



# The Relationship Between Risk Communication and Willingness to Receive Booster Doses of COVID-19 Vaccines

Elahe Sepehrian<sup>1</sup>, Amjad Mohammadi Bolbanabad<sup>1</sup>, Parvaneh Taymoori<sup>1\*</sup> and Arezoo Fallahi<sup>1</sup>

<sup>1</sup>Department of Public Health, Faculty of Health, Kurdistan University of Medical Sciences, Sanandaj, Iran

\*Corresponding author: Department of Public Health, Faculty of Health, Kurdistan University of Medical Sciences, Sanandaj, Iran. Email: parvaneh.tay@gmail.com

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## Abstract

**Background:** Identifying factors associated with willingness to receive a booster dose of COVID-19 vaccines and risk communication are essential to control the pandemic.

**Objectives:** The study aimed to evaluate the relationship between risk communication and willingness to receive booster doses of COVID-19 vaccines.

**Methods:** This cross-sectional study was conducted on 746 over 18 years old adults in Kermanshah, Iran, on October 2022 using random cluster sampling from 396,000 members of the general population who had not received a COVID-19 booster dose. Required data were collected using an online questionnaire from people who met the study requirements and analyzed via SPSS software version 22.

**Results:** A total of 746 participants were between the ages of 40 and 59, 374.0% had a history of underlying disease, and 61.9% received two doses of the Sinopharm vaccine. About 36.3% were willing to accept booster dosages, and men, older adults, and those with underlying diseases were more likely to receive booster vaccinations. The most influential sources of information were social networks and television. There was a positive and significant correlation between risk communication and willingness to receive booster vaccine doses ( $P > 0.05$ ). The average risk communication scores were higher among those more likely to receive a booster dose.

**Conclusions:** Health policymakers should pay more attention to risk communication in designing multi-component interventions and producing appropriate and authentic content in social networks to increase the general population's acceptance of vaccine booster doses.

**Keywords:** Get Vaccinated, Booster Doses, COVID-19 Vaccines, Risk Communication

## 1. Background

Many countries have recommended booster doses to ease the burden of rising death rates and severity caused by new strains of COVID-19 (1-4). Only 35.1% of Iranians and 34.6% of people worldwide received booster shots for COVID-19 (5). Only 346,000 (46.6%) of Kermanshah's over-18 population (742,000 at the time of the research) received the third dose (6).

Factors affecting people's reluctance to vaccinate against COVID-19 vary across countries and regions (7). Age, culture, government handling, and illness likelihood impact vaccine acceptance (8, 9). Perceived risks, uncertainty, and lack of information can lead to emotional, cognitive, and behavioral reactions, which influence public behavior.

COVID-19 challenges public health services' communication ability with at-risk people and groups (10). Regular and active communication prevents misunderstandings and confusion. Health experts and authorities may differ on risk perceptions, while cultural values and beliefs heavily affect public perception (11). Community awareness should be increased for accurate, trustworthy, and accessible information for effective infection control (12). Community involvement in suggested behaviors is essential for effective infection control (13). Experts and researchers should understand the multifaceted nature of risk communication (RC) and willingness to receive COVID-19 booster doses (14).

Risk communication during epidemics is essential for sharing information about risks and facilitating

good choices and preventive actions (13, 15). Risk communication involves sharing information about a risk's nature, size, significance, or control among interested parties. As a result, informed choices and preventive measures can be taken to reduce the impact of crises (13). Risk communication raises awareness, improves knowledge, and influences behavior among stakeholders and public people. Effective risk communication minimizes damage in emergencies, as each person's actions impact others (16).

Risk communication positively influences people's willingness to receive booster doses by providing information about vaccine safety (17) and ensuring effectiveness (18). Vaccine hesitancy is also addressed, demographic messaging is tailored, and public health messages are promoted (19). Studies have indicated that booster shot uptake intent, institutional trust, and public risk information positively correlate, emphasizing risk communication (20).

Studies on the impact of risk communication on COVID-19 booster doses in Iran are limited. This study examined how risk communication affected people's desire to get COVID-19 booster shots in Kermanshah, Iran, in 2022.

