Public perception on COVID-19 vaccination intention

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Article Info	ABSTRACT
	To resolve the health crisis caused by coronavirus disease (COVID-19), the Indonesian government is trying to implement a mandatory vaccination policy for all Indonesians. It was just that the success of this policy is largely determined by acceptance preceded by the public intention to be vaccinated, in which public perception plays a major role in determining intention. This research, therefore, aimed to evaluate and examine the role of perceived risk, benefit, and susceptibility on the COVID-19 vaccination intention. By using a cross-sectional approach, this quantitative study involved 98 participating respondents who were determined by the purposive sampling method. The results of this study finally found and proven that perceived risk (coefficient β=0.290 and T-value 2.456 with p-value=0.011), perceived benefits (β= 0.394 and T-value 3.873 with p-value=0.000), and perceived susceptibility (β=0.233 and T-value 3,230 with p-value=0.001) had a positive and significant effect on the COVID-19 vaccination intention. *This is an open access article under the CC BY-SA license.*

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1. INTRODUCTION

Since the first time the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) appeared and was first identified in late 2019 in Wuhan, China, it has caused tremendous panic in various countries. Only a few months later, this virus has resulted in a global pandemic known as the COVID-19 pandemic. Since it was first identified in Indonesia, COVID-19 has caused widespread panic throughout Indonesia and has become a significant factor in causing the health crisis to the economy. Several steps have been implemented by the Indonesian Government to deal with and tackle COVID-19. It is starting from large-scale social restrictions (also known as *PSBB*) regulations, social distancing rules, using masks and face shields in crowds, adopting new normal, but the results were still insignificant [1]. As a result, until the end of 2020, the Government began planning vaccinations for all Indonesians. This was further strengthened until at the beginning of 2021 through Presidential Regulation (*Perpres*) Number 14 of 2021 on Amendments to Presidential Regulation Number 99 of 2020 on Vaccines Procurement and Implementation of Vaccinations in the Context of COVID-19 Pandemic Prevention, which requires vaccination for all Indonesians who have been designated as the target recipient of the COVID-19 Vaccine as mentioned in Article 13A.

There is no doubt that currently, the burden of the global contagious pandemic is changing. To reduce this, the immunization strategy through vaccination has indeed become the suggestion needed to accommodate this change [2]. The development of vaccines is one of the most fundamental and most significant advances in the history of medicine and public health achievements [3]. Vaccine programs have

played an essential role in preventing significant epidemics of various life-threatening [4]. Vaccines are also a form of right to the highest health standard for the most substantial public health defense against infectious diseases and the most effective way to control diseases caused by pandemics in the modern era [5]–[8]. Especially during the COVID-19 pandemic like today [9]. Therefore, Scientists are racing against time to provide vaccinations proven to be effective [10]. The pace of scientific discovery regarding the COVID-19 vaccine is unprecedented [11].

Currently, developing a vaccine against SARS-CoV-2 and its global access is a priority to end the pandemic. Based on the Decree of the Minister of Health of the Republic of Indonesia Number HK.01.07/MENKES/12758/2020 on the Determination of Types of Vaccines for the Implementation of COVID-19 Vaccination that Indonesia stipulates seven types of vaccines to be used are vaccines produced by PT Bio Farma, Oxford-AstraZeneca, Sinopharm, Moderna, Novavax, Pfizer-BioNTech, and Sinovac. However, the success of this strategy certainly depends on the acceptance of the vaccine by the public. Meanwhile, acceptance depends on the public intention.

