ORIGINAL RESEARCH

Vaccine Confidence Among Young Adults During COVID-19: A Cross-Sectional Study from Turkey

Lale Türkmen 📵

Medical Laboratory Department, Vocational School of Health Services, Gazi University, Ankara, Turkey

Correspondence: Lale Türkmen, Medical Laboratory Department, Vocational School of Health Services, Gazi University, Bahçelievler District, Gölbaşı Campus, No: 10, Ankara, Turkey, Tel +90 0532 625 19 63, Email lturkmen@gazi.edu.tr

Video abstract

Point your SmartPhone at the code above. If you have a QR code reader the video abstract will appear. Or use: https://youtu.be/puq3NvdfmHo.

Purpose: A lack of confidence in vaccination is a threat to public health and undermines vaccine uptake at national and global levels. Unfortunately, COVID-19 vaccine confidence among Turkish young adults is poorly known. This study aims to understand COVID-19 vaccine confidence among Turkish young adults aged 18–29 and the barriers to and facilitators of vaccine uptake.

Methods: The present research is a cross-sectional study. Survey data were collected in May and June 2022 (n = 1066) during the COVID-19 vaccination campaign. Results were expressed in frequencies and percentages for dichotomous variables and mean with standard deviation for continuous variables. To assess COVID-19 vaccine confidence based on selected sociodemographic characteristics, a one-way ANOVA analysis and an independent-sample *t*-test were used.

Results: Almost half of the sample (43.9%) underestimated the risk of contracting COVID-19 disease. 65.9% of participants believed that getting vaccinated against COVID-19 was important, while 47.8% thought the vaccine was safe and not dangerous or harmful. Concerns about vaccine effectiveness (58.3%) were the primary reported reason for vaccination. The percentage of participants who reported barriers to vaccine access was generally low (8.7%). Importantly, 63.9% believed getting vaccinated is their responsibility to their community. 33.8% of participants reported encountering inaccurate, misleading, and unfavorable information about COVID-19 vaccines, while 22.9% said they were unsure.

Conclusion: Addressing concerns about COVID-19 vaccine safety and efficacy, emphasizing the role of vaccination in societal benefits, ensuring easy access to vaccines, and providing access to up-to-date and accurate information from reliable sources might help increase coverage among young adults. Perhaps the most crucial advice is to instill the correct comprehension of vaccination and make lifelong vaccination a reality before individuals develop false beliefs that are challenging to rectify.

Keywords: COVID-19, vaccine confidence, decision-making, socio-cultural factors, young adults

Introduction

The COVID-19 pandemic saw the fastest vaccine rollout the world has ever seen, and the development of effective COVID-19 vaccines has been the turning point of the pandemic.[1] This massive COVID-19 vaccine deployment has led to significant reductions in severe diseases, hospitalizations, and deaths, allowing societies to reopen and avert an estimated 19.8 million deaths in 2021.[1,2] However, the immune response to vaccination is heterogeneous and influenced by various factors such as age, sex, and comorbidities. Vaccination cannot guarantee absolute protection, which accounts for breakthrough infections.[3]

Vaccinations are one of the best public health initiatives, but a growing number of people believe they are unnecessary or harmful.[4–11] A common term employed to describe this phenomenon is "vaccine hesitation", which refers to a delay in acceptance or refusal of vaccination despite the availability of vaccination services.[4,11] Vaccine hesitancy is nothing new. In 2019, the World Health Organization (WHO) identified it as a top threat to global health because it threatens to reverse progress made in tackling vaccine-preventable disease.[12] COVID-19 vaccine hesitancy

5105

appears to be no exception.[5–10] The world has seen the reluctance to get the COVID-19 vaccine. Vaccine hesitancy may lead to lower than desired vaccine coverage.

Just as in developed countries, vaccine hesitancy has been increasing in developing countries like Turkey in recent years.[5,9,10] Studies in Turkey have shown that COVID-19 vaccine hesitancy ranges from 2% to 98%.[9] Moreover, its COVID-19 vaccination rate is above the world average; however, a notable percentage of the population remains unvaccinated.[13]

WHO considered young people an important demographic group in the global public health response to the COVID-19 pandemic due to their concerns, behaviors, and social impact.[14]

In Turkey, young people account for approximately 16% of the population, making them a critical demographic in the national COVID-19 vaccination campaign. Nevertheless, information on the vaccination status of this population is not currently available.[15] Furthermore, very little is available regarding the confidence of Turkish youth in the COVID-19 vaccine.

It is difficult to predict which pathogen will trigger the next pandemic; however, by making guesses now and reviewing previous efforts, we can increase the efficacy and predictability of future responses.[16]

This study aims to understand COVID-19 vaccine confidence among Turkish young adults aged 18–29 and the barriers to and facilitators of vaccine uptake.

Methods

Survey Development and Data Collection

This cross-sectional study was conducted among Turkish young adults aged 18 to 29. The ethical committee at Gazi University approved this study (reference number: 2022–298.9/1/2022). This study was conducted under the principles of the Declaration of Helsinki. Informed consent was obtained from the study participants before the study commencement.

Survey data were collected in May and June 2022 (n=1066) during the COVID-19 vaccination campaign. At the time of this study, vaccines were available for all individuals aged 18–29.

