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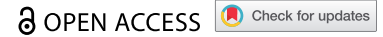
# The mediational role of trust in the healthcare system in the association between generalized trust and willingness to get COVID-19 vaccination in Iran

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**ABSTRACT**

For some individuals, there appears to be some level of unwillingness in getting a COVID-19 vaccine which may be due to trust issues. The present study used a mediation model to investigate how trust is associated with an individual's willingness to get COVID-19 vaccination among Iranians. A total of 10,843 Iranian adults were recruited in Qazvin province using a multistage stratified cluster sampling method. The survey was completed between February 19 and April 9, 2021. The findings showed that generalized trust was positively associated with trust in the healthcare system, trust in the healthcare system was positively associated with willingness to get COVID-19 vaccination, and generalized trust was positively associated with willingness to get COVID-19 vaccination. Also, trust in the healthcare system mediated the association between generalized trust and willingness to get COVID-19 vaccination. There were some significant demographic differences in COVID-19 vaccination willingness. The findings suggest that generalized trust plays a significant role in directly or indirectly influencing individuals' willingness to get COVID-19 vaccine. Therefore, government bodies and health officials may utilize these findings to appeal in a more transparent and professional manner in encouraging individuals to get a COVID-19 vaccine. However, for those with lower trust levels (in general and in the healthcare system), the focus may be to re-build and/or regain the individuals' trust through carefully planned transparent communication, information dissemination, and ethical education to help increase the uptake of COVID-19 vaccination.

## Introduction

The negative impact of the novel coronavirus disease 2019 (COVID-19) on countries and individuals worldwide include economic,[1,2] health[3,4] and social life[5,6] challenges. The situational reports on COVID-19 infection and deaths are still high worldwide.[7] Fortunately, there have been preventive breakthroughs such as COVID-19 vaccines with (at the time of writing) 13 authorized worldwide and several under development.[8,9] Health experts have argued that there needs to be at least 60% of the population vaccinated in order to achieve herd immunity or better control the spread of COVID-19 during the pandemic.[10] Unfortunately, the vaccination drive has been met with low uptake in some countries.

Possible reasons for low uptake include trust issues (between the populace and healthcare system, and/or government, etc.) due to concerns about vaccine safety and growing complacency concerning personal protection behaviors.[11] Although these reasons may vary between countries and/or regions, health experts should examine these reasons in their respective countries. As of April 9, 2021, only four vaccines had been fully approved. These were the Pfizer/BioNtech Comirnaty vaccine (listed on December 31, 2020), SII/

Covishield and AstraZeneca/AZD1222 vaccines (developed by AstraZeneca/Oxford and manufactured by the Serum Institute of India and SK Bio respectively; listed on February 16, 2021), and Janssen/Ad26.COV 2.S (developed by Johnson & Johnson; listed on March 12, 2021).[8,9] Furthermore, there were about 100,000 and 260,000 Iranians fully vaccinated and 260,000 Iranian partly vaccinated compared to about 165 million individuals fully vaccinated and 262 million individuals partly vaccinated people worldwide by April 9, 2021.[12,13] These people were among the first and second priority cohorts which included frontline health care workers, workers and residents in elderly centers and veterans, and older adults aged over 80 years.[14]

The willingness to get COVID-19 vaccination is associated with vaccine hesitancy (i.e., being unsure about getting a vaccine) which usually accounts for a more substantial share of the population than those who have a vaccine resistance (i.e., those who object to vaccines).[11,15,16] Most of the concerns toward COVID-19 vaccination are due to vaccine safety and growing compliance of personal protection behaviors.[11] That is, most individuals believe that the vaccines were hastily developed therefore may not have exhausted the precautionary procedures

involved with vaccine development (unsafe vaccines) while others also focus on the conspiracy theories and purpose of COVID-19.[17–19] These concerns (vaccine safety and COVID-19 conspiracy theories) indicate a need for transparent, carefully planned communication, and thorough and appropriate education is needed to allay these fears and concerns.[18–20] This is because transparent engagement and education dissemination from health experts to individuals may help to resolve their issues concerning COVID-19, developing or boosting their trust in COVID-19 vaccines which may further improve their willingness to get COVID-19 vaccination.[18–20]

