Journal of Iranian Medical Council, Volume 4, Issue no. 1
http://dx.doi.org/10.18502/jimc.v4i1.5741

Original Article

Check for updates

The Influence of Demographic Features and Psychological Constructs on Observing Government-Advised Preventive Measures for COVID-19: The Case of Iran

Zahra Tabibi[1*], Elaheh Abedini[1], Fatemeh Gholipour[1], Seyed kaveh Hojjat[2] and Mahnaz Amini[2,3*]

1. Department of Psychology, Ferdowsi University of Mashhad, Mashhad, Iran

2. Sleep Medicine Division, Psychiatry and Behavioral Sciences Research Center, , Mashhad University of Medical Sciences, Mashhad, Iran

3. Lung Diseases Research Center, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Abstract

Background: The study aimed to assess how people change their social and health-related behavior in the context of COVID-19 epidemic in Iran. To this end, the theory of planned behavior was applied for predicting compliance with government-advised preventive measures. An attempt was made to examine how groups of people in terms of age, gender, educational level, income level, marital status, and health condition were observing the government-advised preventive measures.

Methods: Totally, 5021 people above the age of 15 years responded to an online questionnaire that included items related to demographic features, compliance with COVID-19 preventive behavioral guidelines (home quarantine, avoiding social gathering, keeping physical distance of 1.5-2 *meters*, frequent hand sanitization, and avoiding shopping and outside recreation), TPB constructs (behavioral attitudes, subjective norms, perceived behavioral control, intentions to do the preventive behavior), and risk perception. The study was descriptive and conducted in year 2020.

Results: T-test, ANOVA, and correlations indicated that younger individuals, men, singles, people with lower educational levels, lower income level and no health condition reported lower compliance. Regression showed that intentions, perceived behavioral control, and subjective norm were associated with higher compliance. Furthermore, in regression, young age, male gender, and lower level of education were associated with lower compliance with C-19 PB. Conclusion: Young males with lower level of education infrequently comply with government-advised preventive measures. Also, intention, perceived behavioral control, and subjective norm are related to compliance with government-advised preventive measures.

Keywords: Attitude, COVID-19, Educational status, Intention, Marital status

*** Corresponding author**

Mahnaz Amini, MD
Division of Sleep Medicine, Psychiatry and Behavioral Sciences Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
Email: aminim@mums.ac.ir

Zahra Tabibi, PhD
Department of Psychology, Ferdowsi University of Mashhad, Mashhad, Iran
Email: tabibi@um.ac.ir

Received: Sept 14 2020
Accepted: Nov 26 2020

Citation to this article:

Tabibi Z, Abedini E, Gholipour F, Hojjat SK, Amini M. The Influence of Demographic Features and Psychological Constructs on Observing Government-Advised Preventive Measures for COVID-19: The Case of Iran. *J Iran Med Counc*. 2021;4(1):39-48.

Introduction

Just before the declaration of the World Health Organization (WHO) on March 11, 2020, that Coronavirus disease (COVID-19) had become a global pandemic, the Iranian Ministry of Health and Medical Education announced the outbreak of COVID-19 with 6 confirmed cases and 2 deaths (1). Afterward, people were advised to comply with current worldwide health protocols. The protocol, which aimed to prevent transmission, requested people to stay at home, avoid social gathering and public places, sanitize hands and surfaces as frequently as possible, and wear face masks. To prevent the spread of disease, schools, universities, mosques, holy shrines and public transport services were closed in most of the big cities including the city of Mashhad.

There was no law enforcement, but stay-at-home campaigns encouraged people to remain at home even though it was New Year time and social gathering was a popular tradition in Iran (2). Consequently, people had to change their social- and health-related behaviors dramatically to prevent infection with the COVID-19.

A prerequisite for social and health behavior change is knowledge and risk perception (3). A preliminary study on 8591 participants across the country on the 2-8 of March was conducted and it was found that 60.8% of people have sufficient knowledge of the COVID-19 outbreak and the preventive measures. Over 70% of people reported barriers to comply fully with the prevention protocol (4). Another prerequisite to change social and health-related behavior is defined within the Theory of Planned Behavior (TPB).

