

# Exploring Nursing Students' Awareness and Willingness to Participate in Multi-Site Practice: A Cross-Sectional Study

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**Background:** With the growing awareness of health and the expanding aging population, the demand for health services continues to rise. According to statistics from China, the number of professionals engaged in medical and health care services is insufficient to meet the public's needs, particularly in terms of nursing human resources in medical institutions. Multi-site practice may offer a potential solution to this issue.

**Aim:** To investigate the willingness and motivation of nursing students for multi-site practice of reference and nurse, and to lay a foundation for subsequent research.

**Research Questions:** 1. How much do nursing students know about multi-site practice? What are the main sources of their knowledge of multi-site practice? 2. What are the main intentions and motivations of nursing students to participate in multi-site practice? For example, is it for financial gain, self-worth, or other reasons? 3. What are the potential barriers for nursing students to participate in multi-site practice in the future? For example, will inadequate laws and regulations, occupational safety issues or excessive work load affect their willingness?

**Methods:** This cross-sectional study was conducted across eight provinces in China, involving 1014 nursing students who participated in an online survey between October and November 2021.

**Results:** Among the 1014 nursing students surveyed, 61.74% were introduced to multi-site practice through their educational institutions, 75.25% expressed support for multi-site practice, and 53.75% indicated a willingness to engage in multi-site practice. However, a smaller percentage of students reported having a comprehensive understanding of multi-site practice. Notably, 61.74% of students cited their schools as the primary source of multi-site practice-related knowledge.

**Conclusion:** Nursing students demonstrate positive attitudes toward multi-site practice and a willingness to participate. However, awareness of multi-site practice could be enhanced, and a standardized multi-site practice training system and model should be developed.

**Keywords:** nursing students, multi-site practice, awareness, willingness

## Introduction

According to the data of China's Bureau of Statistics, by the end of 2020, although there were more than 4.7 million registered nurses in China, there were only 3.34 registered nurses per 1000 people, far behind Switzerland (18.37 registered nurses per



1000 people), Japan (12.10 registered nurses per 1000 people), the United States (11.98 registered nurses per 1000 people), Britain (8.68 registered nurses per 1000 people) and South Korea (8.37 registered nurses per 1000 people).<sup>1</sup>

The increasing aging population in China is expected to reach critical mass around the year 2035. Public health emergencies such as COVID-19 and the continuing impact further increases the demand for care and the gap in care in China.<sup>2</sup> Multi-site practice (MSP) of nurse refers to a practice form in which registered nurses can engage in nursing work in multiple medical institutions or places after registering in one hospital. This practice model allows nurses to provide nursing services in a variety of locations, including hospitals, homes, communities, private clinics, long-term care facilities, etc.<sup>3</sup> Following MSP of nurse, relevant departments approve qualified nurses to practice in two or more institutions, which are not limited to medical institutions.<sup>4</sup> This means that one nurse can provide health services in multiple places, meeting the growing demand for health services. With the development of society, nurses' MSP is increasingly getting more focus. In many developed countries, such as the United States and Britain, nurses can carry out MSP as long as they are legally certified.<sup>5</sup> The form of practice is also flexible and diverse. The nurse MSP in China is still in its infancy.

In China, the online appointment of nurses for home service is an important form of nurse MSP. Nurses can complete health service items such as dressing changes through home service. Thus, MSP fully reflects the concept of Internet+ nursing, which is also supported by the Chinese government. In recent years, Beijing, Shanghai, Guangdong, and other provinces and cities have steadily promoted the implementation of nurse MSP with the help of information platforms.<sup>6</sup> 81.28% of nurses specializing in PICC and wound ostomy were willing to participate in MSP because they had a high degree of freedom of practice, less reliance on medical advice, and strong technical expertise.<sup>7</sup> A survey of 1027 outpatients showed that 77.9% of them were willing to accept MSP nursing services and wanted to receive health education and guidance from professional nurses in primary healthcare institutions close to their homes.<sup>8</sup> An exploratory study confirmed that placing MSP nurses in an outpatient blood collection room reduced the average waiting time during peak hours from 16 minutes to 9 minutes, increased patient satisfaction from 87.7% to 94.7%, reduced labor costs for blood drawing by 37.31%, and increased wages for MSP nurses by 22.44%.<sup>9</sup> A Delphi study established a framework for the core competencies of MSP nurses, including professional skills, risk management, cross-team collaboration, educational guidance, and professional competencies. This Delphi study provides a reference standard for the appointment, training, and assessment of MSP nurses.<sup>10</sup> Nurse MSP may solve the problems of the relative shortage of nurses' human resources and unequal distribution of quality care resources. Therefore, nurses' MSP is the inevitable trend in developing the nursing profession in China.

