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by Aftina Husna

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

Aftina Nurul Husna[1]*, Aning Az Zahra[1], Nur Akmal[2], and Milyarti Ningrum[3]

The national mass vaccination program's focus is to end the Covid-19 pandemic in Indonesia, however, various surveys show that there are people still hesitant to receive vaccination. This study aims to predict attitudes towards the Covid-19 vaccine using the theory of planned behavior framework. The predictors tested include: Covid-19 risk perception and confidence in Covid-19 vaccine (model 1), trust to government (model 2), knowledge of Covid-19 and beliefs in conspiracies (model 3). Data collected from N = 323 people aged 15-65 years old, have not been vaccinated against Covid-19, and not work in healthcare. All research instruments were administrated in Indonesian language in the form of online surveys covering respondents from 15 cities in Indonesia. The data was analyzed by hierarchical multiple regression using the enter method and as a result, only model 1 and model 3 were proven to predict attitude toward vaccine. The main variables that determine SVC are Covid-19 risk perception, confidence in the Covid-19 vaccine and knowledge of Covid-19. Meanwhile, trust to government and beliefs in conspiracies do not show a significant influence in the model and this is inconsistent with previous findings. We suggest the need for studies on the intervening effects of emotions, perceptions of government regulations, and changes in pandemic status over time. This study has practical implications for vaccine communication strategies to further intensify the messages about vaccine safety, the health, economic and social risks of Covid-19, as well as a content that adds accurate general knowledge about this disease.

Keywords: attitude, Covid-19 vaccine, theory of planned behavior, mass vaccination program

Since it was first detected in Wuhan, China, in December 2019 the pandemic has continued to sweep around the world for almost two years. In Indonesia, Covid-19 cases had reached >3,5 million by August 2021 and the death toll reached >100 thousand people. This emergency has encouraged the acceleration of handling to reduce fatalities (The National Covid-19 Handling Task Force, 2021a), one of which is with the national vaccination program. In Indonesia, Covid-19 vaccination is mandatory except for people with certain conditions. Holding a vaccine certificate is a requirement to travel during the period of The Implementation of Restrictions on Community Activities (The National Covid-19 Handling Task Force, 2021b).

According to data accessed on August 14, 2021, the coverage of first dose vaccine has reached 25.8% so more than 47 million people have been vaccinated (The Ministry of Health Republic of Indonesia, 2021). Vaccination is carried out gradually with the main target being healthcare workers, followed by public servants, vulnerable communities, and essential economic sector workers. Vaccination aims to achieve herd immunity thus most of the

[1] Lecturer, Faculty of Psychology and Humanities, Universitas Muhammadiyah Magelang, Jalan Tidar, Magelang, Indonesia. E-mail: anhusna@ummgl.ac.id
[2] Lecturer, Faculty of Psychology, Universitas Negeri Makassar, Jalan A P Pettarani, Makassar, Indonesia
[3] Student and research assistance, Faculty of Psychology and Humanities, Universitas Muhammadiyah Magelang, Jalan Tidar, Magelang, Indonesia

population (at least 70%) are immune from exposure to infectious diseases and provides 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).

The Ministry of Health of the Republic of Indonesia, WHO and UNICEF conducted a survey in November 2020. Only 64.8% of respondents were willing to receive the vaccine and that was only if provided by the government, 7.6% refused, and 27.6% were hesitant. The reasons for refusing the Covid-19 vaccine were related to safety (30%), doubt about vaccine effectiveness (22%), distrust of vaccines (13%), concerns of side effects (12%), and religious reasons (8%) (The Ministry of Health Republic of Indonesia, 2020). In March 2021, Katadata Insight Center (KIC) survey found 46.8% of respondents were hesitant to be vaccinated. Uncertainty about the safety and effectiveness of vaccines is the main reason behind hesitating to get vaccinated (*Alasan Ragu-Ragu Vaksinasi Covid-19*/ Reasons for Hesitating Covid-19 Vaccination, 2021). An analysis of netizen conversations on the internet by Rachman and Pramana (2020) found that the contra attitude was caused by feelings of fear and anxiety towards the side effects of vaccines.

