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**Association between level of trust in the healthcare system and influenza vaccine hesitancy among college students in Israel**

**Abstract**

Influenza is an acute respiratory disease caused by an influenza virus. Influenza vaccination is an effective way to prevent influenza and can reduce the risk of related complications. Yet, the coverage rate of influenza vaccine among Israeli students is low due to a sense of complacency, lack of knowledge, and vaccine hesitancy. The current study examined the association between the level of trust in the healthcare system and influenza vaccine hesitancy among college students. A cross-sectional study was conducted via an online questionnaire in April-May 2023. In total, 610 students were surveyed, of whom 57% were vaccinated in the past, but only 12% were vaccinated this year against the flu. Negative, significant, and strong relationships were found between the level of trust in the healthcare system and influenza vaccine hesitancy. Students who had been vaccinated in the past had a higher level of trust in the healthcare system and a lower level of vaccination hesitancy. The linear regression model revealed that being a woman, not Jewish, vaccinated, and trusting the Ministry of Health, family doctor, and health professionals is associated with a decrease in vaccine hesitancy. The findings are consistent with previous research in the field. Based on the study's findings, it is possible to recommend developing intervention programs to increase confidence in the health system and vaccinations by providing knowledge and addressing students' concerns about vaccination.

**1. Introduction**

Vaccine hesitancy is defined as a delay in accepting or outright refusal of vaccines, even when vaccination services are readily available (MacDonald, 2015). This issue has been recognized by the World Health Organization (WHO) (2019) as a major health concern, listed among the top ten threats to public health. The healthcare system plays an essential role in encouraging vaccine uptake for influenza. Influenza leads to approximately 3-5 million cases of severe illness and 290,000-650,000 respiratory-related deaths worldwide (Doyon-Plourde et al., 2019; Kim et al., 2022). Influenza vaccination represents one of the most efficient strategies to reduce the health, societal, and economic impact of influenza (Cassini et al., 2018; Zou et al., 2023). Despite the severity of the flu and the availability of safe vaccines, influenza vaccination rates remain low, posing an international challenge and contributing to the burden of the disease on healthcare systems worldwide (Chotpitayasunondh et al., 2021). Influenza vaccination is crucial for the general population, including the student population in close-knit classroom settings and additional social interactions. Studies have shown low seasonal influenza vaccination rates among students, with coverage ranging from 12% to 30% (Benjamin & Bahr, 2016). If the student population is not vaccinated against influenza, the global population will not meet the World Health Organization's requirement of achieving approximately 75% influenza vaccination coverage. Therefore, although worldwide public health systems must address vaccine hesitancy among the general public, particular emphasis must be placed on university students.

Previous studies have delved into trust within the healthcare system and trust in healthcare providers to explain health-related behavior. Findings from these studies indicate a positive correlation between higher trust in physicians and adherence to medical recommendations, leading to improved health outcomes (Dopelt et al., 2021). Conversely, lower levels of trust are linked to reduced utilization of preventive health screenings and lower uptake of the flu vaccine (Gupta et al., 2014; Ratanawongsa et al., 2013; Birkhauer et al., 2017). The SAGE Working Group on Vaccine Hesitancy recognized trust in the healthcare system and healthcare providers as pivotal determinants of vaccine hesitancy (MacDonald et al., 2015; Chu et al., 2021). Studies have also revealed elevated levels of vaccine hesitancy regarding influenza, COVID-19, or HPV vaccines within specific demographics, including healthcare workers, minority groups, and individuals with lower socioeconomic status, compared to the general population (Hajure et al., 2021; Peretti-Watel et al., 2014; Savoia et al., 2021). Research has underscored the significant impact of a doctor's recommendation on a patient's inclination to receive vaccinations (Silver et al., 2022; Shahbari et al., 2020; Verger & Dubé, 2020). Conversely, individuals who opt not to get vaccinated often cite a lack of trust in these institutions as a primary reason for refusing vaccines (Stecula et al., 2020). Groups with diminished trust in the public health system are approximately half as likely to receive vaccinations compared to those with higher levels of trust (Gilles et al., 2011). Moreover, Healthcare professionals who hesitate about vaccinations may not adequately address their patients' vaccine concerns (Manca, 2018).

