

# The Effect of Psychological Antecedents of Vaccination to Vaccination Behavior of Young Adult in Jabodetabek

Howard Ricardo, Bungarani Pramadefitra and Adhityawarman Menaldi  
*Faculty of Psychology, University of Indonesia, Depok, Indonesia*

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**Abstract:** The viral Covid-19 pandemic has affected public health, economic and well-being significantly throughout the world. In order to reach herd immunity and prevent the transmission of the virus, the Indonesian government launched a vaccination program in January 2021 and it is projected to last for 15 months. This research focuses on understanding the psychological antecedents that affect young adult's intention to be vaccinated, since surveys found that several people in this age group are still vaccine hesitant. 214 online questionnaires from young adults (18-25 years old) in Jabodetabek were analyzed using multiple linear regression analysis. The result indicates that Psychological Antecedents of Vaccination has a significant effect on vaccination behavior,  $F(12, 201) = 9.131$ ,  $p < 0.01$ ,  $R^2 = 0.353$ , with confidence,  $\beta = 0.246$ ,  $t(201) = 3.445$ ,  $p = 0.001$ , collective responsibility,  $\beta = 0.342$ ,  $t(201) = 4.250$ ,  $p = 0.000$  and Perceived Infection,  $\beta = 0.144$ ,  $t(201) = 2.364$ ,  $p = 0.019$  as the significant predictor. This research implies the importance of educating young adults about the effectiveness and the trustworthiness of vaccines and communicating about social responsibility in order to boost their participation in the vaccination program.

## 1 INTRODUCTION

At the end of December 2019 in the city of Wuhan, Hubei Province, China, an outbreak similar to pneumonia appeared and later affected the whole world. This so-called Covid-19 pandemic has a much higher mortality rate per year than the previous coronavirus outbreaks, which are SARS in 2002-2003 and MERS in 2015 (Zhang & Holmes, 2020). In Indonesia, the first case was found in early March 2020 and reached 1,099,687 cases with a total of 30,581 death patients by February 3, 2021 (WHO, 2021).

The Covid-19 pandemic has significantly affected people's physical and mental health, especially for those who were infected with severe symptoms (WHO, 2020a). By December 2020, the global economy also lost 375 billion US dollars, followed by an increase of mortality rate (WHO, 2020b). People are encouraged to adopt a new habit of washing hands frequently, wearing face masks in public places and social distancing. They are enforced to be tested regularly to ensure confirmed cases can be treated and traced immediately (Kemenkes, 2021).

WHO responded by establishing COVAX as a center for Covid-19 vaccine development and distribution. Vaccines can speed up the body's immune response by introducing weakened or

inactivated pathogenic organisms (WHO, 2020c). COVAX has a target of two billion doses of vaccine circulated throughout the world, while the Indonesian government targets 70% vaccine coverage or 181,554,465 people vaccinated (WHO, 2020d; Saputra, 2021). Indonesian vaccination program has started from 13th January 2021 and will last for 15 months in 4 waves (Azizah, 2021).

This program caused one hugely anticipated problem, public vaccine acceptance. This problem emerged because a person's behavior towards vaccines is driven by a combination of several factors such as environment, social influence and motivation (WHO, 2020e). A survey conducted in 34 Indonesian provinces from 19th to 30th September 2020 showed that 27% of the respondents were not confident about the government's intention in spreading the vaccines and 8% of the respondents stated that they didn't want to receive the vaccines (UNICEF, 2020). This supports the other findings that public acceptance is indeed a problem that is also present in various countries with various factors (Detoc, et al., 2020; Leng, et al., 2020; Vai, et al., 2020).

As of April 10, 2021, the initial stage of the vaccination program has covered 24.39% of the first and second wave target recipients (health workers, public officials and elderly) (Saputra, 2021). Young

adult population (18-25 years) will receive the vaccine in the approaching third wave, however, published studies that discuss the psychological factors which shape this age group vaccine behavior are still very few and hard to find. This study aims to find the answer to the prior question, specifically in Jabodetabek. The result of this study will add to the scope of knowledge in the field of Health Psychology and provide an overview to better understand Indonesia's vaccination program.

