Willfulness-to-pay for a booster dose of inactivated SARS-CoV-2 vaccine in Taizhou, China

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ABSTRACT
This study was conducted to ascertain whether people in China would be willing to pay for an inactivated COVID-19 vaccine booster dose. An online survey estimating participants' willingness to pay (WTP) for a booster dose of COVID-19 vaccine was conducted in Taizhou, China. The participants received an e-mail or e-poster on WeChat. A total of 1576 subjects participated the survey. A total of 66.4% (1046/1576) of the respondents were willing to pay for a booster dose of COVID-19 vaccine for themselves. Using binary logistic regression analysis, the following factors were significantly related to a WTP for a booster dose of COVID-19 vaccine: 1) confidence in the safety of the COVID-19 vaccines (high vs. low, OR: 4.30, 95%CI: 1.61–11.43), 2) confidence in the preventive effectiveness of the COVID-19 vaccines against SARS-CoV-2 virus (moderate vs. little, OR: 1.76, 95%CI: 1.30–2.38; great vs. little, OR: 2.244, 95%CI: 1.62–3.12), and 3) COVID-19 vaccine hesitancy (unhesitant vs. very unhesitant, OR: 0.67, 95%CI: 0.45–1.02; hesitant vs. very unhesitant, OR: 0.29, 95%CI: 0.19–0.44; very hesitant vs. very unhesitant, OR: 0.09, 95%CI: 0.03–0.27). This study revealed that a moderate proportion of participants responded that they would be willing to pay for a booster dose of COVID-19 vaccine. These findings suggest the importance of a detailed assessment and a health education plan that better understands the population’s risk perception as well as the potential health risks in China.

Introduction
Coronavirus disease 2019 (COVID-19) is a contagious respiratory infection caused by the severe acute respiratory syndrome coronavirus 2 pathogen (SARS-CoV-2). Vaccinations are the most useful approach to prevent the COVID-19 pandemic from spreading due to their population-wide sensitivity to the virus. In China, the Sinopharm vaccine and Sinovac-CoronaVac are inactivated SARS-CoV-2 vaccines. They have been approved for mass vaccination and registered for Emergency Use Authorization by the WHO. These vaccines have been shown to have good immunogenicity. The inoculations have vaccine-induced neutralizing antibodies against SARS-CoV-2. Although a satisfactory immune response was observed in the general population, careful monitoring of the long-term effects after the initial injection as well as assessing the timing of a booster dose is essential to control COVID-19.

Willingness to pay (WTP) is a method that assesses the maximum amount that individuals are willing to expend on health plans, services, and medical interventions. This concept could also provide a reference for vaccine demand projections and pricing. WTP is a contingent valuation. It includes an imagined estimation that allows individuals to provide the maximum cost they would be willing to pay for a medical service using a structured questionnaire. From an economic viewpoint, the WTP method assumes that an individuals' well-being is based on both their earnings and health. An individual’s WTP is the maximum fee that one would pay for clinical treatment. This treatment would restore the individual to full health while maintaining a consistent status of full health.

The WTP for a booster dose of the COVID-19 vaccine has rarely been studied worldwide. It is well known that a single dose does not immunize 100% of those who receive it. Coupled that the SARS-CoV-2 vaccine is prone to mutation and the vaccine is time-sensitive, it requires us to take booster shots on top of previous COVID-19 vaccination. Declines in vaccine efficacy over time are also believed to be responsible for the resurgence of the epidemic. Up to now, all the COVID-19 vaccines are free of charge for all persons in China. However, it may not be immunized for life. As vaccine effectiveness declines and the virus mutates, it is likely that vaccines will need to be re-vaccinated in the future. Given the limited medical resources available, vaccine use is likely to be costly. Therefore, it is very important to assess the willingness of parents to pay for COVID-19 vaccine for COVID-19 prevention and control. This study aimed to explore whether people in China would be willing to pay for a COVID-19 booster dose of vaccine.
Methods

Study design and data collection

We organized a cross-sectional population-based online survey using the WeChat-incorporated Wen-Juan-Xing platform (Changsha Ranxing Information Technology Co., Ltd., Hunan, China), which is used reachable to a large population in China. The detailed study design had been described in the previous study. A convenient sample was selected to receive an invitation for the survey via WeChat. The interviewees volunteered to answer a self-administered questionnaire by scanning the quick response (i.e., “QR”) code on their mobile smartphones from August 5th to 11th, 2021. After quality control, 1576 interviewees with valid data were included in this study, corresponding to a response rate of 68.0% (1576/2318). This survey was exempted from written informed consent and was approved by the Ethics Committee of Taizhou Hospital of Zhejiang Province (K20210705). All programs were carried out according to the standards of our ethics committee and adhered to the tenets of the Declaration of Helsinki.

