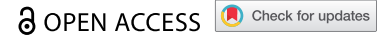Taylor & Francis
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RESEARCH PAPER

Effect of elderly individuals' perceptions and attitudes toward COVID-19 pandemic on rejecting COVID-19 vaccination

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ABSTRACT

Despite the fact that COVID-19 vaccines serve as an important tool for protection against COVID-19 infection, in individuals aged above 65 years, as well as the entire community, there are significant problems associated with getting vaccinated. The aim of this study is to determine the effect of perceptions and attitudes toward the COVID-19 epidemic in individuals over the age of 65 living in Şanlıurfa, Turkey in 2021, on the situation of having COVID-19 vaccination. The study is designed as a case-control type of research. The study population was comprised of individuals aged 65 years and above located in Şanlıurfa, Turkey. The Case Group consisted of individuals, who rejected the COVID-19 vaccination and the Control Group consisted of individuals who have received the vaccine. The individuals recruited in the Case and Control Groups were selected by means of the snowball sampling method. The study included a total of 240 individuals including 120 in the Case Group and 120 in the Control Group. Rate of vaccine rejection was higher in individuals who believed that the media exaggerated the pandemic, the disease had low contagiousness, the pandemic was a conspiracy, the environmental pollution had no role in the disease, the domestic measures taken against the epidemic were inadequate, the personal hygiene could not protect from disease, and who did not believe that the disease was inevitable [p < 0.05]. Governments have a lot of responsibilities in providing accurate information about vaccination to people and increasing confidence in the health system.

Introduction

In December 2019, the world met COVID-19 with the reports of unknown cases of pneumonia in Wuhan, China.[1] In order to cope with the pandemic, social distance rules, restrictions on collective activities and curfews were introduced. As a result, many areas such as health, economy and education were adversely affected. COVID-19 has disrupted all education systems, from pre-school to university education.[2] It negatively affected the quality of life and economic conditions of many people. In addition, the management of the pandemic has put a great deal of pressure on health systems, negatively impacting health systems.[3–7]

Although the COVID-19 virus affects the entire population, individuals aged above 65 years are more vulnerable considering the hospitalization rates, need for intensive care admission, ventilator support, or risk of death.[8,9] The rate of hospitalization due to COVID-19 infection is 40–95 times higher, and further, the risk of death is 1300–8700 times higher in the elderly population.[10] During the initial stages of the outbreak, lockdowns or restrictions were introduced to the general population in certain countries, while others applied the same only to individuals aged above 65 years of age, due to above-mentioned higher risks.[5,11,12]

Vaccines proved to be one of the most important instruments in controlling the COVID-19 pandemic.[13–15] However, assuming that the effectiveness of COVID vaccine is 95%, it is necessary to keep the level of vaccination in the range from 84 to 90% in order to maintain protection.[16] Where, the rate of a full two-dose course of vaccination in adults aged 18 years and above was 77.8% across Turkey in general, the same rate was reported as 52.4% in Şanlıurfa province, where the study was carried out.[17] In other words, the benefits of COVID-19 vaccine have not been adequately utilized, which might be affected by rejection of vaccination. As a matter of fact, vaccine rejection is a truly serious health-threatening condition also throughout the world.[18–25] While, on the one hand individuals reported certain factors as justifications for rejecting vaccination, including lack of confidence in the health system, distrust in vaccine and its contents, and skepticism due to easy accessibility, the perceived risk of the disease, on the other hand, also plays a decisive role as regards the attitude toward the vaccine.[18]

Higher perceived risk and avoidance behaviors regarding a disease contributes in the improvement of health. In particular, in the absence of pharmaceutical interventions, improving human behaviors has an important role to play in preventing the contagion of the disease.[26–28]

The Common-Sense Model [CSM] as developed by Leventhal is an active model that addresses the risk factors associated with psychological, physical well-being, or social health that might have affected or may affect people's health. Individuals, who encounter the disease, tend to produce their own representations of the disease also due to such factors and these representations shape the efforts toward the management

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of the disease.[29–31] An individual, who believes that COVID-19 is a simple upper respiratory tract infection, an international conspiracy, or a divine retribution, may not need to get vaccinated. However, as one begins to observe and experience adverse outcomes associated with the disease, the representation of the disease may be subject to change, increasing the perceived severity of disease and giving a boost to efforts toward vaccination.

