Risk Perception and Behavioral Responses Related to COVID-19 Among the Iranian General Population: An Application of the Extended Parallel Process Model

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Abstract

Background: The novel coronavirus disease 2019 (COVID-19) has emerged as a major global public health challenge. Psychosocial and cultural factors affect adherence to health advice. This study aims to investigate how people have perceived the COVID-19 outbreak using the components of EPPM (i.e., recommended response efficacy, self-efficacy, susceptibility, and severity) and how their behavioral responses contributed to the prevention and control of the disease.

Methods: This cross-sectional study was conducted online in Iran in March and April. Data were collected using an electronic questionnaire via Porsline. Participants were recruited using online applications and posts on platforms such as Telegram, WhatsApp, and Instagram asking people to take part. The posts asked people aged 15 years and over to take part in a study investigating the control and prevention of COVID-19. EPPM was used to develop a questionnaire measuring the risk perception of and behavioral responses to COVID-19. We used a 29-item, standardized, structured format. Analysis of variance (ANOVA) and t-tests were used to compare groups. In all tests, a value of $p < 0.05$ was considered statistically significant.

Results: A total of 3,727 individuals with a mean age (SD) of 37.0 (11.1) years participated in the study. The results by age category revealed significant progressive increases in perceived susceptibility, perceived self-efficacy, and avoidance response scores, particularly among those aged 60 and over. A total of 56.4% of participants were engaging in danger control processes and 43.6% in fear control processes. Women had significantly higher scores than men for self-efficacy, reactance, and avoidance defensive responses; men had higher perceived susceptibility scores for COVID-19 than women. We also found significantly higher scores for behavioral responses among people with advanced educational backgrounds.

Conclusion: more than half of all participants motivated by danger control. This indicates that more than half of participants had high perceived efficacy (i.e., self-efficacy and response efficacy) scores. Self-efficacy scores were significantly higher among participants who were older, female, single, lived in rural areas, or had good economic status. The results of our study suggest that socioeconomic and demographic factors are the main determinants of psychological responses to controlling the COVID-19 pandemic.

Introduction

The novel coronavirus disease 2019 (COVID-19) has emerged as a major global public health challenge [1]. This potentially fatal infectious disease, which has affected most countries worldwide, is characterized by a steady speed of spread, leading to the World Health Organization (WHO) classifying it as a pandemic [2]. In Iran, the first official report of a COVID-19-related death was on February 19, 2020. As of April 13, 73,303 Iranian people have been infected with COVID-19. In total, 4,585 have died and 45,983 have recovered [3].

COVID-19 is transmitted from human to human through respiratory droplets or direct contact. Available findings show that avoiding exposure is the key to preventing COVID-19 infection, which is why quarantining, physical distancing, and isolation have become the primary strategies for reducing COVID-19 incidence and mortality. Quarantine restricts the movement of people and reduces the infection rate for contagious diseases [4]; physical or social distancing involves staying at least two meters away from other persons; and isolation is the state of separating patients with COVID-19 from otherwise healthy people [5]. Maintaining hygiene practices, such as proper hand washing, wearing a mask in crowded places, and staying at home, controlling the spread of the

disease and breaking the transmission chain [6]. During the early stages of the coronavirus pandemic in Iran, several social media campaigns were launched to inform people about the risks of coronavirus and to persuade them to follow health care recommendations.

Psychosocial and cultural factors affect adherence to health advice [7]. There are several factors affecting COVID-19 response behaviors. Multiple health models suggest that risk perception of COVID-19 is a vital component for behavior change [8], one of which is the extended parallel process model (EPPM) [9]. According to EPPM, when people are exposed to a risky situation, they produce two cognitive appraisals: one of the efficacy of the recommended response and one of the threat [10]. EPPM therefore indicates that the perception of risk would act together with self-efficacy levels for prevention [11]. It is important to understand how people are being presented with risky situations during the COVID-19 pandemic, how people are assessing these risks, and how such assessments lead to them changing their behaviors in order to follow COVID-19 health recommendations. This study aims to investigate how people have perceived the COVID-19 outbreak using the components of EPPM (i.e., recommended response efficacy, self-efficacy, susceptibility, and severity) and how their behavioral responses contributed to the prevention and control of the disease. This study also investigates defensive responses (denial, avoidance, and reactance) to the threat of COVID-19 and people's total fear and tension perceptions.