However, as a new force in the nursing team, awareness and willingness of nursing students' MSP will determine their future career direction choice and affect the distribution of health service resources. Nursing education need to continuously improve, not only in the teaching of professional knowledge and skills practice, but also to provide guidance on the future career development direction of nursing students. Nurse MSP is one of the important directions of the future career development. Schools need to form corresponding teaching and training content to promote nursing students' understanding of nurse MSP. Through cross-sectional investigation, this study aimed to understand the awareness, attitude and willingness of nursing students to nurse MSP in China, explore the acceptance degree of nursing students to nurse MSP, analyze the factors that affect their understanding and acceptance of nurse MSP, and provide evidence for the sustainable development of nurse MSP.

## Methods

### Design and Setting

This cross-sectional study adhered to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines for cross-sectional studies ([File S1](#)). Data were collected from nursing schools across eight provinces in China between October and November 2021.

### Public Contribution

We invited two registered nurses, two educational professors, and five junior nursing students to participate in a cognitive interview prior to the questionnaire survey. Their feedback was considered to refine our research plan, and we ensured that the final questionnaire addressed the key points they raised.

## Questionnaire and Participants

### Questionnaire

The survey tool adopts the questionnaire of nursing students' awareness and willingness to nurses' MSP consisting of four parts.<sup>11</sup> The first part included the questionnaire introduction and questions on the demographic data of the nursing students, including gender, age, province, educational level, whether they want to work in nursing in the future, grade of their practice hospital, have they learned about MSP from other sources, understanding of MSP, had too much contact with nurse practitioners, clinic practice time, and level of internship hospital (10 items). The remaining three parts are: (1) The attitude evaluation consists of 17 items divided into five dimensions: awareness, qualification, disadvantage, advantage, and prospect. I-The awareness dimension included a dichotomous question if students were in favor of MSP nurses or not which was calculated statistically based on the selection frequency. II-The objective item sources of qualification included whether qualifications were more suitable for MSP nurses or specialist nurses. III-The disadvantage dimension included ten items and each answer to the single-choice questions is given one frequency. IV-The advantage dimension information included MSP could enhance the brand of the hospital or not, MSP could be convenient for patients or not, MSP could improve the utilization rate of medical resources or not. V-The prospect dimension was comprised of one item relating to views on the prospect of MSP. (2) The willingness part included single-choice question of whether the nursing students had the willingness to practice in MSP. (3) The constraints part included whether the MSP relevant laws and regulations soundness, whether the MSP had an effective monitoring mechanism, whether the interests of nurses were protected in medical risk, whether the MSP had the complete practice information system, whether the MSP had clear access policy, whether the nurse's hospital agreed to participate in MSP, whether the nurses had the energy to deal with MSP. A higher percentage means higher recognition and willingness. Five nursing students pre-filled the questionnaire and revised the questionnaire for any semantic implausibility. Five nursing experts analyzed the content validity of the questionnaire, including the director of the nursing department of a tertiary care hospital and senior nursing school faculty members with more than ten years of teaching experience and with the title of associate professor or above. They revised the questionnaire according to the experts' opinions. After two rounds of expert consultation, the five items with duplicate content expressions were integrated, and each part was reclassified, and the original six dimensions (8 items for attitude evaluation, 1 item for willingness evaluation, 1 item for prospect evaluation, 3 items for motivation perception, 11 items for pros and cons evaluation, and 7 items for constraints evaluation) were integrated into three parts (17 items for attitude evaluation, 2 items for willingness, and 7 items on constraints), resulting in a revised questionnaire with 26 items. The expert content validity of the questionnaire was 0.923. Before the formal distribution of the questionnaire, a pre-survey was conducted with 30 nursing students, yielding the Cronbach's alpha coefficient of the questionnaire was 0.910.