Data were collected using the Centers for Disease Control and Prevention's (CDC) COVID-19 Vaccine Confidence Rapid Community Assessment Guide and Survey.[17] Moreover, "the behavioral and social drivers (BeSD) framework for increasing vaccine confidence" was used to assess vaccination attitudes.[18]

As a first step, a professional translator translated the survey from English to Turkish. Next, a representative sample of 100 individuals participated in pilot testing. In this context, pilot test participants were selected from people with different socio-economic characteristics (eg, employment status and education level), as the problems in understanding the survey questions will become more evident as education and socio-economic level decrease. After that, two rounds of interviews were conducted with participants to ensure that the survey items conveyed their intended meanings. After receiving feedback, the survey comprised 20 questions.

The Cronbach's alpha value, ranging from 0.86 to 0.97, indicated that the questionnaire has good internal consistency. Survey participants were recruited nationally through online snowball sampling. The self-administered survey, prepared in Google Forms, was distributed via WhatsApp groups between the instructor and students. Participants were encouraged to share the survey link with others in their networks. The target sample size was determined using Open Epi 3.01 (http://www.openepi.com).[19] The minimum sample size was 1082 individuals with a 99.9% confidence level, a 5% confidence limit, a 50% expected frequency, and a 1.0 design effect value. The final sample was 1066.

Participants in the study had to be Turkish citizens between the ages of 18 and 29; those who did not meet these criteria were excluded from the study. Data completeness was an inclusion criterion for analysis. The survey was voluntary and anonymous.

Study Measures

The survey consisted of the sections described below.

The first section of the questionnaire included socio-demographic characteristics (including gender, age, education level, income level, employment status, previous COVID-19 infection, and work or school requirements).

The second section assessed three domains that influence vaccine uptake: what people think and feel about vaccines; social processes; and practical factors. The questions are described below. All the questions were scored on a 4-point Likert scale.

The first question was to assess risk perceptions: "How concerned are you about getting COVID-19?" (1 = not at all concerned to 4 = very concerned).

The effectiveness of COVID-19 vaccines assessed the following questions: "How important do you think getting a COVID-19 vaccine is to protect yourself against COVID-19?" (1 = not at all important to 4 = very important). The safety of COVID-19 vaccines was assessed by the following questions: "How safe do you think a COVID-19 vaccine is for you?" (1 = not at all safe to 4 = completely safe).

Trust in healthcare providers (eg, physicians, nurses, pharmacists, and public health professionals) and public health institutions (eg, the Turkish Ministry of Health) was assessed with two questions: "How much do you trust the healthcare professionals who recommended that you get the COVID-19 vaccine?" and "How much do you trust the public health agencies that recommend COVID-19 vaccines?" Both questions were rated on a scale from 1 (do not trust) to 4 (fully trust).

Social responsibility was assessed by the following question: "I have a responsibility to get the COVID-19 vaccine to protect others"? (1 = strongly disagree, 4 = strongly agree).

Social pressure was assessed by response to the following question: "[Do or did] you feel any of the following tried to influence you to get a COVID-19 vaccine?".

Ease of access to COVID-19 vaccination was assessed by response to the following question: "How difficult [would it be for you /was it for you] to get a COVID-19 vaccine"? (1=not at all difficult, 4=very difficult).

Exposure to misinformation was assessed by the following question: "Have you seen or heard any negative information about the safety or effectiveness of COVID-19 vaccines?" The response options were "yes", "no", or "not sure". The full text of the questionnaire has been included as Tables S1 and S2.

Statistical Analysis

Results were expressed in frequencies and percentages for dichotomous variables and mean with standard deviation (SD) for continuous variables. All the items' skewness and kurtosis scores were within the acceptable normality ranges proposed by Tabachnick and Fidell (below +1.5 and above −1.5).[20] To assess COVID-19 vaccine confidence based on selected sociodemographic characteristics, a one-way ANOVA analysis and an independent-sample t-test were used. A one-way ANOVA was used to compare vaccine confidence across three or more groups defined by categorical variables such as gender, education level, and income. An independent-sample t-test was applied to evaluate differences in vaccine confidence between two independent groups, specifically gender and employment status. Following the ANOVA tests, all post-hoc comparisons used the Tukey HSD (honestly significant difference) test. The results were analyzed using SPSS Statistics for Windows, Version 22.0 (IBM Corp., Armonk, NY, USA). A p-value <0.05 was considered statistically significant.

Results

Sociodemographic Characteristics of Participants

In total, 1066 participants responded to the survey. The survey completion rate was 98.5%. The median age was twenty-one (interquartile range: 18–29). The majority of the study participants were male (65.7%), unemployed (68.5%), and had an associate's (college) degree (48.4%). 95.5% of participants had received the COVID-19 vaccine at the time of the survey, and 49.0% were unsure if they had ever had a COVID-19 infection. Most participants (68.9%) reported that getting the COVID-19 vaccine is a requirement for their work or school (Table 1).