Structured questionnaires and measurement of WTP values

We designed a self-administered questionnaire based on previous studies and frameworks on assessing WTP for vaccination against infectious diseases such as pneumococcal conjugate vaccine and influenza vaccine. In order to ensure that the formal questionnaire is comprehensive, scientific and unambiguous, We invited 50 adults to participate in the initial questionnaire test and then revised unreliable questions based on the feedback from the test population.

The questionnaire consisted of several sections as follows: 1) basic demographic characteristics, such as age, sex, residence, educational level, and occupation; 2) personal background information, such as history of chronic disease, influenza vaccination, and allergy to vaccine; 3) knowledge, attitudes, and practices toward the SARS-CoV-2 vaccine; 4) risk perception toward COVID-19 plus willingness to receive and pay for the COVID-19 vaccine for themselves.

WTP is defined as the maximum amount of money someone would be likely to spend to get vaccination. Regarding the fourth section, parents’ WTP for the booster dose of the COVID-19 vaccine for themselves was tested by two questions: 1) “Would you like to be vaccinated if you have to pay for the booster dose of the COVID-19 vaccine?” (There were two items: yes or no) and 2) “How much would you be willing to pay for the booster dose of the COVID-19 vaccine for yourself?” (There were four response options: <100, 100–199, 200–299, 300–399, 400–499, and ≥500 CNY). Considering that individuals’ mean WTP for full COVID-19 vaccination was CNY 254 (USD 36.8) with median of CNY 100 (USD 14.5) in China, also due to the small number of responses for 300–399 CNY, 400–499 CNY, and ≥500 CNY, we classified willing-to-pay into four level: no, 0–99, 100–199, and ≥200 CNY.

Statistical analysis

The dependent variable of the survey was parents’ WTP for the booster dose of the COVID-19 vaccine for themselves. Counts and frequency distributions were displayed for classified data, and χ² (chi-square) tests were used to examine the association between categorical variables and willing/unwilling to pay. The potential factors associated with participants’ WTP, such as sex, age, residence, education, occupation, risk perception of COVID-19, and knowledge and attitudes regarding the COVID-19 vaccine, were initially evaluated using the chi-square test.

Two step binary logistic regression was then applied to identify the factors related to participants’ WTP for a booster dose of COVID-19 vaccine, with the odds ratio (OR) and 95% confidence interval (CI). Independent variables that were significant in the univariate analyses were included in the logistic regression initial model. The second step logistics regression analysis to obtain a final model with only significant variables in the initial model. All data were analyzed using IBM SPSS Statistics software (version 22.0; SPSS Inc., Chicago, IL, USA). A P-value of <0.05, was determined to be statistically significant for the study samples.

Results

A total of 1576 interviewees participated with a 68.0% response rate. The mean age was 40.4 ± 5.6 years (range: 18–76 years), and 52.5% were 40 years and above. Most of the respondents were female (77%), living in urban areas (76.9%), had junior college and above education (50.6%), and had a history of previous influenza vaccination (66.4%). Approximately one-tenth (10.3%, 163/1576) reported that they had chronic diseases such as hypertension, diabetes, chronic liver disease, and/or kidney disease. A total of 8.6% (135/1576) reported that they had an allergic reaction to vaccines.

Overall, 66.4% (1046/1576) of respondents were willing to pay for a booster dose of COVID-19 vaccine for themselves, while 33.6% (530/1576) of respondents were unwilling to pay. Regarding the amount of money to willing to pay, as shown in Figure 1, 46.2% (728/1576), 14.3% (226/1576) and 5.8% (1046/1576) of the respondents were willing to pay less than 100 CNY, 100–199 CNY, and more than or equal to 200 CNY for the booster vaccination, respectively.

