Subjective Norms Predict Intention to Covid-19 Vaccination among Older Adults in Southern Iran: a Community-based Cross-sectional Study

Mahsa Yarelahi[1], PhD student; Elham Rezaian[2], MSc; Farzaneh Bahadori[1], PhD student; Zeinab Sahraian[2], MSc; Somayeh Abolghsemi[3], MSc; Masoud Karimi[4], PhD

[1]Department of Gerontology, University of Social Welfare and Rehabilitation Sciences, Tehran, Iran
[2]Department of Health Promotion, Shiraz University of Medical Sciences, Shiraz, Iran
[3]Department of Nutrition, Fasa University of Medical Sciences, Fasa, Iran
[4]Research Center for Health Sciences, Institute of Health, Department of Health Promotion, School of Health, Shiraz University of Medical Sciences, Shiraz, Iran

Correspondence:
Masoud Karimi, PhD;
Research Center for Health Sciences, Institute of Health, Department of Health Promotion, School of Health, Shiraz University of Medical Sciences, Shiraz, Iran
Tel: +98 9171529307
Email: karimeim@sums.ac.ir

Abstract

Background: The success of the vaccination programs against covid-19 depends on the level of community vaccine acceptance. The present study aimed to investigate the predictors of older adults' intention to uptake the covid-19 vaccine in older adults.

Methods: This cross-sectional study was conducted on 345 older adults in Jahrom, southern Iran. Participants were enrolled by stratified random sampling. The data collection tool was a researcher-made questionnaire consisting of items based on the health belief model (HBM), Theory of planned behavior (TPB) constructs and demographic information. Descriptive statistics, Spearman's correlation, and Ordinal logistic regression analysis were used for data analysis using SPSS version 25. The level of significance was set at 0. 05.

Results: The mean age of participants was 67.7 (7.2) years. Most of the participants (51.3%) intended to receive the vaccine. Perceived barriers (r=-0.201), perceived benefits (r=0.302), self-efficacy (r=0.269), and subjective norms (r=0.387) had significant associations with the intention to vaccine (P<0.001). Subjective norms (β=0.159, P<0.001) were the most powerful predictor of intention to vaccine, followed by perceived benefits (β=0.112, P=0.035) and self-efficacy (β=0.086, P=0.038).

Conclusion: health professionals should promote positive attitudes toward the covid-19 vaccine and reports about vaccination by celebrities and trusted people to persuade older adults to receive the covid-19 vaccine.

Introduction

In late 2019, a new type of coronavirus (COVID-19) appeared in Wuhan Province, China.[1] The virus spread rapidly around the world. The World Health Organization (WHO) classified this outbreak on January 30, 2020, as a public health emergency of international importance.[2] Many people around the world died daily due to this disease.[3] COVID-19 has created many challenges and problems for many countries regarding daily life, health, and economy.[4]

COVID-19 is a threat to everyone, but Older people are at higher risk of getting the disease and have higher rates of complications and deaths from Covid-19.[4, 5] Studies showed that the mortality rate in the over 59 age group is five times more than 30 to 50 age group,[4] which may be largely due to the higher prevalence of comorbidity and underlying diseases in the older adults.[6]

Vaccination has been introduced as the most successful and cost-effective way to limit or eliminate the spread of the covid-19 virus, along with public health policies and individual health behaviors.[4, 7] Achieving herd immunity through vaccinating most at-risk people is necessary for effective vaccination

programs in pandemics.[4, 8]

The success of the vaccination programs depends on the level of vaccine acceptance among the population.[8] So, developing effective policies and health communication interventions to encourage people and maximize covid-19 vaccine intake among the community is very important in pandemic situations.[8, 9]

Some studies suggested that individual perceptions about vaccines are more powerful predictors of intention to get the COVID-19 vaccine than demographic variables.[10-12] On the other hand, according to the covid-19 prevention guidelines, older people are among the priority populations for vaccination. Therefore, identifying the factors affecting the willingness of older adults to receive the vaccine is important for understanding which group of older adults is more likely to accept the vaccine and identifying potentially influential factors in their behavior toward getting the Covid-19 vaccine.[10]

