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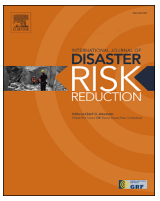

Risk communication and risk perception along with its influencing factors in Covid-19 disease: Focusing on the Extended Parallel Process Model

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ABSTRACT

Introduction: Following the global spread of the Covid-19 infection, the Iranian government adopted measures to control the spread of the disease, but they were not applicable without the acceptance and interaction of the general population. This study used the Extended Parallel Process Model (EPPM) components to attempt to determine risk communication and risk perception along with its influencing factors in Covid-19 disease among the population of northwestern Iran.

Method: This cross-sectional study was conducted among the general population of the province. Demographic characteristics and extended parallel process model questionnaires were used to collect data, which was then analyzed based on descriptive (frequency, mean, standard deviation) and inferential statistics (*t*-test, analysis of variance, regression, chi-square) in SPSS-25 software.

Results: This study showed that 63.8% of the participants continually followed Covid-19 news, and 34% of participants used social media to get the news and warnings related to the Covid-19 pandemic. Among the domains of participants' risk perception for Covid-19 disease, the three domains of self-efficacy, response effectiveness and intention had the highest means compared with other domains. Significant correlations were found between risk perception and the dimensions of age, gender, marriage status, number of family members, place of residence, underlying disease, history of Covid-19, and family history of Covid-19 disease ($p < 0.05$). Multivariate linear regression analysis revealed that perceived sensitivity, perceived severity, self-efficacy, fear, defensive avoidance, intention, and behaviors were independent predictors of response efficacy ($p < 0.001$).

Conclusion: More than two years after the onset of the spread of Covid-19 disease, the risk perception of the disease among the study population was still insufficient in many areas. Risk of

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communication refers to the point of interaction between the government and the people, and the need to improve public trust in this issue is strongly felt.

1. Introduction

The world has been affected by the Covid-19 pandemic over the last two years. The first cases of the disease occurred in Wuhan, China, in December 2019 [1]. With the spread of the disease around the world, the first definitively diagnosed cases were identified in Iran in February 2020 [2]. Millions of people around the world were hospitalized and more than 6 million died as a result of Covid-19 [3]. Following the global spread of the virus, the Iranian government adopted measures to control the spread of the disease. The purpose of these measures was to reduce the circulation of the virus in the community, reduce the effects of the epidemic, and prevent the spread of disease and mortality. These strategies included the use of masks, social distancing, and lockdown at some times [4]. Governments also took important and effective measures to successfully contain the spread of the virus, such as mobilizing human resources and timely provision of medical equipment [5]. Interaction between the government and the people was one of the principles of disease control. Without the cooperation and proper understanding of the existing conditions and risks, management of an epidemic is impossible [6]. Cooperation in the implementation of preventive measures in this situation depends on rapid changes in public behavior and the adaptation of society to a serious situation. In recent decades, the importance of the impact of risk perception on various diseases has been reported [7]. This issue was even more important at the time of Covid-19, because of its emergence and high transmissibility. The focus of governments was on preventing further transmission of the virus among the people. Identifying population behaviors and how people perceive the risk is essential to planning for reducing disease transmission. Therefore, it is important to evaluate the psychological and behavioral responses to the epidemic and determine how perceived risk is associated with participation in protective behaviors [8]. Perceived personal risk of an illness or a dangerous situation can change behavior. In fact, the change in behavior leads to adherence to health and medical standards. Behaviors can change and help stop the spread of the disease, and understanding behaviors are the key to changing them. risk Perception is based on individuals' intuitive assessment of existing risks and depends on social, cultural, and individual factors. These are beyond the classical characteristics of risk and are based on experiences, beliefs, attitudes, judgments, and emotions as well as broader social, cultural, and institutional processes [9,10]. People's understanding of vaccination efficacy is also crucial to their adherence to vaccination [11,12]. In recent years, the extended parallel process model (EPPM) has been used to provide health messages and prevent diseases and high-risk behaviors. Introduced in 1992 by Kim Witte, this model measures the eight main dimensions of risk perception, including behavior, intention, defensive avoidance, fear, response efficacy, self-efficacy, perceived severity, and perceived sensitivity. The two main elements in this model are the assessment of fear or threat, determined by perceived severity and perceived vulnerability, and the assessment of achievement, a combination of self-efficacy and response efficiency.