Materials And Methods

Study design, participants, and data collection

The Ethics Committee of Tabriz University of Medical Sciences approved the study (No: IR.TBZMED.REC.1398.1307). We obtained informed consent from all participants. This cross-sectional study was conducted online in Iran in March and April. Data were collected using an electronic questionnaire via Porsline. Participants were recruited using online applications and posts on platforms such as Telegram, WhatsApp, and Instagram asking people to take part. The posts asked people aged 15 years and over to take part in a study investigating the control and prevention of COVID-19. Those interested in participating were directed to complete the online questionnaire.

The study tool

EPPM was used to develop a questionnaire measuring the risk perception of and behavioral responses to COVID-19. The study questionnaire was designed based on a literature review of EPPM-based risk perception assessments of other infectious diseases [12]. The final questionnaire, Risk Percept COVID-19, consisted of five dimensions: perceived self-efficacy, perceived response efficacy, perceived threats (susceptibility and severity), and behavior responses. We used a 29-item, standardized, structured format [12]. The response efficacy dimension included seven items measuring participants' beliefs about the effectiveness of the recommended preventative responses to COVID-19. A sample items is: "I believe that by disinfecting surfaces, I am less likely to get coronavirus." The perceived self-efficacy dimension included six items measuring participants' beliefs about people's ability to perform the recommended responses to COVID-19. A sample item is "I am able to use a mask in enclosed places with more than two people." Defensive responses (denial, avoidance, and reactance) included eight items measuring people's beliefs about their perception of the risk of COVID-19. A sample item for denial is: "I think sickness or death are in God's hands, and following the precautionary measures isn't important." A sample item for avoidance is: "when television or radio talks about coronavirus, I flip the channel;" for reactance, a sample item is: "I believe that health staff have significantly exaggerated this disease." Perceived and severity

susceptibility included eight items measuring people's beliefs about the magnitude of COVID-19 and about their risk of experiencing COVID-19, respectively. A sample item for severity is: "The coronavirus is a lethal threat;" for susceptibility, a sample item is: "I am at risk for getting the coronavirus". Each item was rated on a 5-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree). Behavioral responses included seven items that measured behaviors preventing COVID-19. A sample item includes: "to protect my family and myself from coronavirus, I've stayed at home and don't go out except in essential situations." For each item, a Yes or No response was required. The following demographic data were collected from all participants: gender, age, marital status, educational qualifications, job, medical history, family history of COVID-19, personal history of COVID-19, economic status (bad, not good, not bad, good), number of family members, information sources, adherence to home quarantine rules.

Analytic procedure

To make it easier to compare the means of the subscales, we converted the scoring into a linear format. First, the sum of responses across the 29 items was calculated (responses were scored as follows: strongly disagree = 1; disagree = 2; neutral = 3; agree = 4; strongly agree = 5), giving total scores ranging from 29 to 145. We then used linear transformation to convert these scores into a 0-100 range using the following formula: [Row score – the lowest possible raw score/highest possible raw score – the lowest possible raw score] x 100. Lower scores indicated lower risk perception, while higher scores indicated better risk perception. The Cronbach's alpha coefficient for the dimensions ranged from .697 to .793, and the intraclass correlation coefficient (ICC) ranged from .71 to .80, both of which were within acceptable ranges.

We also calculated a discriminating value in order to establish fear and danger control scores. Consistent with previous studies [9], we subtracted the perceived threat score from the perceived efficacy score, resulting in a discriminating value. The discriminating value can be either positive or negative. A positive value means that a person is engaging in danger control processes because their perceptions of efficacy are stronger than their threat perceptions, or, in other words, a person is likely to engage in some level of protective behaviors with regard to the specific health threat. A negative value means a person is engaging in fear control processes because their threat perceptions are stronger than their perceptions of efficacy. In these cases, a person is likely to engage in fear control processes and is probably not protecting him or herself against the specific health threat.