### Participants

We conducted an online survey using convenience sampling. Participants were selected from full-time undergraduate nursing students who had not yet graduated and who provided informed consent to voluntarily participate in the survey. The questionnaire comprised 3 dimensions and 26 variables for statistical analysis. The required sample should be 5–10 times the number of variables,<sup>12</sup> so at least 130–260 participants should be recruited. Finally, 1014 undergraduate nursing students from 8 provinces of China completed the online questionnaire.

## Data Collection and Quality Control

After obtaining consent, we issued an online questionnaire through the WJX platform (<https://www.wjx.cn/>). We explained the purpose of this study and the concept of nurse MSP to the participants before they filled in the questionnaire. Respondents could answer the questions online via mobile phones, computers, and other devices. The respondents must follow the relevant prompts to answer all the questions before submitting them to the background database. This questionnaire was completely confidential, which is not affected by other factors while obtaining the cooperation of the respondents, to ensure the authenticity of the content. The electronic questionnaire has more detailed instructions to reduce inefficiency. Each item is set as a required question, and if there is an omission in the answer, a prompt will appear after clicking "submit", which ensures the integrity of the questionnaire and avoids missing answers. The same IP address is limited to one setting to prevent repeated filling.

## Data Analysis

After completing the data collection, we download the original data from the WJX platform to ensure the accuracy of the data. The statistical analysis was performed using SPSS 22.0 software. Descriptive statistics were expressed as frequencies, percentages, means, and standard deviations. Univariate analyses were conducted using analysis of variance (ANOVA), *t*-tests, and chi-square tests, while multivariate analysis was performed using logistic regression. A *p*-value of less than 0.05 was considered statistically significant. Forest plots were generated using GraphPad Prism software.

## Results

### Demographic Characteristics

There were 1014 participants in the study, and the age of the respondents ranged from 16 to 37 ( $19.48 \pm 1.82$ ) years old. General information on all participants is detailed in Table 1.

**Table 1** General Information and Distribution of Participants

| Variable  |                      | Frequency | Percentage (%) |
|---|----------------------|-----------|----------------|
| Sex   | Female               | 131       | 12.92          |
|   | Male                 | 883       | 87.08          |
| Present location                                  | Chongqing            | 745       | 73.47          |
|   | Other*               | 269       | 26.53          |
| Educational level                                 | Master               | 16        | 1.58           |
|   | Undergraduate        | 94        | 9.27           |
|   | Junior               | 904       | 89.15          |
| Whether you want to work in nursing in the future | No                   | 43        | 4.24           |
|   | Yes                  | 636       | 62.72          |
|   | Not sure             | 335       | 33.04          |
| Have you learned about MSP from other sources     | No                   | 157       | 15.48          |
|   | Yes, From school     | 626       | 61.74          |
|   | Yes, From other Ways | 231       | 22.78          |
| Understanding of MSP                              | Know very well       | 43        | 4.24           |
|   | Understand           | 189       | 18.64          |
|   | Normal               | 521       | 51.38          |
|   | Incomprehension      | 239       | 23.57          |
|   | Very ignorant of     | 22        | 2.17           |
| Had too much contact with nurse practitioners     | Yes                  | 264       | 26.04          |
|   | No                   | 750       | 73.96          |
| Clinical practice has been conducted              | < 3                  | 72        | 7.10           |
|   | 3 ~ 6                | 134       | 13.21          |
|   | 6 ~ 9                | 178       | 17.55          |
|   | 9 ~ 12               | 14        | 1.38           |
|   | > 12                 | 39        | 3.85           |
|   | 0                    | 577       | 56.90          |
| Grade of your practice hospital                   | First                | 207       | 20.41          |
|   | Secondary            | 278       | 27.42          |
|   | Tertiary             | 529       | 52.17          |

**Note:** \*Sichuan (n=207), Shanxi (n=14), Guangdong (n=9), Beijing (n=26), Hubei (n=8), Guizhou (n=3), Jiangsu (n=1), Zhejiang (n=1). "MSP" means "Multi-site practice".