Table 1 shows the significant factors associated with higher willing-to-pay for a booster vaccination against COVID-19 were without chronic diseases ($\chi^2 = 4.551, P = .033$), without allergic reactions to other vaccines ($\chi^2 = 13.944, P < .001$), having low perceived susceptibility to COVID-19 ($\chi^2 = 6.805, P < .03$), following the news of the COVID-19 vaccines, ($\chi^2 = 4.507, P < .034$), having an enhanced knowledge regarding the COVID-19 vaccine ($\chi^2 = 38.061, <.001$), having high confidence in the safety of the COVID-19 vaccines ($\chi^2 = 127.819, <.001$), believing that the COVID-19 vaccines have an effect on preventing SARS-CoV-2 virus ($\chi^2 = 133.177, P < .001$) and its’ variants ($\chi^2 = 85.123, P <.001$), full-course vaccine recipients ($\chi^2 = 8.401, P <.004$), and not hesitating to receive the COVID-19 vaccine previously ($\chi^2 = 166.638, P <.001$). No differences were observed in age, sex, residence, educational level, occupation, or influenza vaccination history between those who were willing or unwilling to pay (P > .05).
The effects of independent factors on participants’ WTP for a booster dose of COVID-19 vaccine were further examined using the binary logistic regression final model. As illustrated in Table 2, the respondents with high confidence in the safety of the COVID-19 vaccines (high vs. low, OR: 4.30, 95%CI: 1.61–11.43), and moderate or great confidence in the effectiveness of the COVID-19 vaccines against SARS-CoV-2 virus (moderate vs. little, OR: 1.76, 95%CI: 1.30–2.38; great vs. little, OR: 2.244, 95%CI: 1.62–3.12) would be more likely to pay, while those with COVID-19 vaccine hesitancy were less likely to pay (unhesitant vs. very unhesitant, OR: 0.67, 95%CI: 0.45–1.02; hesitant vs. very hesitant, OR: 0.29, 95%CI: 0.19–0.44; very hesitant vs. very unhesitant, OR: 0.09, 95%CI: 0.03–0.27) for a booster dose of the COVID-19 vaccine.

Discussion

Clinical implications

The medical resources that the government can provide are limited. However, the medical needs of the people are unlimited. All medical policies are determined considering the best interests of the people. SARS-CoV-2 variants and a decline in vaccine efficacy over time are thought to be responsible for the resurgence of the epidemic. Vaccine-induced antibodies are the first barrier against infection. The antibody level response to vaccines is the most important biomarker of vaccine efficacy. As we are aware, inactivated vaccines are not as long lived as vaccines that continue to stimulate the immune system. Previous studies have shown that vaccine-induced neutralizing antibody titers decrease over time. Consequently, the lower the neutralizing antibody titers, the higher the risk of infection. A retrospective study of healthcare personnel who received two doses of COVID-19 vaccine in Thailand showed that antibody levels detected 60 days after vaccination were lower than those detected within 60 days of receiving CoronaVac.\(^\text{18}\) The effectiveness of COVID-19 vaccines from various technical routes in protecting against delta variants has decreased to varying degrees. The risk of breakthrough infection increases with the length of time from the initial vaccination.\(^\text{19}\) Given that the immune response of the COVID-19 vaccine attenuates, it is worth considering the immunogenicity, safety, and efficacy of booster doses of COVID-19 vaccine.

Based on the theory of welfare economy, the advantage of a healthcare service or intervention is viewed as one’s maximum WTP value for the service or intervention.\(^\text{20}\) The social benefit of the intervention is a summary of each subject’s WTP value.\(^\text{8}\) Assessment of WTP values as a measurement tool for a subjects’ satisfaction with booster doses of COVID-19 vaccine could lead to an understanding of how much an individual values this medical intervention. It also could measure whether one would pay and at what price one would pay to receive a specific intervention for COVID-19. However, one significant weakness of the WTP assessment is that it is hypothetical. Regardless of the individual’s answer to the study tool, at the conclusion of the interview, the individual had not yet paid an actual price. What people say they will do and what they really do may be inconsistent.\(^\text{7}\)

It is critical that as many people as possible receive the vaccine once it becomes available.\(^\text{3}\) Previous studies on health economic evaluations and health care have indicated advancing interest in the use of WTP questions. This could serve as an instrument of health advantages.\(^\text{21,22,23}\) Although academic WTP surveys have been conducted to assess the relative values of various vaccinations, they have rarely been used for booster doses of COVID-19. We believe that a WTP questionnaire would assist in evaluating the most acceptable price of booster doses for the general population at risk of COVID-19. Our study showed that 66.4% of the respondents were willing to pay for a booster dose of COVID-19 vaccine for themselves. That was lower than the results of another online survey, in which the vast majority (92.8%) of respondents reported an annual willingness to pay between 0 and 300 CNY (0-46.29 USD) for a booster vaccination.\(^\text{24}\) In addition, this study revealed that 33.6% of participants would not like to pay for a booster dose of COVID-19 vaccine to prevent the disease. This indicates that these respondents were not concerned that COVID-19 would decrease their quality of life.

