



The role of risk perception, risk communication, and demographic factors in COVID-19 preventive behaviors: an online survey in Iran

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ABSTRACT

Objectives: This study investigated preventive behaviors toward coronavirus disease 2019 (COVID-19) and related factors in a Kurdish Iranian sample.

Methods: This online survey was conducted among the population aged 18 and above in Kermanshah Province, in western Iran, in April 2020. Samples were invited and recruited through social media. Data were collected using a questionnaire consisting of 4 sections (questions on demographic variables, risk perception, risk communication, and COVID-19 preventive behaviors) and analyzed using Stata ver. 8.

Results: The Pearson correlation test showed that risk communication was significantly correlated with COVID-19 preventive behaviors ($r = 0.320$, $p < 0.01$). In the final model, where the explanatory power increased with the entry of the risk communication variable, the variables explained a total of 14% of variance in COVID-19 preventive behaviors. Sex ($\beta = -0.482$), risk perception ($\beta = 0.047$), and risk communication ($\beta = 0.662$) were significant determinants.

Conclusion: Risk communication and risk perception related to COVID-19, as well as being a woman, were determinants of COVID-19 preventive behaviors.

Keywords: Behavior; Communication; COVID-19; Media; Perception; Risk

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Introduction

The World Health Organization declared a global public health emergency in January 2020 following the rapid and sudden outbreak of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) [1]. According to statistics, SARS-CoV-2 spread faster in some parts of the world than in others [2]. Iran is still among the leading countries in the Eastern Mediterranean region in terms of the total number of cases and deaths due to coronavirus disease 2019 (COVID-19) [3].

The rapid transmission and unknown aspects of COVID-19, as well as the lack of definitive treatments, have posed serious challenges for disease control [4]. Personal protection measures (e.g., face mask wearing, hand washing, and personal hygiene), travel restrictions, and physical distancing can help reduce the risk of infection and control the spread of disease [5]. People's willingness to participate in self-care plays an important and decisive role in implementing the preventive guidelines recommended by public health authorities. However, encouraging the public to take preventive measures and receive vaccinations remains a problem for health [6]. Assessing the people's perceptions, beliefs, and behavioral responses during epidemics can provide useful information for effective risk communication and successful changes in health behaviors [7].

The lack of attention to scientific analyses, the inability to explain the role of psychosocial patterns, and the lack of appropriate models and theories are some reasons for the failure of national health programs [8]. The health belief model (HBM) aims to explain preventive behaviors, for which the issue of risk perception has been discussed. According to the HBM, to perform a health behavior, people must first feel their vulnerability to the problem (in this case, COVID-19), and then perceive the physical and mental severity of the danger [9]. Risk perception, which is a mental judgment that people make about the characteristics and severity of a risk, is influenced by psychological factors and environmental and social conditions [10]. Understanding the risk of disease can greatly affect the care process and have a significant impact on changing behaviors and lifestyles [11]. According to the protection motivation theory, the adoption of protective measures in individuals is significantly affected by their level of risk perception. This theory suggests that perceptions of the severity of a health threat and vulnerability to that threat determine the degree of risk perception [12]. Evidence shows a moderate correlation between risk perception and health behaviors [13], and research has found that people who are cautious in dangerous situations make more rational decisions [14]. Studies have also shown that attention to health warnings provided by the media is a

factor affecting risk perception in society [15].

Health communication is an essential tool for achieving public health goals, facilitating and supporting behavioral changes, and reducing health inequalities [16]. Risk communication is a key concept in health communication to increase understanding of health threats and support people in making informed decisions to reduce risks [17]. Risk communication involves the effective and accurate exchange of information about health risks during a crisis or emergency condition that promotes risk awareness and health protective behaviors among individuals, communities, and institutions [18]. Risk communication is also effective both for limiting mortality and for minimizing damage to the national economy and public health infrastructure [1].

Previous studies have suggested that the level of attention to health warnings about COVID-19 from state-owned media and social media is an important issue [19–21]. Strengthening health messages during a pandemic can increase the role of health communication and media attention. Effective risk communication means that all related risk messages can be presented and shared openly and in a timely manner with the aim of bridging the knowledge gap between informants and the recipients of messages [22].