According to the EPPM model, people follow one of two paths in response to health messages: risk control or fear control. If the perceived threat and perceived efficiency in a message are both high, people will follow the path of risk control, which means that they will react to the threat with sufficient knowledge and offer solutions to eliminate it. People who receive a message with a high threat rate and low efficiency are driven to the fear control process, and the fear of danger acts as a deterrent to adopting protective behaviors [13]. According to this model, warning-inducing messages initiate two judgments: 1) evaluation of the threat, and 2) evaluation of efficacy, which can occur after warning messages and ways to deal with it are provided [14]. The quality and process of these participatory and warning messages are also very important in receiving, processing, and executing them. Principles of risk communication play an important role in effective communication between government and people in the event of a high-risk situation. The credibility of the media, the level of public trust, the available media resources, and the content of messages and warnings affect the relationship between the people and the government and ultimately risk perception [15,16]. Considering the importance of risk perception and the factors affecting it as well as risk communication to appropriate behaviors at the time of disease outbreak, this study aimed to determine risk communication along with risk perception and its influencing factors during the Covid-19 epidemic in the population of northwestern Iran.

2. Methods

This cross-sectional study was conducted among the general population of the Ardabil province. Inclusion criteria comprised being a resident of Ardabil province, having access to the Internet and virtual social networks, and being willing to participate in the study. The questionnaire was shared via the Internet on social networks. This communication platform was active for one month, and during this period, initial data was recorded in the designed database. Individuals who did not meet the inclusion criteria were excluded from the study.

2.1. Data collection tools

Data were collected using a COVID-19 risk perception questionnaire based on an extended parallel process model (EPPM). The questionnaire was composed of 38 questions in three sections. In the first part, general and demographic information was evaluated with 10 questions. The second part consisted of 24 questions about COVID-19 risk perception, which evaluated eight subscales of EPPM including perceived sensitivity, perceived severity, self-efficacy, response efficacy, fear, defensive avoidance, intention and behavior. Each subscale was evaluated with three questions on a five-point Likert scale. The third part included four risk communication questions consisting of four items.

Although the questionnaire was made from the main components of the EPPM model, in this study, the content validity was assessed using the content validity ratio (CVR), and content validity index (CVI). For this purpose, the opinions of 6 health education experts and 4 epidemiologists were used. The obtained values included for the risk perception and risk communication part were CVI = 0.9, 0.88 and CVR = 0.94, 0.88. The reliability of the tool was also calculated by Cronbach's alpha method after a preliminary study on 40 participants, and the acceptable reliability range for the items was obtained from 0.75 to 0.90.

2.2. Research population

This cross-sectional study was conducted among the general population of the Ardabil province from February to June 2022. A total of 2000 questionnaires were analyzed after removing incomplete ones. Inclusion criteria comprised people over 18 years of age who lived in Ardabil province, had access to the Internet and virtual social networks and were willing to participate in the study. The questionnaire was shared via the Internet on social networks such as Telegram and WhatsApp. This communication platform was active for four months, and during this period, initial data was recorded in the designed database. Individuals who did not meet the inclusion criteria were excluded from the study.

2.3. Sample size and sampling method

During four months of digital questionnaire activation, consecutive sampling was performed. Extensive data collection was attempted through various social networks. The data of all individuals participating in the study during the questionnaire activation period was analyzed based on descriptive (frequency, mean, standard deviation) and inferential statistics (*t*-test, analysis of variance, regression, chi-square) in SPSS-25 software.

3. Results

The data in Table 1 shows that most participants (47.1%) were aged 30–45 years and that women and men comprised 54.9% and 45.1% of the participants, respectively. Other data revealed that 65.2% of the participants were married, and 63% had a university education. Families with 4–6 members had the highest frequency (58.1%), and 87% of participants lived in urban areas. While 75% of participants had no history of Covid-19 disease, 73% had a family member who contracted the disease, and 27% of participants had a relative die of Covid-19.

The data in Table 2 shows that among the domains of participants' risk perception for Covid-19 disease, the three domains of self-efficacy, response effectiveness, and intention had the highest means compared with the other domains (see Table 3).