The TPB is an extension of the theory of reasoned action and identifies intention as a prominent psychological construct in behavioral changes. Based on this theory, people will be motivated to perform a behavior if they positively evaluate the consequences of the behavior (attitudes toward the behavior), perceive social pressures (subjective norms), and perceive oneself capable of performing the behavior (perceived control over the behavior) (5,6). The numerous studies on examining the roles of social-cognitive constructs for determining motivations and behaviors of health-related behavior within the TPB have indicated that high degrees of perceived behavioral control, subjective norm, and positive evaluations motivate observation of health-related behavior that in turn increases the actual behavior (6-8).

TPB has been used to explain a wide variety of health-related behaviors including counterproductive work behaviors (9), safe sexual behaviors among drug users (10), use of a low-fat diet (11), safe driving (12), healthy eating behaviors (13), and self-isolation in pandemic (14). Zhang *et al* (14) applied the TPB as a conceptual framework for explaining self-isolation when facing a pandemic risk in China. The results showed that attitude toward self-isolation exerted the most important role, followed by subjective norms and then perceived behavioral control.

Furthermore, studies indicated no significant differences in health behavior due to demographic features (14-18). For example, Lau *et al* (15) found that age, employment, and educational level are associated with observing self-protective measures in the H5N1 epidemic. Within the TPB model, Ajzen (6) has also noted the impact of demographic features on social-cognitive constructs.

The current study aimed to assess how groups of people in terms of age, gender, educational level, income level, marital status, and health condition are observing the government-advised preventive measures two months after COVID-19 outbreak in Iran. Additionally, TPB model was analyzed to evaluate how it explains the compliance with government-advised preventive measures for COVID-19 outbreak. Specifically, intentions, behavioral attitudes, subjective norms, perceived behavioral control, and risk perception were assessed in predicting compliance with government-advised preventive measures. The results of the study may provide a basis for designing TPB based programs to increase compliance with pandemic preventive measures.

Materials and Methods

The study is a descriptive-comparative correlational research.

Participants

A total of 5021 individuals aging over 15 years participated in the study by completing an online survey. The survey was distributed through social media platforms (Telegram and Whats App) on April 18, 2020, across the country (Gap, Baleh, Robika). The online questionnaire platforms automatically deleted two sets of responses from one mobile device. The

participants were informed in the online questionnaire that by entering the provided Link, they have given us consent to participate in the study. The study protocol was approved by ethics board of the Cognitive Sciences and Technologies Council. Data collection ended on May 6, 2020. Data collection timetable and status of COVID-19 spread are presented in table 1.

Measures

The questionnaire consisted of four main sections:

Personal information: This section included sociodemographic characteristics of the respondents such as age, gender, marriage status, education, province and city of residence, income, and health conditions (Blood pressure, diabetes, cardiovascular diseases, blood lipids, cancer, chemotherapy, chronic kidney dialysis, rheumatism, organ transplant, respiratory diseases, asthma, and chronic bronchitis).

Risk perception: Following the health belief model (19), risk perception of COVID-19 was measured using two questions related to perceived susceptibility (the probability of catching coronavirus in two weeks) and perceived severity (levels of disease severity in infected individuals). Each item was measured using a 5-point Likert scale. The reliability of these two items was 0.64. A reduced number of indicators was used to reduce the response burden.

TPB constructs: For assessing attitudes towards COVID-19 preventive measures, a questionnaire based on the TPB was used. Direct measures for assessing intention toward doing the behavior, behavioral attitude, subjective norm, and perceived behavioral control were used as described and applied in previous research (6,20).

a) Behavioral attitudes: Based upon general recommendations by TPB developers (20), a set of similar five items was used to assess attitude toward the effectiveness of five preventive behaviors (Observing home quarantine, avoiding social gathering, keeping physical distance of 1.5-2 *meters*, frequent hand sanitization, and avoiding shopping and outside recreation) in outbreak of COVID-19. Responses were recorded on 5 point Likert scales with endpoints labeled "strongly agree" and "strongly disagree". The scores can potentially range from 5 to 25 in which higher scores show more positive attitude toward the effectiveness of the preventive behaviors. The reliability of this construct was 0.66.

b) Subjective norms: Based upon general recommendations by TPB developers (20), a set of similar five items was used to assess subjective norms. Items sought how respondents' family and friends comply/ not comply with preventive behaviors (Observing home quarantine, avoiding social gathering, keeping physical distance of 1.5-2 *meters*, frequent hand sanitization, and avoiding shopping and outside recreation). Responses were recorded on 5 point Likert scales with endpoints labeled "strongly right" and "strongly wrong". The scores can potentially range from 5 to 25 in which higher scores show stronger perceptions of the norms that important others comply with. The reliability of this construct was 0.78.