In this study, we considered risk communication as the level of attention to health warnings about the negative effects of COVID-19 and its role in preventive behaviors [23]. The study by Heydari et al. [24] showed that risk communication has direct and indirect positive effects on preventive behaviors. Since few studies have been conducted in Iran on the relationships of risk perception and risk communication with preventive behaviors, the present study was conducted to investigate COVID-19 preventive behaviors and its related factors in western Iran.

Materials and Methods

Study Design and Participants

This online survey was conducted among the population aged 18 and over in Kermanshah Province, western Iran in April 2020, in which samples were selected through social media (WhatsApp and Telegram). During the 2 weeks that the questionnaire page was available online to the respondents, 3,795 people visited and 2,155 (56.8% response rate) completed the research questionnaire. The inclusion criteria were agreement to participate in the study, living in Kermanshah Province, and being at least 18 years old. Subjects were excluded from the study if the questionnaire was incomplete or the person was under 18 years of age. In order to comply with ethical principles, an informed consent form was provided on the first page of the online

questionnaire, in which the participants were assured that all their information would be confidential and anonymous, and participants indicated their agreement by checking a box.

Measurements

The data collection tool in this study included a 4-part questionnaire. The first part contained demographic and contextual questions, including age, sex, marital status, level of education, job status, number of family members, and whether friends and family had been infected with or died from COVID-19. Subjective socioeconomic status (SES) was asked with a question on a 10-point scale. The second part of the questionnaire contained 6 questions about risk perception related to COVID-19, which were scored with a 5-point Likert scale, yielding a total score that ranged from 6 to 30, on which a higher score indicated higher risk perception. Risk communication was assessed by the following question: "How much do you pay attention to the news, information, and warnings from the official and social media about COVID-19?" The answers were scored on a 5-point Likert scale. The final part of the questionnaire examined health preventive behaviors, which were assessed through 6 questions on the individual's behaviors: (1) observance of physical distancing instructions, (2) use of gloves, (3) use of masks, (4) hand washing, (5) disinfection of one's home space, and (6) disinfection of cell phones and laptops. The answers were evaluated with 3 options: no (score 1), yes occasionally (score 2) and always (score 3). The lowest score was 6 and the highest score was 18. A higher score indicated better and more appropriate preventive behaviors for dealing with COVID-19.

The face validity of the questionnaire was assessed by a panel of experts, including 10 specialists in epidemiology, health education and health promotion, sociology, psychology and social welfare. According to the panel, the content validity ratio and content validity index were 100% and 89%, respectively. In addition, internal consistency of risk perception questions was acceptable, with a Cronbach's alpha of 0.706.

Ethical Statement

The present study was approved by the ethics committee of Kermanshah University of Medical Sciences (code: IR.KUMS.REC.1398.1220).

Data Collection and Statistical Analysis

This online survey was conducted among the population aged 18 and over in Kermanshah Province, western Iran in April 2020. The collected data were analyzed using

descriptive and analytical statistics in Stata ver. 8 (StataCorp. LLC, College Station, TX, USA). Mean values with the standard deviation were used for descriptive analysis, and multiple linear regression was used to identify determinants of COVID-19 preventive behaviors. Before running the regression model, we assessed the assumptions of multiple regression. Since the Durbin-Watson statistic was 1.95, and the variance inflation factor was 1.25, conducting the regression model was justified. The normality of the data was confirmed using the Kolmogorov-Smirnov test. The research variables were entered into the regression model in 3 steps: contextual and demographic variables in the first step (model 1), risk perception related to COVID-19 in the second step (model 2), and risk communication in the third model (model 3). In this study, a 95% ($p < 0.05$) significance level was adopted.

Results

The total number of participants in this study was 2,155. Among the respondents 61.4% were women, 32.3% were single, and 76.3% had a university education. More than half of the respondents lived in a family with 4 to 6 people, and more than 39% perceived themselves as being in the middle class of SES. The mean \pm SD age of the respondents was 37.62 ± 10.03 years. The mean \pm SD score of SES was 5.53 ± 2.04 . More than half (52%) of the respondents stated that they always paid attention to health warnings from the media. About 9% of respondents did not use gloves at all and about 40% always wore a mask. The mean \pm SD of the risk perception score was 24.16 ± 3.04 (Table 1).

The Pearson correlation test showed that risk communication had a significant correlation with COVID-19 preventive behaviors ($r = 0.320$, $p < 0.01$), and the association between risk communication and risk perception was moderate and positive; in other words, with increasing risk perception, risk communication also increased ($r = 0.445$, $p < 0.01$) (Table 2).