Trust in the public health organizations and experts that provide vaccine recommendations is a significant factor influencing individuals' decisions and beliefs regarding vaccines (Larson et al., 2018; Stecula et al., 2020). The literature suggests that trust in the healthcare system is built on competence (skills and knowledge) and how the healthcare system and its actors (medical staff) work to benefit the patient through integrity, maintaining individual privacy and medical confidentiality, empathy, and respect (Calnan & Rowe, 2006). A healthcare system based on trust contributes to creating a broader social value, with the idea that the healthcare system not only generates health and prioritizes improving the state of health in society but, as a social institution, establishes social norms shaping human behavior (Gilson, 2006). In recent years, Israel has been relatively low in public trust in the healthcare system compared to the OECD. Only half of the public (52%) believed they would receive the best treatment for a severe illness (Bramli-Greenberg et al., 2020).

Low influenza vaccination rates among students are global (Lee et al., 2018). While vaccine hesitancy has been extensively researched in the general adult population, young individuals have not been a strategic focus of vaccination encouragement and public health communication. Typically, students are young and perceive themselves as healthy with a low risk of falling ill despite the rapid spread of the influenza virus on campuses. Given concerns about students' reluctance to be vaccinated, we explore their level of trust in the healthcare system and whether trust is associated with flu vaccine hesitancy.

### 2. Materials and Methods

#### 2.1. Research Procedure

Descriptive, cross-sectional research was undertaken with students from Ashkelon Academic College. In 2023, approximately 4,200 students studied at the college in the academic track. Approval for the study was obtained from the Ashkelon Academic College Ethics Committee (approval #42-2023). Data was obtained from all College departments. The study duration was a month and a half, from 2 April 2023 to 12 May 2023, coinciding with the end of the influenza vaccination season in Israel. The survey questionnaire was programmed using Qualtrics (Qualtrics, Provo, UT, USA). It was distributed to all students via email. One reminder to fill out the questionnaire was sent via email after three weeks since it was distributed. The questionnaire received a total of 703 entries, with 610 students completing at least 90% of the questionnaire. Therefore, the response rate was 87% of all entries and represented 15% of the research population. On average, it took 5±1.44 minutes to complete the questionnaire. The introductory page of the questionnaire explained the aim of the study. Completing the questionnaire indicated the students' voluntary agreement to participate in the study. Students could stop their responses at any time, and there was no obligation to answer any specific questions.

#### 2.2. Tools

We used an online, closed, anonymous, self-completed questionnaire. A professional translator translated the questionnaire from English into Hebrew. Subsequently, the Hebrew-translated questionnaire was administered to ten non-college attending students to verify the comprehensibility of the questions. The questionnaire was revised based on their feedback. Moreover, the questionnaire underwent content validation through assessment by an expert in public health and epidemiology and an expert in infectious diseases.

The subsequent sections outline the components of the questionnaire:

1. Demographic information: Gender, age, marital status, religion, department, and year of study.
2. Vaccination history - Have you ever been vaccinated against the flu? Have you been vaccinated against the flu this year? The questions were taken from Ryan et al. (2019).
3. Vaccine hesitancy - Six questions from Silva et al. (2021). The respondents were asked to indicate their degree of agreement with each statement in the questionnaire on a Likert scale ranging from 1 (not at all) to 5 (strongly agree) and the option to answer, "don't know." The average of the answers was calculated for each participant after reversing the scales in questions 1 and 6 and dropping the "don't know" answers. A higher score will indicate a higher vaccine hesitancy. Cronbach's α for reliability was 0.77.
4. Level of trust in the healthcare system - three questions from Jennings et al. (2021) measuring the level of trust in one's doctor, the Ministry of Health, and medical professionals. The response scale ranged from 1 (not at all) to 5 (strongly agree). The variable was constructed by calculating the mean for each participant. The mean ranged from 1-5, where a higher score indicates a higher level of trust in the healthcare system. Cronbach's α for reliability was 0.82.

#### 2.3. Data Analysis

The data were analyzed using SPSS 29.0 (IBM, Armonk, NY, USA). Relationships between the variables were examined using Pearson correlation. Differences between groups of students were analyzed using t-tests for independent samples and one-way analyses of variance (ANOVAs). A linear regression model was used to predict the level of vaccination hesitancy. All reported *p*-values were based on two-sided tests and were considered significant when the values were below 0.05.

