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PREDICTING ATTITUDE TOWARD COVID-19 VACCINE AMONG INDONESIANS: AN APPLICATION OF THE THEORY OF PLANNED BEHAVIOR

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Abstract

Vaccination is an important tool to end the pandemic; however, various surveys show considerable cases of hesitance and refusal among public in many countries. This study aimed to predict the effect of several factors on attitudes toward the Covid-19 vaccine using the theory of planned behavior framework. A quantitative survey design was used to collect data from participants from 15 cities in Indonesia (n = 323) during the second wave of pandemic in June-July 2021. Data were analyzed using hierarchical multiple regression to test three models. In Model 1, risk perception and confidence in vaccine significantly predict attitude toward vaccine, *Adj.* R^2 = .501, $F(2, 320) = 162.610$, $p < .000$. In Model 2, adding trust to government does not improve the prediction, *Adj.* R^2 = .504, ΔR^2 = .003, *F for* R^2 *Change* = 3.284, p = .071. In Model 3, we added knowledge about Covid-19 and beliefs in conspiracy in the model, which presented as the best model by having *Adj.* R^2 = .532, ΔR^2 = .030, *F for* R^2 *Change* = 10.222, $p < .000$. Though relatively weaker than the influence of risk perception, $t(317) = 4.250$, $p < .00$, and confidence in vaccine, $t(317) = 10.24$, $p < .00$, knowledge about Covid-19 can predict attitude toward vaccine $t(317) = 4.521$, $p < .00$, while beliefs in conspiracy do not. It is concluded that there is an interplay between control beliefs (knowledge) and behavioral beliefs (risk perception and confidence in vaccines) in shaping attitudes toward a vaccine. Confidence in vaccines plays the most important role, followed consecutively by risk perception and knowledge. It suggests that health authorities emphasize the safety and efficacy of vaccines in reducing the risk of disease while educating the public with authorized information.

Keywords: attitude toward Covid-19 vaccine; national mass vaccination program; theory of planned behavior; Covid-19 risk perception; confidence in Covid-19 vaccine; trust to government; knowledge; beliefs in conspiracy

INTRODUCTION

Since it was first detected in Wuhan, China, in December 2019 the pandemic has continued to sweep around the world. In Indonesia, Covid-19 cases had reached >3.5 million by August 2021 and the death toll reached more than 100 thousand people. This emergency encourages the national vaccination program. Covid-19 vaccination is mandatory except for people with certain conditions (The National Covid-19 Handling Task Force, 2021). Vaccination aims to achieve herd immunity and provide indirect protection to non-immune groups. In the long run, the vaccination will control the percentage of active cases so that the cure rate increases and the mortality rate decreases (Firdaus, 2021). However, achieving this target is not an easy task to do. Doubts that lead to reluctance to get vaccinated inhibits Covid-19 vaccination program in many countries around the world including Indonesia (Lazarus et al., 2020; Murphy et al., 2021).

According to data accessed on August 14, 2021, the coverage of first dose vaccine has only reached 25.8% of population (The Ministry of Health Republic of Indonesia, 2021). Survey on November 2020 showed that only 64.8% of respondents were willing to receive the vaccine only if provided by the government, 7.6% refused, and 27.6% were hesitant (The Ministry of Health Republic of Indonesia, ITAGI, UNICEF, & WHO, 2020). On March 2021, Katadata Insight Center (KIC) survey found 46.8% of respondents were hesitant. Uncertainty about the safety

and effectiveness of vaccines is the main reason behind it (Ulfa, 2021). Rachman and Pramana (2020) found that the negative attitude as shown by hesitance was mainly caused by feelings of fear and anxiety towards the side effects of vaccines.

From an epidemiological perspective, vaccine hesitancy has been long known as the factor that reduces vaccine coverage and increases the risk of outbreaks of preventable diseases such as measles, rubella, polio, and influenza (Dubé et al., 2013). Vaccine hesitancy is considered a complex issue because individual or community decision-making process about immunization is determined by so many factors, not only vaccine-related concerns, but also involve personal and societal levels (Arede et al., 2019; Gianfredi et al., 2019). Decision to get vaccinated involve the interplay between religion, politics, personal beliefs, and economic factors (Pronyk et al., 2019). To improve attitude toward Covid-19 vaccine and to increase public engagement to the vaccination program, best practices derived from psychology are highly needed, especially that investigates what factors play in shaping attitudes towards vaccines.

According to Dubé et al. (2013), attitudes toward vaccines form a continuum that goes from an attitude of actively asking for vaccines (active demand for vaccine) to total opposition to vaccines (complete refusal). Between the two poles, there is a middle attitude in which people are still hesitant (vaccine hesitancy). People who are hesitant show ambivalence whether or not to receive the vaccine. They may agree to one vaccine but refuse another, choose to delay the vaccine, or receive the vaccine with a sense of distrust. On that basis, attitudes towards the Covid-19 vaccine can be divided into three categories: acceptance, hesitance, and resistance (Murphy et al., 2021). A person is said to be hesitant if they delay receiving the vaccine, willing to accept if certain conditions are met, or refuse the vaccine even though the vaccine is widely available (Quinn et al., 2019; Wagner et al., 2021).

