

Original Research

The Effect of Misinformation Acceptance on COVID-19 Prevention Behaviors

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Abstract

The acceptance of misinformation about COVID-19 has had irreversible consequences on public health during the pandemic. The current study was conducted to investigate the effect of misinformation acceptance on preventive behaviors related to COVID-19 and to help health policymakers prioritize the fight against the epidemic. This cross-sectional survey was conducted on 626 Iranians over 15 years old using the available sampling method (March 4–2022 to May 14–2022). The data were analyzed in SPSS-19. With the status of vaccination with acceptance of misinformation, the evidence of higher acceptance of misinformation is seen in people who received a lower dose or did not receive the vaccine. Weaker economic groups have been more exposed to misinformation and accepting it. A negative correlation was found between preventive behaviors and acceptance of misinformation. Therefore, the higher the acceptance of misinformation, the participants observed the weaker preventive behaviors and the acceptance of misinformation along with age and the moderating effect of basic knowledge about COVID-19 predict preventive behavior in misinformation acceptance. The present study has a valuable contribution to our understanding of the effect of acceptance of misinformation on preventive behaviors and the characteristics of acceptance of misinformation as an essential predictor of preventive behaviors. Hence, identifying misinformation and preparing protocols for health advisors to provide people with correct information have a high value in the containment of the pandemic.

Keywords: COVID-19, Misinformation, Preventive behaviors, Source of information, Knowledge.

Introduction

Because of the ambiguous nature of Coronavirus and the considerable power of transmission of this disease, the most important and main way to control the disease is to break the chain of transmission of the virus (Eichenbaum, Rebelo & Trabandt, 2021; Güner, Hasanoğlu & Aktaş, 2020; Nakhaeizadeh & Mohammadi, 2021). At the start of the COVID-19 pandemic, the World Health Organisation (WHO) announced that an information pandemic had developed alongside a disease pandemic (Naeem & Bhatti, 2020). Misinformation was the main source of the information pandemic. Misinformation about COVID-19 can include misinformation about the virus and its transmission, conspiracy theories, and fictitious reports about prevention and treatment methods (Bin Naeem & Kamel Boulos, 2021; Pennycook, McPhetres, Zhang, Lu & Rand, 2020). Some consequences include using ineffective and potentially harmful medicines, ignoring the advice of health authorities, and engaging in behaviors that increase the risk of transmitting the virus. As a result, thousands suffer from these health risks due to medicines and incorrect health information (Islam et al., 2020; Swire-Thompson & Lazer, 2019).

Studies have shown that accepting misinformation impacts their willingness to engage in preventive behaviors. (Lee et al., 2020; Vijaykumar et al., 2021). This non-observance of preventive behaviors was associated with incorrect information about the origin, severity, contagion, and prevention of COVID-19 (Wang, van Antwerpen, Suparman, Gayatri, Sari & Zhang, 2021). The age group also affects the acceptance of misinformation and preventive behaviors (Vijaykumar et al., 2021). The role of health literacy in a recent study in the UK also showed that around half of British adults are at risk of COVID-19 malnutrition, and 40% of respondents can barely understand what is right or wrong about COVID-19 (Ofcom, 2020; Swire-Thompson & Lazer, 2019). According to Shams Ghahfarokhi and Shams Ghahfarokhi (2021), people's adherence to preventive behaviors is primarily influenced by how they know, feel, and behave towards COVID-19 (Shams Ghahfarokhi & Shams Ghahfarokhi, 2021). The study of knowledge, attitude, and performance towards COVID-19 plays an essential role in determining the readiness of society to accept health behavior change measures, especially in the current situation where rumors and misinformation about the prevention, transmission and treatment of coronavirus are circulating in social networks. (Zare et al., 2020).