**3. Results**

#### 3.1. Participants' Characteristics and Influenza vaccination history

In total, 610 students participated in the study, of whom 60% were women, 53% were in relationships, and 21% had children. Most participants were Jewish (83%). Nearly half study in the Faculty of Social Sciences (46%), about a third in Health Sciences (35%), and a fifth in Computer Science and Management (19%). The mean age of the respondents was 27.64 ± 7.20 years. More than half had been vaccinated in the past (57%, excluding participants who could not remember - 61%). Among the participants, just over a tenth are vaccinated (12%), 44% intend to get vaccinated, 8% are undecided, and more than a third (36%) do not intend to get vaccinated. No significant differences were found between the faculties regarding vaccination history. However, significant differences were found regarding vaccination in the research year between the faculties (χ2=24.66, p<0.001), with more students in the health sciences having been vaccinated or intending to be vaccinated (16% and 47% respectively), compared to computer science and management students (14% and 52% respectively), and social sciences students (11% and 35% respectively). Participants' characteristics and Influenza vaccination history are summarized in Table 1.

**Table 1.** Participants' characteristics and Influenza vaccination history.

|  |  |  |
| --- | --- | --- |
| **Characteristics** | ***n*** | **%** |
| Gender:  Male  Female | 243  367 | 40  60 |
| In relationship | 324 | 53 |
| Have children | 128 | 21 |
| Jewish | 509 | 83 |
| Faculty:  Health Sciences  Social Sciences  Computers & Management | 202  262  106 | 35  46  19 |
| Year of studies:  1st  2nd  3rd & 4th | 310  198  102 | 51  32  17 |
| Vaccinated against the flu in the past:  Yes  No  Don't remember | 351  223  36 | 57  37  6 |
| vaccinated this year against the flu:  Yes  Intend to vaccinate  Do not intend to vaccinate  Undecided | 76  269  217  48 | 12  44  36  8 |

#### 3.2. Level of trust in the healthcare system

The distribution of responses to statements that examined the level of trust in the healthcare system is presented in Table 2 after combining categories as follows: answers 1 and 2 were incorporated into the category 'weakly agree,' answer 3 remained 'moderately agree,' and answers 4 and 5 were integrated into the category 'strongly agree.'

**Table 2.** Distribution of responses to the level of trust in the healthcare system questionnaire.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Statement** | **Weakly (%)** | **Moderately (%)** | **Strongly (%)** | **Mean** ± **SD1** |
| I trust the Ministry of Health, which works for the benefit of the entire population | 46 | 32 | 22 | 2.67±1.07 |
| I trust my family doctor's recommendations | 13 | 30 | 57 | 3.55±0.93 |
| I trust the recommendations of the health professionals regarding vaccines | 32 | 33 | 35 | 2.98±1.08 |

To construct the level of trust in the healthcare system variable, we calculated the mean response of each participant. The mean value of the variable was 3.06 (SD = 0.88).

#### 3.3. Influenza vaccine hesitancy

The distribution of responses to statements that examined influenza vaccine hesitancy is presented in Table 3 after combining categories as follows: answers 1 and 2 were combined into the category 'weakly agree,' answer 3 remained 'moderately agree,' and answers 4 and 5 were integrated into the category 'strongly agree.'

**Table 3.** Distribution of responses to the influenza vaccine hesitancy questionnaire.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Statement** | **Weakly (%)** | **Moderately (%)** | **Strongly (%)** | **Don't Know (%)** | **Mean** ± **SD1** |
| I am [not] worried about getting the flu \* | 40 | 19 | 36 | 5 | 3.01±1.36 |
| I am concerned about the ineffectiveness of the flu vaccine | 40 | 9 | 56 | 5 | 3.59±1.61 |
| I am concerned about the limited information available about the flu vaccine | 28 | 10 | 58 | 4 | 3.63±1.62 |
| I will only get the flu shot if it becomes mandatory | 70 | 10 | 13 | 7 | 1.84±1.28 |
| I think the flu shot is not safe | 29 | 13 | 50 | 9 | 3.30±1.52 |
| I [do not] recommend family/friends to get vaccinated against influenza \* | 28 | 24 | 30 | 18 | 3.09±1.37 |

1 The mean was calculated without including the 'I don't know' option.

\* Opposite questions. The data are presented in reverse rank order.

For the purpose of constructing the influenza vaccine hesitancy variable, we calculated the mean response of each participant without the 'I don't know' option and after reversing the scale for questions 1 and 6. The mean value of the variable was 3.11 (SD = 0.70).

