic on the psychological state is not yet apparent, and information about the Saudi residents is insufficient. The existing Saudi studies had a small sample size and were conducted on the general population ignoring certain group-to-group variations.[4] So, this study was designed to determine the relationship between COVID-19, psychological stress, and various factors, focusing on multiple groups and targeting a considerable sample size.

To our knowledge, to date, this study recruited the "largest sample size" to identify stress factors and COVID-19 IES in the Saudi population.

Patients and Methods

Settings and subjects: This cross-sectional study was conducted at Imam Abdulrahman Bin Faisal University (IAU), Dammam, KSA, from June 2020 until December 2020. The study was ethically approved by DSR, IAU, ethical approval number IRB-UGS-2020-01-320. The study complies with the Declaration of Helsinki. The calculated sample size was 4000. The sample size was calculated using open-source epidemiologic statistics for public health tools software. This calculation was based on the estimated prevalence of psychological stress during COVID-19 pandemic and a target adult population of 1160 in a Saudi survey with: Proportion (psychological stress during pandemic) 28%; Precision (d) 5%; Confidence level 95%.[19]

The snowball sampling technique was used to recruit the participants. The Saudi government recommended that people isolate themselves at home and minimize their social interaction, the study respondents were invited electronically to respond to the survey. This online survey was translated into Arabic and was distributed to the students of IAU and the general Saudi population. Inclusion criteria were the Saudi nationals who can read, understand and fill the questionnaire, whereas the subjects under the age of 10 years were excluded from the study. Data collection was done in one month (1st September–1st October 2020), and willing participants filled this

survey based on their experiences in the last 6 months (from March 2020 –to September 2020, which included the period of curfew, lockdowns, work from home and online line teaching for students). The online survey also included a portion for the informed consent of the participants, which all the study participants signed. For the children (aged 10–16 years), informed consent was taken from their parents/guardians and the questionnaire was filled out under the guidance of the parents/guardians.

Survey Development

The three main tools used in the survey were:

1. K10 Kessler Psychological Distress Scale (K10).
2. "Covid-19 impact event scale" (Covid-19 IES).
3. Structured self-administered questionnaire (SSAQ).

Structured self-administered questionnaire (SSAQ).

SSAQ was developed by the authors, based on three previous surveys on the "psychological impacts of COVID-19 Pandemic on the general population."[4,10,12] These surveys were reviewed and updated by adding and removing some questions. The questionnaire was validated by three experts in medical education, and tested by pilot-testing and reliability analysis. The reliability and validity of the questionnaire (excluding the demographic section) were tested by Cronbach's alpha and were found to be 0.811.

The SSAQ included various questions that covered six major areas including (1) demographic details and general characteristics of study participants (2) general health status (3) Physical symptoms and contact history related to the COVID-19 pandemic (4) fears/concerns related to covid-19 (5) knowledge about COVID-19 (6) precautionary measures against COVID-19.(Appendix 1)

The psychological impact of COVID-19 was measured by using the COVID-19 impact event scale (COVID-19IES), whereas general stress level was assessed by K10 Kessler Psychological Distress Scale (K10).

K10 Kessler Psychological Distress Scale (K10)

It is a 10-item questionnaire intended to find a global measure of distress based on anxiety and depressive symptoms that a person has experienced in the last month.[20] Numbers are assigned to 10 response items, which are added to compile a total score. The score range is from 0 to 50. The subjects are then categorized as having mild, moderate, and severe stress, as below:

<10 =no stress
11–18= mild stress
19–26 = moderate stress
≥27= severe stress

"COVID-19 Impact Event Scale" (COVID-19 IES)

This psychological impact specific to COVID −19 was measured by the "COVID-19 impact event scale" (COVID-19 IES).[21] It is a self-administered questionnaire that has been validated in the Chinese population to find out the psychological impact of exposure to the COVID-19 pandemic. This 22-item questionnaire comprises three subscales that aim to measure the mean avoidance, intrusion, and hyperarousal. The subscores are added to compile a total score, based on which the subjects are categorized as having a mild, moderate, and severe psychological impact, as below:

0–23= normal
24–32= mild psychological impact
33–36= moderate psychological impact
>37 = severe psychological impact
(Higher the score, greater the psychological impact).