The information in this table shows that 97.1% of the participants in the study follow news and information about the Covid-19 disease and 54.3% of the participants use official government sources such as radio and television to get information. Only 8.8% of participants reported a “very high” level of trust in information and news from official radio and television sources about the Covid-19 disease, meanwhile, 61.5% of the participants reported that the main motivational media for disease prevention was official radio and television.

In Table 4, the effect of demographics and some variables related to Covid-19 on the dimensions of risk perception are reported. As can be seen, a statistically significant relationship ($p < 0.05$) between the dimensions of risk perception and age was observed. In all dimensions except defensive avoidance, the age group of 60 and above showed a lower mean score than the other age groups. In terms of fear and behavior, females scored higher than males, but in terms of defensive avoidance, males scored higher than females. In other dimensions, there was no statistically significant difference in terms of gender. Single people reported the lowest mean score in the fear and behavior dimension, while divorced individuals and married individuals reported the lowest mean scores in perceived sensitivity and defensive avoidance, respectively. There was no statistically significant difference in other dimensions. Families with a larger number of members reported lower mean scores in the dimensions of fear and self-efficacy. There was a statistically significant difference in the mean scores of different occupational groups in all dimensions. Urban residents perceived sensitivity in terms of sensitivity and behavior, and rural residents showed a higher mean score in defensive avoidance. For people with an underlying disease, a significant difference was observed only in the dimension of defensive avoidance, which was the mean score of this dimension was less reported. People with a history of Covid-19 reported a lower mean score in the self-efficacy dimension but a higher mean score in the behavior dimension than people that had no history of the disease. Individuals with a family history of Covid-19 reported higher scores on intention and perceived sensitivity (see Table 5).

This study also utilized the Pearson correlation coefficient and regression model to evaluate correlations between the main variables of risk perception and investigate the relationship between variables, especially behavioral variables. Accordingly, there was a statistically significant positive relationship between response effectiveness and perceived sensitivity, perceived severity, and self-efficacy ($p < 0.05$). A statistically significant positive relationship was also observed between behavior and self-efficacy, response effectiveness, fear, and intention ($p < 0.05$). The relationships between other variables are also reported in the table.

Linear regression analysis was also performed considering all studied risk factors to determine the most predictive indicator for response efficacy. Table 6 presents the final multivariate linear regression model. Stepwise multivariate linear regression analysis revealed that perceived sensitivity, perceived severity, self-efficacy, fear, defensive avoidance, intention, and behaviors were independent predictors of response efficacy. Based on the results and according to the standard coefficients, the variables had the greatest impact on the effectiveness of the response, respectively, including the intention (standardized beta = 0.347, $p < 0.001$), self-efficacy, (standardized beta = 0.283, $p < 0.001$), perceived intensity (standardized beta = 0.156, $p < 0.001$), and perceived sensitivity (standardized beta = 0.082, $p < 0.001$) variables.

Table 1
Demographic and general characteristics of participants.

Characteristic demographics	Frequency	(%)
Total (No. = 2014)		
Age		
≤30 Years	820	40.7
30-45	948	47.1
46-60	218	10.8
>60 Years	28	1.4
Sex		
Female	1105	54.9
Male	909	45.1
Marriage status		
Single	654	32.5
Married	1313	65.2
Divorced	16	0.8
Widow	31	1.5
Education		
High School	277	13.8
Diploma	468	23.2
Collegiate	1269	63
Number of Family		
<4	777	38.6
4-6	1171	58.1
>6	66	3.3
Job Status		
Housewife	379	18.8
Healthcare worker	250	12.4
Non- Healthcare worker	362	18
Unemployed	177	8.8
Labor	82	34.3
Retired	79	3.9
Other	76	3.8
Resident place		
Urban	1767	87.7
Rural	247	12.3
History of underlying disease		
Yes	219	10.9
No	1795	89.1
History of covid19		
Yes	485	24.1
No	1529	75.9
Family History of covid19		
Yes	1250	62.1
No	764	37.9
Relative die due to covid19		
Yes	540	26.8
No	1474	73.2

Table 2
Scores of participants' risk perception dimensions for Covid-19 disease.

