Predictors of Preventive Behavior Against COVID-19 among People Living in Sub-Urban Area A Year After Pandemic

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**Abstract.** Corona Virus Disease 19 (COVID-19) has dramatically impacted people's lives by its uncertainty. While preventive behavior is crucial, factors contributing to adopting such behavior are varied in a specific context. This study aimed to examine predictors of COVID-19 preventive behavior of people living in the suburban area of Indonesia one year after the pandemic. A cross-sectional, correlational study recruited 246 people living in a suburban area, Tangerang, Indonesia. A form of personal characteristics, vaccine acceptance, self-efficacy, COVID-19 knowledge, and COVID-19 prevention behavior questionnaires were provided based on validity and reliability test. Factor predictors of COVID-19 prevention behavior were analyzed by linear regression. The results revealed that age negatively predicted preventive behavior, while years of education and self-efficacy positively predicted COVID-19 prevention behavior among people living in a suburban area. 9.6 % of the variation in COVID-19 preventive behavior among people living in suburban areas could be explained by age, education, vaccine acceptance, self-efficacy, and knowledge about COVID-19. The study suggests that older age, low education, and poor self-efficacy need to be the priority group of concern in promoting the adoption of preventive behavior against COVID-19 pandemic.

1. Introduction

Since Corona Virus Disease 19 (COVID-19) was declared a pandemic on 11 March 2020 by World Health Organization (1), it has dramatically impacted people's lives, including economic and health aspects, such as physical, mental, and social. Health measures to prevent the spread of COVID-19, including physical and social distancing, adequate ventilation, wearing a mask, hand hygiene, quarantining, have been continuously reminded and recommended to adopt in daily life. Several guidelines have been adjusted to accommodate the application of the preventive measure in the workplace, school, and other public or community facilities. However, after a year of pandemic, 12.807 COVID-19 death cases and 787,408 new confirmed cases as per April 2021 steadily increased (2), which might reflect the issue of health behavior adoption as COVID-19 prevention behavior.

Moreover, the emerging injection of the COVID-19 vaccine instils hope to the people to end this pandemic's uncertainty, isolation, and negative impact. In particular, at least a 5.7 % population in April and 48.4% people worldwide in October 2021 have been vaccinated for the first dose. It indicates the expectation to learn to live with the virus by changing the way of life, including willingness to get the vaccination. Nevertheless, Indonesia, a lower-middle-income country, reported a slow vaccine rate, making a COVID-19 epicentre in Asia (3). For instance, 21.7 % of Indonesian has completed the total dose as of October 2021 (2), which requires more time and effort to cover 70 % of the population to achieve herd immunity. Thus, people living in the community is suggested to persistently apply health measure to prevent the spread of the virus while participating to get vaccine of COVID-19.

Adopting health-promoting behavior is challenging since many interrelated factors contribute to people adopting and adjusting to the new behavior in their day-to-day lives. Approximately two-thirds of people in Indonesia reported willingness to get the COVID-19 (4). However, the study was an online survey that almost 70 % of the respondents were middle class (4). A previous study found that some factors, such as socio-economic, correlated with vaccine acceptance (5). Hence, the willingness to accept the COVID-19 vaccine might differ from other socio-economic contexts, such as people living in a suburban community.

Moreover, the benefits of vaccination to eradicate COVID-19 is the highlight of health-promoting behavior amidst pandemic situations. However, the adoption of COVID-19 prevention behavior is still an issue even after the pandemic year. For instance, only 32 % of people reported wearing the mask, even though 57 % stated that they know the benefit of wearing it in preventing the spread of the virus (6). Moreover, to our knowledge, vaccination acceptance study and its correlation with COVID-19 preventive behavior are under investigation in Indonesian people living in the suburban area. Hence, some concepts under Pender’ Health Promotion Model (7) and literature review were used to guide this study. Even though few studies have been observed vaccine acceptance (8-10), yet no further analysis in predicting the prevention behavior. Therefore, this study aimed to examine predictors of COVID-19 prevention behavior among people living in sub-urban area of Indonesia a year after the pandemic.

**Methods**

This study was a cross-sectional, correlational design. Based on Slovin’ formula, the required sample was 246 people. Moreover, the current study setting was a suburban area, namely Tangerang City, Banten Province, Indonesia. Consecutive sampling was used with the inclusion criteria of age 18 and has been a permanent resident in Tangerang City. The ethical approval was granted from the Faculty of Medicine and Health, Universitas Muhammadiyah Jakarta (No. 060/PE/KE/FKKUMJ/II/2021). Since the limited internet access in the target population, the questionnaire was directly distributed to the sample by following strict health measures to prevent COVID-19.

Five-part of the questionnaire was used to identify personal characteristics, vaccine acceptance, self-efficacy, COVID-19 knowledge, and COVID-19 prevention behavior for data collection measurement. Firstly, the researcher developed the form of a personal characteristic consisting of age, level of education, monthly expenditure, insurance, and social assistance from the government. Secondly, the COVID-19 knowledge questionnaire was adopted from Clements, Frazier (11) The Cronbach Alpha was 0.55, indicated as acceptable. The third, the Self-efficacy questionnaire, was developed by the researcher based on a literature review. It consists of three items with a 4-rating scale assessing confidence in preventing, avoiding transmission, and encountering any issue infected by COVID-19. The Chronbach Alpha was 0.72 represent good reliability. For the vaccine acceptance, it is a single item, 4-point rating scale asking, “Considering the costs and benefits, how likely would you be to voluntarily get the coronavirus vaccine if it were available to the public?” The last, questionnaire COVID-19 Prevention Behavior was modified from Melesie Taye, Bose (12). It is 13 items with a 4-point rating scale which a higher score indicating the better performance of prevention behavior. The Chronbach Alpha was 0.76 represents good reliability.

Concerning the data analysis, descriptive analysis was performed to measure frequency and percentage of personal characteristics, including age, level of education, monthly expenditure, insurance, and social assistance. Mean, standard deviation, and range were used to measure continuous data from COVID-19 knowledge, vaccine acceptance, self-efficacy and prevention behavior. Moreover, linearity, no multicollinearity, and independent observation assumptions were met prior to linear regression analysis.

**Table 1. Characteristics of People Living in Suburban Area of Indonesia One Year after COVID-19 Pandemic (N=246).**

| Characteristics | N | % |
| --- | --- | --- |
| Age |  |  |
| Late Adolescent (<20 year) | 147 | 59.8 |
| Adults | 76 | 30.9 |
| Middle-age&aging | 23 | 9.3 |
| Level of Education |  |  |
| Low | 200 | 81.3 |
| High | 46 | 18.7 |
| Monthly Expenditure |  |  |
| < 1.2 million IDR | 160 | 65 |
| 1.2 – 6 million IDR | 52 | 21.2 |
| >6 million IDR | 34 | 13.8 |
| Insurance |  |  |
| Insured | 171 | 69.5 |
| Uninsured | 75 | 30.5 |
| Social Assistance |  |  |
| Yes | 106 | 43.1 |
| No | 140 | 56.9 |

**Table 2. COVID-19 preventive behavior frequently performed by people living in sub-urban area.**

|  |  |
| --- | --- |
| **Item** | **%** |
| Wearing face mask when going out | 83.7 |
| Using public transportation | 21.9 |
| Avoiding the crowd | 60.9 |
| Washing hand frequently | 84.1 |
| Maintaining physical distance | 78.1 |
| Consuming nutritious and healthy food | 77.2 |
| Exercise regularly | 30.5 |
| Consuming herbal supplements | 34.5 |
| Consuming vitamin and zinc | 52.4 |
| Not shaking hands | 65.9 |
| Staying at home when sick, unless need medical care | 74.8 |
| Increasing physical activity than before pandemic | 37.8 |
| Complying with the recommended diet | 22.8 |

**Table 3. Descriptive statistic of vaccine acceptance, self-efficacy, COVID-19 knowledge, and COVID-19 preventive behavior.**

|  |  |  |  |
| --- | --- | --- | --- |
| **Variables** | **M** | **SD** | **Range** |
| Vaccine acceptance | 3.15 | 0.93 | 1-4 |
| Self-efficacy | 10.22 | 1.82 | 3-12 |
| COVID-19 knowledge | 17.47 | 1.79 | 11-22 |
| COVID-19 preventive behavior | 35.67 | 5.86 | 19-49 |

**Table 4. Multivariate Regression Analysis of COVID-19 Preventive Behavior.**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Model** | **b** | **SE** | **Beta** | **t** | ***p*-value** |
| Age  Years of education  Self-efficacy  Vaccine acceptance  COVID-19 knowedge | -0.07  1.03  .81  -0.11  0.12 | 0.03  0.44  0.21  0.41  0.20 | -0.13  0.14  0.25  -0.01  0.03 | -2.13  2.31  3.90  -0.27  0.63 | 0.034  0.022  0.000  0.784  0.527 |

Dependent variable: COVID-19 Preventive Behavior

Constant= 23.44, R2= 0.111, Adjusted R2= 0.096, *F* (5, 240) = 5.992, *p* < 0.001

**Results**

Out of 246 participants, half were late adolescent (59.8 %), low level of education, have monthly expenditure <1.2 million IDR (65 %), insured by Universal Health Coverage (69 %), have no received social assistance from government (56.9%). Moreover, the average age of participant was 28.33 and average years of education were 12.32. In this study, the most frequent adoption of preventive behavior was washing hand (84.1%), followed by wearing mask (83.7%), physical distance (78.1%), consuming nutritious food (77.2%), and 74.8 % staying at home when sick (table 2). For acceptance to vaccination, the mean score was 3.15 and SD=0.93, with high average score of self-efficacy, vaccine acceptance, COVID-19 knowledge, and COVID-19 preventive behavior (table 3).

Multiple linear regression was used to examine age, years of education, self-efficacy, vaccine acceptance, and COVID-19 knowledge to predict COVID-19 preventive behavior. Table 4 revealed that factors significantly influencing COVID-19 preventive behavior were self-efficacy (Beta= 0.25, *p*< 0.001), followed by years of education (Beta= 0.14, *p*< 0.05), and age (Beta= -0.13, *p*< 0.05). All variabes in the regression model explained 9.6 % variance of COVID-19 preventive behavior in this study. The predicted equation is:

COVID-19 Preventive Behavior’= 23.44-0.13age+0.14yearseduaction+0.25selfefficacy-0.018vaccineacceptance+ .039COVID-19Knowledge

**Discussion**

Three factors, including age, years of education, and self-efficacy, significantly influenced COVID-19 preventive behavior among people living in sub-urban areas in Indonesia. It is found that the most vital factors that contribute to COVID-19 preventive behavior were self-efficacy, followed by education, and age. The findings imply that good prevention behavior against COVID-19 was influenced by the better perception of people regarding confidence in preventing COVID-19 and managing the spread of the virus through any resources.

For the age, it was negatively influenced COVID-19 preventive behavior. It indicates that older participants were less likely to perform COVID-19 preventive behavior. The study revealed that most participants were late adolescents (< 20 years old). As Gutu, Legese (13) found similar characteristics of age with the present study; they reported that younger age was more prevalent in using social media and tend to show good preventive behavior against COVID-19. In a pandemic situation, advanced age is more likely to decline the protective behavior since they tend to engage more to perform routine activities at home and less contact with the crowd in public or health facilities amidst the COVID-19 (14). Similar results can be explained by younger age that was more likely to perform preventive behavior against COVID-19. It might be because younger age is easier to access health information from social media regarding preventive behavior. It has been suggested from school or university to follow strict measurements against COVID-19 than older people living in the community.

Concerning years of education, education was positively influenced COVID-19 preventive behavior. It shows that people living in a suburban area with longer years of education were more likely to adopt preventive behavior. A high level of education was more prevalent than low education in this study, with an average of 12 years of secondary education. The findings confirmed the study of Bazaid, Aldarhami (15) stated that higher education positively correlated with behavior practice to prevent COVID-19. It might be because a higher level of education could facilitate people to access more information related to COVID-19 and help them understand the provided health information better to adopt in their lives. However, the findings inconsistent with the study of Alagili and Bamashmous (16) reported that higher education was less likely to perform COVID-19 preventive behavior due to a lack of complete understanding of scepticisms. The possible reason to explain this was the previous study conducted at the beginning of the COVID-19 situation, which might affect how people with higher education perceived information about the pandemic, lack of trust to circulated information about the unfamiliar situation, leading to poor adherence to recommended preventive behavior. Meanwhile, the present study evaluated the adoption of COVID-19 preventive behavior a year after the pandemic, which might reflect the difference in people's perception related to the preventive behavior against COVID-19.

Self-efficacy made the most substantial unique contribution in explaining COVID-19 preventive behavior concerning self-efficacy. The results indicate that the higher self-efficacy in preventing the COVID-19 perceived by the people living in a suburban area, the more likely they will adopt the preventive behavior. It could happen because the perception of the ability to encounter problems, such as preventing the COVID-19, could help people adopt new healthy behavior to prevent the COVID-19. As Pender believe that behavior specific cognition, such as self-efficacy increase probability of commitment to perform specific action then influence healthy behavior (7). The findings were consistent with (17, 18) and (19). It confirms the findings of Ab Malik, Mohd (19), who showed that self-efficacy is one of the most significant predictors of COVID-19 preventive behavior in the Malaysian population. Hence, the belief that individuals can enact a behavior is crucial to execute specific actions to achieve the desired outcome, such as to prevent COVID-19.

Noteworthy, it was found that 9.6 % of the variance of COVID-19 preventive behavior could be explained by age, years of education, self-efficacy, vaccine acceptance, and COVID-19 knowledge. This result was higher than the previous study in Indonesia, which reported a 7 % variance of COVID-19 preventive behavior (20). It indicates that other factors need to be explored and examined to predict COVID-19 preventive behavior better. Moreover, it was found that knowledge about COVID-19 was not a significant predictor of preventive behavior, and vaccination acceptance was negatively associated with COVID-19 preventive behavior though it was not statistically significant. It indicates that the higher acceptance rate of vaccination is more likely to decline preventive behavior adoption. It could be a concern for policymakers and healthcare providers to consider innovative strategies in promoting COVID-19 preventive behavior even more in the future since the vaccination program is still administered globally and nationally.

**Conclusion**

This study applied Pender's Health Promotion Model to examine factors influencing COVID-19 preventive behavior a year after the pandemic among people living in sub-urban areas in Indonesia that might have different contexts and have not been explored in previous studies. People with younger age, higher education, and perceived higher self-efficacy were more likely to perform COVID-19 preventive behavior. Despite its strength, this study has some limitations, including a small percentage of older adults could limit the generalization of the study's results. Moreover, this study suggests that prior to providing health promotion in the sub-urban community, health care providers need to consider characteristics of age and education, such as prioritizing group of older age with low education for increasing self-efficacy leading to influence the adoption of COVID-19 preventive behavior.

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