Perceived behavioral control: Based upon general recommendations by TPB developers (20), perceived behavioral control regarding the ability/possibility to comply with preventive behaviors (Observing home quarantine, avoiding social gathering, keeping physical distance of 1.5-2 *meters*, frequent hand sanitization, and avoiding shopping and outside recreation) was assessed by six items. Responses were recorded on 5 point Likert scales with one endpoint labeled "strongly right" and the other endpoint labeled "strongly wrong". The scores can potentially range from 30 to 6 in which higher scores show stronger perceptions of behavioral control regarding compliance with preventive behaviors. The reliability of this construct was 0.66.

Intentions: Based upon general recommendations by TPB developers (20), a set of similar seven items was used to assess intentions/decisions to regularly engage in each of the preventive behaviors (observing home quarantine, avoiding social gathering, keeping physical distance of 1.5-2 *meters*, frequent hand sanitization,

Table 1. Daily reports on the spread of COVID-19 within the timetable of data collection (Year 2020)

		Confirmed cases	No. of deaths	Daily decrease	Daily change%
Start of outbreak	Feb. 19th	6	2		
Start of data collection	April 18th	1,374	73	-125	-8.34
End of data collection	May 6th	1,680	78	357	26.98

avoiding shopping and outside recreation, and wearing a mask) until the outbreak is controlled. Responses were recorded on 5 point Likert scales with endpoints labeled "strongly right" and "strongly wrong". The scores can potentially range from 35 to 7 in which higher scores show stronger intentions to engage in the preventive behaviors in the future. The reliability of this construct was 0.73.

COVID-19 preventive behavior: Based upon general recommendations by TPB developers (20), information regarding performance of preventive behaviors in order to control outbreak of COVID-19 including avoiding social gathering, eating out, traveling, keeping physical distancing of 1.5 to 2 *meters*, wearing a mask outside home, frequent hand sanitization, avoiding handshaking, and recreational shopping, was obtained using a similar set of eight questions. For each of these eight behaviors, the frequency of engagement of respondent in that behavior during the previous two weeks was recorded. Responses were recorded on 5 point Likert scales with endpoints labeled "always" and "never". The scores can potentially range from 40 to 8 in which higher scores reflect better performance to engage in preventive behaviors in the past. The Cronbach's alpha coefficient was 0.52 for this construct.

Statistical methods and statistical analysis

Data were reported and analyzed in four steps. First, descriptive data including means and standard deviations of the variable of COVID-19 preventive behavior for each group of participants (groups in terms of age, gender, marital status, educational level, income level, and health condition) were reported. Second, for examining the differences between groups of people in terms of compliance with COVID-19 preventive measures, a series of independent samples *t*-test or one-way analysis of variance (ANOVA) were computed. Third, to examine the relationship between the main variables of TPB constructs, risk perception, demographic and COVID-19 preventive behavior variables, Pearson correlation coefficient was calculated. Forth, for predicting COVID-19 preventive behavior, a three step hierarchical regression, Enter model was computed. All analyses were done using SPSS software, version 24.

Results

Fifty cases with more than 10% missing data were excluded. The remaining missing data were replaced using the series means. The normality of the distribution of each variable was confirmed by considering the range of ±1 for the skewness and kurtosis.

Differences in scores of COVID-19 preventive behavior based on demographic variables

Table 2 presents the demographic features of respondents, means, standard deviations, and the results of the independent samples *t*-test or analysis of variance for the variable of COVID-19 preventive behavior.

As table 2 shows, the age groups of 15 to 19 and 20 to 29 scored lower than all other age groups in COVID-19 preventive behavior. The age group of 30 to 49 scored lower than the age group over 50. Concerning gender, females scored higher than male participants. Married participants scored higher than unmarried ones (widowed, divorced, and unmarried). Regarding education, participants with secondary and high school level education scored lower than all other participants in COVID-19 preventive behavior. Participants with postgraduate education scored higher than those with high school diploma and associate degree (2 years of university study). With regard to income level, groups with less than 2 million Tomans monthly income scored lower than groups with 2-3.5 million Tomans monthly income. Regarding health conditions, participants reporting an underlying disease scored higher than those reporting no diseases in COVID-19 preventive behavior.

Relationships between COVID-19 preventive behavior and all variables

Next, intercorrelations among the entire variables including demographic variables, TPB variables, risk perception and COVID-19 preventive behavior were analyzed. Table 3 shows the correlation matrix of the variables entered into the regression model.