## 2. Objectives

This study evaluated the association between risk communication and willingness to receive booster doses of COVID-19 vaccinations in Kermanshah, Iran, in 2022. According to the study, the most important sources of information were the frequency of vaccine doses received, the degree of unwillingness, and the reasons for refusal.

## 3. Methods

### 3.1. Study Design

This cross-sectional descriptive-analytical study was conducted on 746 over 18 people in 2022 who completed the first and second doses of the COVID vaccine. More than six months were passed since the second dose, and they were willing to participate in the study.

### 3.2. Data Collection

The data were collected using an online questionnaire on an Iranian platform (<https://survey.porsline.ir>). The questionnaire was divided into four sections: demographic data (17 questions), information on

the COVID-19 vaccine, and information about risk communication. The research construct (RC) was adapted by Heydari et al. into a valid and accurate questionnaire (16) based on four parts. (1) Exposure to news media was separated into two categories: traditional mass media and the internet, with two questions. The level of exposure was assessed on a 5-point scale ranging from 1 (often) to 5 (never); (2) Information-gathering ability with three questions; (3) Trust in the government with three questions, and (4) Trust in the news media with three questions were assessed. All questions were evaluated using a 5-point Likert scale ranging from 1 (total agreement) to 5 (full disagreement). The final score was calculated using the average.

The willingness to get a COVID vaccination booster dosage (3 questions), adapted by S. Vellappally (21). The willingness was measured on a 4-point scale ranging from 1 (agree) to 4 (disagree). The respondents who selected the "I agree" and "very agree" options were categorized as willing to receive. This study was approved by the ethics committee of the Kurdistan University of Medical Sciences protocol (IR.MUK.REC.1401.264). A written consent form was sent to participants before the survey began, outlining the project's aims.

### 3.2.1. Validity and Reliability

The questionnaire was prepared by searching for reliable sources. Heydari et al. (16) evaluated a questionnaire's transparency, comprehensiveness, and correlation with five academic experts to assess the comprehensiveness and correlation of items. In this research, factor analysis and Cronbach's alpha coefficient were calculated to ensure the correct selection of measurement items and the reliability of the questionnaire. The study used factor analysis and Cronbach's alpha coefficient to ensure appropriate question selection and questionnaire reliability. Factor loading values for each subscale of risk communication were 0.599 and 0.647 for News Media Exposure. The values of Information Gathering Ability were 0.542, 0.852, and 0.873. The values of Trust in the Government included 0.565, 0.790, and 0.738. The values of Trust in the News Media values were 0.823, 0.803, and 0.823. The Cronbach's alpha coefficient was more than 0.7.

The data were analyzed using SPSS software version 22. The chi-square test determined the relationship between demographic variables, including gender, marital status, age, education, number of children, nationality, religion,

and underlying disease with “reluctance to receive COVID-19 booster doses”. In addition, univariate logistic regression was performed to identify the relationship between vaccine willingness and risk communication with reporting adjusted odd ration (AOR).

#### 4. Results

Table 1 reports the demographic characteristics of the participants. More than half of the respondents (61.9%) received the Sinopharm vaccination twice. Table 2 shows that 36.3% are willing to get booster doses of the vaccine when they are foreign (30.4%) and when they are internal or Iranian (14.1%).

Age, sex, and a history of underlying disease significantly impacted the willingness to receive booster vaccine doses. Men, people over the age of 60, and those with underlying illnesses were more likely to receive a booster dose ( $P < 0.05$ ). Other demographic characteristics, such as religion and ethnicity, had no significant relationship with the willingness to get a booster dose (Table 1).

The main reasons for refusing a booster dose were the end of the COVID-19 epidemic (56.4%) and fear of side effects from the third dose (55.0%). The two essential sources of information regarding booster doses of the vaccination were social networks (51.6%) and television (51.1%). The *t*-test showed that individuals who want COVID-19 vaccine booster doses have significantly higher risk communication compared to those who do not ( $P < 0.001$ ) (Table 3). The multivariate regression results showed that risk communication (AOR = 1.54; CI = 1.08 – 2.20) has a direct and significant relationship with the willingness to receive booster doses of the COVID-19 vaccine (Table 4).