Statistical Analysis

SPSS version 20 (IBM Corp, Armonk, USA) was used for statistical analysis. Frequencies of all variables were calculated. The linear regression method was used to find univariate associations of sociodemographic variables, general health status, contact history, fear against covid-19, knowledge, and precautions of Covid 19, with the K-10 scores as well as the Covid-19 impact event scale. K-10 scores and covid-19 scores were considered dependent variables, whereas all remaining variables were considered independent variables. For all tests, p less than 0.05 was considered significant.

Results

The response rate was 65%, as 4052 out of 7000 participants completed the questionnaire. The psychological impact of the COVID-19 outbreak, using the IES-R scale, revealed a sample mean score of 25.73 ± 15.30 (Mean ±SD). Of all respondents, 1819 (44.9%) reported minimal psychological impact (score<23), 799 (19.7%) had mild psychological impact (scores24–32) whereas 1434 (35.4%) reported moderate or severe psychological impact (score > 33).

The sample mean scores for the K10 scale were 19.44 ± 15.25 (Mean±SD). For the stress subscale (k-10 scores), 1483 of the participants (36.6%) were considered to have a normal score (score: 0–10), 710 (17.5%) suffered from mild stress (score: 11–18), 608 (15%) suffered from moderate stress (score: 19–26) whereas 1251 (30.9%) were considered to be suffering from severe and extremely severe stress (score: 27–42).

Table 1 shows the association between demographic variables and (the COVID-19) impact of the event as well as stress during the epidemic. Male gender, low monthly income, and having a private business were associated with high-stress scores. All age groups were significantly associated with higher K10 and Covid-19 impact scores. Being a student was associated with low-stress levels. The students of elementary school reported the lowest stress levels. 46% of the students mentioned that they enjoy online teaching and 80% enjoyed their home isolation period with their families. Having 1–3 children was associated with significantly higher COVID-19 impact and having 4–10 children with lower impact. Living in villas was also associated with lower covid-19 scores compared to living in apartments and residential complexes.

Table 2 highlights the association between general health status and (COVID-19) impact of the event as well as stress during the epidemic. The majority of study participants reported their physical health status as “Very good” (42.7%) and were free from chronic illness (86.5%). “Poor general health status” and “visit to hospital/doctor in past three months” were associated with significantly higher scores on the K10 and COVID-19 impact scales. “Presence” of chronic disease” was also related to higher scores in COVID-19 impact.

The majority of study participants had no history of direct/indirect contact with COVID-19 (52.1%) or quarantine (81.5%) Table 3. 17.3% of participants had relatives diagnosed with COVID-19, and 45% of the study participants got screened for covid-19. Direct/indirect contact with someone diagnosed with/suspected of having COVID-19 raised stress levels. Moreover, contact with surfaces/tools infected with COVID-19 was also associated with higher k10 scores only. Getting screened for COVID-19, and visiting a hospital in the last six months were also associated with high-stress scores. 18% of our study participants had to do quarantine, either being screened positive or due to a positive contact history also had high-stress scores and COVID-19 impact scales.

Table 4, explores the association between fears against COVID-19 and stress during the pandemic. Regarding Corona, the biggest fear of most of the participants was that Covid-19 can affect their parents.

Table 5, shows the association between Knowledge of COVID-19 and (the COVID-19) impact of the event as well as stress during the epidemic. 90.8% of study participants knew the correct route of transmission of COVID-19. Having less confidence in diagnostic methods of covid-19 and the amount of information available about COVID-19 was associated with higher stress scores. Knowledge of the greater number of people infected with COVID-19 and a greater number of deaths was associated with higher K10 and Covid impact scores. Follow-up of the latest news about Covid vaccines and medication was associated with a higher impact.