As table 3 indicates, the variable of COVID-19 preventive behavior is significantly and positively correlated with intention, behavioral attitude, subjective norm, and perceived behavioral control. Higher intention score was significantly related to higher behavioral attitude, subjective norm, and perceived behavioral control scores. Significant negative correlations emerged between risk perception and COVID-19 preventive behavior, intention, subjective norm, and perceived behavioral control. Moreover, behavioral attitude,

Table 2. Basic characteristics of the participants and descriptive statistics for COVID-19 preventive behavior

Variables	n	%	Mean	SD	t/F	df	p	Tukey HSD
Age								
15-19	180	3.6	21.16	2.18	20.67	6,4948	<0.001	1<2-6
20-29	1159	23.3	21.66	1.94				2<3-6
30-39	1820	36.6	21.95	1.78				3<5,6
40-49	1093	22.0	22.12	1.68				4>1,2
50-59	514	10.3	22.38	1.57				5>1-3
60	189	3.8	22.49	1.53				6>1-3
Missing	16	0.3						
Gender								
Female	3275	65.9	22.21	1.63	14.72	4858	<001	
Male	1585	31.9	21.42	2.02				
Missing	111	2.2						
Marital status								
Unmarried	1253	25.2	21.84	1.97	-2.52	4949	<0.05	
Married	3698	74.4	21.99	1.75				
Missing	20	0.4						
Education level								
Primary school	74	1.5	21.67	1.84	10.16	6,4939	<0.001	
Secondary/high school	380	7.6	21.43	1.97				2<3-7
Diploma	1190	23.9	21.87	1.78				3<6,7
Associate degree	494	9.9	21.84	2.00				4<6
Bachelor's degree	1675	33.3	22.02	1.78				
Master's degree	737	14.8	22.20	1.66				
Doctoral degree	396	8.0	22.19	1.72				
Missing	25	0.5						
Income level								
Less than 1 *mil**	1532	30.8	21.79	1.85	4.23	6,4634	<0.001	1<3,5
1-2 *mil*	932	18.7	21.83	1.89				2<3
2-3.5 *mil*	1062	21.4	22.08	1.70				
3.5-5 *mil*	602	12.1	22.00	1.90				
5-7 *mil*	253	5.1	22.18	1.73				
7-10 *mil*	136	2.7	22.06	1.69				
Over 10 *mil*	124	2.5	21.90	1.97				
Missing	330	6.6						
Health condition								
At least one	1250	25.1	22.10	1.79		4969	<0.01	
None	3721	74.9	21.91	1.81				

*1 *mil*=1Million Tomans (The currency of Iran)

Table 3. Pearson/Spearman correlation coefficients between variables

	M	SD	1	2	3	4	5	7	8	9	10	11	12
1. C-19PB.	21.96	1.81						0.14**	0.19**	0.02	0.10**	0.07**	0.05**
2.Intention	25.21	3.64	0.62**					0.11**	0.19**	0.02	0.03*	0.01	0.04**
3.A.B.	26.17	3.11	0.42**	0.65**				0.06**	0.09**	-0.01	0.11**	0.05**	0.02
4.S.N.	23.45	4.22	0.37**	0.49**	0.34**			0.14**	0.12**	0.04*	-0.01	0.05**	0.04**
5.P.B.C.	26.43	4.45	0.56**	0.70**	0.54**	0.43**		0.04**	0.19**	-0.05**	0.08**	0.01	0.01
6.R.P.	4.36	1.56	-0.09**	-0.05**	0.01	-0.17**	-0.15**	-0.07**	-0.06**	-0.01	0.12**	0.06**	0.06**

**. p<0,01. *. p<0.05 (2-tailed).

Note. C-19PB.= COVID-19 preventive behavior; A.B.= attitude toward the behavior; S.N.= subjective norm; P.B.C.= perceived behavioral control; R.P.= risk perception; 7=age; 8=gender; 9=marital status; 10=education level; 11=income; 12=health condition

subjective norm, and perceived behavioral control were significantly related to each other.

Regarding demographic variables, table 3 shows that age is positively related to COVID-19 preventive behavior, intention, behavioral attitude, perceived behavioral control, and risk perception. Gender is positively related to COVID-19 preventive behavior and intention. Marital status is positively related to subjective norm and negatively related to perceived behavioral control. Education is positively related to COVID-19 preventive behavior and intention, behavioral attitude, perceived behavioral control, and risk perception. Health condition is positively related to COVID-19 preventive behavior and intention, subjective norm, and risk perception.