Professionals often use behavior change models and theories to identify individual perceptions and socio-environmental factors affecting the adoption of health-promoting behaviors to maximize the effectiveness of their interventions, health education, and promotion. Some of the most commonly used behavior change models or theories are the health belief model (HBM) and the theory of planned behavior (TPB).[13-17] During the past several years, evidence suggests that the constructs proposed by these theories have been consistently associated with uptaking vaccines in routine national birth to 18 years' immunization programs and vaccination against H1N1 influenza.[8, 18, 19]

Based on HBM assumptions, people who view themselves at risk for disease (perceived susceptibility), consider the disease consequences serious (perceived severity), perceive the advantages of recommended behaviors (perceived benefits) more than its barriers and costs (perceived barriers), and have self-efficacy needed to perform these behaviors despite the barriers, will adhere to health-related behaviors, more likely. On the other hand, TPB assumes that behavioral intention is the most important determinant of health behaviors, and individuals think about the various aspects of any behavior before deciding whether or not to do it. So the theory examines the relationship between an individual's beliefs, attitudes, perceptions, intentions, and behavior.[14, 16] One of the most important constructs which differentiate TPB from HBM and emphasize on the social context of human behavior in TPB is perceived subjective norms, which refer to individuals' beliefs regarding approval or disapproval of the behavior by any important person.[6]

Since older adults are a high-risk group during the COVID-19 Pandemic and are considered priority groups for receiving the covid-19 vaccine,

and Considering that HBM and TPB have been successfully used as a framework for predicting factors of getting flu vaccine,[20-23] the present study investigates the predictors of older adult's intention to uptake covid-19 vaccine based on constructs of HBM and TPB.

Methods

This cross-sectional study was conducted in Jahrom, southern Iran, in 2021. Based on a Cochran formula and a similar study in the Uk (2021),[8] 353 participants were selected as the required sample size (P=64%, α=0.05, d=0.05). After considering a possible 6% drop, the sample size increased to 375 people. Jahrom has six urban health centers that cover the city's elderly population. Participants were enrolled by stratified random sampling based on the gender and proportion of the aged population who received health care services in each one of the six urban health centers in Jahrom. Inclusion criteria were reviewed by calling the number registered in the electronic file of the selected older adults, and the qualified older adults were invited to attend urban health centers and complete the questionnaires through a 20-30-minute' face-to-face interview. In this study, inclusion criteria were considered as being over 60 years old or, having no cognitive impairments based on ten items Abbreviated Mental Test,[24] being a Persian speaker, and being satisfied to participate in the study. Participants who were not satisfied with their presence in the study and did not answer questionnaires completely were excluded. Totally, 375 questionnaires were administered to participants.

Instruments

Persian version of abbreviated mental test validated by Bakhtiari et al.,[24] was used to screen cognitive impairment in the participants.

The data collection tool was a researcher-made questionnaire consisting of three sections. The first section included demographic information (age, gender, level of education, and marital status). The second section of questionnaire developed based on a similar study[8, 25-29] and an expert panel of 5 health promotion and gerontology professionals, included 22 items, containing three items about perceived sensitivity of getting covid-19 (e.g. I am worried about getting covid-19 disease), four items about perceived severity of getting covid-19 (e.g. I may lose my life because of Covid-19), four items about perceived barriers of getting covid-19 vaccine (e.g. covid-19 vaccine is a new vaccine and I am not sure if it is safe), three items for perceived benefits of getting covid-19 vaccine (e.g. covid-19 vaccine can protect me against severe form of coronavirus infection), three items about self-efficacy for getting covid-19 vaccine (e.g., it would be very easy for me to be vaccinated against covid-19), four items regarding

subjective norms about getting covid-19 vaccine (e.g. most people I know, want to get covid-19 vaccine), and one item on intention to uptake covid-19 vaccine (do you intend to get the covid-19 vaccine if available?). All of the items in this section were assessed through a five-point Likert scale (strongly agree, agree, no idea, disagree, strongly disagree) except the intention, which was assessed through a three-point scale (I intend to receive the vaccine, I have not decided yet, I intend not to receive the vaccine,). The third section of the questionnaire consisted of 8 questions with a five-point Likert scale (very much … not at all) about the extent of participants' confidence toward available covid-19 vaccines.