Table 1 Association Between Demographic Variables and (COVID-19) Impact of Event as Well as Stress During the Epidemic

Variables	N (%)	K-10 Scale			COVID-19 Scale		
		R^2	Adjusted R^2	Beta (95% CI)	R^2	Adjusted R^2	Beta (95% CI)
Gender							
Male	1086 (26.8)	0.033	0.033	0.18** (5.2–7.29)	0.023	0.022	0.15** (4.15–6.25)
Female	2966 (73.2)			Reference			Reference
Age							
Less than 18 years	361 (8.9)			0.31** (12.4–20.7)			0.20** (6.6–14.9)
18–30	2113 (52.1)			0.48** (10.8–18.6)			0.24** (3.4–11.3)
31–40	736 (18.2)	0.04	0.04	0.35** (9.9–17.9)	0.02	0.02	0.27** (6.7–14.8)
41–50	527 (13)			0.23** (6.5–14.6)			0.20** (5.1–13.3)
51–60	257 (6.3)			0.92** (1.5–10.0)			0.08* (0.5–9.2)
Older than 60	58 (1.4)			Reference			Reference
Marital status							
Single	1996 (49.3)			0.19 (0.07–11.4)			−0.15 (−10.3–1.2)
Married	1988 (49.1)	0.007	0.007	0.105 (−2.5–8.9)	0.002	0.001	−0.11 (−9.06–2.3)
Divorced	40 (1.0)			0.032 (−2.4–12.2)			−0.02 (−10.2–4.6)
Widowed	28 (0.7)			Reference			Reference
Monthly Income							
Less than 5000 SR	2134 (52.7)			0.095** (0.87–4.96)			0.14** (2.35–6.45)
5000–10,000 SR	782 (19.3)			0.05 (−0.17–4.25)			0.12** (2.49–6.93)
11,000–15,000 SR	502 (12.4)	0.008	0.007	−0.005 (−2.56–2.14)	0.007	0.006	0.11** (2.75–7.47)
16,000–20,000 SR	290 (7.2)			−0.02 (−3.58–1.64)			0.03 (−1.009–4.23)
21,000–25,000 SR	108 (2.7)			0.01 (−2.35–4.57)			0.04 (0.711–7.66)
More than 25,000 SR	236 (5.8)			Reference			Reference
Employment status.							
Student.	1878 (46.3)			0.008 (−1.05–1.5)			−0.12** (−4.9-(−2.3)
Retired.	195 (4.8)			−0.14** (−12.5-(−7.7)			−0.09** (−9.1-(−4.3)
Private business.	164 (4.0)	0.024	0.023	−0.02 (−4.15–0.96)	0.012	0.011	0.004 (−2.2–2.9)
Employee.	1091 (26.9)			−0.08** (−4.05-(−1.2)			−0.08** (−4.1-(−1.2)
I do not work	724 (17.9)			Reference			Reference
Educational level:							
Elementary school	14 (0.3)	0.005	0.003	−0.04* (−20.6-(−1.6))	0.006	0.005	0.004 (−8.4–10.7)
Middle school	131 (3.2)			−0.03 (−8.4–3.2)			0.05 (−1.6–10.1)
High school	1047 (25.8)			−0.08 (−8.2–2.4)			0.09 (−2.2–8.4)
Diploma	446 (11)			−0.10 (−10.5–0.3)			0.05 (−2.97–7.8)
Bachelor	2295 (56.6)			−0.14 (−9.6–0.9)			0.03 (−4.2–6.3)
Masters	86 (2.1)			−0.07* (−13.6-(−1.3))			−0.03 (−9.0–3.2)
PhD	33 (0.8)			Reference			Reference
During pandemic, did you enjoy your home isolation period with your family?							
Yes	3271 (80.7)	0.076	0.076	−0.28** (−11.82-(−9.5)	0.30	0.30	−0.17** (−7.93-(−5.57)
No	781 (19.3)			Reference			Reference

(*Continued*)

Table 1 (Continued).

