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# Willingness to receive COVID-19 vaccine in relation to psychological wellbeing among a sample of university students in Vietnam

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## Abstract

**Background and aims** Nowadays, there are contradicting opinions about the benefits and risks of COVID-19 vaccine, which lead to the hesitance among recipients to receive the vaccine. This study aims to evaluate the university student's attitude toward COVID-19 vaccine, preventative measure, and status of their psychological wellbeing.

**Methods** This was a cross-sectional study among Vietnamese students aged  $\geq 18$  years to evaluate their willingness to receive COVID-19 vaccine, psychological wellbeing status, and preventive measure compliance. The participants were asked to fill in a questionnaire via Google Form. Descriptive and analytical statistics were performed with  $p < 0.05$  being considered as statistically significant.

**Results** A total of 2998 randomly selected participants in Vietnam completed the questionnaire with participants' mean age of  $20.26 \pm 1.84$ . The mean score for the willingness to receive COVID-19 vaccination was  $46.13 \pm 19.03$  (the highest point was 54). Regarding preventative measures, the mean score of compliance was  $7.15 \pm 1.98$  over a 10 points scale and "being vaccinated or not" did not affect their compliance. 56.94% participants were having normal psychological wellbeing at the time of survey and rest 43.06% reported to have experienced stress, varying from slight to severe level. There might be a trend that those studying medicine or those with higher educational level had higher rate of stress than others.

**Conclusion** The study showed a positive result of Vietnamese students' willingness to receive COVID-19 vaccine and compliance towards preventive measures. Besides, we also reported that almost half participants had experienced stress during the pandemic. Developing proper interventions to deal with factors contributing to psychological wellbeing and related problems are essential to deal with and overcome the pandemic or post-pandemic struggles.

**Keywords** COVID-19, COVID-19 vaccination, Prevention measures, Psychological wellbeing, Vietnam

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## Introduction

Since late 2019, severe acute respiratory syndrome-CoV-2, commonly known as COVID-19, has become a pandemic and has affected more than 600 million people worldwide with the mortality rate of approximately 1%, imposing a huge burden on the public health systems worldwide (until October 2022) [1]. According to the World Health Organization (WHO), as on the 17th of October 2021 (at the time of our study), there were over 240 million cases with 4.8 million deaths globally [2]. Meanwhile, in Vietnam, the 4th wave of COVID-19, incident cases skyrocketed with the Delta variant, causing case overload and a huge public health crisis in Vietnam [3]. Currently, new cases of COVID-19 have decreased substantially in Vietnam to less than a few hundred per day, with almost no deaths reported. However, at the study time point, Vietnam was experiencing the peak of the 4th COVID-19 wave; additionally, the COVID-19 vaccine was being distributed to Vietnam in limited quantities with different varieties such as mRNA vaccine (Pfizer BioNTech, Moderna) and vector vaccine (Astra-Zeneca) among others. Vaccination against COVID-19 has been proven to have high efficacy, of up to at least 80% [4], and vaccination has been the key strategy to reduce the hazards of COVID-19.

Meanwhile, many people show hesitancy to get vaccinated because of potential side effects, differential preferences, and presumptions regarding vaccine efficacy [5]. Reality has proven that the decision of Vietnam's government to promote a nationwide vaccination campaign to reduce the number of cases and deaths was precise. However, the acceptance rate of COVID-19 vaccination among citizens would decide the success or failure of this campaign. Having an insight picture of people's worries will be a good guideline for the Vietnamese government to accelerate the vaccination campaigns [6]. Particularly, the student is a group that requires more attention. Students are a vital part of the country's educational system and youth population. Their attitudes and behaviors towards vaccination can significantly influence the overall vaccination rates and the success of public health efforts. By measuring their willingness to receive the COVID-19 vaccine, we can understand their concerns, beliefs, and preferences. Furthermore, focusing on prevention measures for Vietnamese students was considered a contemporary prevention strategy while waiting for global vaccine distribution.