Predictors of COVID-19 preventive behavior score

The hierarchical regression analysis comprised three steps which estimated the unique contribution of the variable(s) entered in that step beyond the variables previously entered. The variables entered in each step are as follows. The intention was entered in the first step, then behavioral attitude, subjective norm, perceived behavioral control, and risk perception were entered in the second step. After that, demographic features including age, gender, marital status, educational level, income, and health condition were entered in the third step. In the analysis, the residual standard distribution was not normal. Multivariate outliers were removed by deleting cases with standard deviations above +3.3 and under -3.3 that led to an acceptable range of -2.29-3.00. The skewness and kurtosis were <±1 for dependent variable and all predictor variables. A total of 4454 cases remained for the analysis. The results are reported in table 4.

The first model was significant accounting for 39% of the variance of COVID-19 preventive behavior. That means intention could predict COVID-19 preventive behavior as much as 39%. In the second model, the significant variables from the strongest to the weakest beta coefficients ranging between 0.44 and 0.06 were the intention, perceived behavioral control, and subjective norm. The TPB variables as well as risk perception could account for 43% of the variance for preventive behavior. Perceived behavioral control and subjective norm added 3% to the variance explained by the variable of intention (F_{Change}=67.70,

Table 4. Hierarchical multiple regression analysis predicting C-19 PB

	Predictors	B	SE		t	Sig.	R^2	R^2	F	Sig.
Model 1							0.39	0.39	2877.71	<0.001
	Intention	0.30	0.006	0.63	53.64	0.000				
Model 2							0.43	0.42	655.69	<0.001
	Intention	0.21	0.009	0.44	23.62	0.000				
	A.B.	-0.01	0.009	-0.01	-0.59	0.555				
	S.N.	0.02	0.006	0.06	4.44	0.000				
	P.B.C.	0.09	0.006	0.24	14.42	0.000				
	Risk perception	-0.01	0.013	-0.01	-0.79	0.428				
Model 3							0.44	0.44	317.70	<0.001
	Intention	0.20	0.009	0.42	22.60	0.000				
	A.B.	-0.00	0.009	-0.01	-0.50	0.617				
	S.N.	0.02	0.005	0.05	3.80	0.000				
	P.B.C.	0.09	0.006	0.23	13.86	0.000				
	Risk perception	-0.01	0.013	-0.01	-1.00	0.313				
	Age	0.12	0.021	0.08	5.59	0.000				
	Gender	0.30	0.043	0.08	6.81	0.000				
	Marital status	0.01	0.049	0.00	0.24	0.803				
	Education level	0.07	0.015	0.06	4.52	0.000				
	Income	0.01	0.016	0.01	0.89	0.371				
	Health condition	0.02	0.048	0.01	0.48	0.630				

Note: A.B.= attitude toward the behavior; S.N.= subjective norm; P.B.C.= perceived behavioral control

df=4, 4502, p<0.001). Behavioral attitude and risk perception were non-significant. In the third model, the significant variables from the strongest to the weakest beta coefficients ranging between 0.42 and 0.05 were the intention, perceived behavioral control, gender, age, educational level, and subjective norm. The third model accounted for 44% of the variance for preventive behavior. Variables of demographic features added nearly 2% to the explained variance (F_{Change}=21.28, df=6,4496, p<0.001).

Discussion

Data collection for this study was started two months after the announcement of the COVID-19 outbreak in Iran. The study aimed to examine how much government-advised preventive measures are observed by people differentiated by age, gender, educational level, income level, marital status, and health condition. Further, TPB components such as intention, perceived behavioral control, and subjective norm as well as risk perception were assessed to show how they could predict preventive behavior toward COVID-19.

The result of the analysis of variance or t-test showed that older age groups reported higher compliance with COVID-19 preventive measures. In fact, younger participants (the age group of 15 to 29) have observed the preventive measure protocol less than other age groups. Age group of 30 to 49 reported higher compliance compared to the younger groups and less compliance compared to the older groups. Participants over the age of 50 years reported higher compliance compared to people between 15 to 39 years old. This is consistent with studies indicating that older individuals have stronger intentions to observe government-advised preventive measures (21,22).