**Figure 1.** Distribution of willingness to pay in price for the booster dose of COVID-19 vaccine.
Table 1. Sociodemographic characteristics of participants who are willing or unwilling to pay for the booster dose of COVID-19 vaccine (n = 1576).

| Variables                      | Unwilling to pay (n = 530) | Willing to pay (n = 1046) | χ²   | P     |
|--------------------------------|-----------------------------|---------------------------|------|-------|
| Age (years)                    |                             |                           |      |       |
| <40 years                      | 246 (32.8)                  | 503 (67.2)                | 0.395| .530  |
| ≥40 years                      | 284 (34.3)                  | 543 (65.7)                |      |       |
| Sex                            |                             |                           |      |       |
| Female                         | 395 (32.6)                  | 818 (67.4)                | 2.679| .102  |
| Male                           | 135 (37.2)                  | 228 (62.8)                |      |       |
| Residence                      |                             |                           |      |       |
| Rural/town                     | 116 (31.9)                  | 248 (68.1)                | 0.658| .417  |
| Urban                          | 414 (34.2)                  | 798 (65.8)                |      |       |
| Education level                |                             |                           |      |       |
| Junior Secondary and below     | 128 (29.8)                  | 301 (70.2)                | 6.849| .077  |
| Senior Secondary               | 116 (33.2)                  | 233 (66.8)                |      |       |
| Junior College                 | 273 (36.5)                  | 475 (63.5)                |      |       |
| Undergraduate and above        | 13 (26.0)                   | 37 (74.0)                 |      |       |
| Occupation                     |                             |                           |      |       |
| Medical Staff                  | 37 (30.1)                   | 86 (69.9)                 | 0.752| .386  |
| Others                         | 493 (33.9)                  | 960 (66.1)                |      |       |
| Have you ever been vaccinated against influenza? |                   |                           |      |       |
| Yes                            | 341 (32.6)                  | 705 (67.4)                | 1.476| .244  |
| No                             | 189 (35.7)                  | 341 (64.3)                |      |       |
| Have you ever had an allergic reaction to a vaccine? |                   |                           |      |       |
| Yes                            | 65 (48.1)                   | 70 (51.9)                 | 13.944| <.001 |
| No                             | 465 (32.3)                  | 976 (67.7)                |      |       |
| Do you suffer from chronic diseases? |                   |                           |      |       |
| Yes                            | 67 (41.1)                   | 96 (58.9)                 | 4.551| .033  |
| No                             | 463 (32.8)                  | 950 (67.2)                |      |       |
| Have you been following the news of the COVID-19 vaccines? |                   |                           |      |       |
| Yes                            | 484 (32.9)                  | 985 (67.1)                | 4.507| .034  |
| No                             | 46 (43.0)                   | 61 (57.0)                 |      |       |
| Risk perception of COVID-19   |                             |                           |      |       |
| High                           | 97 (34.5)                   | 184 (65.5)                | 6.805| .033  |
| Moderate                       | 192 (37.6)                  | 318 (62.4)                |      |       |
| Low                            | 241 (30.7)                  | 544 (69.3)                |      |       |
| Knowledge on the COVID-19 vaccine |                             |                           |      |       |
| High                           | 314 (29.3)                  | 759 (70.7)                | 38.061| <.001 |
| Moderate                       | 189 (41.0)                  | 272 (59.0)                |      |       |
| Low                            | 27 (64.3)                   | 15 (35.7)                 |      |       |
| Do you think the vaccine is safe? |                             |                           |      |       |
| High                           | 324 (26.5)                  | 898 (73.5)                | 127.819| <.001 |
| Moderate                       | 186 (56.7)                  | 142 (43.3)                |      |       |
| Low                            | 20 (76.9)                   | 6 (23.1)                  |      |       |
| Do you think the vaccine has a preventive effect on COVID-19? |                   |                           |      |       |
| Great                          | 126 (21.7)                  | 454 (78.3)                | 133.177| <.001 |
| Moderate                       | 185 (30.3)                  | 426 (69.7)                |      |       |
| Little                         | 219 (56.9)                  | 166 (43.1)                |      |       |
| Do you think the vaccine is effective against SARS-CoV-2 variants? |                   |                           |      |       |
| Useful                         | 125 (21.0)                  | 471 (79.0)                | 85.123| <.001 |
| Possible useful                | 254 (37.4)                  | 425 (62.6)                |      |       |
| Possible useless               | 67 (53.6)                   | 58 (46.4)                 |      |       |
| Unclear                        | 84 (47.7)                   | 92 (52.3)                 |      |       |
| Have you been vaccinated against COVID-19? |                   |                           |      |       |
| Yes                            | 499 (32.9)                  | 1016 (67.1)               | 8.401| .004  |
| No                             | 31 (50.8)                   | 30 (49.2)                 |      |       |
| Have you ever been hesitant to uptake the COVID-19 vaccine? |                   |                           |      |       |
| Very hesitant                  | 23 (85.2)                   | 4 (14.8)                  | 166.638| <.001 |
| Hesitant                       | 265 (52.2)                  | 243 (47.8)                |      |       |
| Unhesitant                     | 209 (25.0)                  | 626 (75.0)                |      |       |
| Very unhesitant                | 33 (16.0)                   | 173 (84.0)                |      |       |