Variables	N (%)	K-10 Scale			COVID-19 Scale		
		R^2	Adjusted R^2	Beta (95% CI)	R^2	Adjusted R^2	Beta (95% CI)
Do you enjoy your online classes/ work at home?							
Yes	1893 (46.7)	0.035	0.035	−0.19** (−6.67-(−4.82)	0.013	0.013	−0.11** (−4.43-(−2.55)
No	2159 (53.3)			Reference			Reference
Travelling during past 3 months							
Within the city only	3136 (77.4)			0.01 (−3.3−3.99)			−0.04 (−5.15−2.15)
Out of the city within the kingdom	847 (20.8)	0.000	0.000	0.02 (−2.9−4.5)	0.001	0.001	−0.07 (−6.4−1.15)
Out of Kingdom	69 (1.7)			Reference			Reference
Number of Children							
1–3	1030 (25.4)			−0.03 (−2.1−0.09)			0.05** (0.72−2.93)
4–6	607 (15.0)	0.017	0.016	−0.11** (−6.1−3.4)	0.004	0.004	0.02 (−0.45−2.3)
7–10	69 (1.7)			−0.08** (−12.8- (−5.5)			−0.04* (−8.1-(−0.8)
More than 10	7 (0.2)			−0.03* (−23.5-(−1.07)			0.01 (−8.5−14.1)
None	2339 (57.7)			Reference			Reference
Household Size							
One person	54 (1.3)			−0.03 (−7.66−0.58)			−0.012 (−5.77−2.50)
Two	232 (5.7)	0.001	0.000	−0.009 (−2.63−1.52)	0.000	0.000	−0.007 (−2.5−1.63)
3–5 persons	1785 (44.1)			−0.02 (−1.69−0.26)			0.008 (−0.75−1.21)
6 and more persons	1981 (48.9)			Reference			Reference
In-Housing							
Apartments	1062 (26.2)			0.03 (−1.23−3.06)			0.006 (−1.94−2.35)
Single-story house	887 (21.9)	0.004	0.003	0.004 (−2.03−2.3)	0.007	0.006	0.009 (−1.86−2.5)
Villa	1866 (46.1)			−0.04 (−3.3−0.86)			−0.07* (−4.3-(−0.21)
Residential Complex	237 (5.8)			Reference			Reference

Notes: *p value less than 0.05. **p value less than 0.01.

The association between precautionary measures against COVID-19 and (COVID-19) Impact on events and stress is shown in Table 6. Observing various protective measures such as home isolation was associated with low impact. Those who stayed home for 4–12 hours had low-stress scores. Failure to follow any of the precautionary measures against COVID-19 was associated with higher K-10 scores. The belief that necessary precautionary measures were associated with lower K-10 and COVID-19 impact scores.

Discussion

This study aimed to investigate the psychological impact of the COVID-19 outbreak on the general population in Saudi Arabia and its association with multiple factors. In our study, 35.4% of participants suffered from moderate or severe psychological impact (IES >33). Whereas data from other parts of the world showed comparatively high-stress levels in their populations. Passavanti et al examined the psychological impact of Covid −19 in seven different countries and showed that 55.3% of their respondents suffered from moderate to severe stress.[22] In addition, another

Table 2 Association Between General Health Status and (COVID-19) Impact of Event as Well as Stress During the Epidemic. (Already Completed)

Variables	N (%)	K-10 Scale			COVID-19 Scale		
		R^2	Adjusted R^2	Beta (95% CI)	R^2	Adjusted R^2	Beta (95% CI)
Self-evaluation of physical health							
1 Very Poor	21 (0.5)			0.09** (13.17–25.5)			0.07** (8.54–21.3)
2	110 (2.7)			0.20** (15.78–21.3)			0.14** (10.07–15.8)
3	775 (19.1)	0.011	0.011	0.30** (10.45–12.9)	0.068	0.067	0.24** (8.06–10.56)
4	1416 (34.9)			0.21** (5.55–7.57)			0.17**(4.53–6.61)
5 Very Good	1730 (42.7)			Reference			Reference
Presence of Chronic disease							
Yes	545 (13.5)	0.00	0.00	−0.005 (−1.6–1.15)	0.002	0.001	0.04* (0.40–3.16)
No	3507 (86.5)			Reference			Reference
Visited a hospital/ doctor in past 3 months							
Yes	1907 (47.1)	0.017	0.017	0.13** (3.03–4.90)	0.011	0.010	0.103** (2.22–4.10)
No	2145 (52.9)			Reference			Reference

Notes: *p value less than 0.05. **p value less than 0.01.

Mexican study revealed moderate and severe impact scores of 50.3% of their study population.[23] Comparatively low psychological impact on the Saudi population can be attributed to various factors, including less mortality rate and being confident regarding the governmental actions towards the pandemic.[24] For example, shifting schools and universities to virtual learning, travel suspension, holding-up gatherings, and implementation of digital health applications.[5,6]

Although the psychological impact of COVID-19 was found to be low in the kingdom compared to other countries[4,21,22] the levels are still high compared to the pre-pandemic state.[25] Therefore, we aimed to identify various factors causing elevated stress scores during the COVID-19 pandemic in the Saudi population.