#### 5. Discussion

Males were more inclined to get booster doses of the COVID-19 vaccine ( $P < 0.05$ ), which is consistent with earlier studies (21, 22). A study found that men’s desire was 2.5 times higher than women’s (23). Female desire may be lower due to psychological gender differences (24), aversion to novel medical technology (25), and belief in vaccine-fertility myths shared on social media (26, 27). The highest willingness to receive the vaccine was observed in the age group over 60. According to a review study, eight out of 12 studies reported a significantly higher likelihood

of older individuals accepting the first booster dose of the vaccine (23). The greater tendency in older adults may be due to the high probability of getting a severe form of the disease, hospitalization, and mortality due to COVID-19 (24). People with an underlying condition were more likely to get a booster dosage, while unwillingness in healthy individuals was also found (4). Intervention activities are essential for individuals with high health status but limited exposure to health education due to limited facility visits.

Only 36.3% of participants in this study were willing to get booster doses of the vaccination, compared to 44.6% in a comparable survey in Jordan (25). Research has shown that booster dosages are more common in other nations (26). In Denmark, 90% of the study population responded that they would want it when the booster dosage was offered once (27).

In some countries, vaccination is mandatory (21), but in Oran, the public policy prioritizes administering first and second doses rather than booster shots. In study implementation, COVID-19 decreases mortality and hospitalization, impacting willingness to receive booster doses. Studies have revealed people’s reluctance to accept booster doses due to no longer needing a vaccine and fear of side effects (28, 29). This study confirmed the issue related to COVID-19’s total absence due to elements such as illness subsidence, worry disappearance, and confidence in its total disappearance (29).

The results regarding the acceptance of domestic and foreign vaccines were aligned with a previous study on the challenges of initial vaccine uptake in Tehran. About 58% of participants preferred imported vaccines, while 25% opted for vaccines manufactured in Iran (30). A lack of locally made vaccines during outbreaks exacerbates the issue, as people often choose vaccinations based on past experiences. Researchers suggested that more research be conducted to determine why people distrust local vaccines and then take the steps necessary to improve them. This study found that people with a higher average risk of communication were more willing to get booster doses of vaccines. A study stated that risk communication can help reduce the number of people who do not want to use a booster vaccine (21). According to Miao et al., risk communication plays a significant role in Chinese people’s willingness to receive booster doses of vaccines. This approach allows for educating the public about vaccination’s advantages and potential risks (31). Distressing news affects willingness to receive COVID-19

**Table 1.** The Frequency of Demographic Variables and Reluctance to Receive COVID-19 Booster Doses

Variables	No. (%)	Willingness to Receive Booster Doses of COVID-19, No. (%)		P-Value
		Yes	No	
<b>Gender</b>				
Man	352 (47.2)	141 (40.1)	211 (59.9)	0.045
Woman	394 (52.8)	130 (33.0)	264 (67.0)	
<b>Marital status</b>				
Single	329 (44.1)	117 (35.6)	212 (64.4)	0.701
Married	417 (55.9)	254 (36.9)	264 (63.1)	
<b>Age</b>				
18 - 25	157 (21.0)	58 (36.9)	99 (63.1)	0.045
26 - 39	253 (33.9)	77 (30.4)	176 (69.6)	
40 - 59	258 (34.6)	97 (37.6)	161 (62.4)	
≥ 60	78 (10.5)	39 (50.0)	39 (50.0)	
<b>Education</b>				
Illiterate, middle school and high school	142 (19.0)	54 (38.0)	88 (62.0)	0.601
Diploma	206 (27.6)	69 (33.5)	137 (66.5)	
University	398 (53.4)	148 (37.2)	250 (62.8)	
<b>Number of children</b>				
≤ 1	421 (56.4)	148 (35.2)	273 (64.8)	0.709
2	166 (22.3)	60 (36.1)	106 (63.9)	
3	88 (11.8)	33 (37.5)	55 (62.5)	
≥ 4	71 (9.5)	30 (42.3)	41 (57.7)	
<b>Ethnicity</b>				
Kurd	635 (85.1)	226 (35.6)	409 (64.4)	0.317
Other	111 (14.9)	45 (40.5)	66 (59.5)	
<b>Religion</b>				
Shi'ism	602 (80.7)	225 (37.4)	377 (62.6)	0.223
Sunni	144 (19.3)	46 (31.9)	98 (68.1)	
<b>Underlying disease</b>				
Yes	279 (37.4)	120 (43.0)	159 (57.0)	0.003
No	467 (62.6)	151 (32.3)	316 (67.7)	
<b>Total</b>	<b>746 (100)</b>	<b>271 (36.3)</b>	<b>475 (63.7)</b>	