Previous findings on demographic differences in willingness to vaccinate against COVID-19 are varied due to several factors including culture, governmental approach in managing the pandemic, and the perceived risk of being infected with COVID-19.[11,16,18,21] Among Bangladeshi adults, substantial proportions of both sexes, all age groups, all educational levels, irrespective of the location of residence or marital status were willing to vaccinate against COVID-19.[22] Other findings have indicated that older individuals,[18,19,21] females or males,[18,19,21,23] and individuals with higher levels of education[18,21,23] are willing to be vaccinated against COVID-19.

There are several categories of trust[24,25] but for the purpose of the present study, the focus was generalized trust (or general trust) and trust in healthcare system. Generalized trust refers to the willingness to be vulnerable to the actions of others or the belief that most individuals are trustworthy most of the time.[25–27] It is also related to how much an individual trusts another person with whom that individual meets for the first time.[25,27,28] Therefore, generalized trust is one of the main pivots in everyday interactions that has relevance for both building successful social relationships or business transactions, as well as facilitating a broader climate of national understanding and social connection in times where social integration and support can be critical.[27,29]

Trust is an important contributing factor to public compliance and perceived risks during a pandemic and especially the COVID-19 pandemic.[27,30] More specifically, generalized trust is positively associated with compliance but negatively associated with perceived risks.[27,30] Therefore, generalized trust may be a necessary tool for successfully managing COVID-19 vaccination although health authorities must tactfully and cautiously increase the individuals' perceived risks of COVID-19 in order to help facilitate preventive measures in relation to the pandemic.[27,30–32] Across the world, studies conducted have shown that higher levels of trust (e.g., in the government) have been associated with the likelihood of accepting a COVID-19 vaccine.[16,18,30] Therefore, the present study investigated generalized trust which is much broader than specific trust in vaccination.

Similar to generalized trust, trust in the healthcare system is of foundational importance in the relationship between patients and clinicians as well as the health institution at large. Clinicians work to earn and maintain patients' trust throughout the consultation process. Consequently, patients accept their diagnoses and recommended treatments while patients trust the competence of clinicians to the extent of disclosing sensitive personal information during consultation believing that the clinician will keep it confidential.[33] This level of trust is built up over time by clinicians and healthcare institutions through selflessly serving, respecting patients' knowledge and perspectives, and by assuring individuals that they are putting patients' best interests above any financial or nonfinancial self-interest of their own.[33] When clinicians or healthcare intuitions behave selfishly or subvert patient interests, patients lose trust in them.[33,34]

The COVID-19 pandemic has introduced new threats to trust in healthcare due to the way COVID-19 has been managed to date. That is, conflicting messages, concerns about political interference in public health recommendations, and decisions regarding the efficacy of therapeutics threaten trust in the healthcare system.[33] Previous studies have shown a positive association between trusting healthcare workers (or healthcare) and vaccination.[35–37]

To date, there has been no research investigating the structural associations between generalized trust, trust in the healthcare system, and willingness to get COVID-19 vaccination, or any research examining how trust in the healthcare system mediates the association between generalized trust and willingness to get COVID-19 vaccination. Therefore, knowing the structural association between these variables would further enhance understanding and improve the management of COVID-19 vaccination uptake. Consequently, the findings of the present study will be beneficial to government and health experts by deepening their understanding of how to approach individuals who are hesitant regarding COVID-19 vaccination. Therefore, the aim of the present study was to use a mediation model to investigate how trust (general and in healthcare system) is associated with an individual's willingness to get COVID-19 vaccination. The hypotheses were that (1) generalized trust will be positively associated with willingness to get COVID-19 vaccination; (2) trust in the healthcare system will be positively associated with willingness to get COVID-19 vaccination; (3) generalized trust will be positively associated with trust in the healthcare system; and (4) trust in the healthcare system will mediate the association between generalized trust and willingness to get COVID-19 vaccination.