Table 1 Sociodemographic Characteristics Among Young Adults, Turkey, March–June 2022

Characteristics	n	%
Gender		
Female	366	34.3
Male	700	65.7
Age(years)		
18–24	852	79.9
25–29	214	20.1
Education level		
Primary or secondary school	36	3.4
High school	196	18.4
Associate degree	516	48.4
Bachelor's degree or higher	318	29.8
Income(Monthly), *TRY		
5000–10.000 TRY	450	42.2
10.000–20.000 TRY	344	32.3
>20.000 TRY	272	25.5
Employment status		
Employed	336	31.5
Unemployed	730	68.5
Occupation		
Student	680	63.8
Other worker	386	36.2
Previous infection with COVID-19		
Yes	170	15.9
No	374	35.1
Not sure	522	49.0
Work or school requirements(mandates)		
Yes	734	68.9
No	332	31.1

Note: *TRY: Turkish Liras.

Thinking and Feeling About the COVID-19 Vaccination

In the present study, approximately less than one-half of the participants (43.9%) were not concerned about the COVID-19 infection.65.9% of the participants stated confidence in the vaccine's effectiveness and believed it was necessary to vaccinate against COVID-19. The confidence in the safety of the COVID-19 vaccination showed lower rates than views of the vaccine's effectiveness. Just under half (47.8%) of participants thought the COVID-19 vaccine was "very" or "completely" safe. Concerns about vaccine safety and effectiveness were the primary reported reasons among young people. 58.3% and 41.7%, respectively. In terms of trust in healthcare professionals, 74.0% of the participants stated trust in the healthcare professionals administering the COVID-19 vaccination. Nearly two-thirds (62.6%) of participants also trusted public health organizations. Approximately two-thirds (63.9%) of all the participants said that it is their responsibility to vaccinate against COVID-19 to protect others (Table 2).

Overall, 51.4% of participants said their family members had tried to influence them to get the COVID-19 vaccine. Regarding negative information, 33.8% of participants reported seeing or hearing rumors about COVID-19, while 22.9% stated they were unsure (Table 3).

Table 2 COVID-19 Vaccine Confidence Among Young Adults, Turkey, March–June 2022

Questions/ Statements	1 N(%)	2 N(%)	3 N(%)	4 N(%)	Mean	SD
How concerned are you about getting COVID-19?[a]	226(21.2)	243(22.7)	398(37.3)	199(18.6)	2.61	1.160
How important do you think getting a COVID-19 vaccine is to protect yourself against COVID-19?[b]	158(14.8)	204(19.1)	376(35.2)	328(30.7)	2.82	1.030
How safe do you think a COVID-19 vaccine is for you?[c]	156(14.6)	400(37.5)	336(31.5)	174(16.3)	2.50	0.933
How much do you trust the healthcare professionals whogave you a COVID-19 vaccine?[d]	86(8.0)	190(17.8)	470(44.0)	320(30.0)	2.96	0.895
How much do you trust the public health agencies that recommend COVID-19 vaccines?[d]	118(11.0)	280(26.2)	416(39.0)	252(23.6)	2.75	0.939
I have a responsibility to get vaccinated for COVID-19 to protect others.[e]	154(14.4)	230(21.5)	400(37.5)	282(26.4)	2.76	1.001
How difficult [would it be for you /was it for you] to get a COVID-19 vaccine?[f]	760(71.2)	212(19.8)	60(5.6)	34(3.1)	1.41	0.739

Notes: a: 1. Not at all concerned; 2.A little concerned; 3.Somewhat concerned; 4.Very concerned. b: 1. Not at all important; 2.A little important; 3.Somewhat important; 4.Very important. c: 1. Not at all safe; 2.Somewhat safe; 3.Very safe; 4.Completely safe. d: 1. Do not trust; 2.Somewhat trust; 3. Mostly trust; 4. Fully trust. e: 1. Do not agree; 2. Somewhat agree; 3. Strongly agree; 4. Very strongly agree. f: 1. Not at all difficult; 2. A little difficult; 3.Somewhat difficult; 4.Very difficult.

Table 3 The Percentage-Based COVID-19 Vaccine Confidence, Turkey, March-June, 2022

Question		n	%
Have you exposure to negative information about the safety or effectiveness of COVID-19 vaccines?	Yes	360	33.8
	No	462	43.3
	Not sure	244	22.9
[Do / Did] you feel any of the following tried to influence you to get a COVID-19 vaccine?	Family	548	51.4
	Friends	282	26.4
	Schools	238	22.3
	Healthcare providers	98	9.1
	Your employer	60	5.6
Reasons for not getting the COVID-19 vaccines	Concern about side effects	324	58.3
	Lack confidence in the effectivities of the COVID-19 vaccines	232	41.7

COVID-19 Vaccine Confidence by Sociodemographic Characteristics

A *t*-test analysis showed a significant effect of gender on vaccine confidence. Females were more likely than males to believe that COVID-19 vaccines were effective and protected those who received them (t = −4.17, p < 0.001) and that the vaccine was safe (t = −3.56, p < 0.001). Furthermore, females were more likely to trust healthcare providers who administered COVID-19 vaccines (t = −1.99, p < 0.005) and public health agencies that recommend COVID-19 vaccines (eg, the Turkish Ministry of Health) (t = −5.38, p < 0.001). In addition, females felt more responsible for getting the COVID-19 vaccine to protect others (t = −4.42, p < 0.001). Furthermore, the *t*-test indicates that unemployed people were more likely than employed people to believe the COVID-19 vaccine was important (t = −3.83, p < 0.005). Also, the unemployed were more likely than working participants to agree that the COVID-19 vaccine is safe (t = −3.44, p < 0.005) (Table 4).