Complexity of person's attitude toward vaccine can be approached using the theory of planned behavior (Ajzen, 2006; Ajzen et al., 2011). This theory is widely used during Covid-19 pandemic to explain attitude and intention of various health behaviors such as social distancing (Gibson et al., 2021), vaccination (Patwary et al., 2021), and willingness to wear face mask (Irfan et al., 2021) as well as other safety behaviors not directly related to health such as choosing safer tourism destination (Han et al., 2020), the use of mobile food delivery applications (Al Amin et al., 2021), and adoption of internet banking (Sudarsono et al., 2020). Since the decision to get vaccinated is influenced also by politics and personal beliefs (Pronyk et al., 2019), this theory has potential to explain the role of non-health related factors in shaping attitude toward vaccination, such as perception toward government and messages in social media.

According to the theory of planned behavior, humans behave by considering three things: beliefs about the consequences that may be obtained from certain behavior (behavioral beliefs), beliefs about social expectations and behavior of others (normative beliefs), and beliefs about the presence of things that could potentially help or inhibit action (control beliefs). Attitudes toward a particular object are specifically determined by the behavioral beliefs. However, control beliefs and normative beliefs also play role as indirect predictors of attitudes. One of the control belief variables sourced internally is one's knowledge and beliefs about other party may involves political entity within society (Ajzen, 2006; Ajzen et al., 2011). Based on this theory, a person is predicted to have a negative attitude towards the Covid-19 vaccine if they believe that there could be negative consequences of getting vaccination as represented by the variables. This is also influenced by the kind of knowledge a person possesses as well as perception about

government and health authority that issues the mass vaccination program.

Ajzen et al. (2011) interestingly stated about the role of knowledge in attitude formation. *"Knowledge, although necessary, is not sufficient to produce the desired behavior"* (pp. 102). Knowledge determines attitude, but one can act against his/her knowledge. Having accurate knowledge does not guarantee a person will consider more wisely, and conversely misinformation is not necessarily a sign that a person will make bad decisions. Pre-Covid-19 pandemic, there is an intriguing finding that generally people tend to be more willing to get vaccinated if they have limited knowledge of the disease and its vaccines compared to those with more knowledge. People who refuse vaccines are likely those who research a lot of information about vaccines and are aware of health issues, especially if they have a distrust of government and health authorities (Dubé et al., 2013; Hornsey et al., 2018). In the context of Covid-19 vaccination, Murphy et al. (2021) found differently that there was no difference in knowledge about Covid-19 between people who received and hesitated with the vaccination.

In this research, knowledge refer to individual's storehouse of information about disease as well as the health care behaviors (Jayanti & Burns, 1998). In general, knowledge can be represented by two kinds of information: accurate information and misinformation about the object of attitude. Anti-vaccination attitudes are highest among those who tend to think conspiratorially involving misinformation (Hornsey et al., 2018). Believing in conspiracies is a strong predictor of rejection of the Covid-19 vaccine (Venuleo et al., 2020). Belief in conspiracies might cause a person to act counterproductively and obscure a person's Covid-19 risk perception by believing that the disease is actually harmless, the vaccine is dangerous, or the vaccination program is unnecessary and insignificant (Bertin et al., 2020; Čavojová et al., 2020; Freeman et al., 2021; Romer & Jamieson, 2020; Salali & Uysal, 2020; Sherman et al., 2021; Taylor et al., 2020; Uscinski et al., 2020). As knowledge is related to health literacy and it is also proven that knowledge is indicator in preventive behaviors for respiratory infection and other flu-like diseases such as MERS (Goni et al., 2019; Jang et al., 2019), the role of knowledge needs reinvestigation.

Risk perception is a strong predictor of whether a person is willing to receive the vaccine or not. However, it is necessary to distinguish the contradictory effect of the risk perception from the disease and the risk sourced from its vaccine. The higher the risk perception in the individuals that they could be in danger from the disease if not vaccinated, the higher the acceptance of the vaccine. However, if the risk perception of the vaccine itself is higher, rejection of the vaccine may actually occur. Individuals tend to be more reluctant to the risk of experiencing side effects from safe vaccines than the risks which emerge from not being vaccinated (Dubé et al., 2013). In the context of Covid-19, the motive to get the vaccine is influenced by the risk perception around the disease. If an individual believes that the pandemic will last a long time, they are likely to be exposed, and the pandemic will have a major impact on their life, they will be more willing to have the vaccine (Williams et al., 2020).