The reluctance of getting the Covid-19 vaccine does not only occur in Indonesia, but also in many other countries (Lazarus et al., 2021). Doubts that lead to reluctance to be vaccinated become an inhibiting factor for the vaccination program (Murphy et al., 2021). From an epidemiological, vaccine hesitancy is a factor that reduces vaccine coverage and increases the risk of outbreaks of preventable diseases (Dubé et al., 2013). To overcome this problem, a strategy is needed to encourage people who are hesitant to have a more positive attitude towards receiving vaccines. Research is required to find out what socio-psychological factors determine attitudes towards the Covid-19 vaccine.

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 (Dubé et al., 2013). On that basis, attitudes towards the Covid-19 vaccine can be divided into three categories i.e. acceptance, hesitance, and resistance (Murphy et al., 2021). A person is said to be hesitant, for example 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 (Wagner et al., 2021).

In the theory of planned behavior, humans behave by considering three things i.e. 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 considering the consequences of actions. However, attitude alone is not enough to form intentions. Control beliefs play role as indirect predictors of attitudes and one of the control belief variables sourced internally from an individual is knowledge (Ajzen, 2002, 2006; Ajzen et al., 2011). 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. This negative belief is influenced by the kind of knowledge a person has received regarding Covid-19.

Many studies on vaccine hesitancy have been done before, however, the findings are not yet conclusive. First, about the role of the knowledge factor, Ajzen et al. (2011) stated that "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. In the context of previous vaccinations, there is an interesting finding that people tend to be more willing to be 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). While regarding to Covid-19 vaccination, Murphy et al. (2021) found that there was no difference in knowledge about Covid-19 between people who received and hesitated with the vaccination.

In relation to knowlege in the form of misinformation, anti-vaccination attitudes are known to be highest among those who tend to think conspiratorially (Hornsey et al., 2018). Popular conspiracy beliefs around vaccines are that big pharmaeutical companies profit from vaccination programs, that the benefits of vaccines are merely exaggerated while the dangers are hidden, or that vaccine-treated diseases do not actually exist or are simply harmless (Hornsey et al., 2018). Believing in conspiracies is a strong predictor of rejection of the Covid-19 vaccine. These theories beat the empirical evidence of this new disease presented by health experts (Venuleo et al., 2020). Belief in conspiracies might cause a person to act counterproductively and obsecure a person's Covid-19 risk perception by believing that Covid-19 is actually harmless, that the Covid-19 vaccine is dangerous, or the vaccination program is unecessary and insignificant (Bertin et al., 2020; Čavojová et al., 2020; Freeman et al., 2021; Romer & Jamieson, 2020; Salali & Uysal, 2020; Sherman et al., 2020; Taylor et al., 2020; Uscinski et al., 2020).

Risk perception is a strong predictor of whether a person is willing to receive the vaccine or not. The higher the risk perception in the individual 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 (Dubé et al., 2013). It is necessary to distinguish the effect of risk perception from the disease itself and the confidence in the vaccine safety. 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. It is difficult to accept vaccine because the benefits of vaccines cannot be judged by layman, while the disadvantages of vaccines (side effects) are easier to see (Dubé et al., 2013). In the context of Covid-19 vaccination, the motive to get the vaccine is influenced by the risk perception around Covid-19 (Caserotti et al., 2021; Williams et al., 2020). 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). Interestingly, the level of risk perception in the community fluctuates from time to time. A study in Italy revealed that the risk perception changed as the pandemic progressed between the periods of before, during, and after the regional quarantine (Caserotti et al., 2021). The risk of Covid-19 is perceived to be the highest during quarantine; that was when they were most willing to get vaccinated.

Willingness to receive vaccines is basically 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., 2020). Confidence in vaccines can be understood with the 3C framework: complacency, confidence, and convenience. If the Covid-19 vaccine is given free en masse, there are no problems with convenience aspect or the ease of getting the vaccine. Vaccine hesitancy is more likely to

occur when perceptions about the need for vaccination are low and vaccines are considered unimportant (Freeman et al., 2021).

Vaccine hesitancy or lack of confidence in vaccines is 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., 2021; 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., 2021). 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.