**Table 2.** The Frequency of Doses of Injected Vaccines of COVID-19 in the Study Participants

Variables	No. (%)
Sinopharm (two doses)	462 (61.9)
AstraZenica (two doses)	163 (21.8)
CovIran Barkat (two doses)	66 (8.8)
Sputnik V (two doses)	35 (4.7)
Indian Bharat (two doses)	10 (1.3)
PastoCovac (one doses)	10 (1.3)

**Table 3.** The Relationship Between Risk Communication and Vaccine Willingness in Response to COVID-19<sup>a</sup>

Variables	Willingness to Receive Booster Doses of the COVID-19 Vaccine		P-Value
	Yes	No	
<b>Risk Communication</b>	2.60 ± 51.0	2.46 ± 48.0	0.001

<sup>a</sup> Values are expressed as mean ± SD.

**Table 4.** Multivariate Logistic Regression Reveals a Link Between Vaccine Willingness and Risk Communication

Variables	OR (CI95%) <sup>a</sup>	P-Value	AOR (CI 95%) <sup>b</sup>	P-Value
<b>Risk Communication</b>	1.77 (1.30 - 2.41)	0.001	1.54 (1.08 - 2.20)	0.016

<sup>a</sup> OR (CI95%) = odd ratio (confidence interval 95%).

<sup>b</sup> AOR = adjusted odd ratio.

booster doses, and effective messaging and dissemination are crucial for increased acceptance (32). Prior studies have shown that vaccine hesitancy stems from sociocultural factors, distrust in government authorities (33), individual, and group influences, and misinformation about vaccines (34).

Social media and television were the two essential sources of information about the COVID-19 vaccination for participants. Rapid dissemination of fake news, rumors, and false information on social networks can influence people's actions and behavior during crises by strengthening false beliefs (35). Social networks can implement public health initiatives by producing authentic, scientific content and increasing vaccination willingness.

### 5.1. Conclusions

The study highlighted the importance of risk communication in addressing vaccine hesitancy and misinformation. Factors such as belief at the end of the COVID-19 pandemic and concerns about potential side effects were the primary reasons for refusing booster doses. Distressing news and false information on social media can influence people's behavior during crises, underscoring the need for reliable, science-based content dissemination. Effective messaging and accurate information dissemination could increase vaccine acceptance. Vaccine acceptance and protection of public health are emphasized through tailored public health initiatives, accurate information dissemination, and targeted interventions in the face of the pandemic. Further research is recommended to better understand the reasons behind vaccine hesitancy and develop strategies promoting trust and confidence in vaccination programs.

### Footnotes

**Authors' Contribution:** P.T. conceived and designed the evaluation and drafted the manuscript. A.M.B. performed of the statistical analysis and helped to draft the manuscript. P.T. re-evaluated the clinical data, revised the manuscript. E.S. collected the clinical data, interpreted them and revised the manuscript. A.F. revised the manuscript. All authors read and approved the final manuscript.

**Conflict of Interests:** The authors declare no conflict of interests.

**Ethical Approval:** The ethics committee of the Kurdistan University of Medical Sciences approved the protocol of this study under the ethical code of [IR.MUK.REC.1401.264](#).

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**Informed Consent:** A written consent form was sent to participants before the survey began, outlining the project's aims.

### References

1. Anjana VR. The Science of Saving Lives: Understanding Covid-19 Vaccines. *J Surv Fish Sci.* 2022;152-8. <https://doi.org/10.17762/sfs.v9i1.633>.
2. Callaway E. COVID vaccine boosters: the most important questions. *Nature.* 2021;596(7871):178-80. [PubMed ID: 34354274]. <https://doi.org/10.1038/d41586-021-02158-6>.