The results of the ANOVA test showed a significant correlation between vaccination confidence, income, and education level. The following statements were used to assess the relationship between income, education, and confidence in the COVID-19 vaccine: 1) belief in the importance of COVID-19 vaccination (F = 13.19, p < 0.001); 2) belief in the safety of COVID-19 vaccination (F = 14.75, p < 0.001); 3) belief in the responsibility to get vaccinated for COVID-19 to protect others (F = 8.03, p < 0.001); and 4) trust in public health institutions that recommend COVID-19 vaccines (F = 14.12, p < 0.001). For every statement, group III differed significantly from groups II and IV, according to the post hoc comparison. In addition, ANOVA analyses revealed that income levels have a significant effect on vaccine attitudes. It was revealed that the responsibility to get vaccinated for COVID-19 to protect others differed according to income groups (F = 3.30, p < 0.005). In the post hoc comparison, it was found that group I (X = 2.87) was significantly

Table 4 COVID-19 Vaccine Confidence Among Young Adults, by Sociodemographic Characteristics, Turkey, March–June 2022

Questions/ Statements	Gender			Employed Status		
	Male (X)	Female (X)	t	Yes	No	t
How concerned are you about getting COVID-19?	2.48	2.64	NS	3.17	2.55	−2.508*
How important do you think getting a COVID-19 vaccine is to protect yourself against COVID-19?	2.64	2.91	−4.171**	2.64	2.90	−3.832**
How safe do you think a COVID-19 vaccine is for you?	2.36	2.57	−3.566**	2.35	2.56	−3.440**
How much do you trust the healthcare professionals who gave you a COVID-19 vaccine?	2.89	3.00	−1.991*	2.90	2.99	NS
How much do you trust the public health agencies that recommend COVID-19 vaccines?	2.54	2.86	−5.385**	2.60	2.82	−3.586**
I have a responsibility to get vaccinated for COVID-19 to protect others.	2.57	2.86	−4.428**	2.59	2.84	−3.799**
How difficult [would it be for you /was it for you] to get a COVID-19 vaccine?	1.37	1.43	NS	1.45	1.39	NS

Notes: *$p < 0.005$; **$p < 0.001$.
Abbreviation: NS, Non statistically significant correlations found.

Table 5 COVID-19 Vaccine Confidence Among Adults Aged 18–29 Years, by Sociodemographic Characteristics, Turkey, March–June 2022

Questions	Education					Difference	Income					Difference
	1	2	3	4	F		1	2	3	4	F	
How concerned are you about getting COVID-19?	3.00	2.43	2.59	3.33	1.056	NS	2.67	2.59	2.55	2.89	0.448	NS
How important do you think getting a COVID-19 vaccine is to protect yourself against COVID-19?	2.94	2.59	3.01	2.64	13.189**	3–2,4	2.77	2.90	2.78	2.77	1.195	NS
How safe do you think a COVID-19 vaccine is for you?	2.44	2.30	2.69	2.31	14.750**	3–2,4	2.54	2.52	2.47	2.48	0.266	NS
How much do you trust the healthcare professionals who gave you a COVID-19 vaccine?	2.89	2.86	3.03	2.92	2.262	NS	2.86	2.99	2.90	3.03	1.593	NS
How much do you trust the public health agencies that recommend COVID-19 vaccines?	2.78	2.57	2.94	2.56	14.126**	3–2,4	2.89	2.81	2.69	2.71	1.593	NS
I have a responsibility to get vaccinated for COVID-19 to protect others.	2.94	2.57	2.90	2.63	8.031**	3–2,4	2.83	2.87	2.64	2.74	3.307*	2–3
How difficult [would it be for you /was it for you] to get a COVID-19 vaccine?	1.61	1.49	1.41	1.32	3.22	NS	1.31	1.53	1.40	1.28	6.503**	2–4

Notes: *$p < 0.005$; **$p < 0.001$. Income groups: 1= Less than 5.000 TRY; 2=5000–10,000 TRY; 3= 10,000–20,000 TRY; 4=20,000 TRY or above. Education levels 1= Primary or secondary school; 2= High school 3;= Associate degree; 4= Bachelor's degree or higher.
Abbreviation: NS: Non statistically significant correlations found.

different from group II (X = 2.64). Finally, we found that there was a significant effect of income level on the difficulty of getting a COVID-19 vaccine (F = 6.50, p < 0.001). In the post hoc comparison, there was a significant difference between I (x = 1.53) and III (x = 1.28) (Table 5).

Discussion

It is crucial to understand how people think, feel, and act about vaccination to develop strategies to increase acceptance and uptake of vaccines.[11,18] To our knowledge, this study is the most comprehensive study of vaccine confidence at the national level in Turkey.