## Method

### Participants and procedure

Residents of Qazvin province (50 km northwest of Tehran) comprising individuals who lived in cities and villages were used as the population of the present study. To collect the data, a representative sample of the general adult population in Qazvin was recruited comprising 70 multistage stratified clusters. The clusters included six cities in Qazvin province which were Qazvin, Takestan, Avaj, Alborz, Buin Zahra, and Abyek which comprises approximately 1.27 million individuals (51% males) according to the 2018 census. This was followed by stratification in each city based on urban and rural areas and then random selection of several centers. The list of families covered by the centers was then randomly selected.

Well-trained interviewers helped to gather data (via an in-person survey) by visiting eligible participants' homes between February 19 and April 9, 2021 after informing them about the research (its importance to healthcare delivery and Iranians as

a whole) and seeking their consent and willingness to be part of the study via telephone. Participants were also briefed on the ethical issues associated with the research including confidentiality, anonymity, and withdrawal from the research at any time. Data collection mostly took place at weekends and holidays when most people were at home and/or on weekdays when appointments were booked. Interviewers mostly visited participants once (and maximum, twice) which took approximately 25 minutes. The inclusion criteria for the present study included (i) being adult (aged 18 years or above), (ii) living in Qazvin province, and (iii) being a resident who was willing to participate in the study. The exclusion criterion was individuals who were either guests or tourists in Iran. All the procedures in the present study were approved by the Ethics Committee of Qazvin University of Medical Sciences (IR.QUMS.REC.1399.418). Written informed consent was obtained from all the participants.

### Measures

### Demographic characteristics
Participants demographic data such as age, sex, educational status, marital status, and living residence were collected using a background information sheet.

### Generalized Trust Scale (GTS)
The GTS is a six-item self-report scale that assesses the general level of trust of an individual.[29,32,38] It was originally developed by Yamagishi and Yamagishi[38] to assess an individual's expectation of trustworthiness of others.[32] Items (e.g., *"Most people are basically honest"*; see Table 2 for all items) are rated on a five-point Likert scale from 1 (*completely disagree*) to 5 (*completely agree*).[38] A higher score of the summed total indicates a higher level of trust. The Persian version has acceptable reliability and validity indices.[39]

### Trust in Healthcare System Scale (THSS)
The THSS is a three-item self-report scale that assesses trust in healthcare systems. The THSS items comprise *"The Healthcare System makes too many mistakes,"* *"The Healthcare System does its best to make patients' health better,"* and *"The Healthcare System lies to make money"* (Table 2). These items are taken from the nine-item Revised Health Care System Distrust Scale (i.e., Items 1, 4, and 8).[40] Items are rated on a five-point Likert scale from 1 (*strongly disagree*) to 5 (*strongly agree*) similar to its full original version which reported an acceptable Cronbach's alpha (0.83).[40]

### Willingness to get COVID-19 vaccination (WCV)
A single item with a dichotomous response (yes/no) was used to assess whether participants were willing to get COVID-19 vaccination or not (i.e., "Are you going to get COVID-19 vaccination?").

### Data analysis

Descriptive statistics and Pearson correlations were used to illustrate the participants' characteristics, their scores on the instruments, and the correlations between the instruments' scores. Categorical and continuous variables were compared by calculating cluster weighted chi-squares and the adjusted