Females, married participants, and those with specific medical conditions tended to be more compliant than males, unmarried ones, and those with no specific conditions, respectively. Previous studies have also demonstrated that women have a higher intention of observing preventive measures related to pandemics such as MERS-CoV, SARS, and pandemic influenza (16-18,23-26). Better physical and mental health of married people compared to single people (27) may play a role in influencing people's compliance with government-advised preventive measures. Furthermore, health conditions increase the risk of severe infection. It might be that people with these conditions have a higher risk perception leading to more preventive health behaviors (28-33).

With regard to income level, no consistent pattern emerged. However, it seems that the low-income groups (income less than 2 million Tomans) are less likely to comply with the preventive measures. Also, participants with lower levels of education were less likely to comply with the preventive measure protocol compared to people with higher educational levels. Participants with high school diploma were less likely to comply than participants with master and doctoral degrees. People with less education may receive less information about pandemics than people with higher levels of education, and so may not truly understand the importance of observing preventive measures (34). People with less education have possibly low-status jobs, may not be able to work from home during the quarantine, and have less access to personal protective equipment (E.g., face mask) which would make them less willing to comply with the government-advised preventive measures (18).

The result of correlations shows that the preventive behavior toward COVID-19 is related to higher intention, behavioral attitude, perceived behavioral control, subjective norm, and risk perception. All measures have been widely established as significant predictors of adopting preventive health behaviors (35,36). For example, a study shows that perceiving the risk of COVID-19 infection has a positive impact on attitude toward social distancing measures (28).

However, regression analysis indicated that among the social-cognitive constructs, intention, perceived behavioral control, and subjective norms and among the demographic features, age, gender, and educational level were the significant predictors of complying with government-advised preventive measures on COVID-19. Those with higher scores on intentions (42%), perceived behavioral control (23%), and subjective norm (5%) were more likely to comply with COVID-19 health protocol. After intention, the psychological construct of perceived behavioral control was the strongest predictor. It shows that people who feel to have the capacity to comply with the government-advised health protocols tended to do so more often. One argument is that the shortage of personal protective equipment (37) might impair an individual's sense of competence and perceived behavioral control. However, the current

study included social behavior (*i.e.*, social distancing, avoiding recreation) as well as behaviors related to sanitization and face mask wearing (which requires Personal Protective Equipment-PPE). The significance of perceived behavioral control in the current study may also demonstrate the role of self-efficacy in controlling one's own behavior. Further investigation is required to assess whether the significance of perceived behavioral control relates to external barriers or internal capacity.

The role of subjective norm was weak, though significant. This might indicate that social pressure plays a role in convincing people to comply with government-advised preventive measures. Social groups, either family members or friends, may encourage or have a hindering role in observing COVID-19 prevention protocols (38,39). It might, however, be possible to consider observing government-advised preventive measures a personal choice (40).

Behavioral attitude, risk perception, income level, marital status, and health condition did not have significant effects on predicting preventive behaviors. The behavioral attitude was not significant, meaning that the importance of the consequence of complying with the government-advised preventive measures is yet to be shaped among Iranian people. People may not have shaped positive or negative beliefs regarding the effectiveness of preventive measures. This might be due to the fact that advice on the necessity of observing the preventive measures in the community has been inconsistent (41) which might discourage the individuals (39). This, however, requires further study as well.

Furthermore, the regression analysis showed that older people, females, and higher educated people report wearing masks, avoiding social gatherings, avoiding eating outside, avoiding outside home recreation, social distancing, and frequent hand washing. The most vulnerable groups were younger male individuals with lower socioeconomic status. The current study shows that the educational level played an important role than income level in predicting compliance with the government-advised preventive measures. Further study is warranted to explore how education and income level moderates compliance.

The current study has some limitations. First, the sample used for the analysis in this paper consisted of over 5000 people from all over the country. However, only 2% were from village living individuals. Second, due to our survey method (data collected via on-line questionnaires), only people with internet access and Android phones could enter into the study. Third, samples were collected from 29 provinces out of 31. However, most participants were from two provinces of Khorasan Razavi (76%, noting that it is the largest province in Iran) and Khorasan Shomali (14.7%). Such biases may limit the generalization to the whole population. The advantage was that the sample was large and covered people with various educational and income levels.

The implication of the study is that the campaigns or educational preventive programs might focus on increasing self-efficacy and reducing the obstacles in observing preventive measures. Since the pandemic is going to last for a long time, it could be possible to work on the subjective norms and attitude toward preventive behaviors, for possible changes in the preventive behavior of people. People should develop positive attitudes and the efficacy for observing government-advised preventive measures.