Statistical analysis

Statistical analyses were performed using the Statistical Package for Social Science, Version 18, for Windows (SPSS Inc., Chicago, IL, USA). The normality of the data was analyzed using a Kolmogorov–Smirnov test. The characteristics of the participants were summarized as numbers, percentages, or means with standard deviations, where appropriate. Analysis of variance (ANOVA) and t-tests were used to compare groups. In all tests, a value of $p < 0.05$ was considered statistically significant.

Results

Demographic characteristics

Table 1 shows the sociodemographic characteristics of the 3,727 respondents with a 61% response rate. The mean age and standard deviation of the respondents was 37.0 (11.1), with a range of 15 to 96 years old. More than half of all participants (52%) were married men (75%). The majority of respondents had a university degree

(69.9%), while 57.2% reported intermediate economic status. In addition, 40 respondents (1.1%) reported that they had coronavirus and 69 (1.9%) stated that they had a family member with a confirmed case of the disease. The majority of participants (96.1%) lived in urban areas. Information was gathered from all 30 Iranian provinces, with a higher number of respondents from East Azerbaijan (59.5%). See supplementary Table 1 for an overview.

Table 1
Sociodemographic characteristics of respondents (n = 3727)

	Male	Female	Total
Age | Mean (SD) in years	38.2 (11.2)	35.7 (10.9)	37.0 (11.1)
15–29	376 (19.5)	489 (27.3)	865 (23.2)
30–44	1051 (54.4)	944 (52.6)	1995 (53.5)
45–59	419 (21.7)	315 (17.6)	734 (19.7)
60+	87 (4.5)	46 (2.6)	133 (3.6)
Educational status			
Illiterate	9 (0.5)	7 (.4)	16 (0.4)
Elementary school	16 (.8)	32 (1.8)	48 (1.3)
Guidance school	74 (3.8)	64 (3.6)	138 (3.7)
Secondary school	458 (23.7)	465 (25.7)	923 (24.8)
University	1376 (71.2)	1226 (68.6)	2630 (69.9)
Marital status			
Single	439 (49.8)	442 (50.2)	881 (23.6)
Married	1483 (52.7)	1329 (47.3)	2812 (75.4)
Widowed/divorced	11 (0.6)	23 (1.3)	34 (0.9)
Economic status			
Good	378 (19.6)	547 (30.5)	925 (24.8)
Not good, not bad	1084 (56.1)	1049 (58.5)	2153 (57.2)
Poor	471 (24.4)	198 (11.0)	669 (17.9)
History of coronavirus (yes)	18 (1.0)	22 (1.1)	40 (1.1)
History of coronavirus in a family member (yes)	33 (1.7)	36 (2.0)	69 (1.9)
Having hypertension (yes)	173 (8.9)	116 (6.4)	289 (7.7)
Having diabetes (yes)			
Respiratory diseases (yes)	65 (3.3)	45 (2.5)	120 (3.2)
CVD (yes)	78 (4.0)	42 (2.3)	110 (2.9)
Other disease (yes)	177 (9.1)	196 (10.8)	373(9.9)
Locality			
Urban	1862 (96.4)	1717 (95.7)	3579 (96.1)

CVD: Cardiovascular diseases

	Male	Female	Total
Rural	71 (3.6)	77 (4.3)	148 (3.9)
CVD: Cardiovascular diseases			

Perceived risk of the coronavirus disease

The perceived risk and avoidance response dimensions for all participants were categorized based on sociodemographic characteristics (Table 2). The results by age category revealed that as age increased, so too was there a significant progressive increase in perceived susceptibility, perceived self-efficacy, and avoidance response scores. This applied particularly for participants 60 and older. Women had significantly higher scores than men for self-efficacy, reactance, and avoidance defensive responses; men had higher perceived susceptibility scores for COVID-19 than women. The average scores across all dimensions showed significant increases as education levels increased, as well as for participants who were married or had good economic status.