$t$-value using the Stata 'CLTEST' modules for performing cluster-adjusted chi-square tests and $t$-tests. Logistic regression analyses were used to examine the associations between the variables of interest in the present study. The hypotheses were tested using the structural equation modeling (SEM) using the full information maximum likelihood (FIML) estimator. All the missing data were also taken care of by the FIML. Moreover, the Percentile Bias-Corrected Bootstrapping method with 10,000 bootstrapping samples was used to examine whether the proposed mediated effects were significant because this bootstrapping method does not require a normal distribution assumption. The SEM was adjusted for age, sex, marital status, education, and living residence. Before using SEM to examine the path effects and mediated effects, SEM was evaluated using several fit indices. More specifically, comparative fit index (CFI) higher than 0.95, Tucker-Lewis index (TLI) higher than 0.95, root mean square error of approximation (RMSEA) lower than 0.06, and standardized root mean square residual (SRMR) lower than 0.08 together suggest a good fit.[41] The SEM was analyzed using AMOS and all the other analyses were carried out using IBM SPSS. The alpha level for all the statistical analyses was set at 0.05 unless otherwise stated.

## Results

A total of 10,843 participants (4092 males, 37.7%) with a mean age of 35.54 years (SD = 12) participated in the present study. This represents a 78% response rate with no obvious pattern indicating selection bias across the strata. The participants were fairly represented across the various levels of education with the highest cohort completing university (4,230, 39%) and lowest having no formal education (352, 3.2%). The majority were married (8,092, 74.6%), living in the city (8,186, 75.5%), and willing to vaccinate in the near future (8,532,78.7%) (see Table 1). Table 2 indicates that the THSS and GTS both had acceptable Cronbach's alpha reliability coefficients (α of 0.714 and 0.770 respectively), factor loadings, and average variance extracted from SEM. Therefore, the THSS and GTS had acceptable psychometric properties for the present study.

Table 3 shows that older participants (35.89 years±12.04, $p < .001$) among those who would be willing to accept a COVID-19 vaccine, 61.8% were females and 38.2% were males. There was no linear trend for education but among those willing to get a COVID-19 vaccine, 39.8% had a university education, 25.5% had a diploma, 13.2% had secondary school education, 9.5% had primary school education, 8.8% had high school education, and 3.3% had no formal education. Also, among those more willing to get a COVID-19 vaccine, 75.4% were married and 24.6% were single. Those with higher scores in generalized trust ($p < .001$), and trust in the healthcare system ($p < .001$) were more willing to get a COVID-19 vaccine than their comparative counterparts. All the differences were significant ($p < .001$) except the place (rural vs. city) where they lived ($p = .267$).

Table 4 shows that there was a positive association between trust in healthcare system and willingness to get a COVID-19 vaccine (OR = 1.434, 95% CI = 1.348–1.526) as well as a positive association between generalized trust and willingness to get a COVID-19 vaccine (OR = 1.097, 95% CI = 1.032–1.167).

**Table 1.** The demographic characteristics of the respondents included in this study (n = 10843).

|  | Mean ± SD or N(%) |
|---|---|
| *Age (years)* | 35.54 ± 12.00 |
| *Sex* | |
| Male | 4092 (37.7%) |
| *Educational status* | |
| University | 4230 (39.0%) |
| Diploma | 2761 (25.5%) |
| High school | 974 (9.0%) |
| Secondary school | 1540 (14.2%) |
| Primary school | 986 (9.1%) |
| No formal education | 352 (3.2%) |
| *Marital status* | |
| Married | 8092 (74.6%) |
| Single | 2751 (25.4%) |
| *Accommodation* | |
| City | 8186 (75.5%) |
| Rural | 2656 (24.5%) |
| **COVID-19 vaccination in the near future** | |
| Yes | 8532 (78.7%) |
| No | 2052 (18.9%) |
| Missing | 259 (2.4%) |

Response rate was 78%.