Male sex was associated with high COVID-19 IES. This opposed other studies, where females had a higher impact on the COVID-19 pandemic.[24] The difference might be caused by the financial burden, which males in Saudi society mostly handle.[25,26]

Regarding the employment status, our results showed that being employed or retired was associated with less COVID-19 IES compared to private business employees. As the private sector has been affected the most since the pandemic started. Some private businesses have been affected significantly, such as tourism, airline transportation, and outpatient services.[27] However, those who are retired are already getting pensions, and as per Saudi governmental initiative, most of the employed individuals are being given their regular salary even during the pandemic.[28]

This study revealed that elementary school students had lower stress levels. The government withheld campus education since March 2020, and the classes are being held online for all school and university students. By our findings, a study examining the perception of students toward online education found that 73% of the participants had enjoyed the e-learning method, mainly due to the ability to stay at home longer and spend time with their families (69%), ability to access the online materials at any desired time (69%) and the feasibility to learn at their own pace (64%).[29] On the contrary, another study conducted in Saudi Arabia at the beginning of the pandemic found that students had significantly higher scores of stress, anxiety, and depression 4 Similarly, a study conducted

Table 3 Association Between Physical Symptoms/Contact History in Past 3 Months and (COVID-19) Impact of Event as Well as Stress During the Epidemic

Variables	N (%)	K-10 Scale			COVID-19 Scale		
		R^2	Adjusted R^2	Beta (95% CI)	R^2	Adjusted R^2	Beta (95% CI)
Contact History							
Direct contact with someone diagnosed with COVID-19.	1026 (25.3)			0.13** (3.58–5.84)			0.14** (3.93–6.19)
Indirect contact with someone diagnosed with COVID-19.	625 (15.4)			0.04* (0.39–3.08)			0.07** (1.74–4.44)
Direct contact with someone suspected to have COVID-19.	252 (6.2)	0.017	0.016	0.04* (0.78–4.73)	0.021	0.020	0.05** (1.35–5.30)
Contact with surfaces and tools infected with COVID-19.	37 (9)			0.04* (0.65–10.49)			0.03 (−0.62–9.23)
Nothing happened	2111 (52.1)			Reference			Reference
Did any of your relatives diagnosed with COVID-19?							
Yes	699 (17.3)	0.008	0.007	0.09** (2.29–4.77)	0.009	0.009	0.09** (2.60–5.09)
No	3353 (82.7)			Reference			Reference
Screened for Covid-19							
Yes	1856 (45.8)	0.006	0.006	0.08** (1.42–3.30)	0.001	0.001	0.03 (−0.04–1.85)
No	2196 (54.2)			Reference			Reference
Quarantined due to Covid-19							
Yes	748 (18.5)	0.028	0.028	0.17** (5.40–7.79)	0.02	0.02	0.14** (4.34–6.74)
No	3304 (81.5)			Reference			Reference

Notes: *p value less than 0.05. **p value less than 0.01.

in Serbia found an increase in depression and stress levels in students during the pandemic.[30] This may be explained by the disturbance and uncertainty caused by the pandemic on the flow of training and education. Students also reported the two significant disadvantages of social isolation and the technical issues faced during the e-learning process.[31]

Another interesting finding of this study was that the individuals with one–three children showed high COVID-19 IES compared to those with more than four children. These findings are in consistence with other international studies where families with fewer children had more psychological distress. This may be due to parents' concerns towards their children during the pandemic, such as their chance of being infected by the novel virus or the responsibility of combining both working from home and taking care of the quarantined child.[4,32,33]

We also explored the association between "residential type" and stress. The data indicated that living in villas was associated with lower COVID-19 IES than living in apartments. Some studies found that countries and areas where residents tend to live in large, clustered families (ie, co-residence) or tall buildings generally have more deaths due to COVID-19 infections. In addition, it was found that overcrowding was a major risk factor for increasing COVID-19 infection rates.[34,35].