Vaccination intention is behavioural intentions described based on the theory of planned behaviour (TPB) introduced in the 1990s [12]. The intention indicates a person's strong readiness to perform a certain behaviour [13]. Thus, vaccination intention is defined as an antecedent of the actual behaviour of the vaccination [14]. In vaccination intentions, one thing that must be eliminated is doubt. So it is important to determine understanding the factors associated with vaccination intentions to overcome doubts about being vaccinated [15]. As declining public confidence in vaccination can persist in many countries, stronger behavioural research and its antecedents need to be undertaken, especially in Indonesia, where less research has been identified [16]. Apart from factors such as knowledge [17], [18], recommendations [19], political ideology [20], framing [21], and information sharing [22] perceptual factors also need to be taken into account. Because strategies that are effective in limiting the spread of disease and optimise vaccination rates during a pandemic cannot be separated from the perceptions that thrive in the community public [8]. Perceived risk is one of the most influential on vaccination intention among many other instruments. The perceived risk referred to in this study is the fear and worry [23] that a person feels about the vulnerability or possible danger (both to himself and the surrounding environment) that will occur if not vaccinated and the perception of the consequences [24], [25]. The large data set from previous studies has shown that apart from rolling, an important role in various medical-related behaviours. Such as perceptions of disease severity, adherence to treatment [26], and vaccination decisions [27], perceived risk is also empirically proven to be closely related and strongly influence vaccination intention [23], [28]–[31].

Besides perceived risk, previous researches have also confirmed in their findings that perceived benefits [31]–[36] and perceived susceptibility [37], [38] could also shape vaccination intention and decision with the predictive power of each determinant varies across each study [39]. In addition, a large number of previous studies had focused on the acceptance and adoption of influenza [15], [40], A/H1N1 [41], HPV [42]–[44], Zika Virus (ZikV) [45], and hepatitis vaccines [46]. However unfortunately, there are still few who discuss the COVID-19 vaccine [47], [48]. Taking this exposure into account, this study aims to examine intention in COVID-19 vaccination and identify factors associated with it, such as perceptions of risk, benefit, and susceptibility among the people of the special region of Yogyakarta. Thus the hypothesis presented in this study is that perceived risk (H1), perceived benefit (H2), and perceived susceptibility (3) has a positive effect on vaccination intention (H3), which is described in the theoretical framework of the study shown in Figure 1.
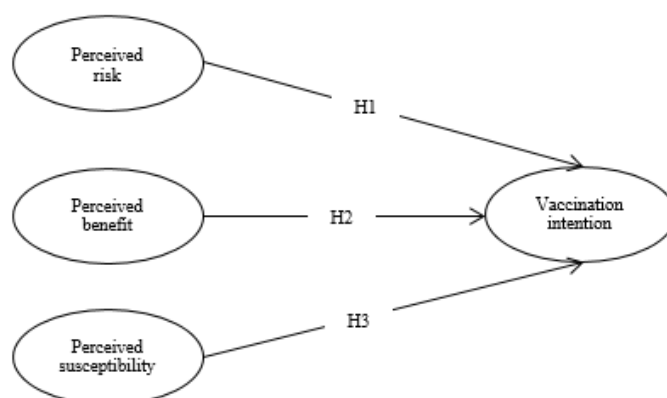

Figure 1. Theoretical framework

2. RESEARCH METHOD

This study aims to examine the factors that influence COVID-19 vaccination intention theoretically refers to TPB [49]. And from TPB's point of view, perception is a strong predictor of vaccination intention [1]. Therefore, this quantitative research with a cross-sectional approach involved four research constructs consisting of an exogenous construct in the form of perceived risk measured by three measurement items [50], benefit by three measurement items [4], and susceptibility by two measurement items [4] and an exogenous construct in the form of vaccine intention measured by three measurement items [50]. The 11 measurement items developed are then used as an online-based questionnaire to be distributed to respondents via a link form sent through social media platforms. Using the purposive sampling method, each respondent was asked to fill in their personal data to fit the criteria expected in this study before finally answering each questionnaire item. After gaining access to 100 respondents for a period of one month (end of December 2020 to end of January 2021), two were eliminated because they were not in accordance with the criteria, while those received and processed were 98 data samples which were people who is male (57 people/58.16%) and female (41 people/41.84%) with a vulnerable age of 11-19 years as adolescents (33 people/33.67%), 20-60 years old as adults (27 people/27.55%), and>60 years as elderly (38.78%) with employment status as public employees (16 people/16.33%), private employees (27 people/27.55%), self employees (36 people/36.73%), students (13 people/13.27%) and unemployed (6 people/6.12%), both COVID-19 survivors (39 people/39.80%) and non-survivors (59 people/60.20%) who live in special region of Yogyakarta.