Table 5 shows that there were positive associations between the following variables: age (being older) and willingness to get a COVID-19 vaccine (OR = 1.011, 95% CI = 1.005–1.016), sex (being male) and willingness to get a COVID-19 vaccine (OR = 1.258, 95% CI = 1.131–1.399), relationship status (being married) and willingness to get a COVID-19 vaccine (OR = 1.154, 95% CI = 1.019–1.306), and those who had primary school education and willingness to get a COVID-19 vaccine (OR = 1.073, 95% CI = 0.878–1.311). However, there were negative associations between the following variables: city accommodation and willingness to get a COVID-19 vaccine (OR = 0.848, 95% CI = 0.750–0.958), those who had diploma education and willingness to get a COVID-19 vaccine (OR = 0.880, 95% CI = 0.775–0.998), those who had high school education and willingness to get a COVID-19 vaccine (OR = 0.839, 95% CI = 0.702–1.002), those who had secondary school education and willingness to get a COVID-19 vaccine (OR = 0.827, 95% CI = 0.708–0.967), and those who had no formal education and willingness to get a COVID-19 vaccine (OR = 0.843, 95% CI = 0.610–1.164). The final model was a significant improvement in fit over a null model $\chi^2$ (9) = 85.364, $p$ < .001. Pearson's chi-square test indicated that the model fitted the data well $\chi^2$ (1457) = 1546.413, $p$ = .310.

Supplementary analysis (Table S1) was conducted using simple logistic regression because the data were not fully eligible to do multinomial logistic regression. However, the results were completely the same.

The SEM showed that generalized trust was associated with trust in the healthcare system (standardized coefficient [$\beta$] = 0.206, $p$ < .001), trust in the healthcare system was associated with willingness to get COVID-19 vaccination ($\beta$ = 0.156, $p$ < .001), and generalized trust was associated with willingness to get COVID-19 vaccination ($\beta$ = 0.025, $p$ < .05). Trust in the healthcare system mediated the association between generalized trust and willingness to get COVID-19 vaccination ($\beta$ = 0.032, $p$ = .002; see Figure 1). The mediated effect was supported using bias-corrected bootstrap test (95% CI = 0.016–0.024). Furthermore, the fit indices were within acceptable limits ($\chi^2$ (df) = 521.070 (65); $p$<0.001; CFI = 0.986; TLI = 0.978; RMSEA = 0.025 (0.023–0.024); SRMR = 0.0189).

## Discussion

The present study used a mediation model to investigate how trust (in general and in the healthcare system) was associated with an individual's willingness to get COVID-19 vaccination. The findings regarding the association of demographic factors with COVID-19 vaccination willingness showed that age, sex (being male), education (having primary education), and relationships status (being married) were positively associated with willingness to get a COVID-19 vaccine. However, living in the city, those who had a diploma or high school education or secondary school education or those who had no formal education were negatively associated with willingness to get a COVID-19 vaccine.

These findings have significant practical implications on how health policymakers may tackle the issue of vaccination hesitancy among the populace. More specifically, the findings identify the demographic characteristics that health experts may target during education on the need for COVID-19 vaccination. Some of the findings in the present study are similar to previous studies[11,15,18,19,21,23] although these findings may be specific to Iranians. For instance, among Americans (US), males and those aged above 65 years were more willing receive COVID-19 vaccination which is similar to the findings in the present study.[15] However, there have been contrary or inconsistent results for different educational levels, age groups, sex,

**Table 2.** Generalized trust and trust in health system with descriptive statistics, reliability coefficients, factor loadings, and average variance extracted statistics.

| Construct | Measurement item | Mean | SD | λ | α | ω | CR | AVE |
|---|---|---|---|---|---|---|---|---|
| Generalized Trust Scale | Most people are basically honest | 2.82 | 1.26 | 0.759 | 0.770 | 0.783 | 0.87 | 0.56 |
| | Most people are trustworthy | 2.74 | 1.24 | 0.870 | | | | |
| | Most people are basically good and kind | 3.18 | 1.21 | 0.967 | | | | |
| | Most people are trustful of others | 3.03 | 1.19 | 0.830 | | | | |
| | I am trustful | 3.96 | 1.10 | 0.306 | | | | |
| | Most people will respond in kind when they are trusted by others | 3.63 | 1.12 | 0.553 | | | | |
| Trust in Healthcare System | The Healthcare System makes too many mistakes | 3.68 | 1.08 | 0.491 | 0.714 | 0.724 | 0.71 | 0.46 |
| | The Healthcare System does its best to make patients' health better | 4.03 | 0.94 | 0.754 | | | | |
| | The Healthcare System lies to make money | 4.16 | 0.92 | 0.758 | | | | |

λ = Standardized factor loading from structural equation model; α = Cronbach's alpha reliability coefficient; ω = McDonald's omega reliability coefficient; CR = Composite reliability; AVE = Average variance extracted from structural equation model.