This study also inquired about the general health status and its association with Covid −19 IES. The participants who rated their physical health status below "very good", those who visited a hospital in the past three months, or those with

Table 4 Association Between Fears Against COVID-19 and (COVID-19) Impact of Event as Well as Stress During the Epidemic

Variables	N (%)	K-10 Scale			COVID-19 Scale		
		R^2	Adjusted R^2	Beta (95% CI)	R^2	Adjusted R^2	Beta (95% CI)
Regarding Corona, your biggest fear is that it can affect:							
You	413 (10.2)			0.01 (−2.24−3.33)			0.06* (0.06−5.64)
Your children	551 (13.6)	0.004	0.003	−0.07 (−5.98-(−0.61)	0.007	0.006	−0.01 (−3.33−2.06)
Your parents	2929 (72.3)			−0.03 (−3.47−1.40)			−0.04 (−3.75−1.12)
Your siblings	159 (3.9)			Reference			Reference
Possibility of your recovery if you were diagnosed with COVID-19?							
1 Very low	36 (0.9)			0.04** (1.95−12.03)			0.05** (2.57−12.68)
2	46 (1.1)			0.09** (9.68−18.63)			0.08** (7.31−16.29)
3	2084 (51.4)	0.012	0.011	0.05** (0.49−2.72)	0.010	0.009	0.06** (0.68−2.92)
4	804 (19.8)			0.05* (0.39−3.16)			0.07** (1.31−4.09)
5 Very high	1082 (26.7)			Reference			Reference
Possibility of you getting infected with COVID-19?							
5 Very high	368 (9.1)			0.25** (11.44−15.32)			0.15** (6.03−9.98)
4	557 (13.7)			0.21** (7.70−11.14)			0.13** (3.96−7.48)
3	1772 (43.7)	0.054	0.053	0.20** (4.68−7.45)	0.021	0.020	0.11** (1.88−4.71)
2	770 (19.0)			0.10** (2.27−5.46)			0.04* (0.07−3.32)
1 Very low	585 (14.4)			Reference			Reference

Notes: *p value less than 0.05. **p value less than 0.01.

a chronic disease had significantly higher scores of K10 and COVID-19 IES than others. Our data is compatible with other studies conducted in China and Saudi Arabia.[4,36,37]

Regarding the contact history, contact with diagnosed or suspected COVID-19 individuals either directly or indirectly was associated with high-stress levels. However, maintaining precautionary measures, including hand hygiene, wearing masks, and social distancing, brought protective effects against the virus and psychological stress.[4,38]

Roughly 18.5% of our study participants had to do quarantine in the past 6 months due to positive tests. It is reported that quarantine raised the stress level in participants, and this was consistent with the reports from various other studies.[39–41] Therefore, these groups should be supported by expanding telepsychiatry, focusing on behavioral therapy and relaxation exercises to lower their stress levels.[4]

Approximately 90.8% of our sample knew the correct mode of transmission of COVID-19, which can be attributed to the availability of information over the internet. A study in the Philippines demonstrated that 98.6% of their sample knew that the transmission is via droplets, and 96.7% believed it can be transmitted through contaminated surfaces.[42,43] In addition, 4.2% of our respondents felt less confident in the available diagnostic methods and this group showed higher levels of stress. Other studies also demonstrated higher DASS scores in individuals who think their doctor could not diagnose COVID-19.[22,44] Similar to our study population, people vigilantly following the news and internet reported higher stress levels. Moreover, a study in Pakistan showed that 72% of the sample think they will feel less stressed if they do not follow the news. It, therefore, suggested spending no more than 3 hours per day checking the news to avoid excessive stress.[44]

Table 5 Association Between Knowledge of COVID-19 and (COVID-19) Impact of Event as Well as Stress During the Epidemic