The authors used two methods to ensure the validity of the questionnaire: face validity and content validity. In the face validity study, ten older adults were interviewed face to face and the items were examined in terms of the difficulty level, appropriateness, and ambiguity. The content validity ratio (CVR) and content validity index (CVI) were calculated to evaluate the content validity of the questionnaire, using the opinions of a panel of experts consisting of six health education and promotion professionals and four gerontologists. THE CVR for all items was more than 0.79, which was acceptable based on Lawshe criteria,[30] AND the CVI for all items was more than 0.85, which was acceptable based on Waltz and Bussel's criteria.[31] The internal consistency of the questionnaire was calculated through Cronbach alpha (>0.87) for each construct. The external consistency was assessed by test-retest Pearson correlation analysis (n=20, R=0.80, P=0.01).

The present study has been approved by the ethical committee of Fasa University of Medical Sciences, Iran (code of ethics: IR.FUMS.REC.1400.040). All participants in the study completed and signed an informed consent form. The questionnaires were anonymous, and participants were assured that their participation was voluntary and that their information would remain confidential.

Data were analyzed using SPSS 25 statistical software at a significance level of <0.05. THE normality assumption of the variables was checked and confirmed through the Shapiro-Wilk test.

Frequency descriptive statistics were used to report the frequency of participants' responses. Mann–Whitney U and Kruskal–Wallis tests were used to compare the frequencies between the groups participating in the study. The mean scores of the constructs between the participating groups were compared by independent t-test and one-way ANOVA. The correlation between the mean scores of constructs was analyzed and reported by Spearman's correlation coefficient. Ordinal logistic regression analysis was used to identify factors affecting the intention to get the covid-19 vaccine.

Results

345 people participated in the study (92%response rate); 45.2% were male. The mean age of participants was 67.7 (7.2) years, with an age range of 60-98 years. Table 1 shows the frequency distribution of participants in terms of demographic variables and the mean of the study variables scores in each demographic subgroup.

In terms of intention to receive the Covid-19 vaccine, the results revealed that most participants (n=177, 51.3%) intended to receive the vaccine. In comparison, 20.6% (n=71) of participants did not decide about it, and 28.1% (n=97) intended not to receive the vaccine. There were no significant differences in terms of intention to receive the covid-19 vaccine between sex and marital status subgroups, but a significantly (P=0.024) lower number of participants who were in high school education level did not intend to receive the vaccine (Table 1).

In the analysis of the participant's responses to the question, "If available, how likely are you to get any of the following covid-19 vaccines?" it was revealed that they had the most confidence in the vaccines which were approved by the World Health Organization or Iran's ministry of health and vaccines which produced in Iran (Table 2).

As shown in Table 3, there were no significant differences in mean scores of study variables between sex, marital status, and education level subgroups, except the perceived susceptibility, which was significantly lower in high school education level compared to other education levels (P=0.001).

Table 1: Frequency distribution of participants' intention about receiving covid-19* vaccine

Demographic variables		Intended to receive the vaccine	Intended to don't receive the vaccine	Had not decided	P
Sex	Female	89 (47.1)	60 (31.7)	40 (21.2)	0.136**
	Male	88 (56.4)	37 (23.7)	31 (19.9)	
Marital status	Married	131 (52.0)	68 (27.0)	53 (21.0)	0.861**
	Single	46 (49.4)	29 (31.3)	18 (19.4)	
Education level	Illiterate	61 (50.00)	44 (36.1)	17 (13.9)	0.024***
	Primary school	69 (57.9)	29 (24.5)	21 (17.6)	
	Middle school	28 (49.1)	15 (26.3)	14 (24.6)	
	High school	19 (40.4)	9 (19.2)	19 (40.4)	

*COVID-19: Coronavirus disease 2019; **Mann-Whitney U; ***Kruskal Wallis

Table 2: The frequency distributions of participants' views about the probability of receiving different covid-19* vaccines, if available.