**Table 3.** Demographic differences on COVID-19 vaccination willingness.

| | COVID-19 vaccination willingness | | |
|---|---|---|---|
| | No (n = 2052) | Yes (n = 8532) | |
| | Mean (SD) or n (%) | Mean (SD) or n (%) | p-value[a] |
| *Age (years)* | 33.87 (11.68) | 35.89 (12.04) | <.001 |
| *Sex* | | | |
|   Male | 658 (32.2%) | 3242 (38.2%) | <.001 |
|   Female | 1386 (67.8%) | 5237 (61.8%) | |
| *Educational status* | | | |
|   University | 760 (37.3%) | 3375 (39.8%) | <.001 |
|   Diploma | 536 (26.3%) | 2157 (25.5%) | |
|   High school | 223 (11.0%) | 742 (8.8%) | |
|   Secondary school | 308 (15.1%) | 1117 (13.2%) | |
|   Primary school | 154 (7.6%) | 802 (9.5%) | |
|   No formal education | 55 (2.7%) | 282 (3.3%) | |
| *Marital status* | | | |
|   Married | 1434 (70.4%) | 6386 (75.4%) | <.001 |
|   Single | 603 (29.6%) | 2087 (24.6%) | |
| *Accommodation* | | | |
|   City | 1566 (76.6%) | 6357 (75.0%) | .267 |
|   Rural | 479 (23.4%) | 2117 (25.0%) | |
| *Generalized Trust[b]* | 3.13 (0.81) | 3.25 (0.81) | <.001 |
| *Trust in healthcare system[c]* | 3.75 (0.80) | 4.00 (0.76) | <.001 |

[a]Categorical and continuous variables were compared by calculating cluster weighted Chi-squares and the adjusted t-value.
[b]Generalized Trust was measured using a scale which had all its items summed up to get an overall score (See the method section for details). [c]Trust in healthcare system was measured using a scale which had all its items summed up to get an overall score (See the method section for details).

**Table 4.** Binary logistic regression of willingness to get a COVID-19 vaccine.

| | Willingness to get a COVID-19 vaccine | | |
|---|---|---|---|
| Variable | OR | 95% CI | 95% CI |
| Trust in healthcare system | 1.434 | 1.348 | 1.348 |
| Generalized trust | 1.097 | 1.032 | 1.032 |
| Constant | 0.414 | - | - |

OR: Odds Ratio; 95% CI: 95% Confidence Interval.

**Table 5.** Binary logistic regression of willingness to get a COVID-19 vaccine.

| Outcome | OR | 95% CI | | p-value |
|---|---|---|---|---|
| Intercept | - | - | - | <.001 |
| Age (years) | 1.011 | 1.005 | 1.016 | <.001 |
| Sex (Ref. Female) | 1.258 | 1.131 | 1.399 | <.001 |
| Accommodation (Ref. Rural) | 0.848 | 0.750 | 0.958 | .008 |
| Married (Ref. Single) | 1.154 | 1.019 | 1.306 | .024 |
| Education | | | | |
| University (Ref.) | - | - | - | - |
| Diploma | 0.880 | 0.775 | 0.998 | .047 |
| High school | 0.839 | 0.702 | 1.002 | .053 |
| Secondary school | 0.827 | 0.708 | 0.967 | .017 |
| Primary school | 1.073 | 0.878 | 1.311 | .490 |
| No formal education | 0.843 | 0.610 | 1.164 | .299 |

OR: Odds Ratio; 95% CI: 95% Confidence Interval; df = 1.

marital status, and living location depending on the region or country.[11,12,15,18] As of August 16, 2021, there were over 4.38 million Iranians who had been fully COVID-19 vaccinated and 11.13 million Iranians who had been partly COVID-19 vaccinated with the main challenge being access to the COVID-19 vaccines alongside minor vaccine hesitancy.[12,13] Going forward, more effort is needed in targeting the demographic groups that have less willingness to get COVID-19 vaccines.

The findings showed that generalized trust was positively associated with willingness to get COVID-19 vaccination which indicates that the higher the generalized trust of the individuals the higher their willingness to get COVID-19 vaccination. This suggests that it may be easier for Iranians to get COVID-19 vaccination if they already have higher levels of generalized trust. This finding is similar to previous findings which found a positive association between generalized trust and COVID-19 vaccine uptake[19,21,42] and compliance to COVID-19 preventive measures.[27,30–32] Re-building or improving generalized trust may be needed in the case of poor COVID-19 vaccine uptake through honest and sincere conversation between officials and individuals (where individuals' views are considered) although that may take a considerable time to accomplish.[24,25,43,44]

Similarly, trust in the healthcare system was positively associated with willingness to get COVID-19 vaccination which suggests that the higher the trust in the healthcare system among Iranians the higher their willingness to get COVID-19 vaccination. Higher trust in the healthcare system is an indication that the healthcare system (workers and institutions) has been professional and selfless in its work toward better healthcare. Due to this, individuals may listen and follow health experts' recommendations to take COVID-19 vaccination.[20,33,45] On the other hand, when individuals do not trust the healthcare system, they may ignore health experts' recommendations and suffer the consequences thereof.[33,34,46] Re-building or regaining individuals' trust may take considerable time. However, it may start with listening to individuals' concerns and reassuring them of professional work, providing accurate information, and serving selflessly.[20,33,43,44] This finding is similar to previous studies[35–37] although one study reported contrary findings.[34]

It was also found that generalized trust was positively associated with trust in the healthcare system which indicates that the higher the generalized trust the higher the trust in the healthcare system. This also suggests that everyone should do their best in upholding or improving the trust gained as this may reflect positively in other sectors of engagement (e.g., healthcare).[24,25] Consequently, any information or recommendation from healthcare institutions or non-healthcare institutions may be taken in good faith. However, one must take caution in exercising this trustfulness during this COVID-19 pandemic period as there is a tendency to be lowered perceived risks of COVID-19 infection.[27,30]

Trust in the healthcare system was found to mediate the association between generalized trust and willingness to get COVID-19 vaccination. This finding indicates that not only does generalized trust positively associated with willingness to get COVID-19 vaccination directly, but also through trust in the healthcare system indirectly. This suggests that there are at least two ways (direct and indirect) of appealing to individuals to take the COVID-19 vaccine which may lead to a desirable outcome especially among Iranians. More specifically, recommendations from non-health sectors (e.g., government) on the need to take COVID-19 vaccination may be accepted directly with or without corroboration from health professionals (i.e., the healthcare system). That is, individuals may be willing to take the COVID-19 vaccine if indirectly recommended by other significant sources (e.g., government communicators) and through health experts
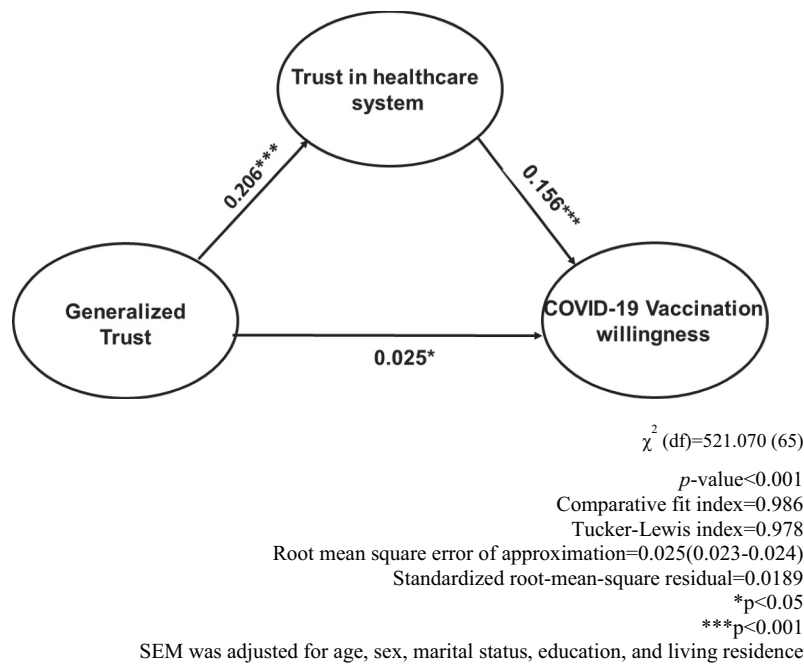
$\chi^2$ (df)=521.070 (65)

