JPAM
JOURNAL OF PURE AND APPLIED MICROBIOLOGY

RESEARCH ARTICLE   **OPEN ACCESS**

Self-efficacy for taking Preventive Measures against COVID-19 among Undergraduate University Students in Saudi Arabia

Awad Mohammed Al-Qahtani[1]* , **Heba A. Ibrahim[2,3], Wafaa T. Elgzar[2,4], Nahid K. Elfeki[5], Mohammed Ashique K. Shaikh[6], Ibrahim Ahmed Shaikh[7] , Salihah Y. Al Mani[8], Marwah A. Alessa[8], Borouj H. Alyami[8], Alanood M. Alwadei[8] and Rawan M. Almuqati[8]**

[1]Department of Family and Community Medicine, College of Medicine, Najran University, Najran, Saudi Arabia.
[2]Department of Maternity and Childhood Nursing, College of Nursing, Najran University, Najran, Saudi Arabia.
[3]Department of Obstetrics and Women's Health Nursing, Benha University, Benha, Egypt.
[4]Department of Obstetrics and Gynecologic Nursing, Damanhour University, Damanhour, Egypt.
[5]Department of Community and Mental Health Nursing, College of Nursing, Najran University, Najran, Saudi Arabia.
[6]Pharmacy Services Division, Najran University Hospital, Najran, Saudi Arabia.
[7]Department of Pharmacology, College of Pharmacy, Najran University, Najran, Saudi Arabia.
[8]Internship Student, College of Medicine, Najran University, Najran, Saudi Arabia.

*Correspondence: awadresearch17@gmail.com; +966 530540450

Abstract

The COVID-19 pandemic has imposed various stresses on individuals and communities. Coping with sudden, tense, demanding situations during an infectious disease outbreak requires self-efficacy. Increasing the public's self-efficacy for preventive and control measures is important in the management of the COVID-19 pandemic. This research was aimed at evaluating the self-efficacy and associated factors of students at a public university in the southwest region of Saudi Arabia during the COVID-19 pandemic. This was a cross-sectional study, and a snowball sampling method was used to recruit participants. Data were collected from the beginning of April to the end of June 2020 using an online questionnaire. A total of 761 students were included in the study. The participants' demographic data were collected, and self-efficacy was analyzed using the General Self-efficacy Scale. The results showed that self-efficacy for dealing with the COVID-19 pandemic was moderate in almost half of the students but was low in approximately 25% of the participants. There were statistically significant associations between self-efficacy regarding the COVID-19 pandemic and gender, college type, marital status, and family income ($p < 0.05$). However, the participants' self-efficacy was not associated with age, residence, or history of chronic illness. In dealing with the COVID-19 pandemic, most students had either moderate or low self-efficacy. Certain demographic variables were positively associated with self-efficacy as perceived by the students. These findings provide data central to the development of self-efficacy initiatives. They may also be useful for the effective implementation of public health preventive behavior programs during the COVID-19 pandemic.

Keywords: COVID-19, University students, Self-efficacy, Saudi Arabia

INTRODUCTION

Coronavirus disease (COVID-19) has led to a global pandemic that started in Wuhan city, China and has affected over 65.8 million people and led to more than 1.5 million deaths worldwide. The disease has presented an unprecedented challenge to public health systems and caused widespread economic and social disruptions. Successful management of this global health crisis requires worldwide collaboration and public responsibility[1,2]. From the beginning of the COVID-19 pandemic, Saudi Arabia took numerous active measures to control the spread of the disease. These measures included travel restrictions, switching students to online learning, quarantines, stopping pilgrimages, suspension of new visa services, and a 24-hour curfew. Despite these measures, the number of positive cases kept increasing, especially after the curfew was partially lifted. Currently, the cumulative number of COVID-19 cases in Saudi Arabia was 361,178[3,4].

According to World Health Organization (WHO), management of COVID-19 depends mainly on preventive and protective measures. Strict infection control measures should be applied during isolation, triage, emergencies, and any suspected patient contact[5]. Application of infection control measures requires adequate knowledge and experience. It also requires high self-efficacy (SE) and low perceived barriers[6]. An increase in SE decreases the barriers to improved preventive practices.