Variable	Mean	Standard deviation
Perceived sensitivity	7.92	1.35
Perceived severity	6.72	2.19
self-efficacy	9.46	2.09
response efficacy	9.42	2.10
Fear	6.19	2.61
Defensive avoidance	4.71	1.78
Intention	9.69	1.99
Behavior	6.58	1.54

4. Discussion

Risk perception is one of the most important issues at the time of incidents. Because the Covid-19 pandemic has created a global emergency, addressing the public's awareness of this new emergency is crucial in planning to prevent the spread of the disease. Each component of risk perception helps managers and policymakers to make dynamic and timely decisions [17]. In the present study, the risk perception of Covid-19 disease among the study population was assessed. This study was based on the extended parallel process

Table 3
Reports the results of risk communication based on the EPPM model. According to the results of this table.

Variable (question)	Frequency	percentage
Do you follow the news and information about COVID-19 disease?		
Yes, I follow up constantly	1284	63.8
I follow from time to time	671	33.3
No, it does not matter to me at all	59	2.9
From which source do you get the most news and information about Covid-19 (number of patients, mortality, and health instructions)?		
Official sources (Radio and Television)	1093	54.3
Unofficial sources (social networks such as Telegram, WhatsApp, etc.)	710	35.3
Unofficial sources (satellite networks)	38	1.9
Family members, friends and relatives	53	2.6
Health experts and specialists	120	6
How much do you trust the information about COVID-19 that is broadcast on the country's official radio and television?		
Not at all	263	13.1
A little	347	17.2
To some extent	800	39.7
Much	426	21.2
Very much	178	8.8
Which source of information most motivates you to the prevention?		
Official sources (Radio and Television)	1239	61.5
Informal sources (Virtual social networks and satellite networks)	775	38.5

model (EPPM) and focused on the risk perception of 2014 citizens of Ardabil province. The results showed that 63.8% of the participants continually followed the Covid-19 news. This can have a positive or negative effect on people's risk perception.

A study of the impact of the media on COVID-19 risk perception showed that communication with the media could be used to improve public policy. At the same time, excessive use of mass media in connection with the Covid-19 virus may lead to excessive and unreasonable reactions and fears [18]. It can be said that consideration of the content in public media is effective in implementing appropriate measures and ultimately improving risk perception among people.

Another study showed that the use of social media was effective in advancing the goals of health prevention programs during the Covid-19 pandemic. furthermore emphasizes the use of the EPPM model to improve people's risk perception, and said health policymakers and managers must design and provide the right content for public media through confident communication channels [19].

Given the importance of social media and the fact that 34% of participants in our study use social media to follow the news and warnings related to the Covid-19 pandemic, planning intervention in the content production of this communication context seems necessary.

A 2021 study conducted in Switzerland showed that risk perception, social trust, and the right balance between health and economic concerns are important factors in managing an epidemic. Building a foundation of social trust begins before the epidemic. Government agencies need to plan to gain public participation in risk mitigation programs [20]. In addition, to achieve the desired results of risk communication in epidemics, intersectoral collaboration is required [21]. One of the most important dimensions of risk perception is self-efficacy, which was also introduced in the current results as a dimension that has the highest mean in participants' risk perception. The results of other studies in Iran have further shown that self-efficacy was scored highly by more than half of the participants. It has also been demonstrated that a lower self-efficacy score in the event of an epidemic threat causes a person to devote their energy to coping with fear rather than using effective control mechanisms. Furthermore, people with higher self-efficacy scores had better health behaviors than others [22,23]. The results of these studies are consistent with the results of the current study.

In the present study, eight areas of perceived risk and their results were reported. Factors affecting the domain of response effectiveness that will eventually lead to appropriate and effective behavior were measured and reported. The results showed that among the areas of study of participants' risk perception of Covid-19 disease, the three areas of self-efficacy, response effectiveness, and intention had the highest means compared with the other areas. The variables that had the greatest impact on response effectiveness were the intention, self-efficacy, perceived severity, and perceived sensitivity, respectively.