Therefore, the present study investigated the effect of accepting misinformation on preventive behaviors related to COVID-19 in the Iranian population over 15 years of age. This will help health policymakers decide which aspects of the information epidemic should be prioritized in the fight against the epidemic. The following hypotheses framed this aim:

Hypothesis 1. Acceptance of misinformation about COVID-19 and preventive behaviors differ in gender groups (male and female), medical history (positive medical history or no medical history), age (15-25 years, 26-45 years, 45-65 years), economic status (low, medium and high) and vaccination status (no vaccination, first dose, second dose, third dose).

Hypothesis 2. Lower acceptance of misinformation about COVID-19 correlates with higher preventive behaviors.

Hypothesis 3. Acceptance of misinformation related to COVID-19 and demographic variables also predicts the effect of moderating the amount of knowledge on COVID-19 preventive behaviors.

Materials and methods

Participants

G*Power software was used to determine the sample size. The minimum sample size for a small effect size, alpha level of 0.05, and power level of 95% was calculated to be 619 samples. The survey was conducted in Porsline¹ for three months from 4th March 2022 and was open until 14th May 2022, and 757 questionnaires were finally extracted. The questionnaires were checked, and outliers were identified. Six hundred twenty-six valid questionnaires were used. The participants were 34.8% male and 65.2% female. The age of the participants was considered to be 15 years and above.

Measures

The research variables in an online questionnaire have three sections. The first part consists of the demographic variables and the type of information sources. The second part contains the items of knowledge about COVID-19 (a moderate variable) and the variable items of acceptance of misinformation, and the third part contains the variable items of preventive behaviors. See Appendix 1 for more information.

Demographics

Demographic variables include gender, age, marital status, level of education, economic status, vaccination status, and personal or family history of Corona disease.

Source of information

Six sources of information were identified by Zhong, Liu, Lee, Zhao, and Ji (2021). These include the internet (general search, search on medical information source websites, official government, and non-government websites), medical staff, close people (family, colleagues, and friends), official media (radio/television), printed sources (book/magazine/newspaper) and social networks (WhatsApp, Telegram, Instagram...). A 5-point Likert scale was used, and each participant could choose the amount of information sources they use - from 1, I never use it, to 5, I use it a lot.

Knowledge level variable related to COVID-19

This research aims to investigate the relationship between the variable of misinformation acceptance and preventive behaviors. However, this variable was used as a moderating variable in the study to confirm the results of the analysis better because, at the time of conducting the survey, many people had received training in COVID-19, which may affect the independent variable of acceptance of misinformation. The studies Abbasi-Kangevari, Kolahi, Ghamari, and Hassanian-Moghaddam (2021) were used to measure the variable of the level of knowledge with COVID-19; however, due to the general characteristics of the participants in the research, some of the specialized items were removed or rewritten. In the study of Abbasi-Kangevari et al. (2021), the reliability coefficient of Cord Richardson 20 was reported as 0.86. Due to changes in some items, Cronbach's alpha coefficient was re-measured and estimated at 0.68.

¹. <http://form.avalform.com/view.php?id=27741048>

Acceptance of misinformation

Since the beginning of the coronavirus epidemic, misinformation about COVID-19 has spread in all sources of information. Reviewing the items on false beliefs and misconceptions in the research of Kreps, Goldfarb, Brownstein, and Kriner (2021) and Lee et al. (2020) and conspiracy theories in the research of Bierwiazzonek, Kuns,t, and Pich (2020) led to the selection of 11 items to assess the acceptance of misinformation. The 3-point Likert scale for each item can be true, false, or no answer. The range of scores fluctuates between 0 and 22 scores. Cronbach's alpha coefficient for the questionnaire is estimated at 0.83.

Preventive behaviors

The instrument for measuring preventive behaviors consists of 11 items taken from the studies of Min, Shen, Yu, and Chu (2020), Cihan, Piriñçi, Gerçek, Ünüvar, and Demirdel (2020), and Taghrir, Borazjani, and Shiraly (2020).

Each item was presented to participants on a three-point Likert scale (I always do, I often do, and I never do). The higher the score for preventive behaviors, the more intensive the implementation of health protocols. The range of scores is between 0 and 22 points. The Cronbach's alpha coefficient for the questionnaire is estimated at 0.73.2.3.