Types of covid-19 vaccines	Very likely N (%)	Likely N (%)	Undecided N (%)	Unlikely N (%)	Very unlikely N (%)
Any vaccine approved by World Health Organization	100 (57.1)	34 (19.4)	26 (14.9)	9 (5.1)	6 (3.4)
Any vaccine approved by the Ministry of Health of Iran	106 (60.6)	24 (13.7)	25 (14.3)	13 (7.4)	7 (4)
Vaccines produced in Iran	81 (46)	32 (18.2)	35 (19.9)	11 (6.3)	17 (9.7)
Vaccines produced in America	47 (26.6)	12 (6.8)	45 (25.4)	22 (12.4)	51 (28.8)
Vaccines produced in England	36 (20.3)	14 (7.9)	48 (27.1)	23 (13)	56 (31.6)
Vaccines produced in Russia	46 (26)	16 (9.0)	52 (29.4)	16 (9)	47 (26.6)
Vaccines produced in China	40 (22.6)	8 (4.5)	54 (30.5)	29 (16.4)	45 (26)
Vaccines produced in other countries	19 (10.7)	6 (3.4)	58 (32.8)	28 (15.8)	66 (37.3)

COVID-19: Coronavirus disease 2019

Table 3: Compared mean (SD) scores of study variables in demographic subgroups

Demographic variables		N (%)	Perceived susceptibility Mean (SD)	Perceived severity Mean (SD)	Perceived barriers Mean (SD)	Perceived benefits Mean (SD)	Perceived self-efficacy Mean (SD)	Subjective norms Mean (SD)
Total		345 (100)	10.23 (2.91)	13.23 (4.78)	12.06 (3.02)	10.20 (2.36)	9.07 (2.89)	12.89 (3.53)
Sex	Female	189 (54.8)	10.15 (2.72)	12.95 (4.16)	12.34 (3.06)	10.07 (2.22)	8.88 (2.29)	12.87 (3.53)
	Male	156 (45.2)	10.32 (3.12)	13.58 (5.42)	11.71 (2.95)	10.34 (2.52)	9.28 (3.47)	12.89 (3.54)
P (independent T-test)			0.596	0.217	0.051	0.287	0.208	0.960
Marital status	Married	252 (73.1)	10.29 (3.04)	13.03 (4.12)	12.05 (3.09)	10.13 (2.40)	8.95 (2.67)	12.87 (3.72)
	Single	93 (26.9)	10.04 (2.53)	13.77 (6.21)	12.06 (2.83)	10.37 (2.24)	9.37 (3.41)	12.92 (2.96)
P (independent T-test)			0.471	0.204	0.972	0.421	0.226	0.904
Education level	Illiterate	122 (35.4)	10.28 (2.51)	13.66 (2.87)	12.19 (2.51)	10.13 (2.01)	8.95 (2.17)	12.78 (2.67)
	Primary school	119 (34.5)	10.49 (2.99)	13.39 (6.01)	11.64 (3.21)	10.39 (2.56)	9.34 (3.53)	13.08 (3.77)
	Middle school	57 (16.5)	10.82 (2.73)	13.11 (4.03)	12.19 (3.63)	10.23 (2.54)	9.03 (3.01)	13.04 (4.33)
	High school	47 (13.6)	8.70 (3.41)	11.88 (5.84)	12.59 (2.91)	9.82 (2.46)	8.68 (2.55)	12.47 (3.87)
P (One-way ANOVA)			0.001	0.176	0.250	0.557	0.549	0.748

SD: Standard deviation

Table 4: Correlation coefficients between study variables and intention to get covid-19 vaccine

Demographic Variable		Perceived susceptibility	Perceived severity	Perceived barriers	Perceived benefits	Self-efficacy	Subjective norms
Total		0.100	0.062	-0.201**	0.302**	0.269**	0.387**
Sex	Male	0.018	0.171**	-0.133	0.341**	0.262**	0.308**
	Female	0.159**	-.0.043	-.233**	0.261**	0.268**	0.460**
Marital status	Married	0.120	0.081	-0.219**	0.354**	0.271**	0.421**
	Single	0.043	0.018	-0.153	0.165	0.289**	0.290**
Education level	Illiterate	0.069	0.115	-0.030	0.185*	0.219*	0.417**
	Primary school	0.139	-0.058	-0.265**	0.347**	0.248**	0.374**
	Middle school	0.206	0.271*	-0.265*	0.398**	0.321*	0.469**
	High school	-0.010	0.015	-0.336*	0.288	0.361*	0.303*