Self-efficacy (SE), which is defined as "a person's judgment of their capability to complete a specific behavior or task," is an important aspect of infection prevention measures. The higher the SE of an individual, the greater their compliance with infection control measures and social distancing during pandemics[7]. A recent Saudi study on health providers' knowledge and perception of MERS-CoV reported a significant relationship between SE and intention to implement infection prevention measures[8]. Another study reported that more educated individuals had higher awareness of infectious disease management, which increased their SE for infection control and social distancing[9]. Moreover, people with higher SE can better manage their emotions and regulate stress. Another study provided evidence of the importance of SE during the COVID 19 pandemic by investigating the impact of psychosocial support for medical staff regarding their sleep during the pandemic[10]. The study found that SE is a vital component of mental health in a time of crisis,

and it can be enhanced through adequate social support during quarantine. An increase in SE improves understanding, reassurance, courage, and control. It also leads to greater self-confidence in pandemic control and a more optimistic view of the situation[11]. Moreover, SE is associated with a positive mental state that may improve sleep quality. Individuals with high SE present reasonably steady emotions during stressful situations. They also might experience fewer nightmares and sleep-related worries and less insomnia[12]. High SE also increases concentration and self-control. This evidence supports the significant impact of SE during COVID-19 management in both hospitals and quarantine centers. One study has suggested that SE helps all community members to overcome the barriers and threats to COVID-19 prevention[10]. The current study aimed to evaluate SE and associated demographic variables during the COVID-19 pandemic among Najran University students.

METHODS
Study design
This was a cross-sectional study of students at Najran University, Najran City. Snowball sampling was used to recruit the study participants. The study was conducted from the beginning of April to the end of June, 2020. A web-based questionnaire was used for the study. The questionnaire was distributed via e-mail and social media applications, such as WhatsApp, Facebook, and Twitter, using an online link. Data confidentiality was guaranteed.

Inclusion criteria
Saudi students with valid e-mail IDs who were active social media users and agreed to participate in the study were included.

Sample size
The Epi Info 7 program was used to calculate sample size; the sample size for frequency in a population size was 16809, corresponding to a 99% confidence level, the anticipated frequency was 50%, and the design effect was 1%. The calculated sample size was 761 students.

Study tools: Two tools were used for data collection.
Tool I was a self-administered questionnaire developed by the researchers after consulting related literature. It was designed to collect demographic information, including gender, age, college type, residence location, marital status, family income, and medical history.

Tool II was the General Self-Efficacy Scale (GSE). It was composed of 10 items ranked on a 4-point Likert scale, from *not at all true* (1 point) to *exactly true* (4 points). The overall score was calculated by summing the responses to all 10 items to generate a score of 10-40, with a greater score representing greater SE[13].

Instrument validity and reliability
After the instrument was developed, it was tested for face, content, and construct validity by a jury of five experts from the fields of nursing and medicine. Instrument reliability was tested using Cronbach's alpha coefficient test ($r = 0.875$).

A pilot study was conducted that included 10% of the participants. The pilot study aimed to ascertain the clarity and validity of the instruments. The data obtained from the pilot study were not included in the results.

Data collection and analysis
Data were collected through a web-based questionnaire and were analysed using SPSS version 23 software. Categorical variables are reported as frequency (n) and percentage (%), and continuous variables are expressed as mean ± standard deviation (SD). Associations between demographic variables and SE were investigated using Fisher's exact test. *P* values less than 0.05 were considered statistically significant.

Ethical statement
The study was reviewed and approved by the Deanship of Scientific Research and the Institutional Review Board of the College of Medicine of Najran University. Formal approval was also obtained from the administration of each college. Students' participation was entirely voluntary and they were informed that they were free to withdraw from the study at any point. Informed consent was obtained from each participant. All data obtained were kept confidential and used for research purposes only.

RESULTS
Demographic profiles of study participants
The demographics of the study participants are presented in Table 1. The mean age of the students was 20.27 ± 4.39 years; 67.5% of the participants were female, and 75.5% resided

Table 1. Participants' demographic variables (n= 761)

Demographic variable	n	%
Residence		
- Urban	574	75.5
- Semi-urban	120	15.8
- Rural	66	8.7
Gender		
- Male	247	32.5
- Female	514	67.5
College		
- Health sciences	301	39.6
- Non-health sciences	460	60.4
Marital status		
- Married	116	15.2
- Single	645	84.8
Monthly family income		
- <5000 SAR	585	76.9
- 5000-10000 SAR	111	14.6
- >10000SAR	65	8.5
History of chronic illness		
- Yes	83	10.9
- No	678	89.1
Age in years (mean ± SD)	20.27±4.39	

in urban areas. More than half (60.4%) of the participants were non-health sciences college students, and 84.8% were single. Slightly more than three-quarters (76.9%) of the participants had family monthly income of less than 5000 SAR. Only 10.9% of the participants had a history of chronic disease.

