Indonesian nursing students' intention to accept COVID-19 vaccines: an online, multicentre survey

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ABSTRACT

Background: The determinants of intention to accept the COVID-19 vaccine and associated factors among nursing students during this pandemic need to be identified. Aims: The study assessed nursing students' attitudes to vaccination, health engagement and trust in government, as well as their intention to have a COVID-19 vaccination. Methods: A cross-sectional study was carried out among nursing students in three provinces of Java, Indonesia, from December 2020 to February 2021. Convenience sampling was used to gather primary data from 640 participants through a structured online survey. Multiple linear regression was used to analyse the results. Findings: All items of vaccine attitude and health engagement as well as trust in government were positive predictors of vaccine acceptance after adjusting for confounding factors. Conclusion: Nursing students were more likely to accept vaccination if they had a positive attitude to vaccination, high levels of health engagement and trust in the government regarding tackling the COVID-19 pandemic.

Key words: ■ Attitude ■ Health engagement ■ Trust in government ■ COVID-19 vaccine ■ Nursing students

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Vaccination is a major public health strategy, which has prevented the spread of diseases (Hu et al, 2020), particularly infectious COVID-19. It has significantly reduced mortality in Indonesia (Suwantika et al, 2020) as well as across the globe (Sallam et al, 2021).

Vaccine hesitancy, characterised by a delay in accepting or refusing vaccination despite it being available, has divided vaccine proponents and anti-vaccine advocates (Izzati et al, 2020; Kwok et al, 2021). As of 18 May 2021, a total of 23 262 139 vaccine COVID-19 doses have been administered worldwide; health professionals, security staff, educators and frontline humanitarian workers were a priority for receiving vaccinations in Indonesia (World Health Organization, 2022).

Nursing students were not included in the first phase of the Indonesian government's priority target vaccine but were included in the second phase, along with certain students. Nursing students can encourage other students to be vaccinated (Jiang et al, 2021), which could optimise COVID-19 vaccination among the student population.

A cross-sectional international study found vaccine acceptance was 43.8% among nursing students from seven universities in Albania, Cyprus, the Czech Republic, Greece, Italy, Kosovo and Spain (Patelarou et al, 2021). However, a study in China found that 83.33% of the nursing students intended to accept a COVID-19 vaccine (Jiang et al, 2021). These inconsistent results could be explained by a variety of reasons, including health engagement, attitudes to vaccination (Barello et al, 2020; Graffigna et al, 2020) and trust in governments (Jiang et al, 2021). Nevertheless, no empirical studies have explored the determinants as well as acceptance of vaccination among nursing students in Indonesia. Fully understanding the determinants of COVID-19 vaccine acceptance in nursing students is critical to implementing vaccination programmes.

To better understand the contemporary threat of vaccine hesitancy to health sustainability, studies have analysed factors that commonly determine attitudes toward vaccines, health engagement (Graffigna et al, 2020) and trust in authorities, as well as information on the COVID-19 vaccine from government sources (Lazarus et al, 2021).

Nursing students' behaviour depends on their attitudes, which also affect their acceptance of vaccination (Tuells et al, 2021).

Health engagement is defined as personal proactivity in the management of health-related concerns (Graffigna et al, 2020). Among multiple factors influencing individuals' health-related behaviours, Graffigna et al (2020) demonstrated the importance of health engagement in influencing health policymaking. This is the only study to have examined whether health engagement could be used to improve acceptance of COVID-19 vaccination and whether it is a valid predictor of whether people maintain and improve attitudes to vaccination (Graffigna et al, 2020).

Indonesia has experienced uncertainty as a result of the pandemic, resulting in mental health problems, changes in economic status, and high morbidity and mortality rates (Rias et al, 2020; Muslih et al, 2021). Given this, the relationships between health engagement and attitudes and acceptance of vaccination should be a concern.

Vaccine acceptance is associated with trust in government, which leads to another major issue regarding the response to the COVID-19 pandemic. Unverified information has been extensively disseminated through numerous media sources, resulting in a considerable portion of the world's population perpetuating false narratives about the COVID-19 pandemic (Lazarus et al, 2021).