Besides, the correlation of psychological wellbeing with COVID-19 in pandemic and post-pandemic era has been found to be distinctive among each age group by previous studies [7, 8]. Importantly, this relationship becomes more severe among people having poor physical or mental conditions. However, among university students,

the relation between mental effects of COVID-19 was reported to be statistically non-significant. Another study among university students in the USA showed that approximately 50% of students had to experience moderate to severe depression, with greater chances of eating disorders and alcohol use disorder due to COVID-19 pandemic and lower chance of positively overcoming this extreme situation and approximately 20% of them have ever thought about suicide [9]. Thus, understanding the attitude and mental condition among this vulnerable group is necessary for timely interventions by the governments and other stakeholders to avoid unfortunate consequences.

Against this backdrop, this study aims at investigating the willingness to receive COVID-19 vaccines by university students in Vietnam, their compliance of prevention measures as well as their status of psychological wellbeing. Furthermore, this examination also entails towards studying the factors that affect psychological wellbeing issues among college students in Vietnam.

## Methods

### Research design

Cross-sectional descriptive.

### Time and place

The study was conducted in Vietnam from October 24, 2021, to November 12, 2021.

### Sample size

This study was carried out using the convenience sampling method. Corresponding to each interested issue: vaccine acceptance [10], prevention measures [11], and psychological wellbeing status [12], we calculated the sample size based on results from previous studies and then chose the biggest one according to sample size formula for one ratio (1) or using one average formula (2):

$$n = Z_{(1-\frac{\alpha}{2})}^2 \frac{p(1-p)}{d^2} \quad (1)$$

$$n = Z_{(1-\frac{\alpha}{2})}^2 \frac{s^2}{\bar{X}.d^2} \quad (2)$$

where  $n$  is the sample size;  $Z_{1-\alpha/2}=1.96$  for 95% confidence interval;  $d$  is the desired deviation compared to  $p$ , here choose  $d=0.03$  and  $z$  score = 2.17;  $p$  is the estimated percent of previous study [12];  $s$  is the estimated standard deviation, and  $\bar{X}$  is the estimated average from previous studies [10, 11]. Thus, the minimum sample size for this study was estimated at 1500.

### Inclusion criteria

The inclusion criteria in this study are the university students, including undergraduate or postgraduate students. The respondents were at least 18 years old, living in Vietnam.

### Exclusion criteria

Subjects who did not agree to participate in this study were excluded.

### Data collection

Due to quarantine requirements, data were collected through Google Forms. The survey link was posted on popular Internet platforms (Facebook, Twitter, Instagram, Zalo, and others). Respondents' participation was totally spontaneous via actively accessing the survey link, and they did not receive any benefits while taking part in the survey. Respondents were asked for an informed consent before filling out all questions in the questionnaire, which was composed of 3 primary outcomes.

#### a. Willingness to receive the COVID-19 vaccine

The Motors of COVID-19 Vaccination Acceptance Scale (MoVac-COVID19S), which has nine items, was used to assess people's willingness to get COVID-19 vaccinations [10]. A seven-point Likert scale, ranging from 1 for "strongly disagree" to 7 for "strongly agree," was used to produce the MoVac-COVID19S. A higher MoVac-COVID19S score denotes a greater level of COVID-19 vaccine acceptability [10].

#### b. Psychological wellbeing

Prior to and following immunization, we compared the psychological wellbeing of college students using the Brief Symptom Rating Scale (BSRS-5) [13]. It has five questions that help determine the following (i) insomnia, (ii) feeling bad or stressed, (iii) feeling irritable or angry, (iv) feeling depressed or vulnerable with low interest, and (v) feeling inferior to others. A five-point Likert scale was used to evaluate each response (0 = not at all, 1 = a little, 2 = normal, 3 = quite a lot, and 4 = a lot) [13].

#### c. Measures to prevent epidemics

The Preventive COVID-19 Infection Behaviors Scale (PCIBS), which consists of five items, was used to assess preventive measures [11]. These include (i) avoiding big gatherings, (ii) keeping your house clean and organized, (iii) washing your hands frequently, and (iv) wearing a mask whenever feasible. For this study, there were two PCIBS choices available: (i) No and (ii) Yes [11].