Procedure

After the questionnaire was published, the data were extracted from the Porsline platform in an Excel file to prepare the data. Incomplete questionnaires were removed. See Appendix 2, file S1, for the dataset.

Statistical analysis

Data analysis was performed using SPSS version 19 software. Descriptive statistics were used for demographic variables and the type of information source. To assess the difference between acceptance of misinformation and preventive behaviors in demographic groups using t-test and ANOVA, to examine the correlation between acceptance of misinformation (dependent variable) and preventive behaviors (independent variable) from the correlation coefficient, to predict preventive behaviors using the acceptance of misinformation, demographic variables with the assumption of knowledge moderating variable related to COVID-19, multivariable hierarchical regression was used.

Results

Table 1, Statistical results, differences between gender groups (male and female), history of disease (history of disease or no history of disease), age (15-25 years, 26-45 years, 45-65 years), economic status (poor, medium and excellent) and vaccination status (no vaccination, first dose, second dose, third dose) in the variables of acceptance of misinformation about COVID-19 and preventive behaviors.

Table 1
Differences in Major Variables According to Demographics, Using T-Test and Anova test (N=626)

Variables	characteristics	No (%)	Preventive behavior Range 0-22			Acceptance of Misinformation Range 0-22		
			mean	SD	T or F	mean	SD	T or F
Age (Year)	15-25	165 (26.40%)	20.32	1.40	9.04**	4.38	2.9	1.74
	26-46	365 (58.30%)	20.57	1.38		4.35	2.8	
	46-65	96 (15.30%)	21.02	1.18		4.85	3.10	
Gender	Female	408 (65.20%)	20.57	1.35	0.08	4.47	2.77	0.4
	Male	218 (34.80%)	20.56	1.40		4.38	2.96	
Marital Status	Married	411 (63.67%)	20.65	1.33	-2.07*	4.62	2.90	-2.18*
	Single	215 (36.33%)	20.41	1.43		4.08	2.88	
Education	Diploma and below	149 (23.8%)	20.56	1.37	0.33	5.14	2.82	5.96**
	Bachelor's degree	337 (53.80%)	20.54	1.36		4.19	2.83	
	Bachelor's degree and higher	140 (22.40%)	20.66	1.41		4.26	3.03	
Economic status	Poor	85 (13.60%)	20.54	1.36	0.05	5.18	3.14	3.09*
	Middle Income	527 (84.20%)	20.58	1.37		4.35	2.86	
	High Income	14 (2.20%)	20.50	1.83		3.43	2.24	
Vaccinatio n type	No vaccination	21 (3.40%)	20.33	1.49	2.99*	7.43	3.12	16.20**
	The first dose	18 (2.90%)	20.77	1.44		6.66	3.21	
	The second dose	252 (40.30%)	20.66	1.46		4.82	2.77	

Variables	characteristics	No (%)	Preventive behavior Range 0-22			Acceptance of Misinformation Range 0-22		
			mean	SD	T or F	mean	SD	T or F
	The third dose	335 (53.50%)	20.67	1.29		3.84	2.74	
Disease history	yes	411 (65.70%)	20.55	1.39	-0.52	2.99	4.53	1.16
	No	215 (34.30%)	20.61	1.33		2.87	4.25	
overall		626	20.57	1.37		2.90	4.44	

* p<0.05 ** p<0.01

Pearson's correlation coefficient was used to examine the relationship between knowledge of COVID-19 and acceptance of misinformation (hypothesis 2). The negative correlation was confirmed at the one percent confidence level ($r = -0.312, p < 0.001$). In this case, the more misinformation accepted, the lower the level of knowledge. Therefore, knowledge of COVID-19 modifies the relationship between acceptance of misinformation and preventive behaviors. Pearson's correlation coefficient was used to examine the relationship between preventive behaviors and acceptance of misinformation. The negative correlation was confirmed at the one percent confidence level ($r = -0.114, p = 0.004$). In this case, the higher the acceptance of misinformation, the lower the preventive behaviors of the participants.

In hypothesis 3, according to Table 2, the independent variables were gradually added to the model, and the difference between F and R2 was calculated in each model. The results show that in the third step, R2 has changed the most, and the variables of acceptance of misinformation, age, and acceptance of misinformation in the level of knowledge compared to COVID-19 ovid (adjuster level) have accepted P values less than 0.05 and less than 0.001. and are predictors of preventive behaviors.

Age and acceptance of misinformation positively affect the level of knowledge, and acceptance of misinformation hurts the dependent variable (rate of preventive behaviors).

Table 2
Summary of the hierarchical regression model for predictive variables of preventive behavior

step		F changes	Modified ΔR^2	ΔR^2	eta
1	The rate of acceptance of misinformation \square				-0.114
2	The rate of acceptance of misinformation \square	5.166	0.015	0.025	-0.117
	The age \square				0.156
	Gender				-0.054
	Marital Status				0.009
	Educational status				-0.020
	Economic status				0.004
	Vaccination type				0.020
	Disease history				0.025

step		F changes	Modified ΔR^2	ΔR^2	eta
3	The rate of acceptance of misinformation $\square\square$	4.263	0.057	0.055	-0.797
	The age \square				0.136
	Gender				-0.062
	Marital Status				-0.017
	Educational status				-0.013
	Economic status				0.008
	Vaccination type				-0.011
	Disease history				0.010
	Acceptance rate of misinformation in the level of knowledge compared to 19 $\square\square$				0.718

* p<0.05 ** p<0/001

Source of information related to COVID-19

According to Table 3, the amount of information resources used needs to pay more attention to official media and a focus on social media and online books and magazines.

Table 3

The amount of use of information resources (N=626)

Information Sources	The frequency of using information resources (%)				
	very high frequency	high frequency	moderate frequency	Low frequency	Very low frequency
Internet search engines	100(16.00)	65(10.4)	179(28.6)	115(18.4)	167(26.6)
Health care staff	68(10.9)	88(14.1)	158(25.2)	138(22.00)	174(27.8)
Family and friends	62(9.9)	91(14.5)	212(33.9)	127(20.3)	134(21.4)
official media (television)	83(13.3)	72(11.5)	162(25.9)	123(19.6)	186(29.7)
Books and magazines	203(32.4)	75(12.1)	170(27.1)	57(9.1)	121(19.3)
Social media	95(15.1)	85(13.6)	132(21.1)	90(14.4)	224(35.8)

Discussion

This study investigated the relationship between accepting misinformation about COVID-19 and preventive behaviors. The first aim was to examine the acceptance of misinformation about COVID-19 and preventive behaviors in demographic groups.

The first aim was to investigate the acceptance of misinformation about COVID-19 and preventive behaviors in demographic groups. In terms of gender, no difference was found between men and women, consistent with Taghrir et al. (2020) and Sadri, Khazaei, Bashiriyan, and Barati (2022). However, a significant difference in preventive behaviors between men and women was reported in the study by Cihan et al., 2020 in Turkish society. Concerning age, the results emphasize the difference in preventive behaviors. The 15-25 and 26-45 age groups show less preventive behaviors than the 46-65 age groups, consistent with Nakhaeizadeh and Mohammadi (2021) and Vijaykumar et al. (2021). Vijaykumar et al. (2021), emphasized a higher acceptance of misinformation and preventive behaviors in the younger age group in Brazil and England.

Of course, Shams Ghahfarokhi & Shams Ghahfarokhi (2021), Sadri et al. (2022), and (Niknejad Jalali, Setoudeh, Rahimi, and Solimaney Mohammadi (2022) found no difference between age groups and preventive behaviors. About marriage, Shams Ghahfarokhi & Shams Ghahfarokhi (2021) found a difference between the single and married age groups, with the married group having more appropriate preventive behaviors. There was no difference between educational attainment and acceptance of misinformation, such that people with a degree or less accepted more misinformation. Regarding economic status, lower economic groups were more exposed to and accepted misinformation, which aligns with Hornik, Kikut, Jesch, Woko, Siegel and Kim (2021). However, there is no difference in preventive behaviors between the groups. This question shows that the weaker groups have finally acted under society.

Regarding the status of vaccination and acceptance of misinformation, people who received a lower dose or did not receive the vaccine showed higher acceptance of misinformation. The same is true of preventive behaviors, which were more appropriate in groups that received three doses. Notably, positive medical history did not differ between the groups regarding acceptance of misinformation and preventive behaviors.

This study found a negative correlation between preventive behaviors and the acceptance of misinformation. Therefore, the higher the acceptance of misinformation, the weaker the preventive behaviors of the participants. These results are consistent with the findings of Hornik et al. (2021), who showed that wearing a face mask and social distancing were negatively correlated with the acceptance of misinformation. This study offered that although there is a relationship between behaviors and acceptance of misinformation, the issue also comes back to their opinions when faced with accepting it. Vijaykumar et al. (2021) also emphasize that accepting correct or incorrect information affects their tendency to engage in preventive behaviors.

The results of the recent research showed that the acceptance of misinformation with age and the modifying effect of basic knowledge about COVID-19 predicted preventive behaviors in the acceptance of misinformation. The variable of acceptance of misinformation negatively affects prediction and age, and the modifying variable has a positive effect. This means that the higher the acceptance of misinformation, the weaker the preventive behaviors, and the higher the basic knowledge about COVID-19 in accepting misinformation and age, the stronger the preventive behaviors. The results are consistent with the research by Burgess and Byrne (2022), which emphasizes gender and knowledge as predictors, and with Wang et al. (2021) and Lee et al. (2020), which also emphasize acceptance of misinformation as a predictor variable.

Conclusion

This study is beneficial for researchers in the field of misinformation. Since acceptance of misinformation is significantly related to preventive behavior and its characteristics are an essential predictor of preventive behaviors, identifying misinformation and identifying protocols for appropriate response and management should be considered during health campaigns. In addition, although information about COVID-19 and recommendations will change according to different peaks, health counsellors must be open and honest, to provide specific and evidence-based information to the public, and remove misinformation from the content. This research has shown that age is a decisive factor in preventive behavior. Therefore, public health counselors must ensure that young people (a high-risk age group compared to middle-aged and older people) are properly educated, as they are the leading carriers of the

transmission cycle. Understanding how different populations in disease-affected regions and countries consume and respond to information with varying spectrums of truth can significantly enhance effectiveness. The study also showed that misinformation and lack of accurate information about vaccine safety can hamper vaccine effectiveness if not addressed promptly and accurately. Effective health communication, especially during infectious disease outbreaks, requires not only the dissemination of accurate information but also the preparation to prevent or eliminate misinformation based on evidence-based research on the characteristics of misinformation and the vulnerability that predicts misinformation among vulnerable populations.

The present study has some limitations. First, our research only included a small number of misinformation claims, and the focus on one type of misinformation, such as conspiracy theories, hoaxes, rumors, etc., was not discussed in isolation. Secondly, this research did not investigate the causes of people's acceptance of misinformation. Only the extent of its effect on preventive behavior was examined. Thirdly, due to the impossibility of proper justification of the participant, using an online survey always limits participant bias due to ethnic and religious reasons. Finally, the sample was considered and done during the fifth peak period in Iran, so its generalization needs further investigation.

For future research proposals, we recommend that misinformation researchers examine the role of culture and context in spreading misinformation. Also, a broader study that includes different types of misinformation can be a valuable addition to the misinformation literature. Also, examining the reasons for accepting misinformation and the cause and effect of variables can help our understanding of the issue. Due to the nature of quantitative research, it is suggested that a qualitative study with standard conditions be conducted to understand the hidden issues (economic and political) in accepting misinformation. Finally, systematic review studies and meta-analyses to examine the difference in results in other countries and the change in results in different peaks offer the possibility of full generalization of the results.

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