There have been no studies linking the factors mentioned above with attitudes towards vaccines in Indonesia. The current situation is that Indonesia is one of the countries with the highest infection rate in the world. The decline of cases in Indonesia will have a significant impact on pandemic control, especially in Asia, wher the knowledge of what factors play in shaping attitudes towards vaccines will be exceedingly helpful. Governments, healthcare workers and other stakeholders will receive input to develop strategies to effectively advise about vaccines. For that reason, this study aims to predict the role of psychosocial and cognitive factors on attitudes toward the Covid-19 vaccine within the theoretical framework of the theory of planned behavior. The predictors in this study were 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.

Methods

Participants

The survey was conducted online using Google Forms from July to August 2021 during the second wave of Covid-19 in Indonesia. It 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 and over, living in areas with relatively high cases of Covid-19 (red zones and orange zones according to Indonesia's Covid-29 risk map), directly affected by the pandemic (experiencing illness) or indirectly (experiencing changes in economic conditions, either on themselves or their families) and have never had the Covid-19 vaccination.

The number of participants in this study was 323 people that were accessed using the convenience sampling technique. This study applied a number of exclusion criteria, namely: 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 be vaccinated first), or have had Covid-19 vaccinations. Initially, this survey managed to involve a total of 395 respondents. The researcher conducted a screening and found that 36 people had received vaccinations, 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 to keep respondents' privacy.

To maintain research ethics, the researcher only used data from respondents who stated "yes" in informed consent in the very first part of survey. In the informed consent, the researcher asked if respondents were willing to participate in this study voluntarily and respondents 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 (initials only) 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.

Instruments

This study measured a number of variables that are predicted affecting attitudes towards the Covid-19 vaccine. All variables were measured using a psychological scale, except knowledge of Covid-19 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, make an effort 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 as long as 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) into Indonesian. 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. Answer A indicates actions of active demand (score 5), answers B, C, and D indicate degree of hesitation, and answer 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 Covid-19 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 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 Lakert response format (1 = very not confident, 5 = very confident). The reliability test showed α Cronbach = 0,94.

The Knowledge of Covid-19 Test

This test was developed to reveal the level of knowledge of Covid-19, including: modes of transmission, symptoms, risk factors, preventive measures, treatment. and Covid-19 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 innacurate 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. 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 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) and contextualized in dealing with Covid-19. 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 reliability test showed α Cronbach = .96.

Analisis Data

The researcher 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 first model analyzes the role of Covid-19 risk perception (X_1) and confidence in vaccines (X_2). The second model adds trust to government (X_3) to the analysis. The last model adds knowledge variables of Covid-19 (X_4) and beliefs in conspiracies (X_5). With regression analysis, the researcher was able to find out what variables were the strongest in influencing attitudes towards the Covid-19 vaccine.

Results

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 $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 for Covid-19 (88.9%), never had close contact with Covid-19 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
	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

Variables	Categories	N	%
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 of Covid-19	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 statys	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 tended to be positive towards the vaccine with an average score of 24.49 (±5.73). Table 3 shows that all predictor variables correlate with attitudes towards the Covid-19 vaccine very significantly ($p<.01$) except beliefs in conspiracies. The strongest correlation is shown in the relationship between confidence in the vaccine and attitudes towards the Covid-19 vaccine ($r = .68$, $p<.01$), while the weakest correlation is shown by the relationship between trust to government and attitudes towards the Covid-19 vaccine ($r = .26$, $p<.01$). Beliefs in conspiracies do not have a significant relationship on all study variables, except knowledge of Covid-19 ($r = .17$, $p<.01$). This means that people who have a lot of knowledge about Covid-19 may also believe that there is a conspiracy surrounding Covid-19 and its vaccine. Another interesting thing is that there is a negative relationship between knowledge of Covid-19 and trust to government ($r = -0.14$, $p<.05$). 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	5.73
Risk perception	40	10	50	32.61	7.38
Confidence in vaccine	48	12	60	41.84	8.58
Trust to government	44	11	55	30.54	9.10
Knowledge	32	0	32	23.50	5.44
Beliefs in conspiracy	51	17	68	37.09	12.99

Table 3
Correlations between research variables

Variables	ACV	RPC	CV	TG	K	BC
1. RPC	.51**	1				
2. CV	.68**	.52**	1			
4. TG	.27**	.20**	.50**	1		
5. K	.38**	.23**	.26**	-.14*	1	
3. BC	.05	.04	-.01	-.04	.17**	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<.05, **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 are 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.