## Evaluation of Nursing Students' Attitude Towards MSP

Results of nursing students' attitudes towards MSP are presented in Table 2. There were 763 nursing students who supported MSP, accounting for 75.25%. 55.23% of nursing students believed that there was no contradiction between nurses' MSP and hospital care.

**Table 2** Nursing Students' Attitudes Towards MSP

| Variable  |  | Frequency | Percentage (%) |
|---|--|-----------|----------------|
| Whether to support the MSP  | Very much agree with                               | 284       | 28.01          |
|   | Approve of   | 479       | 47.24          |
|   | Not sure   | 219       | 21.6           |
|   | Disapprove of                                      | 25        | 2.47           |
|   | Strongly disapprove of                             | 7         | 0.69           |
| The qualifications of nurses who can practice more than one practice                                  | Associate chief nurse and above                    | 110       | 10.85          |
|   | Supervisor nurse                                   | 104       | 10.26          |
|   | Nurse (experience >3 years)                        | 243       | 23.96          |
|   | Nurses with at least 3 years of working experience | 284       | 28.01          |
|   | Any nurse with a nursing certificate is acceptable | 205       | 20.22          |
|   | Other  | 68        | 6.71           |
| MSP can conflict with hospital care   | Yes  | 113       | 11.14          |
|   | No   | 560       | 55.23          |
|   | Not sure   | 341       | 33.63          |
| MSP will affect the order of the hospital where nurses work and increase the difficulty of management | Yes  | 179       | 17.65          |
|   | No   | 465       | 45.86          |
|   | Not sure   | 370       | 36.49          |
| MSP can increase medical risks and affect the quality of medical care                                 | Yes  | 180       | 17.75          |
|   | No   | 462       | 45.56          |
|   | Not sure   | 372       | 36.69          |
| If there is a medical dispute during MSP, do you worry about the protection of nurses' own interests  | Very worried                                       | 227       | 22.39          |
|   | More worried                                       | 492       | 48.52          |
|   | Normal   | 274       | 27.02          |
|   | Not worry  | 15        | 1.48           |
|   | Not worried at all                                 | 6         | 0.59           |
| MSP affects the continuity of patient care  | Yes  | 257       | 25.35          |
|   | No   | 398       | 39.25          |
|   | Not sure   | 359       | 35.4           |
| Different norms for the same practice in different practice locations can cause problems in nursing   | Yes  | 314       | 30.97          |
|   | No   | 353       | 34.81          |
|   | Not sure   | 347       | 34.22          |
| Is there any concern that nurses will not be able to adapt to the working mode of MSP                 | Yes  | 334       | 32.94          |
|   | No   | 320       | 31.56          |
|   | Not sure   | 360       | 35.5           |
| Nurses with specialist nursing qualifications are more suitable for MSP                               | Yes  | 368       | 36.29          |
|   | No   | 235       | 23.18          |
|   | Not sure   | 411       | 40.53          |

(Continued)