Another study emphasized that response effectiveness is important because when people are exposed to a threatening situation, having appropriate response effectiveness affects higher participation in controlling the risk [23]. In line with the results of the present study, other studies have shown that people in the community who react appropriately to a threat such as a disease or epidemic can understand the situation correctly through the mechanism of fear, turning it into intention, and finally performing an appropriate reaction or, in other words, an effective response [19,23]. Of course, some people may use ineffective and unresponsive mechanisms, such as denial in the face of fear, which is another aspect of fear [12]. The results of these studies are consistent with the results of the current study in the sense that fear in individuals if directed to change behavior, will increase people's risk perception and response effectiveness.

In the present study, the effects of demographic factors and the history of Covid-19 on the dimensions of risk perception were also measured. Our results showed that people over the age of 60 reported a lower risk perception score, as mortality from Covid-19 was higher among the elderly, which could be a warning in the study population. Females scored higher than males in terms of fear and behavior, while males scored higher than females in defensive avoidance. The study on university students has shown that despite the fact that they have shown an acceptable level of risk perception, they are vulnerable to the psychological effects of the Covid-19 dis-

Table-4
Relationship between individual-social variables and dimensions of risk perception.

	Intention Mean (SD)	Defensive avoidance Mean (SD)	Fear Mean (SD)	response efficacy Mean (SD)	self-efficacy Mean (SD)	Perceived severity Mean (SD)	Perceived sensitivity Mean (SD)	Behavior Mean (SD)
Age								
≤30 Years	9.7 [2]	4.6 (1.8)	6.1 (2.6)	9.4 (2.2)	9.5 (2.1)	6.5 (2.1)	7.9 (1.4)	6.4 (1.6)
30-45	9.7 (1.9)	4.6 (1.7)	6.3 (2.6)	9.4 (2.0)	9.4 (2.0)	6.7 (2.1)	7.9 (1.2)	6.5 (1.6)
46-60	9.7 (1.8)	4.3 (1.8)	5.6 (2.4)	9.2 (2.0)	9.5 (1.9)	7.1 (2.3)	7.8 (1.3)	6.8 (1.5)
>60 Years	8.2 (1.9)	5.4 (1.9)	5.7 (2.4)	8 (2.2)	8.5 (1.9)	6.6 (2.1)	7.1 (1.6)	6.7 (2.1)
P-Value	0.005	0.000	0.000	0.003	0.095	0.002	0.019	0.041
Sex								
Male	9.3 (2.0)	4.8 (1.9)	5.7 (2.4)	9.3 (2.1)	9.1 (2.1)	6.9 (2.2)	7.9 (1.4)	6.5 (1.6)
Female	10.1 (1.8)	4.5 (1.5)	6.6 (2.6)	9.5 (2.0)	9.8 (1.9)	6.4 (2.1)	7.9 (1.2)	6.6 (1.3)
P-Value	0.149	0.000	0.003	0.182	0.100	0.498	0.023	0.000
Marriage status								
Single	9.6 (2.1)	4.8 (1.8)	5.8 (2.4)	9.4 (2.2)	9.4 (2.1)	6.5 (2.1)	7.9 (1.4)	6.3 (1.6)
Married	9.7 (1.9)	4.6 (1.7)	6.3 (2.6)	9.4 (2.0)	9.4 (2.0)	6.7 (2.2)	7.9 (1.2)	6.6 (1.4)