COVID-19: Coronavirus disease 2019; *Correlation is significant at 0.05 level (two-tailed); **Correlation is significant at 0.01 level (two-tailed)

Spearman's correlations analysis revealed a significant relationships between the mean score of perceived barriers, perceived benefits, self-efficacy, subjective norms, and intention to get the vaccine. Table 4 shows the correlation coefficients between study valuables and intention to get the covid-19 vaccine in all subcategories of demographic variables. Based on these results, in total and almost all subgroups of study participants, subjective norms had the strongest positive relationship with the intention to receive the vaccine.

Spearman's correlations analysis revealed a significant relationships between the mean score of perceived barriers, perceived benefits, self-efficacy, subjective norms, and intention to get the vaccine. Table 5 shows the correlation coefficients between study valuables and intention to get the covid-19 vaccine in all subcategories of demographic variables. Based on these results, in total and almost all subgroups of study participants, subjective norms had the strongest positive relationship with the intention to receive the vaccine.

Table 5: Ordinal regression analysis of the influence of demographic variables and study constructs on intention to receive covid-19 vaccin E

Variable	Coefficient	Std. Error	Wald	df	P	95% Confidence Interval	
						Lower Bound	Upper Bound
Gender Female Male (ref)	-0.326	0.230	2.003	1	0.157	-0.776	0.125
Marital status Single Married (ref)	-0.214	0.252	0.723	1	0.395	-0.708	0.279
Education level Illiterate	-0.137	0.362	0.143	1	0.706	-0.846	0.573
Primary school	0.251	0.364	0.475	1	0.491	-0.463	0.965
Middle school High school (ref)	0.026	0.414	0.004	1	0.950	-0.785	0.838
Age	0.003	0.016	0.030	1	0.862	-0.028	0.033
Perceived susceptibility	-0.034	0.043	0.631	1	0.427	-0.119	0.050
Perceived severity	0.002	0.024	0.009	1	0.924	-0.045	0.050
Perceived barriers	-0.012	0.042	0.077	1	0.781	-0.094	0.071
Perceived benefits	0.112	0.053	4.434	1	0.035	0.008	0.217
Self-efficacy	0.086	0.041	4.305	1	0.038	0.005	0.167
Subjective norms	0.159	0.040	16.081	1	<0.001	0.081	0.237

COVID-19: Coronavirus disease 2019; df: Degree of freedom; P: P value

Discussion

This study aimed to investigate the determinants of older adults' intention toward receiving the Covid-19 vaccine. According to the findings of the present study, almost half of the participants (51.3%) intended to receive the vaccine, while in the studies of Sherman et al. (2020) in the U.K.,[8] and Lin et al. (2020) in China,[32] the majority of participants (64% and 83.5% respectively) intended to receive the covid-19 vaccine. This finding may indicate that older adults in Iran were less receptive to the covid-19 vaccine. It is probably because of doubts and suspicions which have been raised about the covid-19 vaccination in the Iranian population. The older adults were among the first target groups for covid-19 vaccination in Iran, after the health system staff, and at the time of this study, there was not sufficient information about the effectiveness of the covid-19 vaccines. Moreover, contradictory messages were shared in social networks, and on the other hand, a variety of vaccines that give individuals the freedom to choose were not available in Iran; all of these factors may play a role in creating this skepticism.