Table 2 provides details of the students' SE during the period of COVID-19 pandemic. It shows that 44.9% of the participants responded *hardly true* to the statement *I can always solve the difficult problems facing me related to COVID-19*. Moreover, 35.7% of them answered *hardly true* when asked if they could solve most of the problems caused by social distancing, and one-third (33.5%) of the participants *exactly true* when asked if It was easy for them to adhere to the COVID-19 preventive measures.

Fig. 1 shows that 45.9% of the students had moderate SE for dealing with the COVID-19 pandemic, while more than one-fifth (22.9%) of them had low SE for dealing with the pandemic.

Table 2. Students' SE during the period of COVID-19 pandemic (n= 761)

	n	%	n	%	n	%	n	%
I can always solve the difficult problems related to COVID-19 faced by me.	81	10.6	342	44.9	155	20.4	183	24.0
I am confident in my ability to achieve my educational goals during COVID-19 outbreak.	110	14.5	233	30.6	220	28.9	198	26.0
It is easy for me to adhere to the COVID-19 preventive measures.	73	9.6	197	25.9	236	31.0	255	33.5
I am sure I can handle efficiently the unexpected events of COVID-19.	87	11.4	254	33.4	203	26.7	217	28.5
I can manage the emergency situations that arise from the COVID-19.	56	7.4	206	27.1	287	37.7	212	27.9
I can solve most of the problems caused by social distancing if I make the necessary efforts to overcome them.	53	7.0	184	24.2	275	36.1	249	32.7
My abilities help me cope with home quarantine.	69	9.1	217	28.5	259	34.0	216	28.4
When I encounter problems related to home quarantine requirements, I am able to find many alternative solutions.	69	9.1	272	35.7	248	32.6	172	22.6
Usually, when there are crises arising from COVID-19, I can think of suitable and alternative solutions.	130	17.1	218	28.6	230	30.2	183	24.0
Usually, I can overcome problems related to distance education during the spread of the COVID-19.	81	10.6	249	32.7	249	32.7	182	23.9

Table 3 shows statistically significant association ($p < 0.05$) between the participants' SE for the COVID-19 pandemic and gender, college type, marital status, and family income. On the other hand, there was no relationship between the participants' SE and age, residence location, and history of chronic illness.

DISCUSSION

The COVID-19 epidemic is a global health crisis that has greatly impacted communities and individuals worldwide, destabilized the world economy, and hit the most vulnerable the hardest. It has negatively affected physical, social, and mental health. Many people have suffered the loss of loved ones, leading to severe anxiety and despair.

Self-efficacy (SE) is the cornerstone of most of public health education programs. Effective management of the COVID-19 pandemic requires consistent lifestyle modifications, social distancing, and specific hygienic behaviors. Thus, if SE is increased, pandemic control will be more successful. This is the first study conducted in Saudi Arabia aimed at evaluating the SE of Najran University students during the COVID-19 pandemic, as well its association with demographics. It was aimed at providing important information regarding SE, which will be useful in designing health education programs for Saudi University students.

Self-efficacy is a useful measure of confidence in one's ability to take action and successfully implement preventive health

Fig. 1. Total SE scores of Najran University students during the period of COVID-19 pandemic (n= 761)

behaviors[14]. The results of the present study show that nearly half of the students had moderate SE for dealing with the COVID-19 outbreak. However, less than one-third of the participants had high SE for dealing with the pandemic. Slightly more than one-fifth of the students had low SE for managing the pandemic. These results agree with the findings of Nasir et al. (2020)[15] who examined the perception of COVID-19 among a Sudanese population and reported that one-third of the participants had low SE for following preventive measures, such as hand hygiene and social distancing. In a cross-sectional study on the relationship between SE and demographic characteristics among Iranian medical students, Seyedi-Andi et al. (2019)[16] reported moderate SE in a considerable proportion of the participants, and low SE in 25% of participants. De Zwart et al. (2009)[17] conducted an international survey on perceived threat, severity, and SE for SARS and other infectious diseases in Asian and European countries. They found that SE was low among participants for SARS and the common cold in all countries included in the study, while SE during SARS was higher in Asian countries than in European countries.

Self-efficacy has been severely affected during the COVID-19 pandemic[18]. In a study aimed to enhance science engagement by raising SE in students during school disruption due to the COVID-19 pandemic, they designed a game that decreased anxiety and increased SE to enhance scientific engagement. The results of the study also suggested that improvement of SE should be the cornerstone of any strategy aimed at improving online learning during the COVID-19 pandemic. Elgzar et al. (2020)[19] investigated the effect of health belief model-based education on nursing students' health beliefs and knowledge about COVID-19. Before the intervention, both the intervention and control groups had moderate SE. After health belief model-based education, the SE of the intervention group improved significantly. Self-efficacy (SE) may also play an essential role in motivating people to adhere to preventive and protective practices. This idea is supported by a study by Bashirian et al. (2020)[20] who applied the protection motivation theory to examine the use of protective equipment by medical staff when caring for COVID-19 patients. They reported
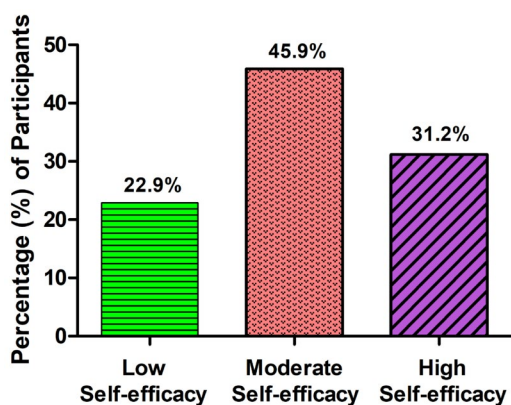
Table 3. Relationship between students' total SE for COVID-19 pandemic and their demographic variables (n= 761)

Socio-demographic data	Low SE		Moderate SE		High SE		Total	FET	P
	n	%	n	%	n	%	n		
	(174)		(349)		(238)				
Age								7.605	0.107
>20	17	25.8	37	56.0	12	18.2	66		
20 - >25	133	23.4	254	44.6	182	32.0	569		
≤25	24	19.0	58	46.1	44	34.9	126		
Residence location								2.570	0.634
- Urban	132	23.0	265	46.2	177	30.8	574		
- Semi-urban	28	23.3	58	48.3	34	28.4	120		
- Rural	14	21.2	26	39.4	26	39.4	66		
Gender								17.798	0.000*
- Male	72	29.1	121	49.0	54	21.9	247		
- Female	102	19.8	228	44.4	184	35.8	514		
College								20.944	0.000*
- Health sciences	64	21.3	167	55.5	70	23.3	301		
- Non-health sciences	110	23.9	182	39.6	168	36.5	460		
Marital status								11.769	0.002*
- Married	13	11.2	63	54.3	40	34.5	116		
- Unmarried	161	25.0	286	44.3	198	30.7	645		
Family monthly income								10.938	0.021*
- <5000 SAR	147	25.1	264	45.1	174	29.7	585		
- 5000-10000 SAR	21	18.9	51	45.9	39	35.1	111		
- >10000SAR	6	9.2	34	52.3	25	38.5	65		
History of chronic illness								3.145	0.201
- Yes	21	25.3	43	51.8	19	22.9	83		
- No	153	22.6	306	45.1	219	32.3	678		

aP < 0.05, Fisher Exact test (FET).

that SE was significantly correlated with other protection motivation theory constructs and recommended that special emphasis be placed on SE and knowledge relating to COVID-19 when discussing adherence to self-protective measures. Spoorthy et al. (2020)[21] conducted a systemic review of the mental health problems encountered by healthcare workers and patients during the COVID-19 pandemic. They found that poor SE was one of the psychological factors associated with stress, anxiety, insomnia, and depressive symptoms, and the results suggested that SE could be enhanced by family and social support.

The present study investigated the associations between students' SE during the COVID-19 outbreak and their socio-demographic characteristics. The results showed statistically significant associations between the students' SE and gender, college type, marital status, and family income. These findings differ from the findings of Yildirim and Guler (2020)[22] who studied COVID-19-related SE and knowledge in 3,190 Turkish participants using an online questionnaire. The SE during COVID-19 was uniquely predicted by mental health as well as gender, chronic disease, and age. They recommended the development of SE-based educational interventions aimed at improving the public mental health during an epidemic. In our study, there was no significant relationship between the students' SE and their age or history of chronic disease. The difference between the two studies regarding the association of age with SE may be attributed to the different age groups of the participants in the studies; Yildirim and Guler (2020)[22] studied SE among an adult population, whereas the mean age in the current study was 20.27 years. In another study, Li et al. (2020)[23] investigated the relationship between COVID-19 protective behaviors in the USA and social media use, risk perception, and demographic

characteristics. Their findings revealed that socio-demographic attributes, including gender, race, and marital status were major factors associated with adherence to protective behaviors and testing for COVID-19. Moreover, Seyedi-Andi et al. (2019)[16] reported significant associations between students' SE and demographic variables such as college type, monthly family income, and gender. Participants with higher family income, females, and students attending medical or dental college had higher SE scores. There was no significant association between SE score and marital status. Multiple linear regression analysis revealed a remarkably high positive and direct relationship between SE and family income.

Most of the studies mentioned here emphasized the importance of SE in infectious disease control. Therefore, public awareness efforts should be directed toward raising public SE. In addition, the factors that influence SE should be thoroughly investigated.

CONCLUSION

Based on the study results, we concluded that approximately one-half of Najran University students had moderate SE, and more than one-fifth of them had low SE for dealing with the COVID-19 pandemic. There were statistically significant associations between the participants' SE during the COVID-19 pandemic and gender, college, marital status, and family income.

Implications of the study

Self-efficacy (SE) is particularly important for adherence to self-protection behaviors and precautions and overcoming psychological stress. A population with a high SE promotes the practice of proper social distancing and healthy behaviors without supervision from the authorities. It also helps to increase an individual's internal capacity to protect their families and communities from COVID-19 infection. The data obtained in this study provide valuable information for policy makers regarding the SE of students at Najran University, Saudi Arabia during the COVID-19 pandemic. The dissemination of such data is essential for the development of evidence-based interventions. Decision makers may use these data to produce social interventions that increase public SE. It will also enrich the COVID-19 international database on the role of SE during pandemics.

DATA AVAILABILITY
All datasets generated or analyzed during this study are included in the manuscript and/or the Supplementary Files.

ETHICS STATEMENT
Ethics statement applicable and included in the methodology section.

REFERENCES
1. World Health Organization a. Weekly epidemiological update-8 December 2020. Available at: https://www.who.int/publications/m/item/weekly-epidemiological-update-8-december-2020 (Accessed on 12/12/2020).
2. World Health Organization b. Impact of COVID-19 on people's livelihoods, their health and our food systems. Available at: https://www.who.int/news/item/13-10-2020-impact-of-covid-19-on-people's-livelihoods-their-health-and-our-food-systems (Accessed on 12/12/2020).
3. Ministry of Health, Saudi Arabia. 2020. MOH publications. Available at: https://www.moh.gov.sa/en/Ministry/MediaCenter/Publications/Pages/covid19.aspx. Accessed on: 21/12/2020.
4. Saudi Center for Disease Prevention and Control. 2020. (COVID-19) Disease Interactive Dashboard. Available at: https://covid19.cdc.gov.sa/daily-updates/. Accessed on: 12/12/2020.
5. World Health Organization. Clinical management of severe acute respiratory infection (SARI) when COVID-19 disease is suspected. Available at: https://www.who.int/publications/i/item/clinical-management-of-covid-19. Accessed on: 12/12/2020. doi: 10.15557/PiMR.2020.0003
6. Hui DS, Azhar EI, Madani TA, et al. The continuing 2019-nCoV epidemic threat of novel coronaviruses to global health - the latest 2019 novel corona virus outbreak in Wuhan, China. *Int J Infect Dis.* 2020;91:264-266. doi: 10.1016/j.ijid.2020.01.009.