Divorced	8.7 (1.0)	5.5 (1.8)	7.6 (2.4)	8.2 (2.0)	8.0 (1.6)	6.5 (1.5)	7.0 (1.5)	6.6 (1.9)
Widow	9.5 (2.4)	5.2 (1.7)	7.2 (2.5)	8.7 (2.5)	9.8 (1.9)	7.1 (2.5)	7.2 (1.8)	6.3 (1.5)
P-Value	0.319	0.032	0.009	0.074	0.055	0.332	0.000	0.007
Education								
High School	9.7 (2.2)	5 (1.7)	6.1 (2.7)	9.5 (202)	9.6 (2.1)	6.8 (2.2)	7.6 (1.7)	6.7 (1.5)
Diploma	9.7 (1.9)	4.8 (1.8)	6.2 (2.5)	9.4 [2]	9.5 (1.9)	6.7 (2.2)	7.7 (1.2)	6.6 (1.5)
Collegiate	9.7 (1.9)	4.5 (1.7)	6.2 (2.6)	9.4 (2.2)	9.3 (2.1)	6.8 (2.2)	8.0 (1.7)	6.4 (1.5)
P-Value	0.892	0.000	0.972	0.892	0.123	0.287	0.000	0.000
Family members								
<4	9.6 (1.9)	4.6 (1.6)	6.3 (2.6)	9.4 [2]	9.4 [2]	6.7 (2.1)	7.9 (1.3)	6.5 (1.4)
4-6	9.7 [2]	4.7 91.80	6 (2.5)	9.4 (2.1)	9.5 (2.5)	6.7 (2.2)	7.9 (1.3)	6.5 (1.45
>6	9.1 (2.1)	4.7 (1.7)	6.2 (2.7)	8.8 (2.2)	8.5 (2.5)	6.7 (1.9)	7.6 (1.4)	6.4 (1.7)
P-Value	0.080	0.650	0.038	0.090	0.002	0.967	0.326	0.840
Job Status								
Housewife	10 (1.8)	4.8 (1.6)	5.9 (2.4)	9.5 (1.9)	9.8 (1.8)	6.5 (2.1)	7.6 (1.3)	6.7 (1.3)
Healthcare worker	9.8 (1.9)	4.4 (1.9)	5.8 (2.4)	9.8 (1.8)	9.4 [2]	6.8 (2.2)	8.3 (1.1)	6.5 (1.5)
Non-Healthcare worker	9.8 (1.6)	4.3 (1.6)	6 (2.6)	9.5 (1.8)	9.4 (1.9)	6.8 (2.2)	8 (1.2)	6.5 (1.4)
Unemployed	9.6 [2]	5 (1.8)	6.2 (2.5)	9.1 (2.2)	9.3 (2.2)	6.6 (2.1)	7.8 (1.3)	6.6 (1.7)
Labor	8.6 (2.2)	4.9 (1.6)	5.6 (2.3)	8.6 (2.5)	8.5 (2.3)	6.9 (2.1)	7.2 (1.3)	6.8 (1.7)
Retired	9.7 (1.7)	4.2 (1.6)	5.8 (2.4)	9.3 (1.8)	9.8 (1.7)	7.3 (2.3)	7.8 (1.3)	6.9 (1.5)
Other	9.4 (2.1)	4.8 (1.8)	6 (2.6)	9.3 (2.2)	9.3 (2.2)	6.6 (2.1)	7.9 (1.4)	6.4 (1.5)
P-Value	0.005	0.000	0.001	0.001	0.000	0.059	0.000	0.005
Resident place								
Urban	9.7 (1.9)	4.6 (1.7)	6.2 (2.6)	9.4 (2.0)	9.4 (2.0)	6.6 (2.1)	7.9 (1.9)	6.5 (1.5)
Rural	9.3 (2.1)	5.2 (1.9)	6.1 (2.4)	9.2 (2.1)	9.3 (2.2)	7.0 (2.2)	7.6 (2.1)	6.8 (1.6)
P-Value	0.271	0.001	0.066	0.731	0.206	0.907	0.00	0.011
History of underlying disease								
Yes	9.8 (1.9)	4.3 (1.4)	6.1 (2.6)	9.2 (2.2)	9.4 (2.1)	7 (2.3)	7.8 (1.3)	6.5 (1.4)
No	9.6 (1.9)	4.7 (1.6)	6.2 (2.6)	9.4 (2.0)	9.4 (2.0)	6.6 (2.1)	7.9 (1.3)	6.5 (1.5)
P-Value	0.731	0.026	0.243	0.489	0.915	0.342	0.789	0.654
History covid19								
Yes	9.4 (2.1)	9.7 (1.9)	6.2 (2.5)	9.5 [2]	9 (2.3)	6.5 (2.2)	8.1 (1.4)	6.6 (1.7)
No	9.7 (1.9)	4.7 (1.7)	6.1 (2.6)	9.1 (2.2)	9.5 [2]	6.7 (2.1)	7.8 (1.3)	6.5 (1.4)
P-Value	0.170	0.092	0.889	0.092	0.027	0.061	0.290	0.000
Family History covid19								
Yes	9.7 (1.9)	4.8 (1.8)	6.2 (2.6)	9.3 (2.1)	9.4 [2]	6.6 (2.1)	8 (1.2)	6.5 (1.5)
No	9.6 (2.1)	4.6 (1.7)	6 (2.6)	9.5 [2]	9.5 (2.1)	6.8 (2.1)	7.7 (1.4)	6.5 (1.5)
P-Value	0.001	0.217	0.389	0.515	0.289	0.534	0.001	0.334
Relative die due to covid19								
Yes	9.6 (1.9)	4.6 (1.6)	6.5 (2.6)	9.3 [2]	9.3 (2.1)	6.7 (2.2)	8 (1.2)	6.4 (1.5)
No	9.7 [2]	4.7 (1.7)	6 (2.5)	9.4 (2.1)	9.4 [2]	6.6 (2.1)	7.8 (1.3)	6.6 (1.5)
P-Value	0.170	0.078	0.343	0.116	0.965	0.434	0.054	0.778