Multiple linear regression was used to identify factors associated with COVID-19 preventive behaviors. For this purpose, in the first step (model 1), demographic and contextual variables were entered in the model. The analysis in this section showed that demographic and contextual variables explained 4.89% of the changes in dependent variable ($R^2 = 0.0489$, adjusted $R^2 = 0.0364$). Among the variables included in the model, age ($\beta = 0.010$), sex ($\beta = -0.567$), employment as a shopkeeper ($\beta = -0.460$), and very high SES ($\beta = 0.483$) were significant determinants of preventive behaviors (Table 3).

In the second step (model 2), in addition to the contextual and demographic variables, Risk perception related to COVID-19 was also included. In this step, the explanatory

Table 1. Characteristics of the study participants

Variable	Value	Variable	Value
Female sex (<i>n</i> = 2,063)	1,266 (61.4)	Socioeconomic status (<i>n</i> = 2,063)	5.53 ± 2.04
Age (y) (<i>n</i> = 1,977)	37.62 ± 10.03	Very low	171 (8.3)
18–29	459 (23.2)	Low	389 (18.8)
30–39	737 (37.3)	Moderate	807 (39.1)
40–49	483 (24.4)	High	586 (28.4)
50–59	245 (12.4)	Very high	110 (5.3)
> 60	53 (2.7)	Risk perception (<i>n</i> = 2,051)	24.16 ± 3.04
Marital status (<i>n</i> = 2,053)		Risk communication (<i>n</i> = 2,064)	4.42 ± 0.67
Single	664 (32.3)	Almost never	3 (0.1)
Married	1,338 (65.2)	Rarely	11(0.5)
Divorced	32 (1.6)	Occasionally	165 (8.0)
Widowed	19 (0.9)	Often	811(39.3)
Number of household members (<i>n</i> = 2,059)		Almost always	1,074 (52.0)
≤ 3	947 (46.0)	Wear gloves (<i>n</i> = 2,064)	
4–6	1,034 (50.2)	Always	141 (6.8)
> 6	78 (3.8)	Sometimes	185 (9.0)
Highest level of education (<i>n</i> = 2,061)		No	1,585 (76.8)
Primary school	16 (0.8)	Not available	153 (7.4)
Secondary school	61 (3.0)	Wear a mask (<i>n</i> = 2,062)	
Diploma degree	411 (19.9)	Always	741 (35.9)
University degree	1,573 (76.3)	Sometimes	1,002 (48.6)
Family or friends infected with COVID-19 (<i>n</i> = 2,065)		No	319 (15.5)
Yes	111 (5.4)	Physical distance (<i>n</i> = 2,067)	
No	1,954 (94.6)	Yes, comply	1,625 (78.6)
Family or friends died from COVID-19 (<i>n</i> = 2,067)		Economic condition does not permit	379 (18.3)
Yes	37 (1.8)	Never	63 (3.0)
No	2,030 (98.2)	Wash hands (<i>n</i> = 2,067)	
Job (<i>n</i> = 2,062)		Always	1,947 (94.2)
Housekeeper	462 (22.4)	Sometimes	118 (5.7)
Government employee	918 (44.5)	Never	2 (0.1)
Workman	77 (3.7)	Disinfect one's home (<i>n</i> = 2,065)	
Shopkeeper	73 (3.5)	Yes always	1,594 (77.2)
Vendor	3 (0.1)	Yes, sometimes	425 (20.6)
Military	21(1.0)	Never	46 (2.2)
Unemployed	199 (9.7)	Disinfect one's personal devisees (<i>n</i> = 2,066)	
University student	88 (4.3)	Yes always	1,486 (71.9)
Others	213 (10.3)	Yes sometimes	511 (24.7)
		Never	69 (3.3)
		Total score for COVID-19 preventive behaviors (<i>n</i> = 2,069)	14.55 ± 1.45

Data are presented as *n* (%) or mean ± standard deviation.
 COVID-19, coronavirus disease 2019.

Table 2. Correlations among the main variables

Variable	Total COVID-19 preventive behaviors	Risk perception	Risk communication
Total COVID-19 preventive behaviors	1.00	0.201**	0.320**
Risk perception	0.201**	1.00	0.445**
Risk communication	0.320**	0.445**	1.00

COVID-19, coronavirus disease 2019.