Vaccination uptake results from a web of interconnected players.[4,11,21–24] A key factor is the perception of risk regarding the disease, and it refers to people's feelings and thoughts about the potential health risks posed by infectious agents.[21–29] Findings from this study demonstrated that nearly half of the sample (43.9%) had underestimated their risk of contracting COVID-19 disease. This finding contradicts the health belief model, the theory of planned behavior and reasoned action, and the protection motivation theory models, which recognize disease risk assessment as the primary motivator of behavior.[22,25,28–30] The presence of this group is concerning because it may lead to decreased perceptions of disease risk and less adoption of public health initiatives now and in the future.[25,28–30] These results highlight the importance of risk perception in early interventions during pandemics.[29,30]

There are multiple perspectives to assess this finding. Because the perception of risk is not only shaped by factual situations but also by psychological, social, institutional, and cultural factors.[11,22,25,27,30]

First, the fact that this study was carried out when the pandemic's effects in Turkey were less severe and restrictions were mainly lifted may have impacted the youths' perceptions of risk. Second, because people have been exposed to risk for a long time, they may have become accustomed to it.[30] The third is optimism bias, which is associated with the notion that some people are more resistant to illnesses than others.[31] The fourth possible explanation is complacency. In general, complacent people have low levels of knowledge, awareness, and active information-seeking; they do not perceive infectious diseases as a threat and, consequently, have no motivation to modify their preventive behavior. In general, complacent people have low levels of knowledge, awareness, and active information-seeking; they do not perceive infectious diseases as a threat and, consequently, have no motivation to modify their preventive behavior.[23,24] Finally, the majority of participants had no direct experience with the virus.[28] This finding again reveals the necessity of evaluating how perceived risk affects health behaviors.

An interesting finding of this study that needs further investigation is that youth do not have confidence in COVID-19 vaccines, particularly their safety (52.1%) and effectiveness (33.9%). Primary concerns included side effects (58.3%) and effectiveness (41.7%). That is unexpected because vaccination typically involves some degree of reflection and choice.[22] This finding contrasts with a large body of literature suggesting that concerns about vaccine safety or confidence in vaccine efficacy are strongly associated with non-vaccination.[11,21–24,26] The literature offers some explanation for this finding. For example, according to SAGE, vaccination attitudes can be seen on a continuum ranging from complete acceptance to total rejection. Vaccine-hesitant individuals are a heterogeneous group in the middle of this continuum. Vaccine-hesitant individuals may reject some vaccines but accept others, delaying or accepting vaccinations but being unsure of doing so.[11] Our findings suggest that Turkish youth accept COVID-19 vaccines but are unsure about them. Our results are concerning because these groups may hurt the success of the vaccination program, have potential health and economic consequences, and ultimately have a long-lasting influence on vaccine confidence. Thus, to avoid adverse effects on vaccine uptake, efforts should focus on maintaining vaccine confidence and monitoring it regularly.[2]

Among the many barriers that contribute to vaccine hesitancy and were identified globally, a recurrent theme continues to be that hesitancy is due to misinformation regarding the benefits and adverse effects of vaccines.[11,26,32–34]

In this study, 33.8% of participants reported encountering inaccurate, misleading, and unfavorable information about COVID-19 vaccines, while 22.9% said they were unsure. This finding aligns with the extensive published literature on COVID-19, which indicates that misinformation and disinformation about vaccines can hurt individual and societal vaccine confidence.[11,26,32–34] At the same time, these findings reiterate the challenges of misinformation and disinformation encountered in other vaccine campaigns and highlight the role of social media in spreading information and potentially influencing public attitudes toward health campaigns. For example, a systematic review of human papillomavirus (HPV) vaccination programs found that the Internet can be a source of misinformation, showing that technology can be both an opportunity and a threat in closing information gaps.[35] It's important to note that this study does not explain the causal aspects of incorrect information about COVID-19 vaccines. Future research must tackle these

challenges in combating incorrect information, as even mentioning a myth (even in an attempt to disprove it) can reinforce it.[26] Information about COVID-19, particularly about vaccines, presented in a way that is easy to understand for people from different educational and economic backgrounds, can help improve knowledge about vaccines and health in general.[34]

The findings in this study suggest that ease of access to COVID-19 vaccines (71.2%) may be a factor in the decision to get vaccinated among young adults.[11,21–24,26] The fact that the COVID-19 vaccine is free in Turkey and the widespread implementation of vaccination programs in many health centers strengthen this proposition.

In this study, a significant proportion of the youth reported trust in healthcare providers (74.0%) and public health agencies (62.6%). This is consistent with other research globally.[21–23,35,36] One important note of caution is that healthcare professionals' interventions could have an impact if they employ informational and persuasive communication strategies well.[21,36]

Mandatory or compulsory vaccination can apply to the whole vaccine program of a country or can be used to influence people to take the vaccinations.[37] In this study, 68.9% of participants stated that COVID-19 vaccination was a requirement (mandatory) for their attendance at work or school. In Turkey, on September 23, 2020, as part of controlled social life, it became required to use the HES code (Life Fits Into Home, a mobile application of the Ministry of Health that inquires about a person's disease and vaccination status).[38] Therefore, making the COVID-19 vaccine mandatory might have encouraged young people to get vaccinated. It is important to note that this topic requires monitoring because if vaccination becomes mandatory, vaccination rates, especially among those with a negative attitude, could decline.[37]

Another factor that helps us understand why young adults accept the COVID-19 vaccine is social responsibility. Among participants, 63.9% reported being willing to get vaccinated for the benefit of another person. These findings are consistent with the 5 Cs Model, which documents the impact of collective responsibility on vaccination behavior.[24] Emphasizing the role of vaccination in the societal benefits of vaccination and that vaccination decisions are a collective responsibility might help increase coverage among youth.[21]

The findings in this study indicate that demographic characteristics such as being male, having higher education, and having a higher income were linked to more negative attitudes.