Table 4
Hierarchical multiple regression analysis investigating predictors of attitude toward Covid-19 vaccine

Variabel	R	R^2	Adj. R^2	ΔR^2	Sig. F change	SE	β	95% CI LL	95% CI UL	*p*
Model 1	**.71**	**.50**	**.50**	**.50**	**.00**					
RPC						.04	.17	.09	.24	.00
CV						.03	.38	.32	.44	.00
Model 2	**.71**	**.51**	**.50**	**.00**	**.07**					
PRC						.04	.16	.09	.23	.00
CV						.03	.41	.34	.48	.00
TG						.03	-.05	-.11	.00	.07
Model 3	**.73**	**.54**	**.53**	**.03**	**.00**					
RPC						.03	.15	.08	.22	.00
CV						.03	.36	.29	.43	.00
TG						.03	-.01	-.07	.05	.73
K						.04	.2	.11	.28	.00
BC						.02	.00	-.03	.04	.67

Note. SVC = 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*

Model 1 which consists of Covid-19 risk perception and confidence in the Covid-19 vaccine explains 50.1% (R^2 = .50) the variance of attitudes towards the Covid-19 vaccine. In model 2, the variable of trust to government is added to the regression equation, but the result is not statistically significant (p>.05). Model 3 adds two more variables, knowledge of Covid-19 and beliefs in conspiracies. As a result, there is a significant change in which this model and it explains 53.9% of the variance of attitudes towards the Covid-19 vaccine. The addition of knowledge of Covid-19 variable in the model demonstrates a very significant effect (ΔR^2 = .03). However, trust to government and beliefs in conspiracies do not have a significant effect (p>.05). Confidence in the Covid-19 vaccine provides the largest effective contribution (26.79%) and is followed by knowledge of Covid-19 (14.38%) and Covid-19 risk perception (10.86%). Putting it into regression equation, attitudes towards Covid-19 vaccine = 0.15 (Covid-19 risk perception) + .29 (confidence in the Covid-19 vaccine) + 0,2 (knowledge of Covid-19) - .15.

Discussion

The aim of this study is to determine whether Covid-19 risk perception, confidence in the Covid-19 vaccine, trust to government, knowledge of Covid-19, and beliefs in conspiracies can predict attitudes towards the Covid-19 vaccine in a sample of Indonesians. This study manages to find out what factors are most important in shaping attitudes towards the Covid-19 vaccine. The results of the hierarchical multiple regression analysis reveal that 53.9% of the total variance in attitudes towards the Covid-19 vaccine can be explained by the influence of Covid-19 risk perception, confidence in the Covid-19 vaccine, and knowledge of Covid-19. There is a 50.4% chance that attitudes towards Covid-19 can improve if an individual clearly perceives the risk of Covid-19 and is confident that the Covid-19 vaccine is safe. The chance increases by 3% when an individual has knowledge of Covid-19 and its vaccine. The biggest factor that improves an individual's acceptance of vaccines is confidence in the vaccines (26.79%), knowledge of vaccines (14.38%), and risk perception (10.86%). However, this study failed to prove the role of trust to government and beliefs in conspiracies in shaping attitudes towards the Covid-19 vaccine.

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 consequences 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 Covid-19 risk perception along with confidence in the Covid-19 vaccine. These findings support many previous studies that the Covid-19 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., 2020; Soares et al., 2021). Accordingly, it is important to improve awareness of the potential dangers of Covid-19 and to

promote understanding that the Covid-19 vaccine is safe in order 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 comformity 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. Considering this idea, it was initially predicted that trust to government would support a more positive attitude towards the Covid-19 vaccine. 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 towards the Covid-19 vaccine. 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 innacurate 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. The obstacles faced by the researcher 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. 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: Covid-19 risk perception, confidence in the Covid-19 vaccine, and knowledge of Covid-19. The results of this study provide practical implications for efforts to improve attitudes towards vaccines in order to increase vaccine up-take 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's health, but also to the economy and social freedom. These messages need to emphasize the safety, efficacy, and importance of the Covid-19 vaccination as well as accurate general knowledge about Covid-19 and the vaccine. The next 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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