Conclusion

The study aimed to evaluate how different people in terms of age, gender, educational level, income level, marital status, and health condition comply with government-advised preventive measures of COVID-19 and how TPB constructs including intention, behavioral attitude, subjective norm, and perceived behavioral control as well as risk perception can predict self-reported compliance with government-advised preventive measures for COVID-19. The result showed females, older age groups, and individuals with higher educational levels are more likely to comply with government-advised preventive measures. Among the socio-cognitive constructs, intention, perceived behavioral control and to a lesser degree, subjective norm significantly predicted self-reported compliance with government-advised preventive measures.

Acknowledgements

This study was approved by the ethics committee of MUMS with reference number of IR.MUMS.REC.1399.065. We would like to thank the Vice chancellor for research affairs of Mashhad University of Medical Sciences (MUMS) for the financial support (Grant number 990054).

References

1. World Health O. Coronavirus disease 2019 (COVID-19): situation report, 72. Geneva: World Health Organization; 2020 2020-04-01.

2. Pourghaznein T, Salati S. National approach in response to the COVID-19 pandemic in Iran. Int J Community Based Nurs Midwifery 2020;8(3):275-6.

3. Janz NK, Becker MH. The health belief model: a decade later. Health Educ Q 1984;11(1):1-47.

4. Erfani A, Shahriarirad R, Ranjbar K, Mirahmadizadeh A, Moghadami M. Knowledge, attitude and practice toward the novel Coronavirus (COVID-19) outbreak: A population-based survey in Iran. Bull World Health Organ 2020.

5. Hill RJ. Belief, attitude, intention and behavior: An introduction to theory and research. Contemp Sociol 1977;6(2):244-5.

6. Ajzen I. The theory of planned behavior. Organ Behav Hum Decis Process 1991;50(2):179-211.

7. Conner M, Armitage C. Extending the theory of planned behavior: A review and avenues for further research. J Appl Soc Psychol 1998;28:1429-64.

8. Godin G, Vézina-Im LA, Naccache H. Determinants of influenza vaccination among healthcare workers. Infect Control Hosp Epidemiol 2010;31(7):689-93.

9. Ju D, Xu M, Qin X, Spector P. A multilevel study of abusive supervision, norms, and personal control on counterproductive work behavior: A theory of planned behavior approach. J Leadersh Organ Stud 2019;26:163-78.

10. Khani Jeihooni A, Kouhpayeh A, Najafi S, Bazrafshan MR. Application theory of planned behavior on promotion of safe sexual behaviors among drug users. J Subst Use 2019;24(3):293-9.

11. Armitage C, Conner M. Distinguishing perceptions of control from self efficacy: predicting consumption of a low fat diet using the theory of planned behavior. J Appl Soc Psychol 1999;29(1):72-90.

12. Tabibi Z, Pfeffer K. Predicting intentions to comply with traffic rules among Iranian drivers. Advances in Transportation Studies 2014;35:89-102.

13. Conner M, Norman P, Bell R. The theory of planned behavior and healthy eating. Health Psychol 2002;21(2):194-201.

14. Zhang X, Wang F, Zhu C, Wang Z. Willingness to self-isolate when facing a pandemic risk: model, empirical test, and policy recommendations. Int J Environ Res Public Health 2019;17(1):197.

15. Lau JT, Kim JH, Tsui HY, Griffiths S. Anticipated and current preventive behaviors in response to an anticipated human-to-human H5N1 epidemic in the Hong Kong Chinese general population. BMC Infect Dis 2007;7:18.

16. Choi JS, Kim JS. Factors influencing preventive behavior against Middle East Respiratory Syndrome-Coronavirus among nursing students in South Korea. Nurse Educ Today 2016;40:168-72.

17. DeLay P. Gender and monitoring the response to HIV / AIDS pandemic. Emerg Infect Dis 2004;10(11):1979-83.

18. Eastwood K, Durrheim D, Francis JL, d'Espaignet ET, Duncan S, Islam F, et al. Knowledge about pandemic influenza and compliance with containment measures among Australians. Bull World Health Organ 2009;87(8):588-94.

19. Champion VL, Skinner CS. The health belief model. In: Glanz K, Rimer BK & Viswanath K, eds. health behavior and health education: theory, research, and practice. 4th ed. Jossey-Boss: A Wiley Imprint; 2008.p.45-65.