Although the data is relatively small, because this research uses The partial least squares structural equation modeling (PLS-SEM) analysis, the number of sample data can work well [51]. Because it fits the accepted range of sample size requirements[52] and meets the minimum sample size of $N \geq 25$ and $N \geq 50+$ M (the number of predictors) standards [53] and also the five times rule or five Event per Predictor Parameter (EPP) [54]. The data is then used as the primary source, then analyzed using PLS-SEM with the SmartPLS 3.0 data processing application.

3. RESULTS AND DISCUSSION

In the PLS-SEM analysis method, the first thing to do is assess the model so that the model is a composite or full-structure model. A model is considered a composite structure if it fulfills two assessment models, namely measurement and structural model assessment [55]. The measurement model is implemented to test the reliability and validity of each construct and research item to examine the appropriateness of the relationship between the indicators and construct variables [56]. The reliability test can be carried out and referred to three stages. The first is the stage of seeing the reliability value of each item shown by the loading value. An indicator item can be a reliable level if the construction explains at least more than 50% (0.50) of the loading value of the indicator variant. However, the indicated value should be>0.70 to be claimed as satisfactory reliability [57], [58].

Based on the loading value shown in Table 1, where the overall loading value per item exceeds 70% (>0.70), it can be ascertained that all items have a satisfactory level of reliability, in addition to assessing the reliability of constructs consistency. The constructs can be claimed to be consistently reliable if it meets the composite reliability (CR) criteria with a tolerance value of 0.60 which is still acceptable [55]. However, CR>0.70% [57], [59] is much better as long as it does not exceed 0.95 [57], [60] and also Cronbach's alpha (α) provided that α>0.70 [61]. The results are shown in Table 2 indicate that the CR value of the entire construct shows>0.70 and<0.95. Also, the α value shown is>0.70, so that it can be assured that the whole construct in this study is reliable.

Table 1. Measurement model

Variabel	Loading	α	CR	AVE
Perceived risk		0.806	0.883	0.716
I am at risk of contracting COVID-19 if I am not vaccinated with the COVID-19 vaccine	0.858			
It is very likely that I will get infected COVID-19 if I don't get the COVID-19 vaccine	0.891			
I and the people around me are likely to get COVID-19 if I don't get the COVID-19 vaccine	0.782			
Perceived benefit		0.796	0.880	0.709
I believe that Vaccination effectively protects a person from COVID-19	0.877			
Vaccination is also very important for the protection of the community from COVID-19	0.853			
By vaccinating myself, I am contributing significantly to the protection of others who cannot be vaccinated	0.795			
Perceived susceptibility		0.769	0.894	0.808
There is a possibility that without COVID-19 vaccination, I will get COVID-19 which could have been prevented by vaccination	0.934			
As long as there is COVID-19, vaccination cannot be avoided at all	0.865			
Vaccination intention		0.889	0.932	0.820
I plan to vaccinate myself	0.863			
I want to be vaccinated with the COVID-19 vaccine	0.926			
I am very serious about vaccinating myself	0.926			

To the procedure to assess the validity (convergent and discriminant). A construct can be considered to be valid if the average variance extracted (AVE) value in each construct shows >50% (0.50). For the convergent validity criterion and the average value of the extracted variance from latent variables in the PLS-SEM model is more significant or higher than quadratic correlations among other latent variables for discriminant validity [58], [59], [61], [62]. Based on this, taking into account the AVE value shown in Table 1 and also the average latent variable value higher than the quadratic correlation as shown in Table 2, the overall constructs in this study are surely considered valid because they meet the required criteria.