## 2 LITERATURE REVIEW

### 2.1 Psychological Antecedents of Vaccination

Psychological antecedents of vaccination are psychological reasons that explain people's acceptance of vaccines (Betsch, et al., 2018). Psychological antecedents hereby refer to dimensions of 5C, attitudes toward vaccines and perceived risk of Covid-19 (Betsch, et al., 2018; Martin & Petrie, 2017; Karlsson, et al., 2021).

The dimensions of 5C are confidence (a person's belief in the vaccine and the system), complacency (an estimation that vaccines are not a necessary preventive measure), constraints (structural and psychological barriers), calculation (individual's involvement in seeking more information) and collective responsibilities (the desire to protect others through herd immunity) (Betsch, et al., 2018; Betsch, et al., 2020). The dimensions of attitudes toward vaccines are mistrust of vaccine benefit (individual's perspective regarding the effectivity of vaccines), worries about unforeseen future effects (individual's perspective regarding the safety and side-effects of vaccine), concerns about commercial profiteering (individual's perspective regarding the government's intention), and preference for natural immunity (individual's perspective regarding another natural immunity alternatives) (Martin & Petrie, 2017). The dimensions of perceived risk of Covid-19 are perceived likelihood of infection (a probability of transmission for certain behavior), perceived severity (perception regarding the severity of a disease that can be caused by infection), and worry (individual's concern regarding certain disease) (Karlsson, et al., 2021; Brewer, et al., 2007).

### 2.2 Vaccination Behavior

Vaccination behavior is a vaccine acceptance behavior that is the result of another complex set of

behaviors or comes from a system that is related to humans, government policies, funding and licensing (Brewer, et al., 2018). The scope of vaccination behavior involves complacency, convenience, confidence (SAGE, 2014; Betsch, et al., 2018), vaccine hesitancy (the stage of vaccination motivation in which a person considers whether he will accept or refuse the vaccine) (Brewer, et al., 2018) and vaccination attitude (the attitude behind the rejection or doubt about receiving vaccines and predicting vaccination behavior) (Martin & Petrie, 2017). The term 'vaccination' here refers specifically to Covid-19 vaccination and does not include other general vaccinations such as polio, smallpox and hepatitis vaccination.

## 3 RESEARCH METHOD

This research is a non-experimental quantitative research with a correlational research design. Data from participants aged 18-25 years who live in the Jabodetabek area (Jakarta, Bogor, Depok, Tangerang and Bekasi) was obtained from April 7, 2021 to May 23, 2021 through an online questionnaire platform by using convenience sampling method. 138 participants are needed to achieve a power of .95 with a medium effect size ( $f^2 = .15$ ) and  $\alpha = .05$  based on power a priori analysis of G\*power 3.1.9.7 (Faul, Erdfelder, Lang, & Buchner, 2007).

This study used the 5C Psychological Antecedents of Vaccination instrument composed in 2018 which consists of 15 items that are divided within five dimensions (confidence, complacency, constraints, calculation, collective responsibility). 5C has a good reliability with Cronbach Alpha ranging from 0.71 - 0.85 and correlates with six previous vaccine hesitancy / acceptance scales with  $p < .01$  (Betsch, et al., 2018; Betsch, et al., 2020). This study also used the Vaccination Attitudes Examination (VAX) Scale composed in 2017 to measure attitudes toward vaccines which consists of four dimensions (mistrust of vaccine benefit, worries over unforeseen future effects, concerns about commercial profiteering, and preference for natural immunity) (Martin & Petrie, 2017). VAX Scale has good reliability with Cronbach Alpha ranging from 0.79 - 0.91 and good validity ( $r > 0.49$ ) with related constructs (Wood, et al., 2019). This study also used the Perceived Risk of Covid-19 instrument composed in 2021 which consists of 7 items that are divided within three dimensions (perceived likelihood of infection, perceived severity, and worry) (Karlsson, et al., 2021). All the Psychological Antecedents of Vaccination instruments

were measured using 1-7 point Likert Scale (1 = Strongly Disagree, 7 = Strongly Agree). Meanwhile, the Vaccination Behavior instrument used in this study was composed in 2021 and was measured using one item by 1-5 point Likert Scale (1 = Very Likely, 5 = Very Unlikely) (Karlsson, et al., 2021).