However, willingness to receive vaccines is also a matter of confidence. Karlsson et al. (2021) found that the risk perception of the Covid-19 vaccine is more significant than the risk perception of the disease itself. Although one believes that Covid-19 is a dangerous disease, concern about the side effects of a rapidly developed vaccine further affects the willingness to receive vaccination (Brunson & Schoch-Spana, 2020; Karlsson et al., 2021; Paul et al., 2021). Confidence in vaccines can be understood with the 3C framework: complacency, confidence, and convenience (Freeman et al., 2021). If the Covid-19 vaccination is mandatory and given free for all, there are no problems with convenience

aspect or the ease of getting the vaccine. Vaccine hesitancy is predicted more likely to occur when perceptions about the need for vaccination are low and vaccines are considered unimportant.

Vaccine hesitancy or lack of confidence in vaccines is also usually the result of a lack of understanding of how immunization works, distrust of government and health authorities, and the novelty of the Covid-19 vaccine itself being so quickly developed by pharmaceutical companies (Freeman et al., 2021). Regarding the level of trust, generally the better the trust in the government, the more willing a person is to be vaccinated (Lazarus et al., 2020; Soares et al., 2021). People who trust the government also respond more positively to recommendations given by others to have them vaccinated and comply with health protocols (Lazarus et al., 2020). Lazarus et al. (2021) also found that countries in Asia (such as China, South Korea, and Singapore) and countries with middle income levels (such as Brazil, India, and South Africa) showed more confidence to their central governments.

Many studies on attitude toward Covid-19 vaccine, particularly on vaccine hesitancy, have been done before; however, the findings are not yet conclusive regarding what factors are the most influential in shaping the attitude. Previous findings also showed contradictory results, such as in the role of knowledge on attitude formation. To date, only a few studies investigated this issue in Indonesia and mostly used descriptive design (e.g., Rachman & Pramana, 2020). Indonesia, as one of the countries with the highest infection in the world will feel a significant impact on the decline of cases from the pandemic control in Asia region. This research will provide valuable input for government, healthcare authority, and other relevant stakeholders to develop better strategies to advocate Covid-19 vaccination program as well as broaden the knowledge from behavioral science perspective.

This study aimed to investigate psychosocial and cognitive factors that predict attitude toward Covid-19 vaccine and to determine what factors have the most influence. Based on the theory of planned behavior as theoretical framework, we hypothesize that attitude toward Covid-19 vaccine can be predicted by knowledge of Covid-19 and beliefs in conspiracies as control beliefs variables, trust to government as one of the variables that shapes normative beliefs, and Covid-19 risk perception and confidence in Covid-19 vaccine as behavioral beliefs variables.

METHOD

Participants

The survey was conducted online using Google Forms from July to August 2021 during the second wave of pandemic in Indonesia. During this period, vaccination program in Indonesia finally entered stage 4 that allowed general public, aside from prioritized healthcare workers, public service offices, and high-risk groups, to get vaccinated. Per July 2021, the achievement of the vaccination program was still very low, only reached 20% of national target in all province in Indonesia (Satuan Tugas Penanganan Covid-19, 2021).

The survey questionnaire was distributed through social media with the help of research collaborators who were fellow lecturers and practitioners in 15 cities (Banda Aceh, Padang, Karawang, Bogor, Semarang, Magelang, Purwokerto, Solo, Yogyakarta, Surabaya, Probolinggo, Jember, Makassar, Buton, and Bima). Participants were Indonesians aged >15 years, living in areas with relatively high cases of Covid-19 (red zones and orange zones according to Indonesia's Covid-19 risk map), directly or indirectly affected by the pandemic (experiencing illness, changes in health and economic conditions) and never got the Covid-19 vaccination before.

The number of participants in this study was 323 people that were accessed using convenience sampling technique. The non-

random sampling was chosen due to several limitations in term of time to conduct study, research fund, and networking to health authorities. These limitations did not allow for more rigorous sampling. This sampling choice potentially limit generalization of finding to overall population, but the number of sample size achieved is adequate for parametric statistical analysis (van Voorhis & Morgan, 2007).

This study applied several exclusion criteria: age outside the criteria (children aged < 15 years are considered unable to complete complex online questionnaires), working as healthcare workers (in Indonesia, healthcare workers are prioritized to get vaccinated), or have had Covid-19 vaccinations. Initially, this survey managed to involve a total of 395 respondents. After screening, it was found that 36 people had received vaccination, 8 people worked in healthcare (e.g., doctors, midwives, and nurses), and 28 people did not complete the survey.

To ensure that respondents' criteria were met, general demographic characteristics such as age, gender, city and province origin, occupation, and educational levels were asked at the beginning of the survey. To find out whether the respondents were affected by the pandemic, they were asked about their economic conditions during the pandemic (whether they lost their job, experienced decreased, stagnated, or increased income), as well as their general health condition (whether they have had Covid-19, had physical contact with Covid-19 patients in the past two weeks, and have comorbid conditions). To ensure that the respondents had never received the Covid-19 vaccination, the researcher asked about their vaccination status too. The health conditions and vaccination status were asked using yes or no questions and no further details were asked.