20. Ajzen I. Constructing a TPB questionnaire: Conceptual and methodological considerations.2002.

21. Bults M, Beaujean DJMA, de Zwart O, Kok G, van Empelen P, van Steenbergen JE, et al. Perceived risk, anxiety, and behavioural responses of the general public during the early phase of the Influenza A (H1N1) pandemic in the Netherlands: results of three consecutive online surveys. BMC Public Health 2011;11(1):2.

22. Popkin BM, Zizza C, Siega-Riz AM. Who is leading the change?: U.S. dietary quality comparison between 1965 and 1996. Am J Prev Med 2003;25(1):1-8.

23. Brug J, Aro AR, Oenema A, de Zwart O, Richardus JH, Bishop GD. SARS risk perception, knowledge, precautions, and information sources, the Netherlands. Emerg Infect Dis 2004;10(8):1486-9.

24. Ek S. Gender differences in health information behaviour: a Finnish population-based survey. Health Promot Int 2015;30(3):736-45.

25. Khan MU, Shah S, Ahmad A, Fatokun O. Knowledge and attitude of healthcare workers about Middle East Respiratory Syndrome in multispecialty hospitals of Qassim, Saudi Arabia. BMC Public Health 2014;14:1281.

26. Park JH, Cheong HK, Son DY, Kim SU, Ha CM. Perceptions and behaviors related to hand hygiene for the prevention of H1N1 influenza transmission among Korean university students during the peak pandemic period. BMC Infect Dis 2010;10:222.

27. Schoenborn CA. Marital status and health: United States, 1999-2002. Adv Data 2004(351):1-32.

28. Callow MA, Callow DD, Smith C. Older adults' intention to socially isolate once COVID-19 stay-at-home orders are replaced with "Safer-at-Home" public health advisories: A survey of respondents in Maryland. J Appl Gerontol 2020;39(11):1175-83. https://pubmed.ncbi.nlm.nih.gov/32697126/

29. Campbell VA, Gilyard JA, Sinclair L, Sternberg T, Kailes JI. Preparing for and responding to pandemic influenza: implications for people with disabilities. Am J Public Health 2009;99(S2):S294-S300.

30. Carico RR Jr., Sheppard J, Thomas CB. Community pharmacists and communication in the time of COVID-19: Applying the health belief model. Res Social Adm Pharm 2021;17(1):1984-7.

31. Hutchins SS, Truman BI, Merlin TL, Redd SC. Protecting vulnerable populations from pandemic influenza in the United States: a strategic imperative. Am J Public Health. 2009;99(S2):S243-S8.

32. Mukhtar S. Mental health and emotional impact of COVID-19: Applying Health Belief Model for medical staff to general public of Pakistan. Brain Behav Immun 2020;87:28-9.

33. Zhang CQ, Zhang R, Chung PK, Duan Y, Lau JTF, Chan DKC, et al. Promoting influenza prevention for elderly people in Hong Kong using health action process approach: study protocol. BMC Public Health 2018;18(1):1230.

34. Wong LP, Sam IC. Public sources of information and information needs for pandemic influenza A(H1N1). J Community Health 2010;35(6):676-82.

35. Katz R, May L, Sanza M, Johnston L, Petinaux B. H1N1 preventive health behaviors in a university setting. J Am Coll Health 2012;60(1):46-56.

36. Mahardika H, Thomas D, Ewing MT, Japutra A. Comparing the temporal stability of behavioural expectation and behavioural intention in the prediction of consumers pro-environmental behaviour. J Retailing Consumer Services 2020;54:101943.

37. Ranney ML, Griffeth V, Jha AK. Critical supply shortages - The need for ventilators and personal protective equipment during the Covid-19 pandemic. N Engl J Med 2020;382(18):e41.

38. Leung H. Why wearing a face mask is encouraged in Asia, but shunned in the US 2020.

39. Chan DKC, Zhang CQ, Weman-Josefsson K. Why people failed to adhere to COVID-19 preventive behaviors? Perspectives from an integrated behavior change model. Infect Control Hosp Epidemiol 2020:1-2.

40. Armitage CJ, Conner M. Efficacy of the theory of planned behaviour: a meta-analytic review. Br J Soc Psychol 2001;40(4):471-99.

41. Feng S, Shen C, Xia N, Song W, Fan M, Cowling BJ. Rational use of face masks in the COVID-19 pandemic. Lancet Respir Med 2020;8(5):434-6.