Identifying the problematic situations and finding solutions may help reduce the rates of vaccine rejection and increase vaccination levels for a successful conduct of individuals' efforts intended to manage the disease. With this study, which examines the perception of illness, perception of causes, perception of control and avoidance behaviors toward COVID-19, the underlying causes of vaccine rejection can be determined more clearly. In the light of emerging risk factors, awareness and knowledge levels can be increased with trainings for the society. There are not enough studies on knowledge and attitudes about health and disease perceptions that prevent elderly individuals from being vaccinated in COVID-19 vaccination. The aim of this study; The aim of this study is to determine the effect of perceptions and attitudes toward the COVID-19 epidemic in individuals over the age of 65 living in Şanlıurfa, Turkey in 2021, on the situation of having COVID-19 vaccination.

Materials and method

The study is designed as a case-control type of research. The study population of the study was comprised of individuals aged 65 years and above located in Şanlıurfa province, in Turkey. A total number of 33 individuals, including patients and their relatives, aged 65 years and above, were interviewed at a health institution in the scope of the pilot study aimed to determine the sample size. The number of the pilot study participants, who received and did not receive COVID-19 vaccine was 9 and 24, respectively. Data on 9 variables associated with perceived COVID-19 disease, perceived causes, perceived control, and avoidance behaviors were collected. The effect of these variables on vaccination was calculated with G power between 0.326 and 0.340 (0.326, 0.327, 0.328, 0.331, 0.332, 0.335, 0.338, 0.339, 0.340).

Using G power software, the sample size required for each group was calculated as at least 117, where the effect size, alpha, and power values were set to 0.3, 0.05, and 0.90, respectively (Effect size was derived from the pilot study.). 120 individuals were recruited for each group.

The research was performed between March and April 2021. As from the onset of the study, the individuals aged 65 years and above, who could be communicated and able to understand and comprehend the questions so as to answer questions, were included in the study.

The individuals to be recruited in the Case and Control Groups were selected by means of the snowball sampling method. Study data began to be collected by taking a neighborhood focal point in the city center and making home visits. Individuals over the age of 65 who were first encountered in the region were included in the study and used as a reference. It was questioned whether there was an individual aged 65 and over that he knew around him, and in this way, the study was continued by obtaining the information of the next from each participant. The Case Group consisted of individuals, who rejected COVID-19 vaccination and the Control Group consisted of individuals, who have received the vaccine. This choice was not made by the researchers. Those who refused to be vaccinated against COVID-19 and those who did not, formed 2 groups that were naturally separated according to their own election results. In the study, all people over the age of 65 encountered in the neighborhood were interviewed. In the pilot study, it was seen that the case and control groups were very similar in terms of matched characteristics. For this reason, interviews were started simultaneously with people who did not get vaccinated (case) and people who did (control). Interviews with 120 non-vaccinated and 120 vaccinated people were completed. A sequential count of matching cases was created using the SPSS "identify duplicate cases" feature. Incompatibility was detected in 38 people. Then the database was exported to excel. Incompatible people (38 people) were examined and 20 people with similar characteristics were considered matched and assigned to the groups. Of the remaining 18 people, those in the control group were excluded from the database. In place of those who were removed, new people were added to the control group, similar to the other 9 people, with a second field study.

The research data was collected by means of a structured survey. The first part of the survey included information about the socio-demographic variables including age, gender, educational status, employment status in any income-generating job, social security status, and income status. The second part consisted of 9 items that investigated the perceived disease, perceived causes, perceived control, and avoidance behaviors toward COVID-19. The items were determined upon a review of the relevant literature.[18–25] The dependent variable of the study was COVID-19 vaccination status, where the independent variables were the socio-demographic characteristics and the perceptions and behaviors related to the disease.