Instruments

This research only used data from respondents who stated "yes" in informed consent in the very first part of the questionnaire. In the informed consent, respondents were asked if they are willing to participate in this study voluntarily and they could choose not to participate. In the cover letter, the researcher clearly clarified the purpose of the study and explained that the survey consisted of eight parts and the completion would take about 15 minutes. To ensure privacy and data confidentiality, the researcher did not ask for names (only initials) and stated that the data collected would only be used for study purposes. The researcher provided an opportunity for respondents to ask further questions about the study by including contact information such as the name of the institution along with an email address. To maintain the reliability of the data obtained online, the survey was set so respondents could only answer once. After the period of collecting data was over, the survey is closed by survey administrator.

This study measured several variables that are predicted affecting attitudes towards the Covid-19 vaccine. All variables were measured using a psychological scale, except knowledge which was measured using a cognitive test. All instruments were presented in Indonesian language.

The Covid-19 Vaccine Hesitancy Scale. Attitudes towards vaccines are understood as a bipolar construct that forms a continuum (Tay & Jebb, 2018). The attitude continuum represents different degrees of attitudes that an individual can have towards vaccines: positive, neutral, or negative. A high score indicates a very positive attitude which is indicated by the presence of an active demand for the vaccine (very enthusiastic, self-initiated, try to get it, prefer to get it immediately), a low score indicates a very negative attitude which is characterized by complete refusal (e.g., strongly against it, apathy, anti-vaccine), and between the two poles is an ambivalent attitude characterized by hesitation. Hesitation is graded from more positive hesitation (e.g., willing to accept if certain conditions are met, if given, if offered, if had time), completely neutral (e.g., undecided, no comment about vaccination),

and more negative hesitation (e.g., do not mind but rather wait first, decide to see first, or avoid vaccine as much as possible).

Attitudes towards the vaccine in this study were measured by a scale that adapted the Oxford Covid-19 Vaccine Hesitancy Scale (Freeman et al., 2021). The adaptation to Indonesian language was conducted by researcher, involving the procedure of translation and back-translation, content validity checking, and followed with pilot testing (Gudmundsson, 2009). The scale consists of 7 items with a stimulus format in the form of questions containing conditions, such as: "If you were offered the Covid-19 vaccine, would you willing to be vaccinated?" or a question asking respondents to describe themselves, such as: "I describe myself as a person who…". The stimulus is followed by a response in a five-option multiple choice format, and each option reflects attitude continuum. Response A indicates actions of active demand (score 5), response B, C, and D indicate degree of hesitation, and response E indicates complete refusal (score 1). Based on the description above, the attitude score is divided into three categories, refusing (score 7-13), hesitation (score 14-28), and accepting (score 29-35). The scale reliability test showed the coefficient α Cronbach = .92.

The Covid-19 Risk Perception Scale. This scale measures the risk perception of the outbreak, e.g., "How likely are you to be infected with Covid-19?", "How concerned are you about contracting Covid-19?"; and the risk perception if not vaccinated e.g., "How likely are you to catch the virus if not vaccinated?", "How concerned are you about contracting Covid-19 if not vaccinated?" (Caserotti et al., 2021). This scale consists of ten items with a five-point Likert response format (1 = very little, 5 = very great). The total score ranged from 10-50. The reliability test showed α Cronbach = .89.

The Confidence in the Covid-19 Vaccine Scale. This scale measures confidence in vaccine safety as a product, e.g., "The Covid-19 vaccine is safe."; confidence in vaccine service providers, e.g., "Healthcare workers (doctors, nurses) explained the side effects of the Covid-19 vaccine clearly and honestly."; and confidence in vaccination policy makers, e.g., "The government's Covid-19 vaccination program is for the good of the community." (Larson et al., 2015). This scale consists of 12 items with a five-point Likert response format (1 = very not confident, 5 = very confident). The total score ranged from 12-60. The reliability test showed α Cronbach = .94.

The Knowledge of Covid-19 Test. This test was developed to reveal the level of knowledge of Covid-19 in six domains: modes of transmission, symptoms, risk factors, preventive measures, treatment, and the vaccination. The relevance of the test content to the measuring domain was validated qualitatively by two general practitioners. During the writing of the items, these two experts helped provide medical information and corrected the content of items that were inaccurate according to the latest medical science on Covid-19. This test consisted of 33 items in which respondents were asked to rate the validity of the statements. There were three response options: True, False and Don't know. Respondents' responses were scored dichotomously; right answer = 1, wrong answer = 0. The total score ranged from 0-33. This test has passed the item difficulty and discrimination analysis. There are no difficult items and majority of item show good discrimination index. This test has α KR-21 = .89.