*p*-value<0.001
Comparative fit index=0.986
Tucker-Lewis index=0.978
Root mean square error of approximation=0.025(0.023-0.024)
Standardized root-mean-square residual=0.0189
*p<0.05
***p<0.001
SEM was adjusted for age, sex, marital status, education, and living residence

**Figure 1.** Mediation model via structural equation modeling showing the associations between generalized trust, trust in healthcare system, and willingness to get COVID-19 vaccination. $\chi^2$ (df) = 521.070 (65), *p*-value<0.001. Comparative fit index = 0.986. Tucker-Lewis index = 0.978. Root mean square error of approximation = 0.025 (0.023–0.024). Standardized root-mean-square residual = 0.0189, *p* < .05, ***p* = < .001. SEM was adjusted for age, sex, marital status, education, and living residence.

(e.g., medical doctors or nurses) directly. This finding is a significant addition to the trust relationship with respect to COVID-19.[25]

## Limitations

The present study has some limitations. First, data for the present study were gathered using self-report measures which may be susceptible to biases such as social desirability. However, the robustness of the psychometric properties for these self-report measures and the data analysis used suggest that the findings are valid and trustworthy to an appreciable degree. Second, a cross-sectional design was used in the present study which, traditionally, limits cause-and-effect relationships between the variables. However, the data analysis used in the present study (structural equation modeling; SEM) are for deducing causal modeling, therefore a causal association can tentatively be made. Third, as different governments use different policies to control COVID-19 infection, the case of Iran may be different from other countries. Therefore, other countries should replicate the present study for a more comprehensive understanding of how the variables in the present study relate to each other. Fourth, the present study did not specifically assess trust in COVID-19 vaccination which would have provided more information about how policy makers could manage people's willingness to get a COVID-19 vaccine. Therefore, future research should examine trust in COVID-19 vaccination and its association among these variables.

## Conclusion

The present study established that trust in the healthcare system mediated the association between generalized trust and willingness to get COVID-19 vaccination. Also, it was observed that (i)

generalized trust was positively associated with trust in the healthcare system, (ii) trust in the healthcare system was positively associated with willingness to get COVID-19 vaccination, and (iii) generalized trust was positively associated with willingness to get COVID-19 vaccination. This suggests that generalized trust plays a significant role in directly or indirectly influencing individuals' willingness to get the COVID-19 vaccine. Therefore, government bodies and health officials may capitalize on these findings to appeal to individuals in a more transparent and professional manner to vaccinate against COVID-19. However, for those with lower trust levels, the focus may be to re-build and/or regain individuals' trust through carefully planned transparent communication, information dissemination, and ethical education of the individuals to help increase the uptake of COVID-19 vaccination. Future studies may also examine factors that affect trust in COVID-19 vaccines and their association with willingness to get a vaccine.

## Disclosure statement

No potential conflict of interest was reported by the author(s).

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