Stronger WTP for COVID-19 vaccine were found in respondents with high confidence in the safety and preventive effectiveness of vaccines or low vaccine hesitancy. This implies that attitudes of safety, effectiveness, and hesitancy regarding COVID-19 vaccines relate to a reduced quality of life. Many studies have shown that respondents’ confidence in the efficacy and safety of the COVID-19 vaccine is also considered an independent predictor of COVID-19 vaccine acceptance and vaccine hesitancy: if the participants were optimistic about the effectiveness of the vaccination, and believed vaccination alleviates the concern and fear about the COVID-19 infection and less concerned about its side effects, then they were more likely to pay for vaccination. This underscores the importance of maintaining confidence in the COVID-19 vaccine.25,26 Thus, such respondents would pay more to avoid the sequelae of COVID-19. Recent evidence from China also showed that people who reckoned that COVID-19 pandemic in China was declining were not willing to pay.17 Currently, most people in
Table 2. Factors associated with willingness to pay for the booster dose of COVID-19 vaccine among participants (n = 1576).

| Independent Variables                                                                 | P    | OR    | 95% CI |
|---------------------------------------------------------------------------------------|------|-------|--------|
| **Initial model**                                                                     |      |       |        |
| Suffering from chronic diseases (Yes vs. No)                                          | .675 | 0.92  | 0.64–1.34 |
| History of allergic reaction to a vaccine (Yes vs. No)                                | .186 | 0.76  | 0.51–1.14 |
| Have you been following the news of the COVID-19 vaccines? (Yes vs. No)               | .901 | 1.03  | 0.65–1.62 |
| Risk perception of COVID-19                                                           |      |       |        |
| High vs. low                                                                          | .245 | 0.83  | 0.60–1.14 |
| Moderate vs. low                                                                      | .558 | 0.93  | 0.71–1.20 |
| Knowledge on the COVID-19 vaccine                                                     |      |       |        |
| High vs. low                                                                          | .082 | 1.89  | 0.92–3.89 |
| Moderate vs. low                                                                      | .127 | 1.75  | 0.85–3.60 |
| Do you think the COVID-19 vaccine is safe?                                            |      |       |        |
| High vs. low                                                                          | .005 | 4.08  | 1.51–11.00 |
| Moderate vs. low                                                                      | .105 | 2.30  | 0.84–6.31 |
| Do you think the vaccine has a preventive effect on COVID-19?                         |      |       |        |
| Great vs. little                                                                      | <.001| 1.96  | 1.36–2.83 |
| Moderate vs. little                                                                   | .002 | 1.64  | 1.20–2.24 |
| Do you think the vaccine is effective against SARS-CoV-2 variants?                   |      |       |        |
| Useful vs. not sure                                                                   | .237 | 1.29  | 0.85–1.98 |
| Possible useful vs. not sure                                                          | .827 | 1.04  | 0.72–1.52 |
| Possible useless vs. not sure                                                         | .940 | 0.98  | 0.59–1.64 |
| Have you been vaccinated against COVID-19? (Yes vs. No)                               | .293 | 1.37  | 0.76–2.47 |
| Have you ever been hesitant to uptake the COVID-19 vaccine?                           |      |       |        |
| Very hesitant vs. very unhesitant                                                     | <.001| 0.10  | 0.03–0.31 |
| Hesitant vs. very unhesitant                                                          | <.001| 0.31  | 0.20–0.48 |
| Unhesitant vs. very unhesitant                                                        | .073 | 0.68  | 0.45–1.04 |
| **Final model**                                                                      |      |       |        |
| Do you think the COVID-19 vaccine is safe?                                            |      |       |        |
| High vs. low                                                                          | .004 | 4.30  | 1.61–11.43 |
| Moderate vs. low                                                                      | .118 | 2.21  | 0.82–5.97 |
| Do you think the vaccine has a preventive effect on COVID-19?                         |      |       |        |
| Great vs. little                                                                      | <.001| 2.244 | 1.62–3.12 |
| Moderate vs. little                                                                   | <.001| 1.76  | 1.30–2.38 |
| Have you ever been hesitant to uptake the COVID-19 vaccine?                           |      |       |        |
| Very hesitant vs. very unhesitant                                                     | <.001| 0.09  | 0.03–0.27 |
| Hesitant vs. very unhesitant                                                          | <.001| 0.29  | 0.19–0.44 |
| Unhesitant vs. very unhesitant                                                        | 0.060| 0.67  | 0.45–1.02 |