Table 2
Risk perception and psychological defense strategies by demographic characteristic

	Response efficacy	Defensive response			Self-efficacy	Threats	
		Denial	Reactance	Avoidance		Severity	Susceptibility
Age (years)	Mean (SD)	Mean (Std.Er)	Mean (Std.Er)	Mean (Std.Er)	Mean (SD)	Mean (SD)	Mean (SD)
15–29	84.0 (11.3)	23.2 (.64)	19.8 (.68)	31.1 (.3)	65.6 (17.2)	76.4 (14.5)	65.5 (19.6)
30–44	83.5 (11.1)	22.0 (.35)	19.2 (.4)	26.6 (.9)	65.6 (17.2)	77.1 (13.4)	69.1 (17.7)
45–59	84.2 (10.9)	21.3 (.62)	18.9 (.6)	24.3 (.5)	68.3 (16.5)	77.0 (13.3)	67.7 (16.8)
60+	83.7 (11.0)	23.0 (1.5)	22.0 (1.5)	24.1 (1.6)	69.4 (16.9)	76.0 (14.0)	68.8 (16.3)
P-value	.473	0.134	0.309	< .0001	< .0001	.539	< .0001
Gender							
Female	85.0 (10.7)	22.0 (.4)	17.5 (.4)	26.0 (.5)	67.6 (17.4)	76.9 (13.8)	66.1 (19.1)
Male	82.7 (11.3)	22.3 (.4)	21.1 (.4)	28.0 (.5)	66.4 (16.8)	76.9 (14.1)	69.3 (17.2)
P-value	.087	.366	0.001	0.015	0.055	.56	< .0001
Educational status							
Illiterate	73.8 (13.5)	36.4 (7.6)	34.3 (6.2)	34.3 (6.4)	51.8 (21.3)	73.7 (15.8)	64.5 (17.6)
Elementary school	81.2 (13.4)	28.8 (3.0)	25.8 (3.2)	34.1 (4.5)	68.9 (15.7)	75.4 (15.6)	56.9 (27.0)
Guidance school	82.9 (13.1)	28.5 (1.7)	24.8 (1.9)	30.8 (2.2)	69.7 (17.9)	74.1 (15.5)	59.4 (18.9)
Secondary school	83.5 (10.9)	24.8 (.59)	20.5 (.6)	27.9 (.7)	68.7 (16.5)	76.0 (13.8)	64.5 (19.1)
University	84.2 (11.1)	20.7 (.31)	18.4 (.3)	26.4 (.4)	66.3 (17.2)	77.4 (13.9)	69.6 (17.30
P-value	0.001	< .0001	< .0001	0.01	< .0001	0.004	< .0001
Marital status							
Single	83.8 (10.9)	23.3 (.6)	20.0 (.7)	30.7 (.8)	68.3 (16.9)	76.4 (14.3)	65.2 (20.2)
Married	83.9 (11.0)	21.7 (.3)	19.1 (.3)	25.9 (.4)	66.6 (17.2)	77.1 (13.8)	68.6 (17.4)

	Response efficacy	Defensive response			Self-efficacy	Threats	
		Denial	Reactance	Avoidance		Severity	Susceptibility
Widowed/Divorced	78.5 (13.8)	26.9 (3.8)	21.5 (3.5)	32.7 (.4)	63.3 (13.5)	74.4 (14.8)	62.7 (20.0)
P-value	0.021	0.017	355	< .0001	0.024	0.224	< .0001
Economic status							
Poor	81.6 (13.0)	23.9 (.6)	20.8 (.7)	27.8 (.9)	63.1 (18.0)	77.9 (14.1)	67.5 (18.6)
Not good, not bad	83.6 (10.3)	22.0 (.3)	19.6 (.4)	27.1 (.5)	66.4 (16.5)	76.5 (13.6)	67.9 (17.7)
Good	85.9 (10.7)	21.2 (.6)	17.7 (.6)	26.6 (.7)	71.1 (17.0)	77.2 (14.7)	67.6 (19.0)
P-value	< .0001	.007	.003	.603	< .0001	0.050	0.841
Locality							
Urban	83.7 (11.1)	22.1 (.3)	19.5 (.3)	27.3 (.3)	67.0 (17.1)	77.0 (14.0)	67.7 (18.2)
Rural	84.7 (10.1)	22.1 (1.6)	16.5 (1.5)	23.1 (1.8)	67.8 (18.5)	74.8 (13.2)	68.1 (18.2)
P-value	.55	1.00	.051	0.033	.051	.066	0.817

Perceived risk scores showed that participants with confirmed coronavirus cases had significantly higher scores, with perceived susceptibility scores being the one exception. Participants without any family history of coronavirus had higher perceived scores for response efficacy and self-efficacy. We found significantly higher scores for perceived risk among respondents with no chronic diseases (see Table 3).

Table 3
Risk perception broken down by disease status

		Response efficacy	Defensive response			Self-efficacy	Threats	
			Denial	Reactance	Avoidance		Severity	Susceptibility
History of coronavirus	Yes	74.9 (23.5)	32.8 (3.9)	30.1 (4.4)	41.5 (4.7)	57.7 (21.9)	67.4 (21.3)	70.0 (22.5)
	No	83.9 (10.8)	22.0 (.27)	19.3 (.3)	27.0 (.4)	67.1 (17.7)	77.9 (13.9)	67.7 (18.2)
P-value		< 0.0001	< 0.0001	0.009	< 0.0001	0.036	0.006	0.442
History of coronavirus in a family member	Yes	81.5 (18.9)	24.5 (2.3)	17.7 (2.5)	30.0 (3.3)	64.5 (20.9)	72.9 (17.4)	68.6 (22.1)
	No	83.8 (10.8)	22.1 (.2)	19.4 (18.3)	27.1 (.4)	67.0 (17.0)	77.0 (13.9)	67.7 (18.1)
P-value		< 0.0001	.25	.32	.45	0.018	0.142	0.031
Having chronic disease								
0		84.1 (10.8)	21.8 (.3)	19.3 (.7)	27.1 (.4)	67.5 (16.9)	76.5 (13.9)	69.3 (18.6)
1		83.1 (11.5)	23.0 (.6)	19.3 (.6)	27.3 (.8)	65.2 (17.7)	78.4 (14.0)	67.6 (16.7)
2		82.8 (11.6)	26.1 (1.7)	22.7 (1.9)	27.9 (2.0)	65.7 (16.4)	77.2 (12.8)	69.0 (15.7)
3 and more		77.6 (18.3)	20.8 (2.6)	17.2 (2.9)	20.0 (4.2)	60.0 (21.3)	74.8 (19.7)	66.6 (22.2)
P-value		0.002	0.026	0.224	.390	0.001	0.016	0.021

Behavioral responses, overall perceived fear and tension, and danger and fear control

The results for the behavioral response dimensions and for overall perceived fear and tension are shown Table 4. Participants aged 30 to 59 years had significantly higher behavioral response scores than others. We also found significantly higher scores for behavioral responses among people with advanced educational backgrounds. Participants who had contracted coronavirus and those who had more than three chronic diseases had lower behavioral response scores. Furthermore, respondents who were younger, less educated, or had low economic status had significantly higher fear and tension scores. Similar results were found for patients with more than three diseases.

Table 4
Behavioral responses, overall perceived fear and tension, and danger and fear control

	Behavioral responses	Overall fear	Overall tension	Danger control	Fear control
	Mean (SD)	Mean (SD)	Mean (SD)	N (%)	N (%)
Total	6.0 (0.98)	6.5 (2.9)	6.8 (2.9)	2101 (56.4)	1626 (43.6)
Age					
15–29	5.7 (1.1)	6.35 (3.0)	6.7 (2.9)	531 (61.4)	334 (38.6)
30–44	6.1 (.9)	6.7 (2.9)	7.0 (2.8)	1061 (53.2)	934 (46.8)
45–59	6.1 (.8)	6.2 (2.9)	6.5 (2.9)	434 (59.1)	300 (40.9)
60+	5.9 (1.0)	5.8 (2.9)	6.2 (2.8)	75 (56.4)	58 (43.6)
P-value	< 0.0001	< 0.0001	< 0.0001	< 0.0001	
Gender					
Female	5.9 (0.94)	6.7 (3.0)	7.1 (2.8)	1079 (60.1)	715 (39.9)
Male	6.1 (1.0)	6.3 (2.9)	6.6 (2.9)	1022 (52.9)	911 (47.1)
	0.005	0.315	0.677	< 0.0001	
Educational status					
Illiterate	5.25 (1.7)	7.1 (3.1)	7.3 (2.)	6 (37.5)	10 (62.5%)
Elementary school	5.8 (1.1)	6.7 (3.50	6.4 (3f.5)	33 (68.8)	15 (31.3)
Guidance school	5.9 (1.1)	6.4 (3.1)	6.8 (3.0)	35 (25.4)	103 (74.9)
Secondary school	6.0 (1.0)	6.5 (3.1)	6.8 (3.1)	595 (64.5)	328 (35.5)
University	6.0 (.9)	6.4 (2.9)	6.8 (2.8)	1364 (52.4)	1238 (47.6)
P-value	.003	.844	.715	< 0.0001	
Marital status					
Single	5.7 (1.1)	6.2 (2.9)	6.5 (2.9)	519 (58.9)	362 (41.1)
Married	6.1 (.9)	6.6 (2.9)	6.9 (2.8)	1566 (55.7)	1246 (44.3)