### Statistical analysis

Descriptive statistics were used to analyze the characteristics of research subjects. Chi-square test was used to test the difference in characteristics between males and females, as well as the psychological wellbeing status of vaccinated and non-vaccinated subjects. Wilcoxon test and one-way ANOVA tests were used to compare the mean of MoVac-COVID19S and PCIBS indices between groups of subjects and to describe the related factors. The difference was considered statistically significant with  $p < 0.05$ .

## Results

### Characteristics of studied subjects

In this study, a total of 2998 participants completed the questionnaire. The mean age of the participants was  $20.26 \pm 1.84$ , and 2097 participants were females accounting for 69.95% of all respondents (Table 1). Among the respondents, 65.98% of participants had a major learning related to medicine, and 34.02% studied fields not related to medicine. Regarding the percentage of people who have been vaccinated, up to 95.03% confirmed that they had been vaccinated and 4.97% were not vaccinated. There were statistically significant differences in degree, field of study, vaccine dose, and vaccine brand between males and females according to Chi-squared test (Table 1).

### Willingness of COVID-19 vaccination among students and its related factors in Vietnam

Participants were examined regarding their knowledge of the benefits of vaccines through 9 questions in the questionnaire, in which each question was rated on a 1–7 scale of agreement. The mean score of total participants was 46.13, and the difference in mean score of MOVAC scale was statistically significant ( $p = 0.029$ ) between males (46.72) and females (45.87) (Table 2). The question with the highest average score ( $5.27 \pm 2.24$ ) was question number 6 "The COVID-19 jab plays an important role in protecting my life and that of others", in which the mean score of females and males were  $5.24 \pm 2.24$  and  $5.33 \pm 2.23$ , respectively. Question number 8 had the lowest score "I can choose whether to get a COVID-19 jab or not" with an average score of  $4.67 \pm 2.2$ , (males,  $4.73 \pm 2.27$ ; females,  $4.65 \pm 2.17$ ). The mean score among male students ( $5.32 \pm 2.25$ ) was higher than that of females ( $5.22 \pm 2.24$ ) with statistically significant difference ( $p = 0.042$ ). Particularly, males and females had considerable difference in the scores of questions 1, 2, 5, and 7, which were all related to knowledge about the preventable benefits of vaccine from COVID-19 ( $p < 0.05$ ) (Table 2).

**Table 1** Characteristics of study subjects

Characteristics of study subject (n = 2998)		Female (n = 2097)		Male (n = 901)		Total (n = 2998)		P value (chi square test)
		N	%	N	%	N	%	
<b>Age (mean (SD))</b>		20.13 (mean)	1.74 (SD)	20.56 (mean)	2.01 (SD)	20.26 (mean)	1.84 (SD)	<b>(Wilcoxon test)</b>
<b>Degree</b>								
	Undergraduate	2085	99.43%	890	98.78%	2975	99.23%	<b>0.019</b>
	Master	12	0.57%	8	0.89%	20	0.67%	
	Doctoral	0	0.00%	3	0.33%	3	0.10%	
<b>Residence</b>								0.100
	School dormitory	219	10.44%	114	12.65%	333	11.11%	
	Rent a house outside	742	35.38%	331	36.74%	1073	35.79%	
	Live with family	1136	54.17%	456	50.61%	1592	53.10%	<b>0.000</b>
<b>Field of study</b>								
	Non-medical	669	31.90%	351	38.96%	1020	34.02%	
	Medical	1428	68.10%	550	61.04%	1978	65.98%	0.823
<b>Being vaccinated</b>								
	No	103	4.91%	46	5.11%	149	4.97%	
	Yes	1994	95.09%	855	94.89%	2849	95.03%	<b>0.021</b>
<b>Vaccine brand</b>								
	Oxford/AstraZeneca COVID-19 vaccine	1200	60.18%	555	64.91%	1755	61.60%	
	Moderna COVID-19 vaccine	118	5.92%	59	6.90%	177	6.21%	
	Pfizer-BioNTech COVID-19 vaccine	218	10.93%	89	10.41%	307	10.78%	
	Sinovac (CoronaVac)	80	4.01%	26	3.04%	106	3.72%	
	Sinopharm (Verocell)	306	15.35%	96	11.23%	402	14.11%	
	Sputnik V	32	1.60%	11	1.29%	43	1.51%	
	Combine	24	1.20%	17	1.99%	41	1.44%	
	Others	9	0.45%	1	0.12%	10	0.35%	
	Don't know	7	0.35%	1	0.12%	8	0.28%	<b>0.000</b>
<b>Vaccine dose</b>								
	1st dose	1125	56.42%	412	48.19%	1537	53.95%	
	2nd dose	869	43.58%	443	51.81%	1312	46.05%	

**Table 2** The willingness of COVID-19 vaccination among undergraduate students in Vietnam

No	Items	Female (n = 2097)		Male (n = 901)		Total (n = 2998)		Wilcoxon test (p value)
		Mean	SD	Mean	SD	Mean	SD	
1	Vaccination is a very effective way to protect me against the COVID-19	5.22	2.24	5.32	2.25	5.25	2.24	<b>0.042</b>
2	I know very well how vaccination protects me from the COVID-19	5.14	2.19	5.28	2.20	5.18	2.20	<b>0.005</b>
3	It is important that I get the COVID-19 jab	5.22	2.23	5.32	2.22	5.25	2.23	0.084
4	Vaccination greatly reduces my risk of catching the COVID-19	5.18	2.23	5.27	2.23	5.20	2.23	0.153
5	I understand how the COVID-19 jab helps my body fight the COVID-19 virus	5.08	2.14	5.22	2.19	5.12	2.16	<b>0.003</b>
6	The COVID-19 jab plays an important role in protecting my life and that of others	5.24	2.24	5.33	2.23	5.27	2.24	0.112
7	The contribution of the COVID-19 jab to my health and well-being is very important	5.17	2.21	5.26	2.23	5.20	2.21	<b>0.035</b>
8	I can choose whether to get a COVID-19 jab or not	4.65	2.17	4.73	2.27	4.67	2.20	0.050
9	Getting the COVID-19 jab has a positive influence on my health	4.97	2.16	5.00	2.25	4.97	2.19	0.116
<b>Total</b>		45.87	18.96	46.72	19.16	46.13	19.03	<b>0.029</b>

SD Standard Deviation

**Table 3** Factors related to the willingness to COVID-19 vaccination among undergraduate students

	Factors	Mean	SD	ANOVA ( <i>p</i> value)
<b>Gender</b>	Female	45.87	18.96	0.261
	Male	46.72	19.16	
<b>Degree</b>	Undergraduate	46.05	19.06	<b>0.025</b>
	Master	57.65	8.06	
	Doctoral	47.33	16.26	
<b>Residence</b>	School dormitory	45.63	18.58	0.368
	Rent a house outside	45.60	19.31	
	Live with family	46.59	18.92	
<b>Field of study</b>	Non-medical	46.08	18.52	0.928
	Medical	46.15	19.28	
<b>Being vaccinated</b>	No	43.87	19.19	0.138
	Yes	46.24	19.01	
<b>Vaccine brand</b>	Oxford/AstraZeneca COVID-19 vaccine	46.56	18.78	0.372
	Moderna COVID-19 vaccine	47.12	19.67	
	Pfizer-BioNTech COVID-19 vaccine	45.59	19.48	
	Sinovac (CoronaVac)	41.43	21.70	
	Sinopharm (Verocell)	45.95	19.05	
	Sputnik V	46.60	17.39	
	Combine	48.34	16.84	
	Others	46.90	17.26	
	Don't know	47.25	16.51	
<b>Vaccine dose</b>	1st dose	45.84	18.74	0.215
	2nd dose	46.72	19.32	

SD Standard Deviation

Regarding associated factors, the results show that the respondents pursuing a master's degree, with a mean score of  $57.65 \pm 8.06$  had a statistically higher willingness to vaccinate than undergraduate and PhD students, with mean scores of  $46.05 \pm 19.06$  and  $47.33 \pm 16.26$ , respectively ( $p = 0.025$ ). All remaining factors including gender, residence, field of study, vaccinated status, vaccine brand, and dose did not affect the participants' willingness to vaccinate (Table 3).

#### Compliance with prevention measures among undergraduate students in Vietnam and its related factors

The difference in epidemic prevention measures of vaccinated and non-vaccinated participants was evaluated via 5 questions on a scale of 0–2 for each question. The average of total score of the vaccinated group was  $7.21 \pm 2.0$  while this figure for the non-vaccinated group was  $6.3 \pm 1.3$ . Particularly, the question with the highest score was

**Table 4** Difference in the compliance with prevention measures among undergraduate students in Vietnam

No	Items	Vaccinated		Non-vaccinated		Total		Wilcoxon test ( <i>p</i> value)
		Mean	SD	Mean	SD	Mean	SD	
1	Avoiding crowds as much as you can	1.13	0.40	1.13	0.35	1.13	0.40	0.806
2	Keeping your house ventilated	1.51	0.58	1.49	0.53	1.51	0.58	0.457
3	Sanitizing and cleaning your house	1.59	0.53	1.57	0.54	1.59	0.53	0.550
4	Washing your hands as much as you can	1.31	0.58	1.28	0.56	1.31	0.58	0.476
5	Wearing a face mask as much as you can	1.20	0.48	1.15	0.46	1.20	0.48	0.162
<b>Total</b>		7.21	2.00	6.13	1.25	7.15	1.98	0.098

SD Standard Deviation

question 3 “Sanitizing and cleaning your house” with an average score of  $1.59 \pm 0.53$ , in which, the mean score of the vaccinated and non-vaccinated group was  $1.59 \pm 0.53$  and  $1.57 \pm 0.54$ , respectively (Table 4). However, the difference between vaccinated and non-vaccinated groups was statistically not significant.

Based on the PCIBS questionnaire consisting of 5 questions with the highest value of total points as 10, our study showed that the mean score of the male group was  $7.24 \pm 1.90$ , while the mean score of the female group was  $7.10 \pm 2.02$  (Table S1). Besides, medical students had a mean score of  $7.21 \pm 2.04$ , while non-medicine related students mean score was  $6.93 \pm 1.75$ . Regarding the status of COVID-19 vaccination, participants who had been vaccinated had a mean score of  $7.21 \pm 2.00$ , while those who had not been vaccinated had a mean score of  $6.13 \pm 1.25$ . Since difference between groups was not statistically significant, no factors related to the compliance with prevention measures were found.

#### Psychological wellbeing status of students during COVID-19 pandemic and its related factors

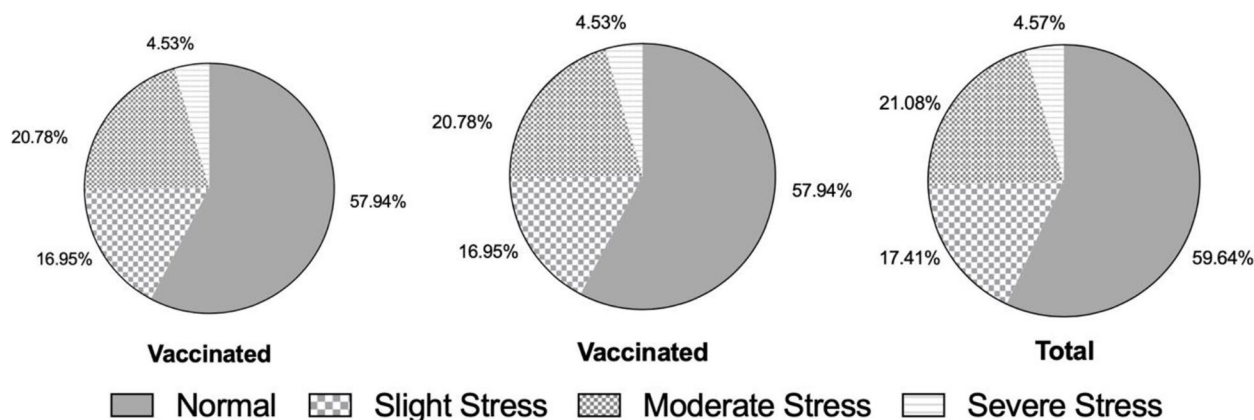
The status of psychological wellbeing was calculated based on five symptoms: (1) difficulty sleeping, (2) stress or depression, (3) easily irritable or angry, (4) feeling depressed or easily lethargic, and (5) feeling inferior to others. Among all respondents, 56.94% people had normal psychological wellbeing status, while slight stress, moderated stress, and severe stress were reported by 17.41%, 21.08%, and 4.57% of the respondents, respectively (Fig. 1). There was statistically significant difference in psychological wellbeing status between vaccinated and non-vaccinated groups ( $p < 0.001$ ), particularly, the rate of stress among participants who had not received COVID-19 vaccine was higher than among

the vaccinated. The proportion of normal, slight, moderate and severe stress among vaccinated group was 57.74%, 16.95%, 20.78%, and 4.53%, respectively. Meanwhile, 41.61% of non-vaccinated people had normal psychological wellbeing, 26.17% had mild depression, 26.85% had moderate levels of depression, and only 5.37% people were suffering from severe depression. Gender, literacy, field of study, and vaccination status were factors that were determined to be associated with the severity of stress levels among participants with  $p < 0.05$  (Table S2).

Regarding gender, females reported to have experienced higher levels of stress than males. Regarding educational level, there might be a trend that higher the literacy level of respondent, more the stress level reported by the respondent. According to our study, 17.41% of undergraduates and 20% of master's level students felt slight stress, while 25% of doctoral students felt stressed and up to 66.67% of master's students experienced severe level of stress. Our study also showed that students with major field related to medicine had a higher rate of stress than those learning non-medicine related fields. Finally, in terms of vaccination status, the unvaccinated participants had higher stress levels than the vaccinated respondents. Specifically, 5.37% of non-vaccinated respondents felt severe stress, 26.85% felt moderate stress, and 26.17% felt slight stress (Table S2).

#### Discussion

This survey was conducted from October to November of 2021, which was coincident with the initiation of the COVID-19 vaccine mass distribution in Vietnam. As a result, almost all the participants (95.03%) have already had the COVID-19 vaccine. In this study, number of



**Fig. 1** Difference in mental health status between vaccinated and non-vaccinated students. \*The difference in the proportion of mental health status was statistically significant with  $p = 0.001$  (chi-square test)



medical students (1978) was almost twice as that of non-medicine related students (1020), which could be due to the fact that medical students were the prioritized group that assisted healthcare workers in treating COVID-19 patients [14]. To quickly control the pandemic domestically, the Vietnamese Government imported vaccines from different countries such as the UK (Oxford/AstraZeneca), the USA (Moderna and Pfizer-BioNTech), China (CoronaVac and Verocell), and Russia (Sputnik V). In Table 1, it was shown that AstraZeneca contributed the most among the vaccine brand used (61.01%), because it was the first COVID-19 vaccine distributed in Vietnam. The number of students who got only the first dose (53.95%) and who already got two doses (46.05%) of the vaccine was somewhat evenly distributed.

Based on the MoVac-COVID-19S model, the factors related to the students' willingness to receive COVID-19 vaccine could be divided in four categories: *impact* (items 1, 4, and 9), *knowledge* (items 2 and 5), *values* (items 3, 6, and 7), and *autonomy* (item 8) [10]. Generally, students in Vietnam understood that COVID-19 vaccine had a high impact on protecting them from COVID-19 (item 1). However, compared to a similar study in mainland China, the total mean score of Vietnam was 5.25, lower than the total score in China (5.76). This was also shown in item 7, where the mean scores, which explained the value of COVID-19 vaccines, were lower in Vietnam (5.20) than in China (5.88), accordingly [10, 15]. Vietnamese students also have a good knowledge that taking the COVID-19 jab would help them protect and fight the virus (items 2 and 5). Nevertheless, the mean score was relatively lower than students from Taiwan, Indonesia, and Malaysia [16]. One of the main reasons of lower score in Vietnam might be that Vietnam had late access to the COVID-19 vaccine than China, Taiwan, Indonesia, and Malaysia. Therefore, university students, especially non-medicine ones, were not yet familiarized with the impact and value of the COVID-19 vaccine.

Interestingly, among the Vietnamese university students, the mean scores of male students were higher than female students (items 1, 2, 5, 7). Zintel and colleagues also mentioned a lower COVID-19 vaccination uptake among females than males, based on the data collected in different countries, which was explained by authors on the basis of higher number of male healthcare providers than female ones in the study [17]. The finding by Zintel and colleagues [17] correlated with our study in that more male students were medical students in our study group. Hence, they needed to take the COVID-19 jabs to assist healthcare workers in caring for COVID-19 patients.

Among factors related to university students' acceptance of COVID-19 vaccination, the most notable factor

was relationship between education level and the willingness to receive the COVID-19 vaccine. As indicated in our results, the percentage of master's and Ph.D. students, who received the vaccine, was higher than undergraduate students. This finding was in line with another research focusing Vietnamese students by Pham and colleagues [18]. In another study by Malik et al. in the context of USA, it was noted that the acceptance rate among graduate/professional students was higher than college students, 79% and 72%, respectively [19]. This indicated that the level of education was strongly correlated with the acceptance of the COVID-19 vaccine [20]. Masters and doctorate level students had a better approach to COVID-19 information since they were either the frontiers in distributing COVID-19 knowledge to the public or researchers who researched various aspects of SARS-CoV-2.

At the current time, according to the Vietnam Ministry of Health's report, almost 100% of Vietnamese people have been vaccinated, and 80% have taken 2 doses of vaccine already, partly thanks to findings from studies of vaccine acceptance. According to Saito et al. (2022), the willingness to receive COVID-19 vaccination was much affected by risk perception [21]. Thus, the government's current mission is to make people understand the decline in the efficacy of vaccines over time, thereby improving their acceptance and proactiveness of booster shots. Learning from our study and other similar studies, advertising campaigns should be aimed at students, since they are both vulnerable and can be direct promoters to their families.

Our result showed that receiving or not receiving the COVID-19 vaccine did not affect the prevention measures among university students in Vietnam ( $p > 0.05$ ). This was also applicable to the related factors that complied with the prevention measures ( $p > 0.05$ ). The reason might be that the Government of Vietnam enforced strict laws to prevent the spread of SARS-CoV-2 within the community [22]. Accordingly, Vietnamese people and students, more specifically, were educated about different methods of COVID-19 prevention since the beginning of the pandemic. As a result, there was no significant difference between the non-vaccinated and the vaccinated group in the compliance with prevention measures, regardless of gender, education level, study major, etc.

The levels of vaccine acceptance and compliance with prevention measures reflected the effectiveness of media. Results from this study may be helpful for government to realize outstanding problems relating to the COVID-19 vaccination campaign; thereby, for devising policy and implementing interventions to resolve these problems. With the help of social networking platforms like Facebook and Zalo and smart apps like Bluezone or NCOVI,

the Ministry of Health of Vietnam has provided accurate and timely information to raise people's awareness and knowledge about COVID-19 [23]. Thus, the rate of correct answer in each question is a helpful scale to evaluate media's efficacy, as well as to suggest further direction for official activities.

Regarding students' psychological wellbeing during the pandemic, more than half of the respondents were feeling "normal" (56.71%). Yet, many felt stress at different levels (slight, moderate, and severe). Tran et al. mentioned that COVID-19 altered many things, including students' sleeping routines, incomes, and study habits [24]. Medical and public health students dealt with more severe stress than non-medicine students [25] since they had to take care of COVID-19 patients, leading to higher COVID-19 exposure. Also, due to the lockdowns, students had to stay home and take online classes. Staring at electronic devices for 6–8 h a day could cause stress levels among students [26]. Furthermore, stress could come from financial issues. A lot of Vietnamese university students had part-time jobs to support their financial needs and to pay for their tuition. Due to the lockdown, they could not make money to support themselves anymore, leading to a financial burden on their shoulders, thereby, causing stress [24]. COVID-19 pandemic was a sensitive period of time causing substantial loss to human life and property. Understanding the psychological wellbeing status of citizens, especially vulnerable subjects, will help government and relevant responsible organizations to make proper and timely policies to support their citizens [12].

### Strengths and limitations of the study

The major strength of this study is a large and diverse sample size. At the time of the research, there was a lot of hesitancy in accepting the COVID-19 vaccine. Consequently, the results somewhat reflected the students' willingness to get the COVID-19 vaccine, prevention against the pandemic, and psychological wellbeing. Additionally, our study was one of few studies evaluating the status of all three abovementioned important issues. Thus, our results provide a big picture of general attitude toward COVID-19 pandemic, which might serve as a useful guide for both Vietnamese government and other stakeholders in the policy-making. With respect to waning vaccine effectiveness, understanding the underlying factors related to the hesitance to take vaccines will be helpful in improving the uptake of booster dose [6]. However, as with all studies, this study also has some limitations.

First, this study used a convenience sampling method; therefore, the findings of this study cannot be generalized to all Vietnamese students. Second, during the survey, the COVID-19 vaccine was unavailable to every person in Vietnam. Hence, the uptake of the vaccine could not be measured. Third, most student participants were from universities in North Vietnam. Consequently, the result cannot reflect the population of whole Vietnamese university student. Lastly, this study was conducted when there was still hesitancy in taking the COVID-19 jab. Therefore, the results only reflected the vaccination status among students at that time. In the future, we would like to conduct a follow-up study, to have a comparison of students' vaccine acceptance, psychological wellbeing, and prevention measures between 2021 and 2022.

### Conclusion

This present study described the willingness to receive COVID-19 vaccine, preventive measure, compliance, and psychological wellbeing status among university students in Vietnam and its related factors with a sample of 2998 respondents. The mean score was  $46.13 \pm 19.03$  (the highest point was 54) for the willingness to receive COVID-19 vaccination, while the mean score of preventative measure compliance was  $7.15 \pm 1.98$  on a 10 points scale and being vaccinated or not did not affect their compliance. That proved the government's efforts to propagate the COVID-19 vaccine's effectiveness and prevention measures to citizens were working. Using students as a small communication channel for families, as well as deploying pre-vaccination in universities and schools can be a helpful way to increase the rate of booster shots in the future. While 56.94% of participants had normal psychological wellbeing, almost half of them had experienced stress from slight to severe levels during the pandemic. We detected that those studying medicine or those with higher educational levels had higher rates of stress than others. Reducing the study program, increasing the number of vacations or supporting tuition fees, and paying bonuses to those involved in the anti-epidemic work can be some of the support measures for medical students in particular and students in general. Besides, the development of school psychology programs is also a strategy worth considering for the long term. Our results are valuable contribution to studies with a wider scale in the future. Additionally, our results can be used as a reference to describe the knowledge and perception of Vietnamese students, which may be helpful for researchers and policymakers to frame proper policies for several problems encountered during the battle against COVID-19.



## Abbreviations

MoVac-COVID19S	Motors of COVID-19 Vaccination Acceptance Scale
BSRS-5	Brief Symptom Rating Scale
NGOs	Non-governmental organizations
PCIBS	Preventive COVID-19 Infection Behaviors Scale
WHO	World Health Organization

## Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s43045-023-00335-z>.

**Additional file 1: Table S1.** Factors related to the compliance with prevention measures among undergraduate students in Vietnam.

**Additional file 2: Table S2.** Factors related to mental health status among study subjects.

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## Authors' contributions

Conceptualization: DTC; methodology: NLB, HVT, MVNS, YVNT, TTL, LANT, TTL, RS, and DTC; software: NLB, HVT and DTC; validation: NLB and HVT; investigation: all authors; data curation: NLB, HVT, and MVNS; writing—original draft preparation: LB, HVT and DTC; writing—review & editing: all authors; visualization: NLB, HVT, RS and DTC; supervision: DTC; project administration: NLB, HVT, and MVNS; funding acquisition: DTC. The authors have read and agreed to the published version of the final manuscript.

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## Availability of data and materials

The data that support the findings of this study are available upon reasonable request.

## Declarations

### Ethics approval and consent to participate

The research was approved by the Ethics Committee in Biomedical Research of VNU School of Medicine and Pharmacy according to the decision number: 01/2021/CN-HĐĐĐ on October 21, 2021. All the respondents were asked for informed consent to participate before completing the online questionnaire.

### Consent for publication

All the respondents were asked for informed consent to participate before completing the online questionnaire.

### Competing interests

The authors declare that they have no competing interests.

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