In this study, there were no significant differences in intention to uptake the Covid-19 vaccine among participants with different gender and marital status subgroups; however, it was significantly lower in participants with high school education levels than those with other education level. These results were consistent with Agley et al. (2021) findings which showed no significant relationship between gender and age with the possibility of receiving the covid-19 vaccine.[33] But, Soares et al. (2021) reported different results. According to their study, older people are more likely to get the vaccine as soon as possible than other age groups. Also, illiterate people and people with primary and secondary education levels were less likely to receive the COVID-19 vaccine than those with higher education levels. Furthermore, women were more likely than men to delaye receiving the vaccine.[34] wake et al. (2021), in a systematic review, reported that male gender, older age, marriage, and a higher level of education were the significant predictors of receiving the covid-19 vaccine, which was inconsistent with the results of the present study.[35] One of the possible reasons for the differences in these findings may be the current study's sample, older adults. Some evidence showed that the adverse effects of covid-19 on older Iranian adults have not been correlated with gender and other demographic variables.[36, 37]

In response to the question "Which vaccine would you receive if available?" most participants stated that they trusted the vaccines approved by the World Health Organization, the Ministry of Health, and the vaccines produced in Iran, respectively. The researchers did not find any similar studies in this field, so comparing these findings with other studies is impossible. But, these results may indicate that despite too much misinformation shared on social networks about the results of scientific research, people still trust reputable national and international scientific health organizations and domestic health products.

The study's findings showed that in almost all cases, the mean scores of study constructs were not significantly different between gender, marital status, and level of education subgroups. The researchers did not find any study about covid-19 vaccine comparing the mean score of study models between demographic subgroups. Some studies have reported that demographic variables were not significant predictors of intention to covid-19 vaccine,[38, 39] while in a study conducted by Chen et al.[38, 39] in China, age, sex, education, and income levels significantly affected covid-19 vaccine hesitancy.[40]

Unlike perceived susceptibility and severity, covid-19 vaccine intention had significant positive relationships with perceived barriers, perceived benefits, self-efficacy, and subjective norms in this study. In different demographic subgroups, subjective norms had the strongest correlation coefficients with vaccine intention, whereas, for men, the strongest relationship was found between perceived benefits and vaccine intention. In ordinal regression analysis, subjective norms were the strongest predictor of intention to get the covid-19 vaccine, followed by perceived benefits and self-efficacy. Like this study, some other studies showed subjective norms as one of the strong predictors of intention to get the covid-19 vaccine,[40-42] but in all these studies, the subjective norms are located after other studied constructs, such as attitudes or perceived benefits. On the other hand, inconsistent with this study, the findings of Fan et al. (2021) on college students in China showed that subjective norms were not a significant predictor for intention to receive the COVID-19 vaccine.[20] One of the possible explanations for the differences in these results may be the differences in study population ages. In the above-mentioned studies, the general or young population was considered the study population. In contrast, the present study focused on older adults, so in this respect, it is unique.

Limitation

As far as we know, this is the first study conducted on older adults about the intention to receive the covid-19 vaccine. Although this can be considered the strength of this study, it can also be a limitation of the study because it can reduce the generalizability of the results to other age groups. The other limitation is that the study's cross-sectional nature does not allow deriving any causal conclusions. In addition, the cross-sectional survey gives us an overview. It does not provide a clear and accurate picture of people's changing attitudes about COVID-19 vaccination, so longitudinal studies are recommended in this issue.

Conclusion

This study aimed to investigate the effective factors for receiving the covid-19 vaccine using HBM and TPB constructs. The findings of this study revealed that subjective norms were the most important factor that explained the intention to receive the covid-19 vaccine. In this study, the descriptive subjective norms, which refers to what most people in the family and community think, feel, or do, were investigated; therefore, the results indicated that observing the prevalence of getting covid-19 vaccine behavior and positive attitudes of any important person toward the Covid-19 vaccine significantly impacted older adults' decision to receive the covid-19vaccine. It is suggested that health education professionals promote a positive attitude toward the covid-19 vaccine and focus on statistical reports on vaccination by community members, celebrities, and trusted and influential people to persuade people toward their marketing activities.

Authors' Contributions

For research articles with several authors. "Conceptualization, M.K. and E.R.; methodology, M.K.; validation, M.K., F.B., and S.A.; formal analysis, M.K and M.Y.; investigation, resources, E.R., Z.S., and S.A.; writing—original draft preparation, M.K. F.B.; M.Y writing—review and editing, M.K. and M.Y.; supervision, M.K and M.Y.; project administration, M.K.; funding acquisition, S.A. All authors have read and agreed to the published version of the manuscript.

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