**Table 2** (Continued).

| Variable  |                 | Frequency | Percentage (%) |
|---|-----------------|-----------|----------------|
| MSP can enhance hospital brand                            | Yes             | 379       | 37.38          |
|   | No              | 203       | 20.02          |
|   | Not sure        | 432       | 42.6           |
| MSP can provide convenience for patients                  | Yes             | 549       | 54.14          |
|   | No              | 111       | 10.95          |
|   | Not sure        | 354       | 34.91          |
| MSP can improve the utilization rate of medical resources | Yes             | 568       | 56.02          |
|   | No              | 99        | 9.76           |
|   | Not sure        | 347       | 34.22          |
| MSP increase patient health care costs                    | Yes             | 199       | 19.63          |
|   | No              | 399       | 39.35          |
|   | Not sure        | 416       | 41.03          |
| MSP make it harder for governments to regulate            | Yes             | 282       | 27.81          |
|   | No              | 313       | 30.87          |
|   | Not sure        | 419       | 41.32          |
| MSP encourage pro-active behavior in nurses               | Yes             | 281       | 27.71          |
|   | No              | 279       | 27.51          |
|   | Not sure        | 454       | 44.77          |
| What do you think of the prospects of MSP                 | Very optimistic | 142       | 14             |
|   | Optimistic      | 395       | 38.95          |
|   | Normal          | 447       | 44.08          |
|   | Pessimistic     | 20        | 1.97           |
|   | Very negative   | 10        | 0.99           |

**Notes:** "MSP" means "Multi-site practice". Questionnaires used with permission from Wang SX, Wu JM. Nursing students' cognition and willingness of nurses' multiple-site practice. *Chin J Nurs Educ.* 2021;18(6):520–525.<sup>11</sup>

## Nursing Students' Willingness and Motivation for MSP

Nursing students' willingness to MSP was graded into four levels and the results are presented in Table 3. There were 943 nursing students who were either willing or neutral to participate in MSP, and only a few (71, 7%) were unwilling. The motivation of nursing students to participate in MSP is presented in Table 4.

## Constraints to MSP of Nursing Students' Perspective

More than 50% of nursing students believed that the laws and regulations of MSP were not perfect (552, 54.44%), MSP lacked effective oversight (537, 52.96%) and medical risks were not clear and nurses' interests were not protected (597, 58.88%). The distribution of factors that nursing students consider to be limiting the practice MSP is presented in Table 5.

**Table 3** A Description of the Willingness of Nursing Students to Practice MSP

| Variable                     |                         | Frequency | Percentage (%) |
|------------------------------|-------------------------|-----------|----------------|
| Willingness to carry out MSP | Yes, the will is strong | 116       | 11.44          |
|                              | Yes, it's OK            | 429       | 42.31          |
|                              | Normal                  | 398       | 39.25          |
|                              | None                    | 71        | 7.00           |