3. Falsey AR, Frenck RW, Walsh EE, Kitchin N, Absalon J, Gurtman A, et al. SARS-CoV-2 Neutralization with BNT162b2 Vaccine Dose 3. *N Engl J Med*. 2021;**385**(17):1627–9. [PubMed ID: 34525276]. [PubMed Central ID: PMC8461567]. <https://doi.org/10.1056/NEJMc2113468>.
4. Paul E, Fancourt D. Predictors of uncertainty and unwillingness to receive the COVID-19 booster vaccine: An observational study of 22,139 fully vaccinated adults in the UK. *Lancet Reg Health Eur*. 2022;**14**:100317. [PubMed ID: 35132400]. [PubMed Central ID: PMC8811487]. <https://doi.org/10.1016/j.lanepe.2022.100317>.
5. van Kampen K, Laski J, Herman G, Chan TM. Investigating COVID-19 Vaccine Communication and Misinformation on TikTok: Cross-sectional Study. *JMIR Infodemiol*. 2022;**2**(2). e38316. [PubMed ID: 36338548]. [PubMed Central ID: PMC9620417]. <https://doi.org/10.2196/38316>.
6. Sib System of Kermanshah University of Medical Sciences. 2022. Available from: <https://sib.kums.ac.ir/Home/Login?state=0>.
7. Neumann-Bohme S, Varghese NE, Sabat I, Barros PP, Brouwer W, van Exel J, et al. Once we have it, will we use it? A European survey on willingness to be vaccinated against COVID-19. *Eur J Health Econ*. 2020;**21**(7):977–82. [PubMed ID: 32591957]. [PubMed Central ID: PMC7317261]. <https://doi.org/10.1007/s10198-020-01208-6>.
8. Ahorsu DK, Lin CY, Yahaghari R, Alimoradi Z, Brostrom A, Griffiths MD, et al. The mediational role of trust in the healthcare system in the association between generalized trust and willingness to get COVID-19 vaccination in Iran. *Hum Vaccin Immunother*. 2022;**18**(1):1–8. [PubMed ID: 34715009]. [PubMed Central ID: PMC8920226]. <https://doi.org/10.1080/21645515.2021.1993689>.
9. Daly M, Robinson E. Willingness to Vaccinate Against COVID-19 in the U.S.: Representative Longitudinal Evidence From April to October 2020. *Am J Prev Med*. 2021;**60**(6):766–73. [PubMed ID: 33773862]. [PubMed Central ID: PMC7883746]. <https://doi.org/10.1016/j.amepre.2021.01.008>.
10. Apandje C, Rahmelia S. Lessons for Citizens Regarding Government Efforts to Promote Covid-19 Vaccines: Responses and Challenges to Post-Pandemic Citizenship Education. *Proceedings of the Annual Civic Education Conference (ACEC 2021)*. Atlantis Press; 2022. p. 56–64.
11. World Health Organization. *Risk communication and community engagement readiness and response to coronavirus disease (COVID-19): Interim guidance*. Geneva, Switzerland: World Health Organization; 2020, [cited 2020 Jan 26]. Available from: <https://www.who.int/publications/i/item/risk-communication-and-community-engagement-readiness-and-initial-response-for-novel-coronaviruses>.
12. Tangcharoensathien V, Calleja N, Nguyen T, Purnat T, D'Agostino M, Garcia-Saiso S, et al. Framework for Managing the COVID-19 Infodemic: Methods and Results of an Online, Crowdsourced WHO Technical Consultation. *J Med Internet Res*. 2020;**22**(6). e19659. [PubMed ID: 32558655]. [PubMed Central ID: PMC7332158]. <https://doi.org/10.2196/19659>.
13. Tambo E, Djuikoue IC, Tazemda GK, Fotsing MF, Zhou XN. Early stage risk communication and community engagement (RCCE) strategies and measures against the coronavirus disease 2019 (COVID-19) pandemic crisis. *Glob Health J*. 2021;**5**(1):44–50. [PubMed ID: 33850632]. [PubMed Central ID: PMC8032327]. <https://doi.org/10.1016/j.glohj.2021.02.009>.
14. Romate J, Rajkumar E, Gopi A, Abraham J, Rages J, Lakshmi R, et al. What Contributes to COVID-19 Vaccine Hesitancy? A Systematic Review of the Psychological Factors Associated with COVID-19 Vaccine Hesitancy. *Vaccines (Basel)*. 2022;**10**(11). [PubMed ID: 36366286]. [PubMed Central ID: PMC9698528]. <https://doi.org/10.3390/vaccines10111777>.