The public will, naturally, judge the quality of an official emergency message by its timeliness and integrity, as well as the trustworthiness and integrity of the messenger, will affect public perception of the communication's content, as well as their compliance with recommended behaviour (Quinn et al, 2013). For example, a study carried out in England, Scotland and Wales found that trust in government authorities, a perception of direct communication and a reduction in confusion early in a pandemic were all correlated with acceptance of influenza vaccination (Rubin et al, 2009). Moreover, a cross-sectional study among the general population in Indonesia revealed that a high level of trust in authoritative information sources was independently correlated with acceptance of the COVID-19 vaccination programme (Wirawan et al, 2021). Therefore, exploring nursing students' trust in their government would be a valuable approach to determining the level of acceptance of vaccination against SARS-CoV-2.

Immunisation campaigns are implemented effectively when vaccine acceptance rates are substantially higher than expected (Malik et al, 2020). To accomplish this, it is important to identify nursing students' health behaviours. Moreover, it is critical to understand their health engagement, attitudes and intentions towards vaccination in general, as well as factors that influence their intention to receive COVID-19 vaccines, as this information can assist educational institutions in developing effective interventions to increase vaccination rates (Jiang et al, 2021). Attitudes towards vaccination and health engagement influence student nurses' willingness to receive vaccination against COVID-19.

This study sought to determine how nursing students' decisions to accept a COVID-19 vaccine were influenced by their attitudes toward vaccination and health engagement. Moreover, the authors examined the relationship between trust

Table 1. Demographics and acceptance of COVID-19 vaccine (*n*=640)

Variables	All participants	Vaccine acceptance	
	n (%)	Mean (*r*)	*P*
Age (years)*	20.38±2.06	0.03	0.506
Sex**			
Male	212 (33.1)	3.71 (1.13)	0.031
Female	428 (66.9)	3.90 (0.93)	
Urbanicity †			
Rural	296 (46.3)	3.82 (1.07)	0.642
Urban	344 (53.8)	3.85 (0.95)	
Religion †			
Islam	413 (64.5)	3.86 (0.96)	0.472
Non-Islam	227 (35.5)	3.80 (1.09)	
Java provinces‡			
East Java	441(68.9)	3.88 (0.98)	0.162
Yogyakarta	73 (11.4)	3.64 (1.17)	
West Java	126 (19.7)	3.80 (0.99)	

Data are presented as the mean ± standard deviation (SD) or frequency and percentage. *P* values were estimated using: *Pearson correlation; † an independent *t*-test, or ‡ one-way ANOVA. *P*<0.05 indicates statistical significance

in the government and acceptance of a COVID-19 vaccination among nursing students in Indonesia.

Methods

Study design and sample

Primary data were collected from nursing students using an online, cross-sectional, multicentre study in three provinces in Java, Indonesia. Respondents were based in both rural and urban areas.

The inclusion criteria were: undergraduate nursing students who were attending online or face-to-face classes in the three provinces of East Java, West Java and Yogyakarta; ability to communicate in Bahasa Indonesia; and being willing to complete the informed consent form. Nursing students confirmed or suspected to have been infected with COVID-19 were excluded.

An a priori sample size was estimated by G★Power analyses using an effect size of 0.10 (Lipsey and Wilson, 1993; Sharma et al, 2021), with an alpha level of 0.05 and power of 0.95, which yielded a sample size of 236.

Considering the estimated dropout rate and to ensure the sample would be large enough, the authors estimated the target was approximately 2.5 times the calculation of nursing students needed for their research. Finally, a total of 640 nursing students consented to participate (*Table 1*).

Data collection

Indonesia was in lockdown during the COVID-19 pandemic when this investigation was carried out, with schools, universities and other institutions using virtual learning. As in previous studies for which respondents were recruited during the pandemic (Rosental and Shmueli, 2021; Sharma et al, 2021),

the authors recruited potential respondents using social media including WhatsApp, Instagram and Facebook. Convenience sampling was used to identify all online groups of nursing students at various universities by contacting a coordinator at each institution. The questionnaire's Google Form link was then sent to the coordinator or group members between 15 December 2020 and 12 January 2021.

The online questionnaire comprised four sections. First, the respondent's intent was identified and their willingness to be vaccinated ascertained. Informed consent was taken by respondents filling out a box to confirm this and by completing the questionnaire for 15 minutes. Participants were free to withdraw at any time.

In the second section, respondents filled out the sociodemographic questionnaire. They then answered a questionnaire about vaccine attitude, health engagement and trust in the government. In the last section, respondents were thanked and asked to forward the online survey link to potential participants.

Ethics
The research and behaviours investigation ethics committee of Institut Ilmu Kesehatan Strada Indonesia gave the study's ethical authorisation (number: 2228/KEPK/XII/2020). Each subject provided written informed consent before participating.

Instruments
A self-administered assessment was chosen as previous research has used this method when examining whether factors such as sex, religion, urbanicity and geographical province influence vaccine COVID-19 acceptance among nursing students (Rosental and Shmueli, 2021; Sharma et al, 2021).

Acceptance of vaccination is a behaviour outcome resulting from a complex decision-making process that can potentially be affected by a wide range of factors (Rosental and Shmueli, 2021; Sharma et al, 2021). The acceptance of vaccination was assessed using a single-item question: 'Do you intend to receive the COVID-19 vaccination?' The answers collected data on the degree of vaccination acceptance using a 5-point Likert scale, with 1 representing not at all likely to 5 representing absolutely. This questionnaire was based on an earlier study (Harapan et al, 2020), which had suggested that a higher score indicated greater acceptance of vaccination.

Respondents were instructed to answer two questions about their attitude towards the vaccine on a 5-point Likert scale, with 1 indicating strong disagreement and 5 indicating strong agreement. These were: 'Vaccination could have serious collateral effects on my own health' and 'I am sure of the vaccine's effectiveness in preventing infectious diseases' (Graffigna et al, 2020).

The authors defined attitude toward vaccines scores as categorical data representing agreement (strongly agree/agree) and disagreement (strongly disagree/disagree/neither agree nor disagree). In this study, the attitude toward vaccines questionnaire translated into Bahasa exhibited an adequate level of content validity index (CVI) of 0.95 according to four experts, including community and educator nurses in Indonesia, and Cronbach's alpha of 0.70.

A revised English version of the health engagement section to assess participants' underlying mental readiness and confidence to participate actively in their own wellness management and risk prevention also indicated levels of knowledge (Graffigna et al, 2020). All respondents were asked to respond to six questions about their health engagement on a 5-point Likert scale, with 1 indicating strong disagreement and 5 indicating strong agreement. Notably, the higher a person's score, the higher their health engagement. Health engagement ratings were generated as categorical data representing agreement (strongly agree/agree) and disagreement (strongly disagree/disagree/neither agree nor disagree). The English version of the health engagement questionnaire was translated into Indonesian for this study, and it had a high level of internal consistency, with a CVI of 0.93 and a Cronbach's coefficient of 0.91.

Finally, participants were asked about their trust in the government, including about it being open with information, honest, competent, committed, caring and interested in protecting people, and the reliability of its information regarding the COVID-19 pandemic. Responses were again on a 5-point Likert scale, where a score of 1 indicated strongly distrust and a score of 5 indicating strongly trust.

Authors defined trust in government regarding vaccine scores as categorical data representing trust (strongly trust/trust) and disagreement (strongly distrust/either trust or distrust, and distrust). This questionnaire was based on an earlier study during an influenza pandemic (Quinn et al, 2009), which suggested that a higher score indicated a greater acceptance of vaccination (*Table 2*).

Data analysis
Participants' demographic data, attitudes towards vaccination, health engagement and trust in governments were compared using descriptive methods. Continuous data were assessed using an independent *t*-test or Pearson correlation.

Multiple linear regression was used to calculate adjusted beta coefficients (adjusted odds ratio) with 95% confidence intervals (CIs) for acceptance of vaccines, which were related to the exposures of interest after adjusting for potential covariate factors such as sex, religion, urbanicity and geographical province.

Multicollinearity concerns a high degree of linear intercorrelation between explanatory variables in a multiple regression model and leads to incorrect results of regression analyses. Multicollinearity was assessed using a variance inflation factor (VIF) of <10 (García et al, 2015). The maximum VIF in this investigation was 2.45, indicating that the data set had a minimal risk of multicollinearity.

All statistical analyses were conducted using IBM SPSS v25, with P=0.05 as the threshold for statistical significance.

Results
Characteristics of respondents
This study enrolled a total of 640 respondents from Java. Their mean age was 20.38 years. The majority (428; 66.9%) were female, and more than half (344; 53.8%) were in urban areas. The religion of most respondents (64.5%) was Islam, and most lived in East Java (68.9%). There were no significant differences

in age, urbanicity, religion and province in terms of vaccine acceptance, but there were significant differences between women and men (*Table 1*).

Specific determining factors for vaccine acceptance are shown in *Table 2*. The mean (standard deviation; SD) of vaccine acceptance was significantly higher ($P<0.001$) in nursing students who agreed with all statements of health engagement (HE) and attitude to vaccine (AVs). Moreover, those with higher acceptance scores also scored more highly for trust in the government (*Table 2*).

Table 3 summarises the findings of the multiple linear regression performed for the adjusted beta-coefficients and 95% CIs of attitude, health engagement and trust in government with vaccine acceptance. All items of attitude and health engagement were the strongest determining factors of the vaccine acceptance score, after adjusting for confounding variables. A further statistical test showed that participants who trusted the government were 0.31 times more likely to accept vaccination than those with no trust in government.

Discussion

Vaccine hesitancy has been a global concern for several decades, and the situation is more difficult with COVID-19 immunisation, owing to the infodemic and confirmation bias around the disease (Dror et al, 2020). The authors set out to investigate the acceptance of the COVID-19 vaccine among nursing students.

This population was selected because nursing students will promote health as future practitioners. There are several ways in which students can be engaged during the COVID-19 pandemic. Students, including nursing students, can educate friends and family members about the necessity of being vaccinated.

In addition, universities can uncover and correct fake claims about COVID-19, such as misinformation about vaccination (Sallam, 2021). Moreover, given the young demographics of social media users, the role of universities on social media platforms is important (Ross and Myers, 2017; Tuells et al, 2021). Since any problems that could affect health engagement need to be identified, it is crucial to evaluate students' baselines for health engagement, trust in the government and attitudes towards vaccination.

Promoting health engagement and trust in the government to commit and provide information based on science, as well as encouraging positive attitudes towards prevention and supporting prevention, should be included in nursing undergraduate programmes.

Studies with the same objective or population are few, which makes finding comparison difficult. As far as the authors are aware that this is the first time that large study using a community-based online research method investigating nursing students' acceptance of the COVID-19 vaccine has been undertaken in the Java provinces in Indonesia.

Health engagement was found to be closely linked to the likelihood of accepting vaccination, and proved to be an effective predictor of whether a person would maintain and improve a favourable attitude towards this (Graffigna et al, 2020). The results of this study were found to align with those of Graffigna

Table 2. Comparisons of respondents' attitudes toward a vaccine, health engagement and trust in government with their acceptance of the COVID-19 vaccine (n=640)

Variables	All participants	Vaccine acceptance	
	n (%)	Mean (r)	P
Health engagement (HE)			
I can manage my own health effectively (HE1)			
Disagree	211 (33.0)	2.98 (0.98)	<0.001
Agree	429 (67.0)	4.26 (0.70)	
I spend a lot of time informing myself about health (HE2)			
Disagree	270 (42.2)	3.19 (1.06)	<0.001
Agree	370 (57.8)	4.31 (0.63)	
I can manage my own health even under stress (HE3)			
Disagree	222 (34.7)	2.97 (0.97)	<0.001
Agree	418 (65.3)	4.30 (0.66)	
I usually share concerns about my own health with my general practitioner (HE4)			
Disagree	242 (37.8)	3.04 (1.01)	<0.001
Agree	398 (62.2)	4.32 (0.63)	
I usually tell my general practitioner about unusual symptoms (HE5)			
Disagree	186 (29.1)	2.98 (1.06)	<0.001
Agree	454 (70.9)	4.19 (0.74)	
It is important to cooperate with healthcare workers in defining how to manage my own health (H6)			
Disagree	189 (29.5)	2.87 (1.02)	<0.001
Agree	451 (70.5)	4.24 (0.67)	
Attitudes towards vaccines (AVs)			
A vaccination could have serious collateral effects on my own health (AVs1)			
Disagree	342 (53.4)	3.37 (1.06)	<0.001
Agree	298 (46.6)	4.37 (0.60)	
I am sure of vaccines' effectiveness in preventing infectious diseases (AV2s)			
Disagree	251 (39.2)	3.13 (1.01)	<0.001
Agree	389 (60.8)	4.30 (0.69)	
Trust in government			
No trust	385 (60.2)	3.56 (1.02)	<0.001
Trust	255 (39.8)	4.25 (0.82)	

Data are summarised as mean ± standard deviation (SD), frequency, and percentage, and *P* values were estimated using an independent t-test; *P*<0.05 indicates statistical significance

et al (2020) and showed that an active level of health engagement and positive attitude are associated with greater vaccine acceptance.

A study by Barello et al (2020) suggested that an in-depth assessment of students' views on accepting vaccinations and health engagement may help planners to devise solutions to deal with many aspects of the problem, including underlying attitudes that impact on views on vaccination acceptance. The results of our study align with those of Barello et al, in that

Table 3. Adjusted beta-coefficients of attitudes, health engagement, trust in government and participants' acceptance of COVID-19 vaccine (n=640)		
Variable	**Unadjusted coefficient β (95% CI)**	**Adjusted coefficient β (95% CI)**
Health engagement (HE)		
I can manage my own health effectively (HE1)		
Disagree	Ref	Ref
Agree	1.29 (1.15~1.42)†	0.27 (0.11~0.43)†
I spend a lot of time informing myself about health (HE2)		
Disagree	Ref	Ref
Agree	1.13 (1.00~1.26)†	0.17 (0.02~0.31)*
I can manage my own health even under stress (HE3)		
Disagree	Ref	Ref
Agree	1.33 (1.21~1.46)†	0.29 (0.12~0.45)†
I usually share concerns about my own health with my general practitioner (HE4)		
Disagree	Ref	Ref
Agree	1.28 (1.15~1.41)†	0.28 (0.12~0.44)†
I usually tell my general practitioner about unusual symptoms (HE5)		
Disagree	Ref	Ref
Agree	1.20 (1.06~1.35)†	0.17 (0.02~0.33)*
It is important to cooperate with healthcare workers in defining how to manage my own health (H6)		
Disagree	Ref	Ref
Agree	1.37 (1.23~1.50)†	0.26 (0.09~0.43)†
Attitudes towards vaccines (AVs)		
A vaccination could have serious collateral effects on my own health (AVs1)		
Disagree	Ref	Ref
Agree	1.01 (0.87~1.14)†	0.29 (0.17~0.41)†
I am sure of vaccines' effectiveness in preventing infectious diseases (AV2s)		
Disagree	Ref	Ref
Agree	1.17 (1.04~1.30)†	0.21 (0.06~0.36)†
Trust in government		
No trust	Ref	Ref
Trust	0.69 (0.54~0.84)†	0.31 (0.20~0.42)†

Adjusted beta-coefficients and 95% confidence intervals (CIs) were estimated using a multiple linear regression after adjusting for gender, age, geographical provinces and urbanicity. * $P<0.05$; † $P<0.001$.

they also showed that health engagement was significantly correlated with vaccination acceptance.

Current research on COVID-19 vaccine preferences suggests that vaccine safety and efficacy rather than attitudes toward vaccination are the primary predictors among Jordan's citizens (El-Elimat et al, 2021). Another study undertaken in Jordan reported vaccine hesitancy rates of 56.5%, 76.6% and 76.0% in university health students, science students and humanities students respectively, which could imply negative attitudes towards vaccination (Sallam, 2021). The reason for the differences in vaccine hesitancy may be related to the differences in knowledge about the disease among the three student groups (Sallam, 2021).

In line with the present study, the findings of Sallam (2021) can be used as a basis to advocate for the role of university students in health schools, particularly nursing students, in promoting positive attitudes and encouraging acceptance of vaccination. The results of the present study show a positive correlation between a negative attitude towards vaccines and low acceptance of vaccines among university nursing students in Indonesia. Consequently, an individual's health engagement and attitudes are fundamental to their psychological readiness to consider being vaccinated as part of a vaccination programme. As a result, it is important to analyse both individual health engagement and attitudes toward vaccination to understand how health behaviour influences the effectiveness of immunisation services in clinical and community settings.

Trust is a critical component of risk management because it has the potential to influence whether the public perceives something as positive or negative, and hence it indirectly affects the acceptance of policies (van der Weerd et al, 2011). Trust is a necessary but variable component of successful COVID-19 vaccination uptake, and trust in information from the government is connected significantly with vaccine adoption and ensuring that the steps suggested are followed (Lazarus et al, 2021). This is important, given that there is considerable evidence that trust in government authorities plays a role in vaccine decision-making. Moreover, individuals who have a high level of trust in their government are more likely to accept proposed measures than those with less trust (Siegrist and Zingg, 2014).

The results of the present study are aligned with the findings of Siegrist and Zingg (2014), which also showed that high levels of trust in government indicated higher vaccine acceptance. Lessons learnt in previous contagious disease outbreaks and global healthcare emergencies emphasise the critical role of credible information sources and guidance on disease containment from governments to improve trust in them (Siegrist and Zingg, 2014).

However, overcoming vaccination hesitancy entails more than simply establishing trust. It is a multifaceted, complicated and context-sensitive undertaking that must be tackled concurrently at worldwide, regional and national levels (Siegrist and Zingg, 2014; Lazarus et al, 2021).

Epidemiological research among medical students in India showed that a lack of trust in government authorities discouraged people from engaging in vaccine trials (Wilpstra, 2020). Consequently, an effective strategy to overcome this or to

develop trust in governments could be important to increase willingness to be vaccinated.

Strength and limitations

A strength of this study is that it was conducted as multicentre survey. It is one of the few studies to examine the effects of health engagement and attitudes towards vaccination on COVID-19 vaccine acceptance, an issue that has become increasingly important as the vaccine has been disseminated to the public.

This study is also relevant because previous research on COVID-19, government trust and vaccination adoption tended to collect data early in the pandemic. The present study, conducted in December 2020, highlights more social policy challenges.

A limitation is that the data were gathered via social media, which could have added bias as a result of the absence of certain target populations. Another limitation is that comments submitted through Google's web forms cannot be monitored for internet protocol addresses (Sharma and Tikka, 2020). However, similar surveys have previously been conducted during the COVID-19 pandemic (Rias et al, 2020; Lazarus et al, 2021; Rosental and Shmueli, 2021; Wirawan et al, 2021) because engaging with participants face to face as part of a population survey was impossible because of social distancing requirements.

KEY POINTS

- Nursing students' acceptance of COVID-19 vaccination should be a concern
- The primary hurdles to COVID-19 vaccine uptake are poor health engagement and attitudes towards vaccination
- Positive attitudes to vaccination, high levels of health engagement and trust in the government are associated with vaccine acceptance
- Trust in the government was the most commonest reason for people accepting COVID-19 vaccination

The present study surveyed a student population from three provinces in Java and focused exclusively on nursing students, which may limit the generalisability of the findings. Respondents could have been adversely affected by media coverage of the COVID-19 vaccine, given that the issue of the pandemic has not been integrated into academic curricula.

Furthermore, even though this study adjusted for a considerable number of potential confounding factors, respondents' year and semester of study were not collected. However, the authors used linear logistic regression analysis to make predictions for potentially confounding factors applicable to a large group of nursing students, thus avoiding the effect of an unequal distribution.

CPD reflective questions

- What factors might contribute to COVID-19 vaccination acceptance among nursing students?
- How might trust in government affect COVID-19 vaccination acceptance?
- Do you think encouraging positive attitudes towards vaccination and health engagement should be implemented in nursing undergraduate programmes?

Conclusions

To the authors' knowledge, this is the first study to examine vaccination acceptance among undergraduate nursing students in Java, Indonesia, using an online multicentre survey. The study demonstrated that the primary hurdles to COVID-19 vaccine uptake were poor health engagement and misinformed attitudes towards vaccination. Trust in the government was the most commonly cited influence on belief regarding the safety and effectiveness of COVID-19 and vaccination. A lack of trust in government statements contributed to vaccine hesitancy, along with the unregulated spread of fake news and misinformation eventually resulting in an infodemic. **BJN**

Barello S, Nania T, Dellafiore F, Graffigna G, Caruso R. 'Vaccine hesitancy' among university students in Italy during the COVID-19 pandemic. Eur J Epidemiol. 2020;35(8):781–783. https://doi.org/10.1007/s10654-020-00670-z

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. https://doi.org/10.1007/s10654-020-00671-y

El-Elimat T, AbuAlSamen MM, Almomani BA, Al-Sawalha NA, Alali FQ. Acceptance and attitudes toward COVID-19 vaccines: a cross-sectional study from Jordan. PLoS One. 2021;16(4):e0250555. https://doi.org/10.1371/journal.pone.0250555

García CB, García J, López Martín MM, Salmerón R. Collinearity: revisiting the variance inflation factor in ridge regression. J Appl Stat. 2015;42(3):648–661. https://doi.org/10.1080/02664763.2014.980789

Graffigna G, Palamenghi L, Boccia S, Barello S. Relationship between citizens' health engagement and intention to take the COVID-19 vaccine in Italy: a mediation analysis. Vaccines (Basel). 2020;8(4):576. https://doi.org/10.3390/vaccines8040576

Harapan H, Wagner AL, Yufika A et al. Acceptance of a COVID-19 vaccine in Southeast Asia: a cross-sectional study in Indonesia. Front Public Health. 2020;8:381. https://doi.org/10.3389/fpubh.2020.00381

Hu D, Martin C, Dredze M, Broniatowski DA. Chinese social media suggest decreased vaccine acceptance in China: an observational study on Weibo following the 2018 Changchun Changsheng vaccine incident. Vaccine. 2020;38(13):2764–2770. https://doi.org/10.1016/j.vaccine.2020.02.027

Izzati AN, Indarwati R, Makhfudli M et al. Pro-and anti-vaccination among mothers in deciding children's immunization: a qualitative study. Open Access Maced J Med Sci. 2020;9(B):385–391. https://doi.org/10.3889/oamjms.2021.6113

Jiang N, Wei B, Lin H, Wang Y, Chai S, Liu W. Nursing students' attitudes, knowledge and willingness of to receive the coronavirus disease vaccine: a cross-sectional study. Nurse Educ Pract. 2021;55:103148. https://doi.org/10.1016/j.nepr.2021.103148

Kwok KO, Li KK, Wei WI, Tang A, Wong SYS, Lee SS. Editor's choice: influenza vaccine uptake, COVID-19 vaccination intention and vaccine hesitancy among nurses: a survey. Int J Nurs Stud. 2021;114:103854. https://doi.org/10.1016/j.ijnurstu.2020.103854

Lazarus JV, Ratzan SC, Palayew A et al. A global survey of potential acceptance of a COVID-19 vaccine. Nat Med. 2021;27(2):225–228. https://doi.

org/10.1038/s41591-020-1124-9. (Lazarus JV, Ratzan SC, Palayew A et al. Author Correction: A global survey of potential acceptance of a COVID-19 vaccine. Nat Med. 2021;27(2):354. https://doi.org/10.1038/s41591-020-01226-0

Lipsey MW, Wilson DB. The efficacy of psychological, educational, and behavioral treatment: confirmation from meta-analysis. Am Psychol. 1993;48(12):1181–1209. https://doi.org/10.1037/0003-066X.48.12.1181

Malik AA, McFadden SM, Elharake J, Omer SB. Determinants of COVID-19 vaccine acceptance in the US. EClinicalMedicine. 2020;26:100495. https://doi.org/10.1016/j.eclinm.2020.100495

Muslih M, Susanti HD, Rias YA, Chung MH. Knowledge, attitude, and practice of Indonesian residents toward COVID-19: a cross-sectional survey. Int J Environ Res Public Health. 2021;18(9):4473. https://doi.org/10.3390/ijerph18094473

Patelarou E, Galanis P, Mechili EA et al. Factors influencing nursing students' intention to accept COVID-19 vaccination: A pooled analysis of seven European countries. Nurse Educ Today. 2021;104:105010. https://doi.org/10.1016/j.nedt.2021.105010

Quinn SC, Kumar S, Freimuth VS, Kidwell K, Musa D. Public willingness to take a vaccine or drug under emergency use authorization during the 2009 H1N1 pandemic. Biosecur Bioterror. 2009;7(3):275–290. https://doi.org/10.1089/bsp.2009.0041

Quinn SC, Parmer J, Freimuth VS, Hilyard KM, Musa D, Kim KH. Exploring communication, trust in government, and vaccination intention later in the 2009 H1N1 pandemic: results of a national survey. Biosecur Bioterror. 2013;11(2):96–106. https://doi.org/10.1089/bsp.2012.0048

Rias YA, Rosyad YS, Chipojola R et al. Effects of spirituality, knowledge, attitudes, and practices toward anxiety regarding COVID-19 among the general population in Indonesia: a cross-sectional study. J Clin Med. 2020;9(12):3798. https://doi.org/10.3390/jcm9123798

Rosental H, Shmueli L. Integrating health behavior theories to predict COVID-19 vaccine acceptance: differences between medical students and nursing students. Vaccines (Basel). 2021;9(7):783. https://doi.org/10.3390/vaccines9070783

Ross JG, Myers SM. The current use of social media in undergraduate nursing education. A review of the literature. Comput Inform Nurs. 2017;35(7):338–344. https://doi.org/10.1097/CIN.0000000000000342

Rubin GJ, Amlôt R, Page L, Wessely S. Public perceptions, anxiety, and behaviour change in relation to the swine flu outbreak: cross sectional telephone survey. BMJ. 2009;339:b2651. https://doi.org/10.1136/bmj.b2651

Sallam M. COVID-19 vaccine hesitancy worldwide: a concise systematic review of vaccine acceptance rates. vaccines (Basel). 2021;9(2):160. https://doi.org/10.3390/vaccines9020160

Sallam M, Dababseh D, Eid H et al. Low COVID-19 vaccine acceptance is correlated with conspiracy beliefs among university students in Jordan. Int J Environ Res Public Health. 2021;18(5):2407. https://doi.org/10.3390/ijerph18052407

Sharma R, Tikka SK. COVID-19 online surveys need to follow standards and guidelines: comment on 'Does COVID-19 pandemic affect sexual behaviour? A cross-sectional, cross-national online survey' and 'Binge watching behavior during COVID 19 pandemic: a cross-sectional, cross-national online survey'. Psychiatry Res. 2020;290:113173. https://doi.org/10.1016/j.psychres.2020.113173

Sharma M, Davis RE, Wilkerson AH. COVID-19 vaccine acceptance among college students: a theory-based analysis. Int J Environ Res Public Health. 2021;18(9):4617. https://doi.org/10.3390/ijerph18094617

Siegrist M, Zingg A. The role of public trust during pandemics. Eur Psychol. 2014;19(1):23–32. https://doi.org/10.1027/1016-9040/a000169

Suwantika AA, Boersma C, Postma MJ. The potential impact of COVID-19 pandemic on the immunization performance in Indonesia. Expert Rev Vaccines. 2020;19(8):687–690. https://doi.org/10.1080/14760584.2020.1800461

Tuells J, Egoavil CM, Morales-Moreno I, Fortes-Montoya E, Salazar-García C, Rodríguez-Blanco N. Knowledge, attitudes, and sources of information on vaccines in Spanish nursing students: a cross-sectional study. Int J Environ Res Public Health. 2021;18(7):3356. https://doi.org/10.3390/ijerph18073356

van der Weerd W, Timmermans DRM, Beaujean DJMA, Oudhoff J, van Steenbergen JE. Monitoring the level of government trust, risk perception and intention of the general public to adopt protective measures during the influenza A (H1N1) pandemic in the Netherlands. BMC Public Health. 2011;11(1):575. https://doi.org/10.1186/1471-2458-11-575

Wilpstra C. Vaccine knowledge and vaccine attitudes of undergraduate nursing students. Doctoral dissertation submitted to University of Windsor, Canada, 2020. https://scholar.uwindsor.ca/etd/8491 (accessed 20 April 2022)

Wirawan GBS, Mahardani PNTY, Cahyani MRK, Laksmi NLPSP, Januraga PP. Conspiracy beliefs and trust as determinants of COVID-19 vaccine acceptance in Bali, Indonesia: cross-sectional study. Pers Individ Dif. 2021;180:110995. https://doi.org/10.1016/j.paid.2021.110995

World Health Organization. WHO coronavirus disease (COVID-19) dashboard. 2022. https://tinyurl.com/49cfzbve (accessed 20 April 2022)