The survey was completed by means of face-to-face interviews with the participants. The interview stage took approximately 30 minutes for each participant.

Statistical Package for the Social Sciences [SPSS] Version 20 software program was used for the analyses in the scope of the study. A p level of <0,05 was considered statistically significant. Mean, standard deviation, and percentage were used to express the descriptive statistics. Chi-square test was used to perform single-variable analyses and accordingly, the adjusted Odds Ratio was calculated.

Required approval for the conduct of the study was obtained from the Clinical Research Ethics Committee of Harran University. Written consents of the participant were collected after they were provided with necessary information.

Results

The mean age of the Case Group was 75.5 ± 6.0 [min: 65 years, max: 89 years] and 53.3% of the individuals were female. 75.8% of the individuals included in the Case Group did not receive any formal education, where the ratio of graduates of elementary school, and secondary school and above, was 17.5% and

Table 1. Distribution of sociodemographic characteristics by status of vaccination.

	Not vaccinated		Vaccinated			
	N	%	N	%	X^2	P
Sex						
Female	56	46,7	57	47,5	0,01	0,89
Male	64	53,3	63	52,5		
Age						
65–74 years old	80	66,7	82	68,3	0,07	0,78
75 years and older	40	33,3	38	31,7		
Education						
Not finished school	91	75,8	91	75,8	0,00	1,00
Primary school graduate	21	17,5	21	17,5		
Secondary school and above	8	6,7	8	6,7		
Income status						
Income less than expenses	50	41,7	41	34,2	1,66	0,44
Income equal to expenses	62	51,7	68	56,7		
Income more than expenses	8	6,7	11	9,2		

6.7%, respectively. 34.2% of the individuals included in the Case Group had an income level, which was less than their expenses. The Control Group matched the Case Group by age, gender, education, and income status [p > 0.05] (Table 1).

95.4% of the study participants had social security, including 89.6% covered by the Social Security Institution [SSI] and 5.8% by private health insurance. 37.9% of the study participants reported income levels of less than their expenses, 54.2% had equal income and expenses, where 7.9% had more income than their expenses.

The perceptions and attitudes of those, who accepted and rejected vaccination, as regards COVID-19 are shown in Table 2. Rate of vaccine rejection was higher in individuals, who believed that the media exaggerated the pandemic, that not all could be infected by the disease, that the pandemic was a conspiracy of developed countries, that environmental pollution had no role in the disease, that the domestic measures taken against the epidemic

were inadequate, and that personal hygiene could not protect from disease [p < 0.05, respectively **CI:1,13–4,08, CI:1,31–7,95, CI:2,05–7,41, CI:4,61–17,36, CI:4,69–32,69, CI:1,45–11,32**]. There was no difference between those who rejected or accepted vaccination, by the belief that the epidemic was a divine retribution [p > 0.05, CI:0,94–2,72]. The rate of vaccine rejection was higher in individuals, who frequently participated in social activities during the pandemic period [p < 0.05, **CI:1,16–3,81**]. There was no difference between those, who rejected or accepted vaccination [p > 0.05, CI:0,91–3,11], by hand-shaking behavior. The individuals, who believed the media exaggerated the pandemic, were 2.1 times more likely to reject vaccination. The individuals, who were not convinced that the disease could infect anyone, were 3.2 times more likely to reject vaccination. The individuals, who believed that the COVID-19 pandemic was a conspiracy of developed countries, were 3.9 times more likely to reject vaccination. The individuals, who were convinced that environmental pollution would not cause COVID-19 disease, were 8.9 times more likely to reject vaccination. The individuals, who believed that preventive efforts in Turkey were not adequate to provide sufficient protection against the COVID-19 pandemic, were 12.4 times more likely to reject vaccination. The individuals, who felt that personal hygiene could not prevent the COVID-19 virus infection, were 4.1 times more likely to reject vaccination. During the COVID-19 pandemic, those, who frequently participated in social activities, were 2.1 times more likely to reject vaccination.