15. Glik DC. Risk communication for public health emergencies. *Annu Rev Public Health*. 2007;**28**:33–54. [PubMed ID: 17222081]. <https://doi.org/10.1146/annurev.publhealth.28.021406.144123>.
16. Heydari ST, Zarei L, Sadati AK, Moradi N, Akbari M, Mehralian G, et al. The effect of risk communication on preventive and protective Behaviours during the COVID-19 outbreak: mediating role of risk perception. *BMC Public Health*. 2021;**21**(1):54. [PubMed ID: 33407302]. [PubMed Central ID: PMC7787415]. <https://doi.org/10.1186/s12889-020-10125-5>.
17. Thorpe A, Fagerlin A, Butler J, Stevens V, Drews FA, Shoemaker H, et al. Communicating about COVID-19 vaccine development and safety. *PLoS One*. 2022;**17**(8). e0272426. [PubMed ID: 35930557]. [PubMed Central ID: PMC9355181]. <https://doi.org/10.1371/journal.pone.0272426>.
18. Lee KY, Dabak SV, Kong VH, Park M, Kwok SLL, Silzle M, et al. Effectiveness of chatbots on COVID vaccine confidence and acceptance in Thailand, Hong Kong, and Singapore. *NPJ Digit Med*. 2023;**6**(1):96. [PubMed ID: 37231110]. [PubMed Central ID: PMC10208906]. <https://doi.org/10.1038/s41746-023-00843-6>.
19. Greenberg J, Dube E, Driedger M. Vaccine Hesitancy: In Search of the Risk Communication Comfort Zone. *PLoS Curr*. 2017;**9**. [PubMed ID: 28357154]. [PubMed Central ID: PMC5346025].
20. Lin Y, Huang Z, Xu X, Du W, Alias H, Hu Z, et al. Multi-dimensional psychosocial factors influencing the willingness to receive a COVID-19 vaccine booster: A survey among the public in Mainland China. *Hum Vaccin Immunother*. 2022;**18**(6):2126667. [PubMed ID: 36165498]. [PubMed Central ID: PMC9746437]. <https://doi.org/10.1080/21645515.2022.2126667>.
21. Vellappally S, Naik S, Alsadon O, Al-Kheraif AA, Alayadi H, Alsiwat AJ, et al. Perception of COVID-19 Booster Dose Vaccine among Healthcare Workers in India and Saudi Arabia. *Int J Environ Res Public Health*. 2022;**19**(15). [PubMed ID: 35897309]. [PubMed Central ID: PMC9332579]. <https://doi.org/10.3390/ijerph19158942>.
22. Lounis M, Bencherit D, Rais MA, Riad A. COVID-19 Vaccine Booster Hesitancy (VBH) and Its Drivers in Algeria: National Cross-Sectional Survey-Based Study. *Vaccines (Basel)*. 2022;**10**(4). [PubMed ID: 35455371]. [PubMed Central ID: PMC9031698]. <https://doi.org/10.3390/vaccines10040621>.
23. Galanis P, Vraka I, Katsiroumpa A, Siskou O, Konstantakopoulou O, Katsoulas T, et al. First COVID-19 Booster Dose in the General Population: A Systematic Review and Meta-Analysis of Willingness and Its Predictors. *Vaccines (Basel)*. 2022;**10**(7). [PubMed ID: 35891260]. [PubMed Central ID: PMC9323526]. <https://doi.org/10.3390/vaccines10071097>.
24. Galanis P, Vraka I, Katsiroumpa A, Siskou O, Konstantakopoulou O, Katsoulas T, et al. Predictors of Willingness of the General Public to Receive a Second COVID-19 Booster Dose or a New COVID-19 Vaccine: A Cross-Sectional Study in Greece. *Vaccines (Basel)*. 2022;**10**(7). [PubMed ID: 35891225]. [PubMed Central ID: PMC9317544]. <https://doi.org/10.3390/vaccines10071061>.
25. Al-Qerem W, Al Bawab AQ, Hammad A, Ling J, Alasmari F. Willingness of the Jordanian Population to Receive a COVID-19 Booster Dose: A Cross-Sectional Study. *Vaccines (Basel)*. 2022;**10**(3). [PubMed ID: 35335042]. [PubMed Central ID: PMC8950968]. <https://doi.org/10.3390/vaccines10030410>.
26. Yadete T, Batra K, Netski DM, Antonio S, Patros MJ, Bester JC. Assessing Acceptability of COVID-19 Vaccine Booster Dose among Adult Americans: A Cross-Sectional Study. *Vaccines (Basel)*. 2021;**9**(12). [PubMed ID: 34960170]. [PubMed Central ID: PMC8703732]. <https://doi.org/10.3390/vaccines9121424>.
27. Sonderskov KM, Vistisen HT, Dinesen PT, Ostergaard SD. COVID-19