7. Bandura A. Self-efficacy: Toward a unifying theory of behavioral change. *Psychol Rev.* 1977;84(2):191-215. doi:10.1037//0033-295x.84.2.191

8. Alshammari F. Knowledge and Perception of Health Practitioners towards MERS-CoV in Hail Region, Kingdom of Saudi Arabia. *Am J of Nurs Res.* 2018;6(1):12-17. doi: 10.12691/ajnr-6-1-2

9. Al-Mohrej A, Agha S. Are Saudi medical students aware of middle east respiratory syndrome coronavirus during an outbreak? *J Infect Public Health.* 2017;10(4):388-395. doi:10.1016/j.jiph.2016.06.013.

10. Xiao H, Zhang Y, Kong D, Li S, Yang N. The Effects of Social Support on Sleep Quality of Medical Staff Treating Patients with Coronavirus Disease 2019 (COVID-19) in January and February 2020 in China. *Med Sci Monit.* 2020;5(26):e923549. doi: 10.12659/MSM.923549

11. Segrin C, Passalacqua SA. Functions of loneliness, social support, health behaviors, and stress in association with poor health. *Health Commun.* 2010;25(4):312-322. doi:10.1080/10410231003773334

12. Bihlmaier I, Schlarb AA: Self-efficacy and sleep problems. *Somnologie.* 2016;20:275-280. doi: 10.1007/s11818-016-0085-1

13. Schwarzer R, Jerusalem M. Generalized Self-Efficacy scale. In: Johnston M, Wright S, Weinman J. Measures in Health Psychology: A User's Portfolio. Windsor: NFER-NELSON; 1995:35-37.

14. Champion VL, Skinner CS. The Health Belief Model. In Health Behavior and Health Education: Theories, Research, and Practice. K. Glanz, Rimer, B.K., Viswanath, K. (Eds.) San Francisco, CA: Jossey Bass; 2008:45-62.

15. Nasir EF, Yagoub HMA, Alhag AK. Study of the Sudanese perceptions of COVID-19: Applying the Health Belief Model. *medRxiv.* 2020. doi: 10.1101/2020.05.28.20115477

16. Seyedi-Andi SJ, Bakouei F, Adib Rad H, Khafri S, Salavati A. The relationship between self-efficacy and some demographic and socioeconomic variables among Iranian Medical Sciences students. *Adv Med Educ Pract.* 2019;10:645-651. doi: 10.2147/AMEP.S185780

17. de Zwart O, Veldhuijzen IK, Elam G, et al. Perceived Threat, Risk Perception, and Efficacy Beliefs Related to SARS and Other (Emerging) Infectious Diseases: Results of an International Survey. *Int J Behav Med.* 2009;16(1):30-40. doi:10.1007/s12529-008-9008-2

18. Yang X, Zhang M, Kong L, Wang Q, Hong J. The Effects of Scientific Self-efficacy and Cognitive Anxiety on Science Engagement with the "Question-Observation-Doing-Explanation" Model during School Disruption in COVID-19 Pandemic. *J Sci Educ Technol.* 2020. doi: 10.1007/s10956-020-09877-x

19. Elgzar WT, Al-Qahtani AM, Elfeki NK, Ibrahim HA. COVID-19 Outbreak: Effect of an Educational Intervention Based on Health Belief Model on Nursing Students' Awareness and Health Beliefs at Najran University, Kingdom of Saudi Arabia. *Afr J Reprod Health.* 2020;24(2):78-86.

20. Bashirian S, Jenabi E, Khazaei S, et al. Factors associated with preventive behaviours of COVID-19 among hospital staff in Iran in 2020: an application of the Protection Motivation Theory. *J Hosp Infect.* 2020;105(3):430-433. doi: 10.1016/j.jhin.2020.04.035

21. Spoorthy MS, Pratapa SK, Mahant S. Mental health problems faced by healthcare workers due to the COVID-19 pandemic-A review. *Asian J Psychiatr.* 2020;51: 102119. doi: 10.1016/j.ajp.2020.102119

22. Yildirim M, Guler A. COVID-19 severity, self-efficacy, knowledge, preventive behaviors, and mental health in Turkey [Published online ahead of print, 2020 Jul 16]. *Death Stud.* 2020. doi:10.1080/07481187.2020.1793434

23. Li S, Feng B, Liao W, Pan W. Internet Use, Risk Awareness, and Demographic Characteristics Associated With Engagement in Preventive Behaviors and Testing: Cross-Sectional Survey on COVID-19 in the United States. *J Med Internet Res.* 2020;22(6):e19782. doi: 10.2196/19782