Discussion

The aim of this study, which examines the perception of illness, perception of cause, perception of control and avoidance of COVID-19, is to determine the underlying causes of vaccine

Table 2. Distribution of perceptions and attitudes toward COVID-19 disease by the vaccination status.

		Not vaccinated		Vaccinated	
		N	%	N	%
Is the media exaggerating the COVID-19 outbreak?	Yes	33	27,5	18	15,0
	No/Don't know	87	72,5	102	85,0
	X2:4,88	**P:0,02**	**OR:2,14**	**CI:1,13–4,08**	
Can the COVID-19 virus infect everyone?	No/Don't know	20	16,7	7	5,8
	Yes	100	83,3	113	94,2
	X2: 6,00	**P:0,01**	**OR:3,22**	**CI:1,31–7,95**	
Is the COVID-19 outbreak an event that developed countries do to sell drugs and vaccines?	Yes	45	37,5	16	13,3
	No/Don't know	75	62,5	104	86,7
	X2:17,23	**P <0,01**	**OR:3,90**	**CI:2,05–7,41**	
Is environmental pollution one of the important causes of corona COVID-19 virus disease?	No/Don't know	65	54,2	14	11,7
	Yes	55	45,8	106	88,3
	X2:47,17	**P <0,01**	**OR:8,94**	**CI:4,61–17,36**	
Is the COVID-19 outbreak a punishment given by God for people turning away from religion?	No/Don't know	50	41,7	37	30,8
	Yes	70	58,3	83	69,2
	X^2:2,59	P:0,10	OR:1,60	CI:0,94–2,72	
Are preventive studies in Turkey sufficient against the COVID-19 epidemic?	No/Don't know	115	95,8	78	65,0
	Yes	5	4,2	42	35,0
	X2:34,28	**P <0,01**	**OR:12,38**	**CI:4,69–32,69**	
Can the transmission of the COVID-19 virus be prevented by paying attention to personal hygiene?	No/Don't know	18	15,0	5	4,2
	Yes	102	85,0	115	95,8
	X2:6,92	**P:0,01**	**OR:4,05**	**CI:1,45–11,32**	
How was your participation in social events held during the COVID-19 epidemic?	I joined	40	33,3	23	19,2
	Never joined	80	66,7	97	80,8
	X2:5,51	**P:0,02**	**OR:2,10**	**CI:1,16–3,81**	
How was your handshake behavior with other people during the COVID-19 pandemic?	I shook hands	33	27,5	22	18,3
	Never shook hands	87	72,5	98	81,7
	X^2:2,35	P:0,12	OR:1,69	CI:0,91–3,11	

The vaccinated group (control group) was taken as a reference in the OR calculation.

rejection. The knowledge and attitudes of elderly individuals about the disease were questioned and their effects on vaccine refusal were examined. 3 out of 4 individuals in the Case Group reported that they did not receive any formal training, where 1 out of 3 individuals reported that their income was less than their expenses. Probably the lower levels of education in the Case Group was associated with the lower overall schooling rate during their childhood.[32,33]

The individuals, who believed that the media exaggerated the pandemic, and that COVID-19 virus was not contagious were 2 times and 3.2 times more likely to reject vaccination, respectively. When the literature on vaccine rejection and its psychological determinants is examined, it has been seen that individuals whose main sources of information are news programs, social media platforms and TV programs have higher rates of vaccine rejection.[18,19] Despite the fact that there are number of procedures in place to create news in conventional media, individuals on social media may create contents on their own without any editorial supervision.[21] The perceived seriousness or severity of disease drives the behavior of individuals. Nevertheless, the burden of infectious diseases has decreased thanks to successful administration of a number of vaccines over the years. Therefore, the perceived severity of some diseases or groups of diseases might have become lower.[34] Albahri et al. noted that the rate of individuals, who accepted vaccination, increased by the belief that the risk of being infected by the disease increased at personal and public levels and that the consequences of the disease were serious.[22] Similarly, in many studies on the COVID-19 vaccine and vaccine rejection, it has been found that those with insufficient knowledge and negative perceptions and attitudes about the vaccine are prone to vaccine rejection.[35,36]