***p* < 0.01.

Table 3. Multiple regression analysis of factors associated with COVID-19 preventive behaviors, Kermanshah, Iran, 2020

Independent variable	Model 1		Model 2		Model 3	
	Coefficient (β)	SE	Coefficient (β)	SE	Coefficient (β)	SE
Age	0.010*	0.004	0.009*	0.004	0.007	0.004
Sex	-0.567**	0.09	-0.553**	0.089	-0.482**	0.087
Marital status						
Married	-0.182	0.103	-0.125	0.102	-0.168	0.099
Divorced	-0.300	0.318	-0.270	0.312	-0.323	0.303
Widowed	-0.638	0.421	-0.374	0.415	-0.070	0.404
Highest level of education						
Secondary	-0.554	0.536	-0.849	0.528	-0.799	0.512
Diploma	-0.542	0.49	-0.774	0.482	-0.640	0.468
Academic	-0.553	0.49	-0.815	0.482	-0.703	0.468
Job						
Government employee	0.005	0.121	-0.064	0.119	-0.066	0.116
Workman	-0.105	0.230	-0.147	0.228	-0.045	0.221
Shopkeeper	-0.460*	0.232	-0.403	0.228	-0.391	0.222
Vendor	-1.01	0.962	-1.220	0.945	-0.925	0.917
Military	0.210	0.391	0.091	0.384	0.299	0.373
Unemployed	0.016	0.167	0.038	0.165	0.001	0.160
University student	-0.189	0.215	-0.192	0.212	-0.145	0.206
Other	0.101	0.156	0.045	0.153	0.050	0.149
Socioeconomic status						
Low	-0.078	0.162	-0.026	0.16	-0.012	0.156
Moderate	-0.007	0.151	0.031	0.149	-0.016	0.145
High	0.134	0.157	0.164	0.155	0.048	0.151
Very high	0.483*	0.219	0.446*	0.216	0.325	0.210
Chronic diseases	0.106	0.114	0.117	0.113	0.089	0.109
Family or friend infected with COVID-19	-0.066	0.179	0.015	0.176	0.037	0.171
Family or friend died from COVID-19	-0.266	0.302	-0.334	0.297	-0.322	0.288
No. of household members						
4-6	0.028	0.080	0.052	0.079	0.077	0.076
> 6	-0.382	0.204	-0.270	0.201	-0.196	0.195
Risk perception			0.113**	0.012	0.047**	0.013
Risk communication					0.662**	0.061
Cons	16.65**	0.691	13.20**	0.734	11.96**	0.712
N	1,916		1,902		1,900	
p > F	0.001		0.001		0.001	
R-squared	0.0489		0.0888		0.1423	
Adjusted R-squared	0.0364		0.0762		0.13	
Root mean-square error	1.64		1.61		1.57	

COVID-19, coronavirus disease 2019; SE, standard error.

* $p < 0.05$, ** $p < 0.01$.

power of the model was increased to 8.88%, reflecting a change of approximately 4 percentage points ($R^2 = 0.0888$, adjusted $R^2 = 0.0762$), which indicates the importance of the risk perception of COVID-19. In model 2, the variables of age ($\beta = 0.010$), sex ($\beta = -0.553$), very high perceived SES ($\beta = 0.446$), and risk perception ($\beta = 0.113$) remained in the model (Table 3).

In the third step (model 3), risk communication was entered into the model in addition to the variables of model 2. The new analysis showed that the sum of the variables in model 3 explained 14.23% ($R^2 = 0.1423$, adjusted $R^2 = 0.13$) of variance in preventive behaviors toward COVID-19. Sex ($\beta = -0.482$), risk perception ($\beta = 0.047$), and risk communication ($\beta = 0.662$) remained in the final model (Table 3).

Discussion

The aim of this study was to investigate the effect of contextual and demographic variables, risk communication, and risk perception on COVID-19 prevention behaviors in western Iran. Risk communication had a direct effect on preventive behaviors that was greater in magnitude than the other variables included in the regression model. This finding is consistent with the study by Heydari et al. [24], who similarly emphasized the role of risk communication in COVID-19 preventive behaviors. Studies on the mechanism of the relationship between risk communication and individual performance and adopting appropriate strategies have emphasized the following steps: (a) receiving a warning message (b) understanding the relevant content, (c) accepting and believing the importance of the existing message, (d) confirming the truth of their interpretations with other people, and (e) acting in response to save lives [25].