#### 3.4. The relationships between the level of trust in the healthcare system and influenza vaccine hesitancy

Negative, significant, and strong relationships were found between the level of trust in the Ministry of Health, one's family doctor, health professionals, the general trust variable in the healthcare system and influenza vaccine hesitancy (rp=-0.45, p<0.001; rp=-0.21, p<0.001; rp=-0.44, p<0.001; rp=-0.43, p<0.001 respectively), that is, the higher the level of trust in the healthcare system, the lower the influenza vaccine hesitancy.

#### 3.5. The relationship between influenza vaccination history and the study variables

Significant differences were found between the students who had been vaccinated in the past and students who had not been vaccinated in the level of trust in the healthcare system (t=3.89, p<0.001), and vaccination hesitancy (t=6.69, p<0.001) so that students who had been vaccinated in the past had a higher level of trust in the healthcare system than unvaccinated students (3.17 vs. 2.87 respectively), and a lower level of vaccination hesitancy (2.95 vs. 3.23 respectively).

#### 3.6. Differences between faculties

Significant differences were found between faculties in terms of level of trust in the healthcare system (F(543)=4.46, p<0.05). Students in the health sciences faculty demonstrated the highest level of trust, followed by students in the social sciences and, finally, students in computer science and management (averages of 3.22, 3.01, and 2.92, respectively). Scheffe post hoc tests revealed that students in the health sciences faculty had significantly higher knowledge levels than students in the social sciences and computer science and management.

Furthermore, significant differences were found between the faculties regarding influenza vaccine hesitancy (F(565)=3.17, p<0.05). Computer science and management students had the highest hesitancy level, followed by students in the social sciences and, finally, health sciences (averages of 3.22, 3.10, and 3.00, respectively). Scheffe post hoc tests revealed that students in computer science had significantly higher hesitancy levels than health science students.

#### 3.7. Regression model to predict influenza vaccine hesitancy

Table 4 presents the results of a linear regression model predicting influenza vaccine hesitancy. The coefficients and p-values shed light on how each variable predicts vaccine hesitancy. Being female, not Jewish, vaccinated, and trusting the Ministry of Health, family doctor, and health professionals is associated with a decrease in vaccine hesitancy. The best predictors of the decrease in vaccine hesitancy are the level of trust in the Ministry of Health and the health professionals' recommendations and being Vaccinated in the past. The explained variance of the model is 30% (p<0.001).

**Table 4.** Linear regression model results for predicting influenza vaccine hesitancy

|  |  |  |  |
| --- | --- | --- | --- |
| Variable | B | β | p |
| Gender (0-male, 1-female)  Religion (0-Jewish, 1-not Jewish)  Vaccinated (0-no, 1-yes)  Ministry of Health,  Family doctor  Health professionals | -0.21  0.20  -0.28  -0.23  -0.10  -0.22 | -0.12  0.09  -0.16  -0.29  -0.11  -0.28 | 0.001  0.020  <0.001  <0.001  0.019  <0.001 |
| Adjusted R Square  F  N | 0.30, p<0.001  39.43, p<0.001  545 | | |

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**4. Discussion**

Our results showed that trust in the Ministry of Health, that it does indeed works for the benefit of the entire population, is low (average 2.67), and the trust in the health professionals' recommendations regarding vaccines is higher but not satisfactory (average 2.98). Nevertheless, the participants trust their family doctor's recommendations (average 3.55). Previous studies In Western countries also demonstrate the disparity in trust and satisfaction levels between local health services and the national healthcare system. While trust and satisfaction often range from 80-90% at the local level, they decline to approximately 50-60% at the national level. This emphasizes the people's trust in their local doctors compared to the national level (Cooper et al., 2017; Quinn et al., 2017; Jamison et al., 2019).

Negative, significant, and strong relationships were found between all the dimensions of trust in the healthcare system and influenza vaccine hesitancy. The literature indicates that public trust in healthcare professionals is essential for the health system to function effectively. Trust is the primary factor influencing individuals' vaccination decisions (Shahbari et al., 2020; Gilkey et al., 2016). Among other things, when making decisions, individuals must trust the information they are being provided (Ozawa et al., 2016). In the context of vaccinations, decision-making is associated with trust in government and public health professionals (Larson et al., 2015). In line with our findings, studies showed a negative correlation between an individual's trust in the healthcare system and workers and vaccine hesitancy (Ahorsu et al., 2022; Jennings et al., 2023; Freiman, 2023). Physician endorsements advocating for vaccinations are recognized as one of the most influential factors affecting public attitudes toward vaccinations (Silver et al., 2022; Shahbari et al., 2020; Verger & Dubé, 2020). Conversely, hesitancy and skepticism regarding vaccinations can be linked, in part, to a diminished level of trust in physicians (Stecula et al., 2020; Raude et al., 2016).

A cross-national study conducted during the COVID-19 pandemic found that as trust levels in the healthcare system and the World Health Organization were higher, vaccine hesitancy was lower (Rozek et al., 2021). A similar study at the University of North Carolina showed that as students' trust levels in the healthcare system and other information sources were higher, their hesitancy levels were lower (Qiao et al., 2020). A survey among students from the Central University Center of Baia Mare (Romania) found a significant correlation between individuals with high trust levels in institutions and their intentions to vaccinate (Cotîrleţ, 2022). The link between trust in the healthcare system, attitudes towards vaccines, and vaccine hesitancy can also be explained using the Health Belief Model (Betsch et al., 2015). According to this model, to change a person's behavior or, in this case, move them from vaccine hesitancy to vaccine acceptance, they need to believe and have confidence that the action being taken can indeed benefit them, meaning that, in this case, the vaccine can help them. The higher the person trusts the system, the more they believe the vaccine can benefit them.

Research findings indicated that students who have been previously vaccinated have higher levels of trust in the healthcare system and lower levels of hesitancy compared to students who have not been vaccinated. The Theory of Planned Behavior (Ajzen, 1991) argues that their attitudes and social norms influence a person's behavior. In other words, those who have already been vaccinated likely hold more positive attitudes, and they hesitate less to vaccinate again. Additionally, it can be assumed that individuals who have been vaccinated live in an environment where social norms emphasize trust in the healthcare system and vaccines.

We also found that Students from health sciences have the highest trust level and the lowest vaccine hesitancy level compared to students from other disciplines. Similar findings were also obtained in a study conducted at a university in Saudi Arabia (Mallhi et al., 2022) and in Japan (Kawahara & Nishiura, 2020). Health science students learn about it in depth and encounter it in an internship, so they have higher trust than students whose contact with the health system is only as patients. They also learn more about the mechanism of vaccines, which reduces hesitation.

The linear regression model revealed that being a woman, not Jewish, vaccinated, and trusting the Ministry of Health, family doctor, and health professionals is associated with a decrease in vaccine hesitancy. In a study by (Shon et al., 2021), it was found that female students were vaccinated more than male students, suggesting that among students, males exhibit higher levels of vaccine hesitancy, like the findings obtained in the current study. Consistent with the regression, studies have found that previously vaccinated students have less vaccine hesitancy (Ryan et al., 2019; Shon et al., 2021; Sunil & Zottarelli, 2011). Regarding religion- These findings align with other studies indicating that Arab society in Israel has less trust in state institutions, including the healthcare system (Shahbari et al., 2020; Pinchas-Mizrachi et al., 2020).

When delving into the interplay of trust and vaccine hesitancy, it's crucial to acknowledge the erosion of public trust in governments, healthcare systems, and experts on a global scale due to the impact of the COVID-19 pandemic (Freiman, 2023). The pandemic has unleashed a flood of misinformation, famously termed an 'Infodemic' (Dopelt et al., 2023), contributing to the rise in vaccine hesitancy. Freiman (2023) advocates for mitigating vaccine concerns and fostering trust among the hesitant by actively engaging and imparting knowledge (Drążkiewicz, 2021). It is reasonable to anticipate that trust will streamline intricate decisions about vaccination (Larson et al., 2018).

#### 4.1. study limitations

The research was limited to students from a single college, potentially impacting the ability to apply the findings to students nationwide. Furthermore, most participants had not received the flu vaccine this year, and a significant portion expressed no intention to do so. This suggests a potential selection bias, wherein students hesitant about vaccines may have been more inclined to participate in the survey.

**5. Conclusion**

Trust in the Ministry of Health, the family doctor, and the public health professionals are important predictors of vaccine hesitancy. Physicians may be able to build on the trust their patients have in them to address vaccine concerns and increase vaccination rates against influenza. However, to persuade students to vaccinate, interventions to transfer professional knowledge and allay concerns about vaccinations can be done on campuses in collaboration with the management of the institutions, the Ministry of Health, and doctors from the nearest hospitals or clinics. It is crucial to make it clear to students that young people can also get seriously ill with the flu and that they are at high risk of infection due to overcrowding in classrooms and other social interactions they are involved in. Finally, trust-building steps should be taken between the various components of the healthcare system and the student population, viewing them as ambassadors for increasing vaccination rates.

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