#### 4 RESULT

218 participants filled out the questionnaire and 4 of them were removed due to double submission. The age range of participants was 18-25 years (M = 21, SD = 1.585), where the highest number was found at the age of 21 years at 32.7% (n = 70). 73.8% (n = 158) of the participants were women and 54.2% (n = 116) lived in Jakarta. Most of the participants' occupations were students at 78% (n = 167) and 71% (n = 152) had completed the SMA/SMK (Senior high school) education level.

Table 1: Overview of Research Variables (N=214).

Variable	Min	Max	Mean	SD
Vaccination Behavior	1.00	5.00	4.63	0.718
Confidence	2.33	7.00	5.377	0.922
Complacency	1.00	6.67	2.517	1.028
Constraints	1.00	7.00	2.313	1.219
Calculation	2.67	7.00	5.446	1.088
Collective Responsibility	2.00	7.00	6.117	0.887
VAX	1.33	5.58	3.466	0.893
Perceived Infection	1.00	6.00	3.50	1.108
Perceived Severity: Personal	1.00	5.00	2.88	1.156
Perceived Severity: General	1.00	5.50	4.598	0.834
Perceived Severity: Death Likelihood	1.00	7.00	4.43	1.188
Worry: Ill	1.00	5.00	3.33	1.193
Worry: Transmit	1.00	5.00	4.02	1.142

Table 2: Multiple Linear Regression to Predict Vaccination Behavior (N=214).

Predictor	B	SE	t	P
Constant	1.914	0.600	3.192	0.002
Confidence	0.192	0.056	3.445	0.001
Complacency	0.088	0.056	1.582	0.115
Constraints	0.015	0.046	0.320	0.749
Calculation	-0.07	0.040	-1.76	0.080
Collective Responsibility	0.277	0.065	4.250	0.000
VAX	-0.11	0.063	-1.79	0.074
Perceived Infection	0.094	0.040	2.364	0.019
Perceived Severity: Personal	-0.02	0.040	-0.44	0.662
Perceived Severity: General	0.015	0.068	0.225	0.822
Perceived Severity: Death Likelihood	0.004	0.039	0.097	0.923
Worry: Ill	0.012	0.046	0.255	0.799
Worry: Transmit	0.025	0.043	0.582	0.561

Note: F(12,201) = 9.131, R<sup>2</sup> = 0.353, \*p<0.05, \*\*p<0.001, DV = Vaccination Behavior

The results of the regression analysis showed that there were three significant predictors F(12, 201) = 9.131, p < 0.01, with an R<sup>2</sup> of 0.353, which are confidence ( $\beta = 0.246$ , t(201) = 3.445, p = 0.001), collective responsibility ( $\beta = 0.342$ , t(201) = 4.250, p = 0.000) and perceived infection ( $\beta = 0.144$ , t(201) = 2.364, p = 0.019). This indicates that the 35.3% variance of the Vaccination Behavior score was predicted by the Psychological Antecedent of Vaccination. The results of this analysis show a large effect size because the R<sup>2</sup> value is higher than 0.26 (Cohen, 1988).

#### 5 DISCUSSION

The results of the study showed that Psychological Antecedents of Vaccination, especially confidence,

collective responsibility and perceived infection, significantly influence Vaccination Behavior of young adults in Jabodetabek. This finding supports several previous studies which also emphasize the importance of psychological factors behind vaccine acceptance, for example how providing information regarding virus risk, vaccine safety, clarifying misconceptions about vaccines, clinical details of vaccine provision, framing and clarity of messages can encourage vaccine acceptance (Lawes-Wickwar, et al., 2021).