Variables	N (%)	K-10 Scale			COVID-19 Scale		
		R^2	Adjusted R^2	Beta (95% CI)	R^2	Adjusted R^2	Beta (95% CI)
Knowledge of the route of transmission of COVID-19							
Cough/sneezing/droplets	3681 (90.8)			−0.06** (−5.49-(−1.20)			−0.07 (−3.65−2.62)
Blood	4 (0.1)	0.004	0.003	0.01 (−7.09−23.06)	0.010	0.009	0.005 (−12.5−17.64)
Air	163 (4)			−0.02 (−4.26−2.01)			−0.102** (−7.58-(−3.29)
I do not know	204 (5.0)			Reference			Reference
Confidence level about the diagnostic methods of COVID-19							
1 Very low	171 (4.2)			0.08** (3.77−8.73)			0.06** (2.26−7.24)
2 Low	308 (7.6)	0.013	0.012	0.10** (3.77−7.70)	0.012	0.011	0.09** (3.51−7.45)
3 Moderate	1396 (34.5)			0.10** (1.93−4.48)			0.12** (2.56−5.12)
4 High	1284 (31.7)			0.07** (1.14−3.73)			0.07** (0.97−3.57)
5 Very high	893 (22.0)			Reference			Reference
Satisfactory level on the amount of information available about COVID-19							
1 Very low	175 (4.3)			0.08** (3.41−8.28)			0.07** (2.82−7.71)
2 Low	403 (9.9)			0.09** (2.70−6.21)	0.011	0.010	0.06** (1.12−4.64)
3 Moderate	1286 (31.7)	0.012	0.011	0.10** (2.05−4.56)			0.12** (2.66−5.18)
4 High	1196 (29.5)			0.04* (0.19−2.75)			0.07** (1.09−3.66)
5 Very high	992 (24.5)			Reference			Reference
Are you updated about the number of infected people and deaths because of COVID-19?							
Yes	2419 (59.7)	<0.001	<0.001	−0.01 (−1.34−0.57)	0.001	0.001	0.03 (−0.002−1.92)
No	1633 (40.3)			Reference			Reference
Are you following the latest news about vaccines and medication for COVID-19?							
Yes	2043 (50.4)	0.001	<0.001	−0.03 (−1.72−0.16)	0.001	0.001	0.03* (0.075−1.96)
No	2009 (49.6)			Reference			Reference
Knowledge of the number infected people with COVID-19 in KSA							
Less than 500	717 (17.7)			0.07** (0.79−4.65)			0.06* (0.27−4.14)
Less than 1000	288 (7.1)			0.07** (1.79−6.51)			0.06** (1.20−5.94)
Less than 2000	114 (2.8)	0.005	0.004	0.07** (2.98−9.39)	0.005	0.004	0.07** (3.47−9.90)
More than 2000	2868 (70.7)			0.07** (0.66−4.02)			0.05 (−0.11−3.26)

(*Continued*)

Table 5 (Continued).

Variables	N (%)	K-10 Scale			COVID-19 Scale		
		R^2	Adjusted R^2	Beta (95% CI)	R^2	Adjusted R^2	Beta (95% CI)
Less than100	66 (1.6)			Reference			Reference
Knowledge of the number deaths because of COVID-19 in Saudi Arabia							
Less than 30	329 (8.1)			0.04 (−0.67−5.54)			0.02 (−2.08−4.14)
Less than 60	197 (4.9)	0.002	0.001	0.05* (0.40−7.16)	0.003	0.002	0.07** (1.24−8.02)
Less than 100	242 (6.0)			0.07* (1.02−7.54)			0.03 (−1.22−5.31)
More than 100	3155 (77.9)			0.06 (−0.66−4.71)			0.02 (−1.85−3.53)
Less than 10	129 (3.2)			Reference			Reference

Notes: *p value less than 0.05. **p value less than 0.01.

Knowledge about the number of infected cases daily was associated with increased stress levels among participants. However, it is crucial to keep people updated regarding the number of local cases of infection and recovery. According to a study, people who do not know of the recoveries have higher anxiety levels.[43] It perhaps can aid in adherence to health precautions. Furthermore, getting information from a trusted, authorized source is thought to benefit the psychological state of individuals. In a study, 90% of people thought that news from untrusted sources sparks a panic.[44] Ministry of health has taken Twitter account to release a daily report of infections, recoveries, and mortalities. They have also dedicated a whole section of their website to this matter. In addition, virtual clinics are now established with an option for mental health support.[6,28]

Our findings showed that precautionary measures, especially home isolation have protective psychological effects. Consistent with our findings, the individuals who focused on the benefits of staying at home, seeing it as responsible behavior and a requirement for feeling secure, had less severe psychological issues.[45] In contrast, some studies indicated home isolation may impact on people's social lives by limiting contact with others, leading to an increase in feelings of loneliness and social isolation.[4]

The biggest strength of this study is the large sample size focusing on the general population, thereby ignoring certain group-to-group variations. As with any empirical results, the initial findings from the present study are subject to several limitations. First, data collected from self-reported online surveys cannot directly measure the full psychological impact of the participants compared to professional medical mental health assessments. The second limitation concerns the inability to generalize the study to the whole population, especially among non-social media users and the illiterate.