	Behavioral responses	Overall fear	Overall tension	Danger control	Fear control
Widowed/Divorced	5.5 (1.3)	5.6 (3.3)	5.9 (3.2)	16 (47.1)	18 (52.9)
P-value	< 0.0001	0.001	< 0.0001	0.133	
Economic status					
Good	5.9 (1.0)	6.4 (2.9)	6.7 (2.7)	582 (62.9)	343 (37.1)
Not good, not bad	6.0 (.9)	6.4 (2.8)	6.8 (2.9)	1194 (56.0)	939 (44.0)
Bad	6.0 (1.0)	6.7 (2.9)	7.1 (3.0)	325 (48.6)	344 (51.4)
P-value	0.055	0.050	0.008	< .0001	
History of coronavirus					
Yes	5.4 (1.9)	5.5 (3.1)	6.0 (3.2)	17 (45.9)	20 (54.1)
No	6.0 (.9)	6.5 (2.9)	6.8 (2.9)	2084 (56.5)	1606 (43.5)
P-value	< 0.0001	.514	.181	0.132	
History of coronavirus in a family member					
Yes	5.7 (1.6)	6.1 (3.0)	6.6 (2.9)	34 (49.6)	35 (50.7)
No	6.0 (.9)	6.5 (2.9)	6.8 (2.8)	2067 (56.5)	1591 (43.5)
P-value	< .0.0001	.713	.688	0.141	
Disease status					
0	6.0 (.97)	6.4 (2.9)	6.7 (2.9)	1677 (58.2)	1202 (41.8)
1	6.0 (.96)	6.7 (3.0)	7.1 (2.8)	346 (49.2)	357 (50.8)
2	6.0 (1.1)	6.7 (2.9)	7.0 (2.8)	66 (57.4)	49 (42.6)
3 and more	5.7 (1.8)	7.2 (2.8)	7.5 (2.9)	12 (40)	18 (60.0)
P-value	.941	.049	.028	< 0.0001	
Locality					
Urban	6.0 (.99)	6.5 (2.9)	6.8 (2.8)	2014 (56.3)	1565 (43.7)
Rural	6.2 (.9)	3.2	6.5 (3.0)	87 (58.8)	61 (41.2)
P-value	.46	.05	.134	0.555	

Table 4 shows the discriminating values indicating danger control and fear control scores based on different sociodemographic characteristics. A positive value indicates that participants were engaging in danger control process, because their efficacy perceptions of COVID-19 were stronger than their threats perceptions. These participants were therefore likely to be exhibiting protective behaviors. Negative values mean that participants were likely to be engaging in fear control processes because their threat perceptions of COVID-19 were stronger than their efficacy perceptions. A total of 56.4% of participants were engaging in danger control processes and 43.6% in fear control processes. There were significant differences in danger and fear control scores dependent on age, gender, educational and economic status, and chronic disease status.