Firstly, unemployed young people unexpectedly showed more positive attitudes towards the COVID-19 vaccine than their employed counterparts. The COVID-19 pandemic has significantly impacted Turkey's socio-economy, leading to increased job insecurity, unemployment, and loss of income, especially among the youth.[39] As a matter of fact, the youth unemployment rate in Turkey reached an all-time high of 25.3% during the COVID-19 pandemic.[40] This increased vaccine acceptance among the unemployed may be associated with their desire to return to work, as they see vaccination as a way to facilitate this return. Additionally, there is widespread and free access to the COVID-19 vaccine for the unemployed or those without health insurance in Turkey. This finding is consistent with three other studies conducted in Turkey,[41] the United States,[42] and Israel[43] that found that the unemployed were significantly more likely to accept the COVID-19 vaccine during the pandemic. It is important to note that the study conducted is cross-sectional, which means that making generalizations about the relationship between income and vaccine acceptance behavior can be difficult and should be done carefully. However, we emphasize that more research needs to be done to identify the situational or underlying factors that influence the acceptance and uptake of COVID-19 vaccines among socially disadvantaged young people.

Second, we found that females had more positive attitudes than males. Females were more likely to trust their healthcare providers and felt more responsible for getting vaccinated against COVID-19 to protect others. Our results cannot establish causality, but they are supported by previous studies documenting associations between trust in healthcare providers and more positive health outcomes. This finding suggests the importance of clarifying what makes provider recommendations most effective.[21] On the other hand, females may have felt more responsible for getting vaccinated against COVID-19 due to concerns about spreading the virus to their families and loved ones.[44] Studies on gender differences in COVID-19 vaccine hesitancy and resistance have yielded limited and contradictory results.[44] This finding suggests that gender differences in vaccine confidence exist and that further research is needed to determine the underlying causes of these differences.

Finally, in terms of education, people with a higher level of education were more concerned about the importance and safety of vaccines. It contrasts with published COVID-19 literature, including studies from Turkey, which indicate that low education is related to a reduced willingness to receive the COVID-19 vaccine.[41,45,46] This finding suggests that promoting the benefits of vaccination cannot be based solely on education.[11]

In conclusion, a detailed analysis of socio-cultural variables will enhance the understanding of vaccine confidence regarding COVID-19 and contribute to the development of public health strategies.

The findings in this research are subject to several limitations. First, available data are primarily limited to cross-sectional surveys, making it impossible to infer cause and effect. Second, this study employed a snowball sampling method. While it allowed the recruitment of participants through their networks, it introduces a potential selection bias; for example, the sample may include an over-representation of individuals with numerous social connections who share similar characteristics. Third, as snowball sampling is not random, the sample may not be representative of the broader population, and the findings cannot be generalized to a specific target group. Fourth, the survey method was designed online and did not include people who did not have internet access or did not use social media; this could lead to an underestimation of vaccine confidence. Fifth, the findings may not be generalizable to other countries or cultural contexts, as vaccine attitudes can vary widely based on cultural factors. Finally, attitudes, behaviors, and perceptions might change quickly, and these results might not reflect COVID-19 vaccination confidence. Therefore, this limitation should be considered when interpreting the results.

Conclusion

This research can support the evaluation of all assumptions in the dynamic, multivariate COVID-19 vaccination process over time. The study produced a finding that will inform a proactive response to future public health crises among Turkish youth; paradoxically, our findings suggest that despite high COVID-19 vaccination rates among young people, there are concerns about vaccine effectiveness and trust. Equally important, another finding was that nearly half of young adults underestimated their risk of contracting COVID-19, highlighting the importance of correcting risk perception as part of public health strategies. To ensure the sustainability of future immunization programs. To ensure the sustainability of future immunization programs, addressing concerns about COVID-19 vaccine safety and efficacy, emphasizing the role of vaccination in societal benefits, ensuring easy access to vaccines, and providing access to up-to-date and accurate information from reliable sources might help increase coverage among young adults. Perhaps the most crucial advice is to instill the correct comprehension of vaccination and make lifelong vaccination a reality before individuals develop false beliefs that are challenging to rectify.

Ethics Approval

The Gazi University Research Committee on Ethics approved this study (Approval No. 2022-298).

Acknowledgments

The author thanks all participants involved in the study.

Disclosure

The author reports no conflicts of interest in this work.