The research finding that the confidence dimension has a significant effect on Vaccination Behavior supports the research results in Italy, where it was stated that a significant predictor of acceptance of the Covid-19 vaccine was the level of trust in the vaccination administration institution and also a person's personal confidence in the safety of the vaccine (Riccio, et al., 2021). Research in Jordan, Kuwait and Saudi Arabia also shows how trusting the vaccine-related conspiracies can lower public acceptance of vaccines (Sallam, et al., 2021). The Indonesian National Agency of Drug and Food Control has maintained the quality and safety of vaccines since the beginning of the vaccination program by issuing lot release certificates for the Sinovac vaccine, participating in monitoring the development of vaccine clinical trials and conducting evaluations in collaboration with other institutions (Kemenkes, 2021a). By May 12, 2021, 80.8% people in Indonesia were willing to receive the vaccine, which reflects the importance of gaining people's confidence regarding vaccines (Kemenkes, 2021b).

The research finding that the level of collective responsibility significantly influences vaccination behavior supports previous research which states that someone with a high prosocial level and who has an awareness that he is responsible for the safety of others will engage more in health behavior to protect those around him (Kokkoris & Kamleitner., 2020; O'Connor & Evans, 2020). People who were aware of the consequences of the Covid-19 pandemic on their health tended to have an awareness and emotional obligation of their responsibility to adopt prosocial behavior which would encourage them to engage in altruistic and pro-vaccine behavior (Radic, et al., 2021). It can be concluded that the participants of this study have an understanding that the consequences of their behavior regarding vaccination can endanger or help others around them.

The research finding that the level of Perceived Risk of Covid-19, especially Perceived Likelihood of Infection dimension, significantly influences vaccination behavior supports previous research

which states that perceived risk of transmission significantly predicts vaccination behavior (Brewer, et al., 2007). People who perceived themselves prone to Covid-19 transmission would be more likely to receive the vaccine (Karlsson, et al., 2021). Those with low perceived risk of transmission also were found to have a low intention to get vaccinated (Thomson, et al., 2016).

The findings of this study where Complacency, Constraints, Calculation, Attitudes Towards Vaccines, Perceived Severity and Worryness did not significantly influence Vaccination Behavior provide an interesting insight about the dynamic of vaccine behavior. Research showed that demographic factors, such as gender, income, educational level and the social media platform used, played a huge role in predicting people's vaccination behavior (Sallam, et al., 2021). Another research in Japan stated that a person's intention to be vaccinated was influenced by being elderly, living in rural areas or having congenital diseases (Yoda & Katsuyama, 2021). These findings from previous studies implied that demographic factors provide various alterations in the dynamic of people's vaccine behavior, which explained why the results of this age group specific study were different.

## 6 CONCLUSIONS

Based on the results of research analysis, it can be concluded that there is a significant effect of psychological antecedents of vaccination on the level of vaccination behavior in young adults in Jabodetabek, where 35.3% of the variance of vaccination behavior in this age group is influenced by the level of psychological antecedents of vaccination possessed. The first conclusion shows that the confidence dimension has a significant effect on vaccination behavior. This implies that the higher a person's confidence in the safety and effectiveness of the vaccine, as well as in the government administering the vaccination, the higher the level of acceptance of that person's vaccine intention. The second conclusion shows that the dimension of collective responsibility has a significant effect on vaccination behavior. This implies that the higher a person's awareness and responsibility for maintaining personal health behavior because it can affect many people, the higher the level of vaccine acceptance will be. The third conclusion shows that the perceived infection of Covid-19 has a significant effect on vaccination behavior. This implies that the higher people's risk perception regarding Covid-19

transmission, the higher the level of vaccine acceptance will be.

This research can be the basis for the development of further research. Studies that show differences between men and women regarding vaccination receipts (Ricchio, et al., 2021; Murphy, et al., 2021), as well as survey findings where provinces such as Riau (32.1%) and South Sumatra (31.7%) are still has a high level of vaccine hesitancy (Facebook Company, 2021) providing insight that further research can focus on this population and be carried out with comparative study designs and cluster random sampling or quota sampling techniques. Given the results of studies that emphasize the importance of the confidence dimension in young adult vaccine acceptance, further research with an experimental type can focus on this dimension. One of them is to look at the form of media framing or what kind of information sources can increase the confidence level of this age group.

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