The individuals, who believed that the pandemic was a conspiracy of the developed countries with an aim to sell medicines and vaccines, were four times more likely to reject vaccination. Sallam et al. suggested in their 2021 study that reliance on vaccine-related conspiracy claims was associated with lower levels of accepting COVID-19 vaccination.[18] Similarly, upon an investigation of conspiracy beliefs and health behaviors related to COVID-19, Earnshaw et al. found that participants, who believed in conspiracy theories, had 3.9 times less intention to accept vaccination compared to the participants, who did not believe in such theories.[37] This is consistent with the literature and that the conspiracy theories serve as a serious obstacle to people getting vaccinated.

The rate of rejecting vaccination was higher in the individuals, who disregarded the environmental factors, who did not care about personal hygiene, and, who did not limit social activities. As a matter of fact, Alibrahim et al. found in a study on rejecting vaccination in Kuwait that those, who were not adequately informed about the disease by the public health authorities, and those, who were not worried about contracting the infection, adopted a negative approach to getting vaccinated.[25] Similarly, vaccine rejection rate was higher in those, who believed that the disease prognosis was not very serious, or that the disease had a harmless nature.[23,24] The lower perceived danger of the disease due to the lack of accurate information might have adversely affected the vaccination efforts.

The rate of the risk of rejecting vaccination was 12 times higher in individuals, who believed that preventive efforts in place in Turkey were not adequate against the COVID-19 pandemic. Consistent with above, studies in the relevant literature suggested that vaccine rejection was higher in those, who had lower levels of confidence in the health system, and those, who had opposing political ideas against the governing party. Trust in the technical knowledge and organizational skills of the governments contributes positively to vaccination efforts.[20,38,39]

The rejection of vaccination was not associated with considering or not considering COVID-19 pandemic as a divine retribution. However, there are studies suggesting that there is a significant association between health behaviors and religiosity.[40,41]

Disease representations created by individuals are very important for vaccine rejecting. It is the responsibility of governments to provide accurate information and awareness. In this sense, in future studies on vaccine rejection, studies that examine both the lack of knowledge of individuals and the psychological factors that prepare the ground for vaccine rejection will contribute to the literature.

Conclusion and recommendations

The rate of rejecting vaccination is higher in those, who are not convinced that the disease is contagious, dangerous, and preventable. Those who did not take environmental factors into account, did not care about personal hygiene, and did not limit social activities were found to have a higher rate of not getting vaccinated. This shows that the information about the disease is incomplete and inaccurate. In this sense, the public should be supported with health education. The health system and central government should be transparent and reassuring in matters related to the pandemic. The Ministry of Health and health institutions should guide the society toward the right source of information. Those who think that the media exaggerated the epidemic and that the disease is a conspiracy are more likely to reject the vaccine. In this respect, trainings should be organized to increase the public's confidence in the health system and the government.

Limitations

Since the basic education level was very low in the research group, communication problems were encountered from time to time. The inclusion of only those living in the city center and the small number of samples are also limitations of the study. Also, the study represents only its own sample due to its case-control type.