References

1. World Health Organization. Global COVID-19 vaccination strategy in a changing world; July 2022 Available from: https://www.who.int/publications/m/item/global-covid-19-vaccination-strategy-in-a-changing-world–july-2022-update. Accessed September 25, 2022.
2. Watson OJ, Barnsley G, Toor J, Hogan AB, Winskill P, Ghani AC. Global impact of the first year of COVID-19 vaccination: a mathematical modelling study. *Lancet Infect Dis*. 2022;22(9):1293–1302. doi:10.1016/S1473-3099(22)00320-6
3. Notarte KI, Ver AT, Velasco JV, et al. Effects of age, sex, serostatus, and underlying comorbidities on humoral response post-SARS-CoV-2 Pfizer-BioNTech mRNA vaccination: a systematic review. *Crit. Rev Clin Lab Sci*. 2022;59(6):373–390. doi:10.1080/10408363.2022.2038539
4. Dubé E, Laberge C, Guay M, Bramadat P, Roy R, Bettinger J. Vaccine hesitancy: an overview. *Hum Vaccin Immunother*. 2013;9(8):1763–1773. doi:10.4161/hv.24657

5. Özceylan G, Toprak D, Esen ES. Vaccine rejection and hesitation in Turkey. *Hum Vaccin Immunother*. 2020;16(5):1034–1039. doi:10.1080/21645515.2020.1717182

6. Lazarus JV, Wyka K, White TM, et al. Revisiting COVID-19 vaccine hesitancy around the world using data from 23 countries in 2021. *Nat Commun*. 2022;13(1):3801. doi:10.1038/s41467-022-31441-x

7. Sallam M. COVID-19 vaccine hesitancy worldwide:A concise systematic review of vaccine acceptance rates. *Vaccines*. 2021;9(2):160. doi:10.3390/vaccines9020160

8. Nossier SA. Vaccine hesitancy: the greatest threat to COVID-19 vaccination programs. *J Egypt Public Health Assoc*. 2021;96(1):18. doi:10.1186/s42506-021-00081-2

9. Gulle BT, Oren MM, Dal T. COVID-19 vaccine hesitancy in Turkey: a systematic review and meta-analysis. *Epidemiol Infect*. 2023;151:e199. doi:10.1017/S0950268823001875

10. Salali GD, Uysal MS. COVID-19 vaccine hesitancy is associated with beliefs on the origin of the novel coronavirus in the UK and Turkey. *Psychol Med*. 2020;19:1–3.

11. World Health Organization's SAGE vaccine hesitancy Working Group. Report of the SAGE working group on vaccine hesitancy. 12, November 2014. Available from: https://www.asset-scienceinsociety.eu/sites/default/files/sage_working_group_revised_report_vaccine_hesitancy.pdf. Accessed February 17, 2022.

12. World Health Organization. Ten threats to global health in 2019. 2019. Available from: https://www.who.int/news-room/spotlight/ten-threats-to-global-health-in-2019. March 17, 2022.

13. Our World in Data. Coronavirus (COVID-19) Vaccinations. 2024. Available from: https://ourworldindata.org/covid-vaccinations?country=~TUR. Accessed March 17, 2024.

14. World Health Organization (WHO). Young people and COVID-19: behavioural considerations for promoting safe behaviours 2021. Available from: https://www.who.int/publications/i/item/978-92-4-002831-9. Accessed March 17, 2022.

15. Turkish republic ministry of health COVID-19 vaccine information platform 2024. Available from: https://covid19asi.saglik.gov.tr. Accessed March 17, 2024.

16. Williams BA, Jones CH, Welch V, True JM. Outlook of pandemic preparedness in a post-COVID-19 world. *NPJ Vaccines*. 2023;8(1):178. doi:10.1038/s41541-023-00773-0

17. Centers for Disease Control and Prevention. COVID-19 Vaccine confidence rapid community assessment guide: a guide to help you understand your community's needs regarding COVID-19 vaccines in three weeks. 2021. Available from: https://www.cdc.gov/vaccines/covid-19/vaccinate-with-confidence/rca-guide/index.html. Accessed on December 15, 2021.

18. World Health Organization & United Nations Children's Fund. Data for action: achieving high uptake of COVID-19 vaccines: gathering and using data on the behavioural and social drivers of vaccination: a guidebook for immunization programmes and implementing partners: interim guidance. 2021. Available from: https://apps.who.int/iris/handle/10665/339452. Accessed on April 5, 2022.

19. Sullivan KM, Dean A, Soe MM. OpenEpi: a web-based epidemiologic and statistical calculator for public health. *Public Health Rep*. 2009;124 (3):471–474. doi:10.1177/003335490912400320

20. Tabachnick BG, Fidell LS. *Using Multivariate Statistics*.6th ed. Boston: Allyn & Bacon; 2013.

21. Brewer NT. What works to increase vaccination uptake. *Acad Pediatr*. 2021;21(4S):9–16. doi:10.1016/j.acap.2021.01.017

22. Brewer NT, Chapman GB, Rothman AJ, Leask J, Kempe A. Increasing vaccination:Putting psychological science into action. *Psychol Sci Public Interest*. 2017;18(3):149–207. doi:10.1177/1529100618760521

23. Betsch C, Böhm R, Chapman GB. Using Behavioral insights to increase vaccination policy effectiveness. *Policy Insights Behav Brain Sci*. 2015;2 (1):61–73. doi:10.1177/2372732215600716

24. Betsch C, Schmid P, Heinemeier D, Korn L, Holtmann C, Böhm R. Beyond confidence: development of a measure assessing the 5C psychological antecedents of vaccination. *PLoS One*. 2018;13(12):e0208601. doi:10.1371/journal.pone.0208601

25. Brewer NT, Weinstein ND, Cuite CL, Herrington JE. Risk perceptions and their relation to risk behavior. *Ann Behav Med*. 2004;27(2):125–130. doi:10.1207/s15324796abm2702_7

26. World Health Organization. Regional Office for Europe. Vaccination and trust: how concerns arise and the role of communication in mitigating crises. 2016. Available from: https://apps.who.int/iris/handle/10665/343299. Accessed June 17, 2023.

27. Cipolletta S, Andreghetti GR, Mioni G. Risk perception towards COVID-19: a systematic review and qualitative synthesis. *Int J Environ Res Public Health*. 2022;19(8):4649. doi:10.3390/ijerph19084649

28. Dryhurst S, Schneider CR, Kerr J, et al. Risk perceptions of COVID-19 around the world. *J Risk Res*. 2020;23(7–8):994–1006. doi:10.1080/13669877.2020.1758193

29. Wise T, Zbozinek TD, Michelini G, Hagan CC, Mobbs D. Changes in risk perception and self- reported protective behaviour during the first week of the COVID-19 pandemic in the United States. *R Soc Open Sci*. 2020;7(9):200742. doi:10.1098/rsos.200742

30. Slovic P. Perception of risk. *Science*. 1987;236(4799):280–285. doi:10.1126/science.3563507

31. Sharot T. The optimism bias. *Curr Biol*. 2011;21(23):R941–5. doi:10.1016/j.cub.2011.10.030

32. Cascini F, Pantovic A, Al-Ajlouni YA, et al. Social media and attitudes towards a COVID-19 vaccination: a systematic review of the literature. *E Clin Med*. 2022;48:101454. doi:10.1016/j.eclinm.2022.101454

33. van der Linden S, Roozenbeek J, Compton J. Inoculating against fake news about COVID-19. *Front Psychol*. 2020;11:566790. doi:10.3389/fpsyg.2020.566790

34. Kricorian K, Civen R, Equils O. COVID-19 vaccine hesitancy: misinformation and perceptions of vaccine safety. *Hum Vaccin Immunother*. 2022;18(1):1950504. doi:10.1080/21645515.2021.1950504

35. Ver AT, Notarte KI, Velasco JV, et al. A systematic review of the barriers to implementing human papillomavirus vaccination programs in low- and middle-income countries in the Asia-Pacific. *Asia Pac J Clin Oncol*. 2021;17(6):530–545. doi:10.1111/ajco.13513

36. Nguyen KH, Yankey D, Lu PJ, et al. Report of health care provider recommendation for COVID-19 vaccination among adults, by recipient COVID-19 vaccination status and attitudes - United States, April-September 2021. *MMWR Morb Mortal Wkly Rep*. 2021;70(50):1723–1730. doi:10.15585/mmwr.mm7050a1

37. Betsch C, Böhm R. Detrimental effects of introducing partial compulsory vaccination: experimental evidence. *Eur J Public Health*. 2016;26 (3):378–381. doi:10.1093/eurpub/ckv154

38. HES (Hayat Eve Sığar – Life Fits Into Home). 2022. Available from: https://hayatevesigar.saglik.gov.tr/index-eng.html. Accessed August 10, 2023.

39. Göktaş N.The effect of the Covid-19 pandemic on unemployment: an assessment on Turkish statistical institute and Turkey employment agency data. *J Biga Econ Admin Sci Faculty.* 2023;4(1):29–40.

40. Tatar M, Ergün S. Impact of the covıd-19 pandemıc on youth unemployment ın Turkey. *Diyalektolog.* 2021;28:129–145.

41. Sonmezer MC, Sahin TK, Erul E, et al. Knowledge, attitudes, and perception towards COVID-19 vaccination among the adult population: a cross-sectional study in Turkey. *Vaccines.* 2022;10(2):278. doi:10.3390/vaccines10020278

42. Khubchandani J, Sharma S, Price JH, Wiblishauser MJ, Sharma M, Webb FJ. COVID-19 vaccination hesitancy in the United States: a rapid national assessment. *J Community Health.* 2021;46(2):270–277. doi:10.1007/s10900-020-00958-x

43. Dror AA, Eisenbach N, Taiber S, et al. Vaccine hesitancy: the next challenge in the fight against COVID-19. *Eur J Epidemiol.* 2020;35(8):775–779. doi:10.1007/s10654-020-00671-y

44. World Health Organization(WHO). Critical sex and gender considerations for equitable research, development and delivery of COVID-19 vaccines. 2021 Available from: https://cdn.who.int/media/docs/default-source/immunization/sage/covid/gender-covid-19-vaccines-sage-background-paper.pdf?sfvrsn=899e8fca_15&download=true. Accessed November 07, 2024.

45. Baack BN, Abad N, Yankey D, et al. COVID-19 vaccination coverage and intent among adults aged 18-39 years - United States, March-May 2021. *MMWR Morb Mortal Wkly Rep.* 2021;70(25):928–933. doi:10.15585/mmwr.mm7025e2

46. Abedin M, Islam MA, Rahman FN, et al. Willingness to vaccinate against COVID-19 among Bangladeshi adults: understanding the strategies to optimize vaccination coverage. *PLoS One.* 2021;16(4):e0250495. doi:10.1371/journal.pone.0250495