Discussion

This EPPM-based study was conducted to assess the risk perceptions, behavioral responses, overall perceived fear and tension, and danger and fear control processes among Iranian people during the early stages of the COVID-19 pandemic. The study provides a timely assessment of and initial evidence related to the risk perceptions and psychological responses individuals have had to COVID-19 during its early stages, with more than 3,700 individuals across the country taking part in the study. According to EPPM, two cognitive appraisals are initiated after a person learns about a health risk: one related to the threat it poses and a second related to the efficacy of the recommended responses. When the threat of COVID-19 threat is perceived to be more significant, people are motivated to do act to protect themselves. According to level of perceived efficacy, people have two responses: those who perceive the responses to have high levels of efficacy are motivated to protect themselves by controlling the threat of COVID-19; those who perceive low levels of efficacy levels, those who doubt their ability to adhere to the health care recommendations, and those who doubt that said recommended responses can really avert the threat use psychological defense to control their fear [13]. Our results show that 56.4% of respondents were motivated by danger control responses and 43.6% by fear control responses. This indicates that more than half of all participants had high perceived efficacy (i.e., self-efficacy and response efficacy) scores. Self-efficacy scores were significantly higher among participants who were older, female, single, lived in rural areas, or had good economic status. A current study from China showed an association between self-efficacy and social support among patients who had been treated for coronavirus [14]. This is inconsistent with our results, which show that participants with a history of coronavirus had lower self-efficacy scores. Respondents who had a family member with coronavirus and those with three or more comorbidities had lower self-efficacy scores for controlling COVID-19. Self-efficacy is a positive mental state that is part of the cognitive appraisal process reducing stress and tension [15]. Our assessment of overall stress and tension levels also indicated that stress and tension were significantly lower among respondents who were older, had no diseases, lived in rural areas, were widowed/divorced, or had good economic status. According to our results, respondents with high self-efficacy scores are better able to control their emotions.

According to the results, efficacy responses were significantly higher among respondents who were well-educated and had good economic status. It seems that these individuals believe they can carry out the recommended responses to protect themselves from COVID-19.

Our results also showed that respondents who were male, older, well-educated, and married had significantly higher perceptions of susceptibility. In fact, these individuals were simply thinking about the threat of COVID-19 and believed that the threat was relevant to them. According to the WHO, older people are at higher risk of contracting COVID-19 [16]. The Iranian health care system and media provided significant coverage of the COVID-

19 pandemic, recommending that all people—and especially older people—take care themselves. This likely resulted in older people learning that they were more susceptible to the disease.

Individuals usually use psychological defense strategies to control their fears. These strategies include denial, avoidance, and reactance. Our results showed that lower defensive response scores correlated with better responses from participants. Defensive avoidance occurs when individuals block out feelings and thoughts about a threat or ignore further information about it, for example, switching the television channel or skipping COVID-19-related news. People in younger age groups (15–29 years) had higher avoidance scores and lower self-efficacy scores, indicating that younger people tended to take more risks and ignore health recommendations [17]. Illiterate people had the lowest self-efficacy and highest defensive responses. The results of our study suggest that socioeconomic and demographic factors are the main determinants of psychological responses to controlling the COVID-19 pandemic.

Strengths and limitations

The greatest strength of this study is its format: the online method allows for the timely gathering of information from a wide range of community groups. Since the pandemic made other data collection methods were unsafe and difficult for both the researchers and the study participants, the online sampling method was particularly convenient. We asked participants to complete the questionnaire for any family members who were illiterate or had no internet access. Because of the online nature of the study, we were unable to reach people who weren't interested in or who did not have access to the study questionnaire. Another strength is that this study is the first to record the behavioral responses of people to early information about COVID-19, before they later became saturated with COVID-19 news and information.

Conclusion

more than half of all participants motivated by danger control. This indicates that more than half of participants had high perceived efficacy (i.e., self-efficacy and response efficacy) scores. Self-efficacy scores were significantly higher among participants who were older, female, single, lived in rural areas, or had good economic status. Illiterate people had the lowest self-efficacy and highest defensive responses. The results of our study suggest that socioeconomic and demographic factors are the main determinants of psychological responses to controlling the COVID-19 pandemic.

Abbreviations

WHO
World Health Organization; **EPPM**:extended parallel process model; **ANOVA**:Analysis of variance; **COVID-19**:coronavirus disease 2019

Declarations

Ethics approval and consent to participate

The study received ethical approval from the Ethics Committee of Tabriz University of Medical

Consent for publication

The authors have agreed on the content of the manuscript.

Availability of data and material

The data collection tools and datasets generated and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare no conflicts of interest.

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Authors’ contributions

LJ and AM were responsible for the study design. LJ did the analyses. LJ and AM were responsible for data interpretation. FB, PR, SS, and ZS helped in the study design and data gathering, KP and AM helped in the drafting of the manuscript. All authors have read and approved the final manuscript.

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