Disclosure statement

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

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References

1. Rothan HA, Byrareddy SN. The epidemiology and pathogenesis of coronavirus disease [COVID-19] outbreak. J Autoimmun. 2020;109:102433. doi:10.1016/j.jaut.2020.102433.
2. Nicola M, Alsafi Z, Sohrabi C, Kerwan A, Al-Jabir A, Iosifidis C, Agha M, Agha R. The socio-economic implications of the coronavirus pandemic (COVID-19): a review. Int J Surg. 2020 ;78:185–93. doi:10.1016/j.ijsu.2020.04.018. Epub 2020 Apr 17. PMID: 32305533; PMCID: PMC7162753.
3. Hossain E, Rana J, Islam S, Khan A, Chakrobortty S, Ema NS, Bekun FV. COVID-19 vaccine-taking hesitancy among Bangladeshi people: knowledge, perceptions and attitude perspective. Hum Vaccin Immunother. 2021 Nov 2;17(11):4028–37. doi:10.1080/21645515.2021.1968215. Epub 2021 Sep 23. PMID: 34554050; PMCID: PMC8828157.
4. Saha SM, Pranty SA, Rana MJ, Islam MJ, Hossain ME. Teaching during a pandemic: do university teachers prefer online teaching? Heliyon. 2021 Dec 24;8(1):e08663. doi:10.1016/j.heliyon.2021.e08663. PMID: 35028450; PMCID: PMC8741442.
5. Demirbilek Y, Pehlivantürk G, Zö Ö, Alp Meşe E. COVID-19 outbreak control, example of ministry of health of Turkey. Turk J Med Sci. 2020 Apr 21;50(SI–1):489–94. doi:10.3906/sag-2004-187. PMID: 32304192; PMCID: PMC7195985.
6. Açikgöz Ö, Günay A. Short-Term impact of the Covid-19 pandemic on the global and Turkish economy. Turk J Med Sci. 2021 Dec 17;51(SI–1):3182–93. doi:10.3906/sag-2106-271. PMID: 34365782; PMCID: PMC8771017.
7. Ahmadi ZH, Mousavizadeh M, Nikpajouh A, Bahsir M, Hosseini S. COVID-19: a perspective from Iran. J Card Surg. 2021;36(5):1672–76. doi:10.1111/jocs.15054. Epub 2020 Sep 28. PMID: 32985709; PMCID: PMC7537158.
8. CDC. COVID-19 information for specific groups of people; [accessed 2021 Oct 14]. https://www.cdc.gov/coronavirus/2019-ncov/need-extra-precautions/index.html.
9. Andryukov BG, Besednova NN. Older adults: panoramic view on the COVID-19 vaccination. AIMS Public Health. 2021 May 8;8(3):388–415. doi:10.3934/publichealth.2021030. PMID: 34395690; PMCID: PMC8334630.
10. CDC. Risk for COVID-19 infection, hospitalization, and death by age group; [accessed 2022 Apr 13] https://www.cdc.gov/coronavirus/2019-ncov/covid-data/investigations-discovery/hospitalization-death-by-age.html
11. Khatatbeh M. Efficacy of nationwide curfew to encounter spread of COVID-19: a case from Jordan. Front Public Health. 2020 Aug 21;8:394. doi:10.3389/fpubh.2020.00394. PMID: 32984234; PMCID: PMC7475701.
12. Bloem JR, Salemi C. COVID-19 and conflict. World Dev. 2021 ;140:105294. doi:10.1016/j.worlddev.2020.105294. Epub 2020 Nov 11. PMID: 33199938; PMCID: PMC7657608.
13. Aziz AB, Raqib R, Khan WA, Rahman M, Haque R, Alam M, Zaman K, Ross AG. Integrated control of COVID-19 in resource-poor countries. Int J Infect Dis. 2020;101:98–101. doi:10.1016/j.ijid.2020.09.009. Epub 2020 Sep 9. PMID: 32916249; PMCID: PMC7480448.
14. CDC. COVID-19 vaccine. Effectiveness; [accessed 2021 Oct 27] https://www.cdc.gov/coronavirus/2019-ncov/vaccines/effectiveness/how-they-work.html.
15. WHO. COVID-19 vaccines; [accessed 2021 Oct 16]. https://www.who.int/emergencies/diseases/novel-coronavirus-2019/COVID-19-vaccines.
16. Kadkhoda K. Herd Immunity to COVID-19. Am J Clin Pathol. 2021 Mar 15;155(4):471–72. doi:10.1093/ajcp/aqaa272. PMID: 33399182; PMCID: PMC7929447.