Conclusion

During the first few months of the COVID-19 pandemic, the psychological impact of the Covid-19 outbreak revealed that 35.4% of participants suffered from moderate or severe psychological impact (score > 33); 19.7% rated mild psychological impact (scores24–32); whereas 44.9% reported minimal psychological impact (score <23).

This study also identified various stress factors responsible for high COVID-19 IES. These findings can help formulate psychological interventions for improving the stress scales in vulnerable groups during this COVID-19 pandemic.

Table 6 Association Between Precautionary Measures Against COVID-19 and (COVID-19) Impact of Event as Well as Stress During the Epidemic

Variables	N (%)	K-10 Scale			COVID-19 Scale		
		R^2	Adjusted R^2	Beta (95% CI)	R^2	Adjusted R^2	Beta (95% CI)
How to protect yourself from COVID-19?							
No need for protection	80 (2.0)			0.002 (−4.9–5.47)			−0.03 (−8.01–2.43)
Home isolation	1636 (40.4)	0.002	0.002	−0.12 (−7.7–0.40)	0.003	0.002	−0.17* (−9.26-(−1.12)
Others	2280 (56.3)			−0.13 (−8.1-(−0.03)			−0.19** (−9.89-(−1.79)
I do not know (ref)	56 (1.4)			Reference			Reference
Are you following any precautionary measures?							
No	75 (1.9)	0.001	0.001	0.03* (0.42–7.38)	< 0.001	< 0.001	0.021 (−1.09–5.89)
Yes	3977 (98.1)			Reference			Reference
To avoid getting infected with Covid-19 virus, the average hours of me staying at home, during the past 3 months:							
Have not stayed at home.	52 (1.3)			−0.01 (−5.14–3.51)			−0.01 (−4.8–3.85)
Up to 4 H/ day	58 (1.4)			0.001 (−3.93–4.30)			-0.01 (−4.84–3.41)
4–8 H/ day	241 (5.9)	0.004	0.003	-0.08** (−7.11-(−2.5)	0.006	0.005	-0.07** (−6.88-(−2.29)
8–12 H/ day	598 (14.8)			-0.04 (−3.29–0.19)			-0.07** (−4.74-(−1.25)
More than 12H/ day Did not go out at all	2524 (62.3) 579 (14.3)			-0.05* (−3.02-(−0.27) Reference			-0.09** (−4.23-(−1.47) Reference
What is your opinion on the statement – "I feel that there is a lot of unnecessary precautions taken against Covid-19":							
1 Extremely opposed	1581 (39.0)			−0.05 (−3.43–0.43)			−0.08* (−4.45-(−0.58)
2	856 (21.1)			−0.01 (−2.52–1.57)			−0.04 (−3.57–0.53)
3	953 (23.5)	0.004	0.003	0.00 (−2.02–2.02)	0.003	0.002	−0.02 (−2.85–1.21)
4	379 (9.4)			0.03 (−0.77–3.92)			−0.01 (−2.69–2.02)
5 Extremely agree	283 (7.0)			Reference			Reference
Do you feel depressed due to social isolation during pandemic?							
Yes	1878 (46.3)	0.18	0.18	0.42** (11.96–13.68)	0.127	0.127	0.36** (10.05–11.82)
No	2174 (53.7)			Reference			Reference

Notes: *p value less than 0.05. **p value less than 0.01.

Data Sharing Statement

Data can be obtained from the corresponding author on request.

Ethics Approval

The study was ethically approved by Deanship of scientific research, IAU, ethical approval number IRB-UGS-2020-01-320.

Consent for Publication

The authors give consent to publish the whole content of the article.

Author Contributions

All the authors have made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis, and interpretation, or in all these areas. All the authors have contributed significantly in the drafting or writing, or substantially revising or critically reviewing the article. All the authors have agreed on the journal to which the article was submitted. All the authors have reviewed and agreed on all versions of the article before submission, during revision, the final version accepted for publication, and any significant changes introduced at the proofing stage. All authors gave final approval of the version to be published. All the authors agree to take responsibility and be accountable for the contents of the article.

Funding

This was non funded research.

Disclosure

The authors report no conflicts of interest in relation to this work.

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