Table 2. Discriminant validity

	PR	PB	PS	VI
Perceived risk (PR)	0.846	-	-	-
Perceived benefit (PB)	0.796	0.842	-	-
Perceived susceptibility (PS)	0.596	0.598	0.899	-
Vaccination intention (VI)	0.743	0.765	0.642	0.905

After completing the assessment of the measurement model, the next pace is to assess the structural model. The structural model has been applied as an assessment test to determine the relationship among research constructs [63], [64] by referring to the determination coefficient (R^2) and the effect size (f^2) values. Assessing on R^2 Assessing on R^2 aimed to quantify the accuracy of the prediction of the variance model described for the endogenous or dependent latent variable with conditions that are acceptable if>0.25 with details of moderate (0.50) or strong (0.75) predictive accuracy [56], [65], [66]. Whereas f^2 is applied to evaluate the magnitude of the influence of endogenous (independent) variables on exogenous (dependent) with moderate effect criteria if the value is 0.15 if the value shown is higher than 0.35, it means that the influence is substantial if it is lower to 0.02, it is considered to have a weak effect [56], [64], [65].

Based on the proceeds of data processing through SmartPLS 3.0, the R^2 value obtained in the endogenous variable of vaccination intention is 0.667, which means that the prediction accuracy for vaccination intention is 66.7% with moderate or medium criteria. As for the f^2 value, data processing results also show that the effect of perceived risk on vaccination intention is 0.087 (8.7%), which means it has a relatively small effect. The magnitude of the similar effect also occurred on the effect of perceived susceptibility on vaccination intention with a value of only 0.098 (9.8%). The magnitude of the effect of the perceived benefits on vaccination intention is in the value of 0.159 (15.9%), which means it is still in a moderate level of influence.

The next pace which is also the last step is to test the hypothesis through path coefficient analysis [56]. Based on Tables 3 and Table 4, it appears that all endogenous variables in this study have a positive and significant direct effect on the intention to the COVID-19 vaccine, which will be further explained one by one. The first hypothesis (H_1) of this study, which "perceived risk has a positive and significant effect on the COVID-19 vaccination intention", seems to be accepted and proven. This is indicated by the evidence of the coefficient value β=0.290 and T-value 2.456 with p-value=0.011. The results of proving this hypothesis are in the same direction and support the results of previous studies [28]–[31], [67]. In addition, this result also implies that individuals who claim to be at risk as measured in this study as a concern that when they are not vaccinated will be at risk and are most likely to be affected by COVID-19 both for themselves and their surroundings so that at the end more likely to intend to get COVID-19 vaccine if it is available. Psychology offers a general proposition as a form of intervention to increase vaccination intention. The proposition states that thoughts, feelings, and risk beliefs can motivate someone to get vaccinated [68]. In fact, the effect of perceived risk on vaccination intention has been considered stronger than objective risk [69]. So based on that explanation, it can be deduced that the more perceived risk of the person for COVID-19, the higher the intention is to be vaccinated with the COVID-19 vaccine.

Table 3. The summary of hypotheses results

	Coefficient (β)	T-value	Result
Perceived risk → Vaccination Intention (H_1)	0.290	2.456**	Accepted
Perceived benefit → Vaccination Intention (H_2)	0.394	3.873*	Accepted
Perceived susceptibility → Vaccination Intention (H_3)	0.233	3.230*	Accepted

Note: *Significance at (ρ=0.01); **Significance at (ρ=0.05)

Table 4. The summary of relationships assessment

	Direct effect		Indirect effect		Total effect	
	β	T-value	β	T-value	β	T-value
Perceived risk → Vaccination intention	0.290	2.456**	-	-	0.290	2.456**
Perceived benefit → Vaccination intention	0.394	3.873*	-	-	0.394	3.873*
Perceived susceptibility → Vaccination intention	0.233	3.230*	-	-	0.233	3.230*

Note: *Significance at (ρ=0.01); **Significance at (ρ=0.05)

Apart from perceived risk, perceived benefit is also convinced to be one of the factors that motivate a person to get vaccinated. Therefore, this research proposes a second hypothesis (H_2) in the form of "perceived benefit has a positive effect on the COVID-19 vaccination intention". With the coefficient value β=0.394 and T-value 3.873 with p-value=0.000, the bootstrapping results on the SmartPLS 3.0 application prove that the proposed H_2 is accepted and confirmed. The direction of the results of this study is certainly in line with previous supported empirical studies [31]–[36]. The consequence of the desire, will, and intention to be vaccinated is that people perceive that the COVID-19 vaccine provides benefits to them. People feel themselves and the people around them will be more protected if they vaccinate themselves. So from this, it can be considered that perceived benefits are a strong predictor of vaccination intention. Summarized Result of Direct and total effect path among the variables tested as shown in Figure 2.
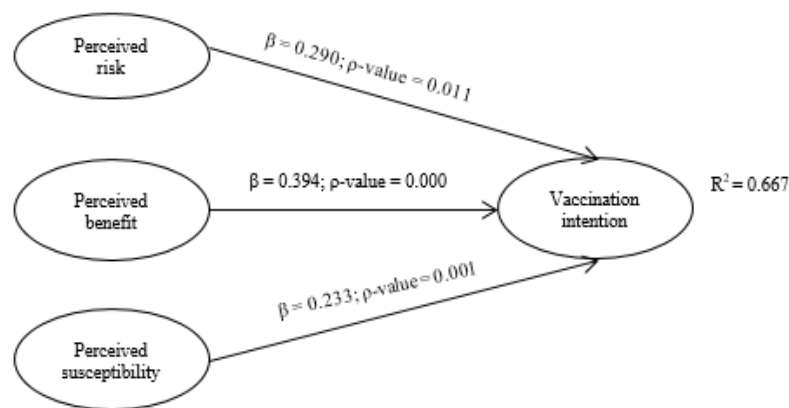

Figure 2. Summarized result of direct and total effect path among the variables tested

Another thing that is closely related in this study is the argument developed in the Health Belief Model (HBM) theory that perceived susceptibility has a role as an antecedent that cannot be ignored on vaccine intentions [70]. Therefore the third hypothesis (H_3) offered in this study is perceived susceptibility has a positive and significant effect on the COVID-19 vaccination intention. The value of β=0.233 and the T-value of 3.230 with p-value=0.001 is evidence that H_3 is accepted. The result of this study is certainly in line with previous studies [37], [38] as well as the implication that perceived susceptibility is a strong predictor of vaccine intention [71], [72] and even preventive health behaviour [73]. It means that feelings and perceptions of the susceptibility of being vaccinated will cause a strong desire to be vaccinated. And the higher the perception of susceptibility, the stronger the vaccine's intention. Thus the overall exogenous variables in this study in the form of perceived risk, benefit, and susceptibility are strong predictors of intention because of their positive and significant impact on vaccination intention.

4. CONCLUSION

Overall, this study seeks to prove and at the same time explain how perceptions (risk, benefit, and susceptibility) can affect vaccination intention. The results demonstrate that both perceived risk, benefit, and susceptibility are strong antecedents or predictors in influencing vaccine interest as hypothesized. However, caution in concluding must be considered, given the deficiencies and limitations of this study. It is clear that this study only covers a small sample (98 people) in one area alone (special region of Yogyakarta), so other researchers in the future will need that research with a larger sample and broader coverage. Several other variables may also need to be investigated and the variables in this study to gain additional insight regarding health behaviour in the public community, especially regarding COVID-19 vaccination.

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