17. TR Ministry of Health. Covid 19 vaccine information platform; [accessed 2021 Oct 27] https://covid19asi.saglik.gov.tr/?gclid=Cj0KCQjw8eOLBhC1ARIsAOzx5cF-ZUeG7AqkylCBuGjNOfmbdVs9PHH8rFWJz8NQicO-cbwr87DBxMwaArbcEALw_wcB.
18. Sallam M. COVID-19 vaccine hesitancy worldwide: a concise systematic review of vaccine acceptance rates. Vaccines [Basel]. 2021 Feb 16;9(2):160. doi:10.3390/vaccines9020160. PMID: 33669441; PMCID: PMC7920465.
19. Al-Sanafi M, Sallam M. Psychological determinants of COVID-19 vaccine acceptance among healthcare workers in Kuwait: a cross-sectional study using the 5C and vaccine conspiracy beliefs scales. Vaccines [Basel]. 2021 Jun 25;9(7):701. doi:10.3390/vaccines9070701. PMID: 34202298; PMCID: PMC8310287.
20. Al-Amer R, Maneze D, Everett B, Montayre J, Villarosa AR, Dwekat E, Salamonson Y. COVID-19 vaccination intention in the first year of the pandemic: a systematic review. J Clin Nurs. 2021 Jul 6;31(1–2):62–86. doi:10.1111/jocn.15951. Epub ahead of print. PMID: 34227179; PMCID: PMC8447353.
21. Puri N, Coomes EA, Haghbayan H, Gunaratne K. Social media and vaccine hesitancy: new updates for the era of COVID-19 and globalized infectious diseases. Hum Vaccin Immunother. 2020 Nov 1;16(11):2586–93. doi:10.1080/21645515.2020.1780846. Epub 2020 Jul 21. PMID: 32693678; PMCID: PMC7733887.
22. Albahri AH, Alnaqbi SA, Alshaali AO, Alnaqbi SA, Shahdoor SM. COVID-19 vaccine acceptance in a sample from the United Arab Emirates general adult population: a cross-sectional survey, 2020. Front Public Health. 2021 Jul 26;9:614499. doi:10.3389/fpubh.2021.614499. PMID: 34381748; PMCID: PMC8350048.
23. Troiano G, Nardi A. Vaccine hesitancy in the era of COVID-19. Public Health. 2021;194:245–51. doi:10.1016/j.puhe.2021.02.025. Epub 2021 Mar 4. PMID: 33965796; PMCID: PMC7931735.
24. Schwarzinger M, Watson V, Arwidson P, Alla F, Luchini S. COVID-19 vaccine hesitancy in a representative working-age population in France: a survey experiment based on vaccine characteristics. Lancet Public Health. 2021;6(4):e210–e221. doi:10.1016/S2468-2667[21]00012-8. Epub 2021 Feb 6. PMID: 33556325; PMCID: PMC7864787.
25. Alibrahim J, Awad A. COVID-19 vaccine hesitancy among the public in Kuwait: a cross-sectional survey. Int J Environ Res Public Health. 2021 Aug 22;18(16):8836. doi:10.3390/ijerph18168836. PMID: 34444585; PMCID: PMC8394561.
26. West R, Michie S, Rubin GJ, Amlôt R. Applying principles of behaviour change to reduce SARS-CoV-2 transmission. Nat Hum Behav. 2020;4(5):451–59. doi:10.1038/s41562-020-0887-9.
27. Shook NJ, Sevi B, Lee J, Oosterhoff B, Fitzgerald HN. Disease avoidance in the time of COVID-19: the behavioral immune system is associated with concern and preventative health behaviors. PLoS One. 2020 Aug 20;15(8):e0238015. doi:10.1371/journal.pone.0238015. PMID: 32817714; PMCID: PMC7446877.
28. Oosterhoff B, Shook NJ, Iyer R. Disease avoidance and personality: a meta-analysis. J Res Pers. 2018;77:47–56. doi:10.1016/j.jrp.2018.09.008.
29. McAndrew LM, Martin JL, Friedlander M, Shaffer K, Breland J, Slotkin S, Leventhal H. The common sense of counseling psychology: introducing the common-sense model of self-regulation. Couns Psychol Q. 2018;31(4):497–512. doi:10.1080/09515070.2017.1336076. Epub 2017 Aug 11. PMID: 31274964; PMCID: PMC6604661.
30. Postolica R, Iorga M, Savin M, Azoicai D, Enea V. The utility of Leventhal's model in the analysis of the psycho-behavioral implications of familial cancer - a literature review. Arch Med Sci. 2018;14(5):1144–54. doi:10.5114/aoms.2016.63149. Epub 2016 Oct 19. PMID: 30154899; PMCID: PMC6111358.