ease [24]. In school students who are in the lower age category, in addition to the negative psychological impact during the Covid-19 era, also reported a low-risk perception [25] It seems that age is an important factor in society's perception of risk, which should be considered in educational planning. A study conducted in China showed that the psychological effects of the covid-19 disease, such as depression and anxiety, were greater in women than in other population groups [26]. Other studies have also reported higher risk perception scores for females, which is consistent with the current findings but not in terms of defensive avoidance [27–29]. Also, in the present study, a significant relationship was shown between different jobs and dimensions of risk perception. This issue has been shown in other studies under the specific title of Covid-19 burnout [30]. It seems that new results can be achieved by measuring job burnout and its relationship during epidemics.

Table 5
Bivariate correlations between key variables.

Behavior	Intention	Defensive avoidance	Fear	response efficacy	self-efficacy	Perceived severity	Perceived sensitivity	Variables
–	–	–	–	–	–	–	1	Perceived sensitivity
–	–	–	–	–	–	1	.234*	Perceived severity
–	–	–	–	–	1	.232*	.319*	self-efficacy
–	–	–	–	1	.578*	.328*	.322*	response efficacy
–	–	–	1	.113*	.058*	.238*	.060*	Fear
–	–	1	.189*	−.155*	−.153*	.014	−.134*	Defensive avoidance
–	1	−.220*	.114*	.611*	.640*	.254*	.326*	Intention
1	.099*	.014	.078*	.074*	.056*	−.004	−.032	Behavior

* Significant at level of $P < 0.05$; computed by Spearman rank correlation.

Table 6
Multivariate regression analysis with response efficacy as a dependent variable.

Model	Unstandardized coefficients (B)	St. Error	Standard coefficient (Beta)	t	Sig.
Constant	.992	.337		2.945	.003
Perceived sensitivity	.129	.030	.082	4.250	.000
Perceived severity	.149	.018	.156	8.234	.000
self-efficacy	.283	.023	.283	12.164	.000
Fear	.014	.015	.017	.919	.358
Defensive avoidance	−.030	.022	−.025	−1.345	.179
Intention	.368	.025	.347	14.548	.000
Behavior	.033	.024	.024	1.352	.176

4.1. Limitation

One of the limitations of this study is the lack of face-to-face interaction with the participants due to the special conditions of the pandemic at the time of data collection. Participants from all age groups and occupations participated in the study with high diversity, but some people may not have participated in the study due to the lack of access to the internet virtual networks of a part of society. Although this study was conducted with a large sample size in a large province, due to various background factors, the risk perception in other communities may be different from the present results.

5. Conclusion

The current results indicate that the response effectiveness during the outbreak of Covid-19 disease was influenced by the variables of intention, self-efficacy, perceived severity, and perceived sensitivity. Furthermore, the areas of risk perception and the overall risk perception score during the Covid-19 pandemic can be effective in responding to the behavioral response of individuals in the community. It is suggested that administrators develop and implement training programs at the general level, at schools and universities, to raise the risk perception of individuals.

Another result of this study was the participants' attention to formal media and, to a lesser extent, virtual social networks. Professional planning for content production is recommended to increase risk perception in the community through such communication platforms.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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