Risk communication plays an important role in effectively communicating, supporting public needs, and carrying out preventive measures in stressful situations and epidemics [26,27]. Understanding how people interpret risk, and especially how people use risk information to make important decisions about health behaviors, is effective for preventing disease [28]. It is important to identify the factors that are likely to lead to behavior change because ignoring audience perceptions can ultimately promote destructive and high-risk behaviors for health [29]. Risk communication is one of the most important components related to health that can enhance correct perceptions of risk and reduce the risk of harm through preventive behaviors [30].

Another finding of this study was the direct effect of risk perception on COVID-19 preventive behaviors. This finding was consistent with the study of Heydari et al. [24], although the effect of risk perception in their study was greater than that observed herein. It seems that increasing risk perception and engaging in protective behaviors are effective ways to moderate the risk factors of the disease [31]. The results of a prior study showed an association between increased risk perception and increased protective measures [12]. According to other studies, increasing risk communication can enhance risk perception and subsequently, increase protective behavior [32,33].

One of the important results of this study was the significance of age and sex variables in all 3 regression models. The results of this study showed that age had a positive and significant effect on COVID-19 preventive behaviors. This finding is inconsistent with the study by

Khazaei-Pool et al. [34] in Iran, but Tabibi et al. [35] showed that older participants had adapted more to COVID-19 preventive measures. Other studies have also shown more positive intentions to follow preventive measures in older individuals [36,37]. The elderly are at a significantly higher risk of morbidity and mortality due to COVID-19. Observance of COVID-19 preventive behaviors at older ages seems to be directly related to the degree of their vulnerability and risk perception [38].

Regarding sex, several studies have shown sex differences in preventive behaviors to avoid the spread of disease. For example, women are more likely than men to observe social distance and personal hygiene [39,40], which is consistent with our study. Fard et al. [41] in Iran showed that the sex variable explained 9% of variance in self-care behaviors associated with COVID-19. Firouzbakht et al. [42], in a study in Iran, showed that women generally had better preventive behaviors. In a meta-analysis, Moran and Del Valle [43] showed that women are more likely to avoid crowds and physical contact with others to prevent respiratory diseases. They also showed that women engage in more preventive behaviors than men to adapt to new conditions. These results indicate an inherent difference in how men and women respond to respiratory diseases and epidemics.

Another noteworthy result of this study was the effect of SES on COVID-19 preventive behaviors. In our study, in model 1 and model 2, having a very high subjective SES had a positive and moderate effect on COVID-19 prevention behaviors, but in model 3, the effect of subjective SES was not significant with the entry of risk communication. Some studies [42,44] have emphasized the role of SES in preventive behaviors, which is consistent with the results of models 1 and 2 in this study. Although evidence has shown that SES is among the strongest predictors of individual morbidity and mortality [45,46], in this study, the inclusion of risk communication removed SES from the final model.

Limitations

One of the limitations of this study is that data were collected by self-reporting. Therefore, some degree of measurement error may have occurred. In addition, due to less access to the internet and smartphones among the elderly and economically low-status groups, the population of this study might not have been fully representative. Nonetheless, the present study presents a good picture of the effect of risk communication and risk perception on COVID-19 preventive behaviors. Furthermore, the use of an appropriate sample size enhanced the accuracy of the conclusions.

Conclusion

This study showed that risk communication, risk perception, female sex, and older age were significant determinants of COVID-19 preventive behaviors. It seems that strengthening appropriate and timely programs and messages through mass media would likely be effective for preventing high-risk behaviors for COVID-19 in Iran. Paying attention to health warnings in the COVID-19 pandemic plays a role beyond all economic, social, and cultural factors and diminishes the effects of those factors. In general, based on the findings of this study, the importance of media and messages should be acknowledged as an important and influential source of preventive behaviors beyond SES.

Notes

Ethics Approval

This study was approved by the ethics committee of Kermanshah University of Medical Sciences (code: IR.KUMS.REC.1398.1220).

Conflicts of Interest

The authors have no conflicts of interest to declare.

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Availability of Data

All data generated or analyzed during this study are included in this published article. For other data, these may be requested through the corresponding author.

Authors' Contributions

Conceptualization: MR, NRG, YS; Data curation: FJN, NS; Formal analysis: MR, FN; Supervision: ZJS; Validation: MK, AA, ShS, SaS; Visualization: NRG, YS; Writing-original draft: NRG, YS, MK; Writing-review & editing: all authors.

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