31. Leventhal H, Meyer D, Nerenz D. The common sense representation of illness danger. In: Rachman S, editor. Contributions to medical psychology. Vol. 2. 1st ed. Oxford: Pergamon Press; 1980. p. 7–30.

32. Olgun N, Aslan FE, Yücel N, Öntürk ZK, Laçin Z. Assessment of health status of the elderly. Acıbadem Univ Health Sci J. 2013;2:72–78.

33. Şanlıurfa TT, Yumin ET, Öztürk A, Sertel M, Yumin M. The relationship between pain and health status, mobility and daily life activities in community-living elderly healthy volunteers. Turkish J Phys Med Rehabil. 2011;57(4).

34. Patricia CRN, Zulay JPY, Carlos RLJ, Alejandra CM, Cristina JSR, Josefina RV. The influence of antivaccination movements on the re-emergence of measles. J Pure Appl Microbiol. 2019;13 (1):127–32. doi:10.22207/JPAM.13.1.13.

35. Hossain ME, Islam MS, Ghose TK, Jahan H, Chakrobortty S, Hossen MS, Ema NS. COVID-19 vaccine acceptability among public university students in Bangladesh: highlighting knowledge, perceptions, and attitude. Hum Vaccin Immunother. 2021 Dec 2;17(12):5089–98. doi:10.1080/21645515.2021.2010426. Epub 2021 Dec 10. PMID: 34893016; PMCID: PMC8903915.

36. Alzubaidi H, Samorinha C, Saddik B, Saidawi W, Abduelkarem AR, Abu-Gharbieh E, Sherman SM. A mixed-methods study to assess COVID-19 vaccination acceptability among university students in the United Arab Emirates. Hum Vaccin Immunother. 2021 Nov 2;17(11):4074–82. doi:10.1080/21645515.2021.1969854. Epub 2021 Sep 17. PMID: 34534052; PMCID: PMC8828074.

37. Earnshaw VA, Eaton LA, Kalichman SC, Brousseau NM, Hill EC, Fox AB. COVID-19 conspiracy beliefs, health behaviors, and policy support. Transl Behav Med. 2020 Oct 8;10(4):850–56. doi:10.1093/tbm/ibaa090. PMID: 32910819; PMCID: PMC7499784.

38. Kreps S, Prasad S, Brownstein JS, Hswen Y, Garibaldi BT, Zhang B, Kriner DL. Factors associated with US adults' likelihood of accepting COVID-19 vaccination. JAMA Netw Open. 2020;3(10): e2025594. doi:10.1001/jamanetworkopen.2020.25594. Erratum in: JAMA Netw Open. 2020 Nov 2;3[11]:e2030649. PMID: 33079199; PMCID: PMC7576409.

39. Mesch GS, Schwirian KP. Social and political determinants of vaccine hesitancy: lessons learned from the H1N1 pandemic of 2009-2010. Am J Infect Control. 2015;43(11):1161–65. doi:10.1016/j.ajic.2015.06.031. PMID: 26521933; PMCID: PMC7132648.

40. Ahrenfeldt LJ, Möller S, Hvidt NC, Lindahl-Jacobsen R. Religiousness and lifestyle among Europeans in SHARE. Public Health. 2018;165:74–81. doi:10.1016/j.puhe.2018.09.009. Epub 2018 Oct 26. PMID: 30384031.

41. Stamatoulakis KK. Religiosity and prosociality. Procedia-Social Behav Sci. 2013;82:830–34. doi:10.1016/j.sbspro.2013.06.357.