- booster vaccine willingness. *Dan Med J*. 2021;**69**(1). [PubMed ID: [34913428](#)].
28. Rzymiski P, Poniedzialek B, Fal A. Willingness to Receive the Booster COVID-19 Vaccine Dose in Poland. *Vaccines (Basel)*. 2021;**9**(11). [PubMed ID: [34835217](#)]. [PubMed Central ID: [PMC8624071](#)]. <https://doi.org/10.3390/vaccines9111286>.
29. Neely SR, Scacco JM. Receptiveness of American adults to COVID-19 vaccine boosters: A survey analysis. *PEC Innov*. 2022;**1**:100019. [PubMed ID: [35360835](#)]. [PubMed Central ID: [PMC8791622](#)]. <https://doi.org/10.1016/j.pecinn.2022.100019>.
30. Khankeh HR, Farrokhi M, Khanjani MS, Momtaz YA, Forouzan AS, Norouzi M, et al. The Barriers, Challenges, and Strategies of COVID-19 (SARS-CoV-2) Vaccine Acceptance: A Concurrent Mixed-Method Study in Tehran City, Iran. *Vaccines (Basel)*. 2021;**9**(11). [PubMed ID: [34835179](#)]. [PubMed Central ID: [PMC8620861](#)]. <https://doi.org/10.3390/vaccines9111248>.
31. Miao Y, Li Y, Zhang W, Wu J, Gu J, Wang M, et al. The Psychological Experience of COVID-19 Vaccination and Its Impact on the Willingness to Receive Booster Vaccines among the Chinese Population: Evidence from a National Cross-Sectional Study. *Int J Environ Res Public Health*. 2022;**19**(9). [PubMed ID: [35564859](#)]. [PubMed Central ID: [PMC9100074](#)]. <https://doi.org/10.3390/ijerph19095464>.
32. Allen K, Lambert SB, Yuen A, Pourmarzi D. Factors associated with COVID-19 booster vaccine willingness among migrants from the Eastern Mediterranean living in Australia: a cross-sectional study. *BMC Public Health*. 2022;**22**(1):2205. [PubMed ID: [36443806](#)]. [PubMed Central ID: [PMC9706861](#)]. <https://doi.org/10.1186/s12889-022-14608-5>.
33. Trent M, Seale H, Chughtai AA, Salmon D, MacIntyre CR. Trust in government, intention to vaccinate and COVID-19 vaccine hesitancy: A comparative survey of five large cities in the United States, United Kingdom, and Australia. *Vaccine*. 2022;**40**(17):2498-505. [PubMed ID: [34218963](#)]. [PubMed Central ID: [PMC8220944](#)]. <https://doi.org/10.1016/j.vaccine.2021.06.048>.
34. Folcarelli L, Miraglia Del Giudice G, Corea F, Angelillo IF. Intention to Receive the COVID-19 Vaccine Booster Dose in a University Community in Italy. *Vaccines (Basel)*. 2022;**10**(2). [PubMed ID: [35214605](#)]. [PubMed Central ID: [PMC8877002](#)]. <https://doi.org/10.3390/vaccines10020146>.
35. Dijl DE, Zebel S, Gutteling JM. Integrating social media features into a cell phone alert system for emergency situations. *J Contingencies Crisis Manag*. 2018;**27**(3):214-23. <https://doi.org/10.1111/1468-5973.12251>.