**Note:** "MSP" means "Multi-site practice".

**Table 4** Motivation of Nursing Students to Undertake MSP

|   |               | Increase<br>Income | Show<br>Self-worth | Upgrade<br>Skills  | To Help<br>Improve the<br>Nursing Level of<br>Community<br>Institutions for<br>the Aged | Other              |
|---|---------------|--------------------|--------------------|--------------------|---|--------------------|
| Educational level                       | Master        | 13 (81.25)         | 11 (68.75)         | 11 (68.75)         | 8 (50.00)   | 0 (0.00)           |
|   | Undergraduate | 82 (87.23)         | 82 (87.23)         | 76 (80.85)         | 55 (58.51)  | 10 (10.64)         |
|   | Junior        | 735 (81.31)        | 685 (75.77)        | 709 (78.43)        | 491 (54.31)   | 217 (24.00)        |
|   | <b>Total</b>  | <b>830 (81.84)</b> | <b>778 (76.73)</b> | <b>796 (78.50)</b> | <b>554 (54.64)</b>  | <b>227 (22.39)</b> |
| Sex                                     | Female        | 715 (80.97)        | 679 (76.90)        | 700 (79.28)        | 482 (54.59)   | 196 (22.20)        |
|   | Male          | 115 (87.79)        | 99 (75.57)         | 96 (73.28)         | 72 (54.96)  | 31 (23.66)         |
|   | <b>Total</b>  | <b>830 (81.84)</b> | <b>778 (76.73)</b> | <b>796 (78.50)</b> | <b>554 (54.64)</b>  | <b>227 (22.39)</b> |
| Place of birth                          | Other         | 352 (84.01)        | 328 (78.28)        | 325 (77.57)        | 239 (57.04)   | 110 (26.25)        |
|   | Chongqing     | 478 (80.34)        | 450 (75.63)        | 471 (79.16)        | 315 (52.94)   | 117 (19.66)        |
|   | <b>Total</b>  | <b>830 (81.84)</b> | <b>778 (76.73)</b> | <b>796 (78.50)</b> | <b>554 (54.64)</b>  | <b>227 (22.39)</b> |
| Grade                                   | Grade1        | 471 (81.49)        | 445 (76.99)        | 453 (78.37)        | 316 (54.67)   | 127 (21.97)        |
|   | Grade2        | 193 (80.75)        | 181 (75.73)        | 188 (78.66)        | 124 (51.88)   | 62 (25.94)         |
|   | Grade3        | 90 (85.71)         | 79 (75.24)         | 82 (78.10)         | 62 (59.05)  | 25 (23.81)         |
|   | Grade4        | 72 (83.72)         | 69 (80.23)         | 69 (80.23)         | 50 (58.14)  | 13 (15.12)         |
|   | Grade5        | 4 (66.67)          | 4 (66.67)          | 4 (66.67)          | 2 (33.33)   | 0 (0.00)           |
|   | <b>Total</b>  | <b>830 (81.84)</b> | <b>778 (76.73)</b> | <b>796 (78.50)</b> | <b>554 (54.64)</b>  | <b>227 (22.39)</b> |
| Clinical practice has been<br>conducted | 0             | 462 (80.07)        | 439 (76.08)        | 462 (80.07)        | 306 (53.03)   | 145 (25.13)        |
|   | 0~3           | 54 (75.00)         | 59 (81.94)         | 56 (77.78)         | 40 (55.56)  | 11 (15.28)         |
|   | 3~6           | 116 (86.57)        | 110 (82.09)        | 107 (79.85)        | 77 (57.46)  | 23 (17.16)         |
|   | 6~9           | 150 (84.27)        | 132 (74.16)        | 131 (73.60)        | 105 (58.99)   | 40 (22.47)         |
|   | 9~12          | 13 (92.86)         | 11 (78.57)         | 9 (64.29)          | 7 (50.00)   | 1 (7.14)           |
|   | >12           | 35 (89.74)         | 27 (69.23)         | 31 (79.49)         | 19 (48.72)  | 7 (17.95)          |
|   | <b>Total</b>  | <b>830 (81.84)</b> | <b>778 (76.73)</b> | <b>796 (78.50)</b> | <b>554 (54.64)</b>  | <b>227 (22.39)</b> |
| Grade of your practice hospital         | First         | 155 (74.88)        | 153 (73.91)        | 162 (78.26)        | 113 (54.59)   | 57 (27.54)         |
|   | Secondary     | 229 (82.37)        | 215 (77.34)        | 227 (81.65)        | 152 (54.68)   | 57 (20.50)         |
|   | Tertiary      | 446 (84.31)        | 410 (77.50)        | 407 (76.94)        | 289 (54.63)   | 113 (21.36)        |
|   | <b>Total</b>  | <b>830 (81.84)</b> | <b>778 (76.73)</b> | <b>796 (78.50)</b> | <b>554 (54.64)</b>  | <b>227 (22.39)</b> |

**Note:** "MSP" means "Multi-site practice".

**Table 5** Factors That Nursing Students Think Restrict the Development of MSP

| Variable  |          | Frequency | Percentage (%) |
|---|----------|-----------|----------------|
| The laws and regulations of MSP were not perfect                      | Yes      | 552       | 54.44          |
|   | No       | 92        | 9.07           |
|   | Not Sure | 370       | 36.49          |
| MSP lacked effective oversight  | Yes      | 537       | 52.96          |
|   | No       | 103       | 10.16          |
|   | Not Sure | 374       | 36.88          |
| Medical risks were not clear and nurses' interests were not protected | Yes      | 597       | 58.88          |
|   | No       | 73        | 7.2            |
|   | