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Applying two behavioral theories to predict the willingness to receive COVID-19 vaccine booster in the elderly: A cross-sectional study

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ABSTRACT

Background: The COVID-19 vaccination booster can effectively protect the elderly from infection while also lowering the risk of serious illness and death. However, barriers remain in willingness of the elderly to boost vaccination.

Objective: Using the protection motivation theory (PMT) and the theory of planned behavior (TPB), to study the factors that influence willingness of the elderly to get the COVID-19 vaccine booster.

Methods: The elderly who visited three randomly selected medical institutions in Nanjing’s core urban region between March and April 2022 were chosen as study participants. A face-to-face survey was conducted using purposeful sampling and a self-designed questionnaire. The questionnaire contained sociodemographic characteristics, the elderly’s willingness to obtain a COVID-19 vaccine booster, and psychosocial cognitive components based on the PMT and TPB. SmartPLS 3.0 was used to conduct structural equation modeling.

Results: 214 participants were included in the analysis. The combined model of the two behavioral theories explained the willingness to accept COVID-19 vaccine booster well with $R^2$ of 0.490. Self-efficacy ($\beta = 0.315$) was the strongest predictor of vaccine booster willingness. Subjective norms ($\beta = 0.160$), perceived severity ($\beta = 0.157$), and perceived vulnerability ($\beta = 0.159$) also showed positive effects on vaccine booster willingness, while response cost ($\beta = -0.143$) had a negative effect on the willingness. No significant association between attitudes, response efficacy and the willingness was discovered.

Conclusion: The willingness of the elderly to receive the COVID-19 vaccine booster was affected by psychosocial cognitive factors. This study supports the applicability of the PMT and TPB models to interpret the willingness of the elderly in such areas.

1. Introduction

By May 2022, the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) had infected nearly 500 million individuals worldwide, with approximately 6 million deaths. Vaccine remains the most promising and cost-effective intervention to control the COVID-19 pandemic. In reality, vaccine has effectively alleviated the spread of the global epidemic. However, COVID-19 still poses a major health threat to vulnerable populations such as the elderly due to virus mutation and other reasons. Although the majority of people infected with the Omicron strain are asymptomatic or mild symptomatic, there are still serious cases of infection, most of which occur in the elderly.

A single dose of COVID-19 vaccine can protect 60%–70% of the elderly from COVID-19 infection, while two doses can protect 85%–90% of the elderly. However, the human body’s immunological level will decline rapidly 6 months after receiving two doses of vaccination.

Keywords:
Elderly
COVID-19 vaccine booster
Vaccination willingness
Protection motivation theory
Theory of planned behavior
Structural equation modeling

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Moreover, the Omicron strain may be able to circumvent the immunity obtained by two doses of vaccine or previous infection. Booster doses of an mRNA-based vaccine significantly reduce the risk of reinfection with COVID-19 and remain effective against the Omicron variants. According to the epidemic data in Hong Kong, China, the mortality rates of COVID-19 people aged 60–69 years, 70–79 years, and 80 years and over who had not been vaccinated with COVID-19 vaccine was 52.5, 34.8, and 13.5 times higher than that of those vaccinated with COVID-19 vaccine booster in the same age groups, respectively. Besides, during the outbreak of Omicron in Jilin, China in March 2022, the number of serious cases among people over 60 years who had received no dose or only one dose of COVID-19 vaccine was 20 times higher than those who had received two or three doses. However, during this period only 79.5% and 29.8% of elderly people aged 60 years and over in this area completed the full and booster vaccination, respectively. In May 2022, there were 264 million people over 60 years in China, of whom 228 million (86.4%) had received a vaccine; however, there were still more than 100 million people (37.9%) who had not received a vaccine booster. This low vaccination coverage seriously compromises the achievement of herd immunity in some countries and regions, which in turn affects local prevention and control measures. The long-standing “dynamic zero-COVID” in China is largely driven by its large elderly population and relatively low vaccination coverage rate. Therefore, it is a topic of international concern to explore the determinants of receiving COVID-19 vaccine booster of the elderly (see Fig. 1).

In addition to external factors such as vaccine availability, several recent studies have focused on vaccine hesitation or intention. The psychosocial cognition of the elderly in line with their age is an important internal factor that influences their vaccination willingness and behavior.

Theory-based studies provide a better understanding of health-related behaviors, and theory-based interventions are more effective in practice. However, little is known regarding the impact of psychosocial factors on the willingness of the elderly to have a COVID-19 booster shot. The cognitive processes of threat appraisal and coping appraisal, according to PMT, play a major role in making decision on protective behaviors. Perceived severity and perceived vulnerability are two main components of threat appraisal. Response efficacy, self-efficacy, and response cost are three main components of coping appraisal. However, PMT solely focuses on people’s cognitive perceptions of threats and coping appraisals, while ignores the impact of other factors such as attitudes on the specific behavior. Moreover, the influence from the individual’s social circle cannot be excluded. According to the TPB, attitudes, subjective norms, and perceived behavioral control are also three key elements that influence behavioral intentions.

This study aimed to evaluate the psychosocial cognitive factors of the willingness of the elderly to get COVID-19 vaccination boosters by integrating PMT and TPB, based on the previous opinions on the two theories and the complementarity of their psychological explanation paths. According to Ajzen, perceived behavioral control is most compatible with the concept of self-efficacy, thus the two variables are treated as the same concept in this study. The following assumptions are offered in this study based on the explanatory cognitive dimensions of the two theories: the elderly’s willingness to get a COVID-19 vaccination booster is positively influenced by perceived severity, perceived vulnerability, self-efficacy, response efficacy, attitudes (positive evaluation), and subjective norms (supportive ones), while negatively influenced by response cost.

2. Methods

2.1. Participants

This study was carried out in Nanjing, Jiangsu Province from March to April 2022. There are five districts in the main urban area of Nanjing. We randomly selected three districts, and then selected one primary medical institution from each district for investigation. Participants were included if they [i] were over 60 years; [ii] had no hearing impairment; and [iii] had certain cognitive ability to correctly understand the questionnaire items and can independently complete the survey. Participants were excluded if they had contraindications to the COVID-19 vaccine. After removing the pre-survey’s sample, 314 participants were selected by purposeful sampling. According to the purpose of this study, participants who had not received COVID-19 vaccine and had received COVID-19 vaccine booster were excluded in the data analysis. Finally, 214 questionnaires were included in the data analysis. The final sample size included in the analysis was larger than the minimum sample size required for structural equation modeling.

2.2. Measures

This study used a self-designed questionnaire. We developed the initial questionnaire by reviewing and analyzing studies on PMT, TPB, and vaccine intention. The first draft of the questionnaire was developed after discussions among the group members. To adjust the language expression and content of the questionnaire, a pilot survey was first conducted among 30 older adults who met the inclusion and exclusion criteria at the sampling points. The questionnaire included three sections:

Sociodemographic characteristics: this section included gender, age, education level, marital status, whether living alone, work status, monthly income, number of chronic diseases, and health status.

Willingness of getting COVID-19 vaccine booster: this section included four items, such as, “I will actively respond to the policy to receive a COVID-19 vaccine booster”. Each item was scored on a five-point Likert scale, ranging from “extremely unwilling” to “extremely willing”. The higher the score, the stronger the intention to vaccinate.

Psychosocial cognitive dimensions based on the integration of PMT and TPB: perceived severity (4 items, e.g., “If I get COVID-19, it will have a serious impact on my life and work”); perceived vulnerability (4 items, e.g., “I haven’t been anywhere else so I can’t get the COVID-19”); response efficacy (4 items, e.g., “COVID-19 booster vaccine can reduce severe COVID-19 pneumonia”); self-efficacy (5 items, e.g., “I’ll go for a booster dose even if the vaccination location is far from where I live”); response cost (3 items, e.g., “COVID-19 booster vaccination cost me extra time and effort”); attitudes (2 items, e.g., “I believe that COVID-19 vaccine booster is very effective in providing enhanced protection against COVID-19 virus.”) and subjective norms (5 items, e.g., “I will go for a booster dose because of government’s promotion”). Each item was rated on a five-point Likert scale, ranging from “totally disagree” to “totally agree”. The higher the score, the higher the level of cognition of the dimension.

Reliability and validity tests were carried out on the items of
vaccination intentions and psychosocial cognitive dimensions. The KMO value was 0.881, the p-value for Bartlett’s test was less than 0.001, the total variance of the dimensions was 67.97%, Cronbach’s α value for the scale was 0.927, and Cronbach’s α values for each dimension ranged from 0.675 to 0.975. The results showed that the scale had good reliability and validity.

2.3. Data collection

Participants were informed of the study’s purpose and the confidentiality of their information by a uniformly trained investigator before the survey. After obtaining the oral informed consent of the participants, the data were collected by face-to-face interviews. The survey time for each participant was approximately 15 min. The respondents received a small daily necessity (eg, a hand cream worth less than 10 RMB (about 1.44 dollars)) as compensation for the time spent on answering the questionnaire.

2.4. Data analysis

To improve accuracy, the data were double entered and checked by Epidata 3.0. Sociodemographic characteristics of the participants and the scores of each psychosocial cognitive dimension were analyzed using SPSS 25.0. Categorical variables were expressed as Frequency (Percentage). Partial Least Squares-Structural Equation Modeling (PLS-SEM) are considered suitable for processing skewed data, exploratory studies, or theoretical extensions, especially when evaluating numerous variables in complex models. The first step was to evaluate the measurement model of the scale. The reliability evaluation indicators included Cronbach’s α and composite reliability (CR). Average variance extracted (AVE) and factor loadings were calculated to assess the convergent validity of the measurement model. The discriminant validity of latent variables was discriminated using the Fornell-Larcker criterion and the heterotrait-monotrait ratio (HTMT). The second step was to conduct a path analysis on each dimension and vaccination willingness in the model. The Goodness-of-Fit (GoF) value was used to evaluate the model’s fit. PLS-SEM analysis was conducted using SmartPLS 3.0. A two-sided test with a significance level of 0.05 was used for all tests.

3. Results

3.1. Sociodemographic characteristics

A total of 214 participants were included in the analysis. The number of females (51.4%) was slightly higher than that of males (48.6%). Most of the participants were under 70 years (61.2%), were married (83.6%), were retired (85.0%), and get secondary education (78.0%). More than half of the participants had a monthly income of more than 5,000 RMB (about 722 dollars) (53.3%) and had two or more kinds of chronic diseases (51.9%). The majority (91.6%) of the participants were not living alone (Table 1).

Table 1 Baseline sociodemographic characteristics (N = 214).

| Variables               | Frequency | Percentage (%) |
|-------------------------|-----------|----------------|
| Gender                  |           |                |
| Male                    | 104       | 48.6          |
| Female                  | 110       | 51.4          |
| Age (years)             |           |                |
| 60–70                   | 131       | 61.2          |
| 70–79                   | 70        | 32.7          |
| ≥80                     | 13        | 6.1           |
| Education level         |           |                |
| Primary education       | 167       | 78.0          |
| Secondary education     | 21        | 9.8           |
| Marital status          |           |                |
| Married                 | 179       | 83.6          |
| Others                  | 35        | 16.4          |
| Living alone            |           |                |
| Yes                     | 18        | 8.4           |
| No                      | 196       | 91.6          |
| Source of income        |           |                |
| Salary                  | 20        | 9.3           |
| Pension                 | 183       | 85.5          |
| Support from children   | 11        | 5.1           |
| Income (RMB per month)  |           |                |
| <5000                   | 100       | 46.7          |
| 5000–10,000             | 73        | 34.1          |
| ≥10,000                 | 41        | 19.2          |
| Chronic diseases        |           |                |
| None                    | 39        | 18.2          |
| One                     | 64        | 29.9          |
| Two or more             | 111       | 51.9          |
| Self-rated health       |           |                |
| Very good/Good          | 97        | 45.3          |
| Fair/Poor               | 117       | 54.7          |

| Dimension              | Items       | Number of people scoring ≤3 | Number of people scoring ≥4 |
|------------------------|-------------|-----------------------------|------------------------------|
| Vaccination willingness (VW) |            |                            |                             |
| VW1                    | 20 (9.3%)   | 194 (90.7%)                 |
| VW2                    | 18 (8.4%)   | 196 (91.6%)                 |
| VW3                    | 25 (11.7%)  | 189 (88.3%)                 |
| VW4                    | 29 (13.6%)  | 185 (86.4%)                 |
| Perceived severity (PS) |            |                            |                             |
| PS1                    | 28 (13.1%)  | 186 (86.9%)                 |
| PS2                    | 70 (32.7%)  | 144 (67.3%)                 |
| PS3                    | 66 (30.8%)  | 148 (69.2%)                 |
| PS4                    | 68 (31.8%)  | 146 (68.2%)                 |
| Perceived vulnerability (PV) |            |                            |                             |
| PV1                    | 109 (50.9%) | 105 (49.1%)                 |
| PV2                    | 141 (65.9%) | 73 (34.1%)                  |
| PV3                    | 146 (68.2%) | 68 (31.8%)                  |
| Response efficacy (RE) |            |                            |                             |
| RE1                    | 38 (17.8%)  | 176 (82.2%)                 |
| RE2                    | 44 (20.6%)  | 170 (79.4%)                 |
| RE3                    | 57 (26.6%)  | 157 (73.4%)                 |
| RE4                    | 28 (13.1%)  | 186 (86.9%)                 |
| Self-efficacy (SE)     |            |                            |                             |
| SE1                    | 50 (23.4%)  | 164 (76.6%)                 |
| SE2                    | 30 (14.0%)  | 184 (86.0%)                 |
| SE3                    | 57 (26.6%)  | 157 (73.4%)                 |
| SE4                    | 28 (13.1%)  | 186 (86.9%)                 |
| SE5                    | 33 (15.4%)  | 181 (84.6%)                 |
| Response cost (RC)     |            |                            |                             |
| RC1                    | 175 (81.8%) | 39 (18.2%)                  |
| RC2                    | 189 (88.3%) | 25 (11.7%)                  |
| RC3                    | 145 (67.8%) | 69 (32.2%)                  |
| Attitudes (AT)         |            |                            |                             |
| AT1                    | 57 (26.6%)  | 157 (73.4%)                 |
| AT2                    | 42 (19.6%)  | 172 (80.4%)                 |
| Subjective norms (SN)  |            |                            |                             |
| SN1                    | 36 (16.8%)  | 178 (83.2%)                 |
| SN2                    | 47 (22.0%)  | 167 (78.0%)                 |
| SN3                    | 26 (12.1%)  | 188 (87.9%)                 |
| SN4                    | 30 (14.3%)  | 175 (81.8%)                 |
| SN5                    | 28 (13.1%)  | 186 (86.9%)                 |

3.2. Distribution of scores for psychosocial cognitive items

The scores for each psychosocial cognitive item are shown in Table 2. Except for response cost, the percentage of the elderly with scores ≥4 in all other dimensions were higher than perceived vulnerability.

3.3. Testing the measurement model

Cronbach’s α of each dimension ranged from 0.756 to 0.923 (>0.700). The CR ranged from 0.852 to 0.945 (>0.800). All the values of Cronbach’s α and CR met the recommended criteria, which indicated that the reliability of each dimension was good. The values of AVE in this model were all greater than 0.500, and the factor loadings of all items were greater than 0.700, indicating that this model had good convergent validity (Supplemental Table 3).

The results of the Fornell-Larcker criterion test are shown in
Supplemental Table 4. The square root of the AVE (value on the diagonal) for each dimension was larger than its correlation coefficient with other dimensions (values in the same row and column). All HTMT values were less than 0.850 (Supplemental Table 1). The results indicated good discriminative validity across dimensions.

3.4. Testing the structural model

$f^2$ is used to evaluate the effect of independent variables on dependent variables in the structural equation model, which should not be less than 0.020. The values of $f^2$ of the paths with statistical significance in this study were all higher than 0.020. $Q^2$ is an indicator of the predictive relevance of latent variables. The value of $Q^2 > 0$, indicates a good predictive correlation of the model. $R^2$ represents the explanatory power of the model for latent variables. The adjusted $R^2$ was 0.490, which was greater than 0.330. Therefore, the constructed model was considered to have moderate explanatory power. The value of GoF was 0.590, which was greater than 0.360, indicating that the model fitted well (Supplemental Table 2).

The path analysis results of the model are shown in Table 3. Self-efficacy ($β = 0.315, P < 0.001$), perceived severity ($β = 0.157, P = 0.020$), perceived vulnerability ($β = 0.159, P = 0.045$), and subjective norms ($β = 0.160, P = 0.015$) all showed direct positive effects on the vaccination willingness, while response cost ($β = -0.143, P = 0.016$) had a negative effect on the intention to vaccinate. This result partially supported the research hypotheses. However, attitudes and response efficacy conferred no significant effect on intention to vaccinate, which was not in line with the hypotheses.

4. Discussion

This study focused on the interpretation of the booster vaccination intention among the elderly. Different from previous studies using some single dimensions of a behavioral theory, this study integrated two behavioral theories (ie, PMT and TPB) for the first time, to systematically construct a multi-dimensional interpretation framework. This study found that subjective norms, perceived severity, perceived vulnerability, and self-efficacy all had a positive impact on the vaccination willingness of the elderly, while response cost hindered their vaccination willingness. The constructed framework had good explanatory and predictive ability for the elderly’s willingness to receive a vaccine booster.

Subjective norms and self-efficacy positively predicted the willingness of the elderly to vaccinate. This is similar to the results of Hao Ran et al. which studied the socio-psychological factors that influence Americans’ intention to vaccinate against COVID-19. For the elderly, encouragements from family, trust in government, and especially advice from physicians influenced their willingness to vaccinate. Americans over 60 years wanted to listen to their doctor’s recommendation before making a decision, even if they were hesitant about getting the COVID-19 vaccine. This may be due to the fact that doctors can advise on whether the elderly can be vaccinated and what type of vaccine they should receive. The elderly’s views on the vaccine may be influenced by family’s concerns about its safety and efficacy. These imply that boosting doctors’ or family members’ awareness of the COVID-19 vaccination booster could help to urge the elderly to get vaccinated in the future. In this study, self-efficacy was found to be the strongest predictor of the intention to receive a COVID-19 vaccine booster among the elderly, and it has been described as a major predictor of health-related behaviors in the elderly in previous studies. Individuals are more likely to be vaccinated if they are confident in their ability to complete the COVID-19 booster dose. According to Bandura’s self-efficacy theory, people can gain self-efficacy by providing them with the knowledge, skills, and resources they need, to make them feel that they can effectively engage in certain behaviors. As a public health practice, the promotion of COVID-19 vaccine boosters in the elderly requires attention to improving the psychological coping strategies in this population, so as to improve their self-efficacy and confidence in their ability to practice the related health behaviors.

The willingness of the elderly to acquire a COVID-19 vaccine booster was positively influenced by their perception of severity. The elderly would be more likely to obtain the COVID-19 booster vaccine if they were informed of the risk of COVID-19. This is consistent with the previous findings on influenza vaccine intention among the elderly. Although there is also a study found that people may be ignorant of the severity of COVID-19 when clinical treatment and therapeutic medications improve, the majority of its participants were adults. The elderly are more concerned about their health, which influences their perception of COVID-19’s dangers. According to the findings of a differential analysis of factors influencing the use of COVID-19 preventive measures by different age groups, people aged 18–34 years were more concerned about the effectiveness of protective behaviors and their ability to implement those behaviors when coping with COVID-19, whereas the elderly over 65 years were more concerned about the disease’s severity. The intentions of the elderly to have a COVID-19 vaccine booster were directly influenced by their perception of vulnerability. The findings imply that the elderly who believe themselves to be at high risk of infection are more likely to receive a COVID-19 booster shot. This is in line with the findings of a previous survey on the willingness of persons over 50 years to be vaccinated against COVID-19. The same results were found in a study conducted in the United States on the willingness of adults to receive the COVID-19 vaccination. However, the score of perceived vulnerability was lower than other dimensions in this study. This may be related to the early-stage epidemic prevention and control in China, which made many elderly people believe they were in a safe environment, thus ignoring their vulnerability to illness. Given the role of vulnerability cognition in improving the willingness of the elderly to receive COVID-19 vaccine booster, the importance of perceived vulnerability in the elderly should be re-emphasized.

The response cost was one issue that kept the elderly from receiving a COVID-19 immunization booster. The willingness of the elderly to obtain a COVID-19 vaccine booster decreased as their self-perceived cost of receiving a COVID-19 vaccine booster increased. A study on the usage of mobile apps for health treatments found that removing perceived barriers enhanced the willingness of older people to use mobile apps for health interventions. Similarly, a study on investigating the willingness to take pneumococcal vaccine among adults over 65 years in Hong Kong found that perceived barriers to pneumococcal vaccination were significantly negatively correlated with intention to receive the pneumococcal vaccine. The elderly with underlying medical issues are particularly concerned about the negative effects of booster immunization. A large body of evidence, however, suggests that adverse reactions to immunization are uncommon in the elderly, although the elderly are unaware of this. In addition, during booster vaccination, the risk of infection with COVID-19 is often taken into account by the elderly. This indicates that there should be clearly defined and uniform operational norms in place for the planning and delivery of inoculation, and medical personnel should strictly adhere to them. Furthermore, the elderly should be appropriately informed of vaccination protection requirements before vaccination, and it should be
mentioned that typical vaccination behavior does not pose a risk of infection.

Response efficacy was not found to be a predictor in this study. This is consistent with the findings of a recent study\textsuperscript{[50]} which suggested that response efficacy cannot predict the intention of vaccination due to uncertainty about whether vaccination can play an important role in controlling the spread of COVID-19. Similarly, no association was observed between attitudes and the willingness. This implies that measures to improve response efficacy or change the attitude towards COVID-19 vaccine boosters may not have obvious effects in intervention.

This study had certain limitations. First, because most of the participants in this study were outpatients from community institutions, there was a potential of selection bias. In addition, the elderly who refused to participate in the survey may differ from those who participated in the survey in certain characteristics, thus resulting in a non-response bias. Some participants may want their answers to be accepted by society, thus creating a social expectation bias. Second, the sample size of this study is small, which limited the generalization of the findings. In the future study, the sample size can be increased by conducting cross-provincial and municipal research. Third, this study was a cross-sectional survey, thus the conclusions drawn cannot indicate causality.

5. Conclusion

Based on a theoretical framework developed by integrating PMT and TPB, this study showed that self-efficacy was the strongest predictor of intention to get a COVID-19 vaccine booster of the elderly. Perceived severity, perceived vulnerability, and subjective norms also positively predicted the intention to acquire a vaccine booster of the elderly, whereas response cost prevents the elderly from taking the booster dose. This study not only aids in understanding the readiness of the elderly to get a COVID-19 vaccination booster, but also provides a theoretical basis for public health personnel to formulate relevant measures.

5.1. Research data availability

The raw data supporting the conclusions of this article will be made available by the authors without undue reservation.

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Author statement

Jingyu Wang: Methodology, Investigation, Writing - Original Draft. Ting Li: Resources, Investigation, Project administration. Jinjin Ge: Data Curation, Formal analysis, Writing - Review & Editing. Meng Zhou: Data Curation, Supervision. Anita Nyarkoa Walker: Writing - Review & Editing. Jiaxin Chen: Investigation. Ting Zhang: Supervision, Visualization. Kangkang Zhang: Visualization. Shuyan Gu: Writing - Review & Editing. Hua You: Project administration, Writing - Review & Editing, Conceptualization, Supervision.

Declaration of competing interest

The authors declare that they have no competing interests.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.sapharm.2022.10.011.

Appendix

| Part II Vaccination willingness |
|--------------------------------|
| If you can get COVID-19 booster vaccine, would you like to: |
| (COVID-19 booster vaccine refers to the dose of the vaccine that is supplemented according to the level of antibody subsidence after the basic dose of the new crown vaccine is completed to maintain the body's immunity to the new crown virus.) |
| 1. Take the initiative to arrange the time and place for COVID-19 booster vaccine: |
| (1) very unwilling (2) unwilling (3) neutral (4) willing (5) very willing |
| 2. Actively respond to the government's call to get COVID-19 booster vaccinated: |
| (1) very unwilling (2) unwilling (3) neutral (4) willing (5) very willing |
| 3. Take the initiative to understand the precautions after getting COVID-19 booster vaccine: |
| (1) very unwilling (2) unwilling (3) neutral (4) willing (5) very willing |
| 4. Take the initiative to learn about the information about COVID-19 booster vaccine: |
| (1) very unwilling (2) unwilling (3) neutral (4) willing (5) very willing |

| Part III Items based on PMT and TPB |
|------------------------------------|
| PS1 If I contract COVID-19, it will cause serious harm to my physical and mental health |
| PS2 If I get COVID-19, the cost of cure is very high |
| PS3 I would be terrified if I got COVID-19 |
| PS4 If I don't get COVID-19 booster vaccine, it will reduce the immune effect of the previous vaccine |
| PV1 For now, COVID-19 is still there, so I may get it |
| PV2 I haven't been anywhere else so I can't get COVID-19 |
| PV3 No one around me get COVID-19, so I won't get it |
| PV4 If I don't get COVID-19 booster vaccine, it will increase the possibility of me contracting COVID-19 |
| RE1 COVID-19 booster vaccine can reduce the possibility of severe symptoms |

(continued on next page)
I will get COVID-19 booster vaccine because of the unified arrangement of the community or unit

I will get COVID-19 booster vaccine because of the advice of my relatives, friends and medical staff

The possible adverse reactions of COVID-19 booster vaccine will cause my inner worries and fears

Getting COVID-19 booster vaccine could have potential long-term effects on my health

I will get COVID-19 booster vaccine because of the advice of my colleagues. I think COVID-19 booster vaccine is more effective than the base shot alone

I will get COVID-19 booster vaccine because of low awareness or ignorance about the booster vaccine

I will get COVID-19 booster vaccine because of the recommendation of my doctors

I will get COVID-19 booster vaccine because of the high efficacy of the vaccine

I will get COVID-19 booster vaccine because the idea of preventive measures against Covid-19 has been well cultivated or popularized

I will get COVID-19 booster vaccine for the benefit of my family and friends

I will get COVID-19 booster vaccine because of the science or evidence-based belief

I will get COVID-19 booster vaccine because of the medical staff or community service

I will get COVID-19 booster vaccine because of the personal need and medical demand

I will get COVID-19 booster vaccine because of the experienced or observed safety of the vaccine

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