Final model: Only significant variables in the initial model were included.

China are vaccinated, taken together with our findings, their perception of the risk of being infected, the benefits of being vaccinated and the trust in the safety of the vaccination turned out to effect WTP the most.

**Methodological considerations**

There were several advantages to the methodological considerations in this study. First, the WTP tool involves the valuation of interests in the same cost unit. This is necessary for promoting quick medical decision-making regarding allocation of resources. It sets an enhanced potential for detecting all corresponding subjects, choices, and altruistic belief values regarding preventive interventions. Second, we adjusted for other possible booster doses of COVID-19 vaccine-associated factors that might influence WTP values using a logistic regression model. However, this study had some disadvantages. First, Taizhou is only one area of China, and our sample is not representative of the whole citizens. That is, the generalizability of the results is uncertain. Second, although the study target population are relatively young and less representative of the general population, young and middle-aged parents are the decision makers in the case of family members (including their children, the elderly and themselves) vaccination as they are responsible for them. Third, we did not collect information on children’s WTP, which may influence parents’ decision to pay. Fourth, respondents only had to choose the range of money they were willing to pay rather than fill in the respective amount, so we couldn’t calculate the mean and standard deviation of the maximum amount they were willing to pay for the booster shot. In addition, a social desirability bias may be inevitable when subjects tend to respond to beneficial options. Due to data collection without sufficient time, we could not correctly identify the “actual” WTP values of booster doses of COVID-19 vaccine. Finally, our estimates were explored at only one point in time and, by clear assessment, could not be applied to consider long-term WTP values. Further epidemiological and longitudinal investigations are essential. This is not only to extrapolate these findings to other regions of China, but also to better understand the causal relationship between additional factors and WTP. This understanding may assist in increasing the acceptance of booster doses of COVID-19 vaccines.

**Conclusion**

In conclusion, this study found that a moderate proportion of subjects reported a WTP for a booster dose of the COVID-19 vaccine. These findings suggest the importance of a detailed assessment and a health education plan that better understands the risk perception and potential health risks in China. Public policy plans require an overall cost-benefit analysis. WTP for...
a booster dose of COVID-19 vaccine would measure the interest in adequate therapy or a vaccine to reduce the risk of repeated widespread outbreaks.

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Author’s contributions
J.S. Z. and T.H.T. conceived the study. M.X.Z., J.S. Z. and T.H.T. designed the questionnaire. J.S. Z. collected the data. M.X.Z. was responsible for the coding of the analyses. T.H.T., M.X.Z. and X.Q.L. analyzed and interpreted the data, and wrote the first draft of the paper. X.Q.L. and Y.C. searched, sorted and interpreted the relevant literature. All authors edited and approved the final manuscript.

Disclosure statement
No potential conflict of interest was reported by the author(s).

Data sharing statement
All data underlying the findings are within the paper.

Ethics approval and consent to participate
This study was exempted from informed consent and approved by the Ethics Committee of Taizhou Hospital of Zhejiang Province (Approval number: K20210705) in China.

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