The Beliefs in Conspiracies Scale. This scale was developed to measure how much a person believes in ideas that contain misinformation in the form of conspiracy theories. Beliefs in conspiracies consist of three indicators synthesized from Bertin et al. (2020) and Romer and Jamieson (2020), which include: fearful ideas about the dangers of the vaccine (e.g., "Covid-19 vaccine will change human DNA."), ideas that underestimate the dangers

of the disease (e.g., "Covid-19 does not actually exist."), and ideas of blaming certain parties for the origin of the disease (e.g., "The Covid-19 pandemic was planned by a certain group."). A total of 17 items with the stimulus in the form of statements containing misinformation. Responses use a four-point Likert format (1 = definitely true, 4 = definitely false). The total score ranged from 17-68. The reliability test showed the coefficient α Cronbach = .94. The scale was reversed in scoring, the higher a person's score meaning the greater their beliefs in conspiracies.

The Trust to Government Scale. This scale was developed based on the concept of trust to government conveyed by (Grimmelikhuijsen & Knies, 2017). Trust to government consists of three aspects: perceived competence (e.g., "Overall, the government is able to tackle the Covid-19 pandemic."), perceived benevolence (e.g., "In tackling Covid-19, I believe the government is acting in accordance with the interests of the people."), and perceived integrity (e.g., "In tackling Covid-19, the government keeps its promises."). This scale consists of 11 items with a five-point Likert response format (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree). The total score ranged from 11-55. The reliability test showed α Cronbach = .96.

Analytical technique

The researchers conducted assumption tests of linearity, normality, and homoscedasticity before testing the hypothesis. The data analysis was divided into two stages: describing the data with descriptive statistics and testing hypothesis with hierarchical multiple regression. Researchers tested three models of predicting the attitude of the Covid-19 vaccine (Y) using the enter method. The Model 1 analyzed the role of Covid-19 risk perception (X_1) and confidence in vaccines (X_2) as behavioral beliefs variables on attitude toward vaccine. The Model 2 added trust to government (X_3) as variable that shapes normative beliefs to the analysis. The Model 3 added knowledge variables of Covid-19 (X_4) and beliefs in conspiracies (X_5) as cognitive factors that shapes control beliefs. With regression analysis, the researcher was able to find out what variables were the strongest in influencing attitudes towards the Covid-19 vaccine. All analysis is conducted in SPSS 22.

RESULT AND DISCUSSION

The demographic characteristics of all participants can be seen in Table 1. Most respondents were women (74%), aged 22-34 years or in early adulthood (62.5%), come from Java (50.1%), and lived in urban areas (67.5%). In level of education, most of them were undergraduates (48.6%), incomes less than Rp1,500,000.00 or about $105 per month (49.5%), and during pandemic are still working with stable income (43.3%). Most respondents stated to have never been tested positive (88.9%), never had close contact with patients in the last two weeks (84.2%) and do not have comorbid conditions (83%). Most respondents have not registered to get the vaccine (72.1%) and were still considering or observing the current situation (46.7%). The results of the measurement of attitudes towards the Covid-19 vaccine showed most respondents were hesitant (68.7%).

Table 1.
Demographic Characteristics and Categorization of Attitude Towards Covid-19 Vaccine

Variables	Categories	*n*	%
Gender	Female	239	74
	Male	84	26
Age (years old)	15-21 (late adolescent)	92	28.5
	22-34 (early adult)	202	62.5
	35-44 (middle adult)	19	5.9

Table 1.
continued

	45-64 (late adult)	8	2.5
	> 65 (elderly)	2	.6
Province	West Nusa Tenggara	94	29.1
	West Java	48	14.9
	Central Java	45	13.9
	Special Region of Yogyakarta	36	11.1
	East Java	33	10.2
	Aceh	21	6.5
	Others	46	14.2
Living place	Urban area	218	67.5
	Rural area	105	32.5
Education level	Junior high school	4	1.2
	Senior high school	114	35.3
	Diploma	18	5.6
	Bachelor	157	48.6
	Master	26	8.0
	Doctor	4	1.2
Income per month	Less than Rp1.500.000/ $105 (approximately)	160	49.5
	Rp1.500.000-Rp2.500.000 / $105-175	84	26.0
	Rp2.500.000-Rp3.500.000 / $175-245	29	9.0
	> Rp3.500.000/ $245	50	15.5
Economic conditions during pandemic	Loss job and income	61	18.9
	Still working with decreased income	118	36.5
	Working as usual with stable income	140	43.3
	Working with increased income	4	1.2
Tested positive before	No	287	88.9
	Yes	36	11.1
Contact with sufferer in the last 2 weeks	No	272	84.2
	Yes	51	15.8
Comorbid conditions	No	268	83.0
	Yes	55	17.0
Vaccination status	I have registered, but not yet vaccinated	90	27.9
	I have not registered myself to get vaccination	233	72.1
Intention to get vaccine	I am not willing to get vaccinated	33	10.2
	I am considering it/ observing situation first	151	46.7
	I will register myself to get vaccine	139	43.0
Attitude toward Covid-19 vaccine	Complete refusal	11	3.4
	Hesitate	222	68.7
	Active demand for vaccine	90	27.9

The descriptive statistical analysis can be seen in Table 2 and the correlation analysis among all variables in Table 3. It appears that respondents showed hesitancy that leaned towards positive attitude towards the vaccine with an average score of 24.49 (*SD* = 5.729). Table 3 shows that all predictor variables correlate with attitudes towards the vaccine with statistically significant result ($p < .01$) except beliefs in conspiracies. The strongest correlation is shown in the relationship between confidence in the vaccine and attitudes towards the vaccine ($r = .686$, $p < .01$), while the weakest correlation is shown by the relationship involving beliefs in conspiracy ($r = .196$, $p < .01$). Beliefs in

conspiracies have relatively significant weak relationships on all study variables, except for knowledge (r = .073, p > .05). This means that people who believe in conspiracy may come from various levels of knowledge about Covid-19. Another interesting finding is the negative relationship between knowledge and trust to government (r = -.139, p < .01). It appears that people who understand better about Covid-19 tend to have less trust in the government even though the correlation is weak.

Table 2.
Descriptive Statistics of Research Variables

	Range	*Min.*	*Max.*	*Mean*	*SD*
Attitude toward Covid-19 vaccine	28	7	35	24.49	5.729
Risk perception	40	10	50	32.61	7.383
Confidence in vaccine	48	12	60	41.84	8.588
Trust to government	44	11	55	30.54	9.101
Knowledge	32	0	32	23.50	5.438
Beliefs in conspiracy	51	17	68	47.91	12.990

Table 3.
Correlations Between Research Variables

Variables	ACV	RPC	CV	TG	K	BC
1. RP	.512**	1				
2. CV	.686**	.517**	1			
3. TG	.268**	.208**	.496**	1		
4. K	.378**	.227**	.262**	-.139**	1	
5. BC	.196**	.199**	.278**	.206**	.073	1

Note. ACV = Attitude towards Covid-19 Vaccine; RP = Risk Perception; CV = Confidence in Vaccine; TG = Trust to Government; K = Knowledge; BC = Beliefs in Conspiracy.
**p < .01 (two-tailed)

Hierarchical multiple regression analysis was conducted in this study using the enter method to calculate the parameters in the three models proposed in the hypothesis. The results of the analysis of predictions of attitudes towards the Covid-19 vaccine is reported in Table 4. The assumption test was carried out before the hypothesis test, and all independent variables had a variance inflation factor (VIF) which was located between 1-10 thus it was concluded that there was no multicollinearity. Observations on normal probability plot and scatter plot revealed that the data met the assumptions of normality and homoscedasticity.

Model 1, which consists of Covid-19 risk perception and confidence in the Covid-19 vaccine explains 50.4%, R^2 = .504, F(2, 320) = 162.610, p = .000, the variance of attitudes towards the vaccine. In model 2, the variable of trust to government is added to the regression equation, but the result is not statistically significant (ΔR^2 = .005, *F for* R^2 *change* = 3.284, p = .071). Model 3 adds two more variables, knowledge, and beliefs in conspiracies. As a result, this model has a significant change (ΔR^2 = .030, *F for R2 change* = 4.767, p = .000), which could explain 53.2% of the variance of attitudes towards vaccine. The addition of knowledge variable in the model demonstrates a very significant effect (ΔR^2 = .030; t(317) = 4.521, p = .003. However, trust to government, t(317 = -.331, p = .741, and beliefs in conspiracies, t(317) = -.099, p = .921 do not have a significant effect.

Table 4.
Hierarchical Multiple Regression Analysis Investigating Predictors of Attitude Toward Covid-19 Vaccine

Var.	*R*	R^2	*Adj.* R^2	ΔR^2	*F for* R^2 *Change*	*SE*	β	95% *CI LL-UL*	*t*	*p*
M1	**.710**	**.504**	**.501**	**.504**	**162.610**					**.000**
RP						.036	.167	.097-.238	4.689	.000
CV						.031	.383	.323-.443	12.48	.000
M2	**.714**	**.509**	**.504**	**.005**	**3.284**					**.071**
RP						.036	.163	.093-.233	4.576	.000
CV						.035	.412	.344-.480	11.93	.000
TG						.029	-.052	-.108-.004	-1.81	.071
M3	**.734**	**.539**	**.532**	**.030**	**10.222**					**.000**
RP						.035	.148	.080-.217	4.250	.004
CV						.036	.364	.294-.434	10.24	.000
TG						.029	-.010	-.067-.048	-.331	.741
K						.044	.200	.113-.278	4.521	.003
BC						.018	-.002	-.036-.033	-.099	.921

Note. Var. = Variables; M = Model; ACV = Attitude towards Covid-19 Vaccine; RP = Risk Perception; CV = Confidence in Vaccine; TG = Trust to Government; K = Knowledge; BC = Beliefs in Conspiracy; CI = Confidence Interval; LL = Lower Limit; UL = Upper Limit.

The visualization of the model validated in this study can be seen in the following diagram (Figure 1). Among five factors investigated, the most influential variables are risk perception, followed by vaccine confidence and knowledge about the disease. Meanwhile, beliefs in conspiracies and trust in the government have no significant effect on attitude towards vaccine.

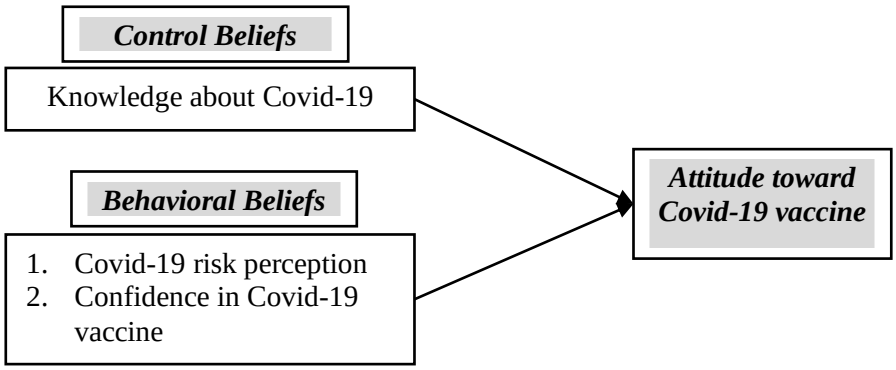

Figure 1. Factors Affecting Attitude Toward Covid-19 Vaccine

Based on the results above, this study found what factors are most important in shaping attitudes towards the vaccine. The hierarchical multiple regression analysis results reveal that 51.9% of the total variance in attitudes can be explained by the influence of Covid-19 risk perception and confidence in the vaccine. The value will increase by 3.1% with the addition of the third variable, knowledge about Covid-19 and its vaccine. However, this study failed to prove the influence of trust to government and beliefs in conspiracies in shaping attitudes towards the Covid-19 vaccine.

This research found that most respondents were still hesitant (68.7%) to receive Covid-19 vaccine, meanwhile 27.9% are showing positive attitude by actively demanding for vaccine. Only 3.4% respondents completely refused vaccination. This variation of

attitudes seems to correspond with the intention to get vaccine (see Table 1). There are relatively equal number of respondents who were still considering vaccination or observing the progress of situation (46.7%) and who showed acceptance by registering themselves to get vaccine (43%). This indicates some overlap. About a half of those who hesitate is still willing to get vaccine.

Based on the findings of this study, this internal variations among those who hesitate can be explained by the interplay between the three variables: confidence in Covid-19 vaccine, Covid-19 risk perception, and knowledge about the disease. Those who are willing to get vaccine are those who have better confidence that the vaccine is safe and efficacious to provide protection as well as perceive a heightened risk if they do not get vaccination. The acceptance is better if they also have better knowledge about the nature of the disease and how its vaccine is developed.

The importance of risk perception, confidence in vaccines, and knowledge in attitude shaping, supports the application of planned behavior theory in prediction of vaccine behavior. Confidence in vaccines is a kind of behavioral beliefs which is related to behavioral consequence, and it is formed by information held by individuals. Behavioral belief can be derived from knowledge as well as perceptions about conditions in the environment. From this study, we find that individuals would accept the Covid-19 vaccine if they are confident that the vaccination will produce the expected consequences, such as keeping them safe from the risk of disease. On the contrary, individuals will refuse to get vaccinated if the action causes unwanted consequences, such as experiencing side effects or other safety concern.

This study supports previous findings that acceptance of vaccines is more likely to be determined by the risk perception of the vaccine itself than the risk perception of the disease (Dubé et al., 2013). This study finds that half of the variance in attitudes towards the Covid-19 vaccine can be defined by the risk perception along with confidence in the vaccine. These findings support many previous studies that vaccine hesitancy is related to confidence in the efficacy and safety of vaccines and the Covid-19 risk perception (Brunson & Schoch-Spana, 2020; Caserotti et al., 2021; Freeman et al., 2021; Graffigna et al., 2020; Karlsson et al., 2021; Paul et al., 2021; Soares et al., 2021). Accordingly, it is important to improve awareness of the potential dangers of Covid-19 and to promote understanding that the vaccine is safe to increase the attitude from being hesitant to become more positive and accepting.

Some of the results of this study do not support the findings of previous studies about the role of knowledge. This study finds the importance of having knowledge about diseases and its vaccine. At least in the context of the current Covid-19 pandemic, having adequate knowledge about Covid-19 and the vaccine is very important to deal with hesitancy and to have greater acceptance. Studies on vaccine hesitancy conducted before the Covid-19 pandemic found that people who knew more about vaccines, diseases, and health issues were more likely to be reluctant to receive vaccines, while the choice to be vaccinated was based more on social conformity than level of knowledge (Dubé et al., 2013). We consider the characteristic of nowadays society which is different from the community in the past during previous pandemic. A lot of information about Covid-19 is shared through television broadcasts, social media, and online mass media. This information expose communities in urban and rural areas. According to Mannan and Farhana (2020), information contributes to the formation of public attitudes towards vaccines, even though accurate information circulates at the same time as misinformation.

According to Dubé et al. (2013), public confidence in vaccines is based not only on knowledge, but also confidence in the

government as a social institution in communities that launches vaccination programs. It was initially predicted that trust to government would support a more positive attitude. However, the prediction was not proven in this study, even after there was a significant correlation between trust to government and attitudes towards the Covid-19 vaccine. Another finding that differs from previous studies was that the extent to which individuals believe in conspiracies and misinformation, did not affect their attitudes. The negative influence of beliefs in conspiracies on attitudes towards Covid-19 has proven in many studies (Bertin et al., 2020; Freeman et al., 2021; Romer & Jamieson, 2020; Uscinski et al., 2020; Venuleo et al., 2020). Therefore, this inconsistency is very interesting for further examination, regarding how the actual mechanism by which trust to government and beliefs in conspiracies may shape attitudes towards vaccines.

We expect the role for other variables that may moderate or mediate the association, for example the level of fear (van Prooijen & van Vugt, 2018). Although a person believes in conspiracies and it causes inaccurate knowledge of Covid-19 and the vaccine, they may still choose to receive the vaccine for emotional or pragmatic reasons. Believing in misinformation alone is not enough to blur the perception that Covid-19 is risky. People can still feel a great danger from other impact of pandemic (e.g., in economic) and demonstrate acceptance of vaccines despite of skepticism. Previous studies have discovered that risk perception could change according to the development of the pandemic situation (Caserotti et al., 2021). What was happening in Indonesia from June to August 2021 is a second wave of high transmission of Covid-19. The data was taken during a period when morbidity and mortality rates escalated so it is not surprising if the Covid-19 risk perception in the community is also high. It would be beneficial if the next studies can compare changes in attitudes towards the Covid-19 vaccine throughout the pandemic period.

Perception of subjective norms is also important to consider in the future studies. Indonesia is one of the countries that set mass vaccination a mandatory program. During the Covid-19 second wave, the Indonesian government issued a policy that regulated inter-city travel requirements, including showing vaccine certificate (The National Covid-19 Handling Task Force, 2021b). In several institutions, schools, campuses and offices, Covid-19 vaccination program was campaigned and encouraged to accelerate the normalization of community and office activities. Vaccination is part of new norms, and everyone will have to receive vaccination sooner or later. People who delay vaccination will be prevented from doing activities and travelling, therefore, they may seek a vaccine for pragmatic reasons. The consequences of not being vaccinated are not seen as solely a health risk, but also an economic or social one e.g., limited freedom to socialize and to do activity in public. These economic and social risks are not covered in this study, and it is necessary to explore what exactly are the risks perceived by individuals during pandemic. This will be useful practically for mitigating pandemic of flu-like disease in the future as well as for developing the concept of disease risk perception that are more nuanced and cover the variety of community experiences.

This study contains several limitations. The first is the sample size, which is too small to represent the Indonesian population and thus limits generalization. The obstacles faced by the researchers relate to the difficulty of reaching respondents who have never had Covid-19 vaccination. The preparation and collection of this study data began when the mass free vaccination program was accelerated to get more people vaccinated. This situational changing was beyond our predictions. Due to this limitation, this finding must be taken carefully and serve more as preliminary for next studies. The second is that the data collection instruments are very long according to some respondents and therefore, future researcher needs to shorten the instruments. For this reason, psychometric

studies are needed to develop a measuring instrument that is more concise, but remains reliable, valid, and more convenient for online administration.

CONCLUSION

This study proves the main factors that predict attitudes toward the Covid-19 vaccine: risk perception, confidence in the vaccine, and knowledge. The results of this study provide practical implications for efforts to improve attitudes towards vaccines and increase vaccine uptake in Indonesia as well as in other countries that are struggling with the same problem. This study suggests informational content in vaccine communication strategies. Governments and health authorities can focus on health messages that raise public awareness about the risks of Covid-19, not only to individual health but also to the economy and social freedom. These messages need to emphasize the safety, efficacy, and importance of the vaccination as well as accurate general knowledge about Covid-19 and the vaccine. The subsequent studies can consider the role of emotional factors, the dynamics that occur in the community, such as regulatory changes, and the development of pandemic status at local and national levels.

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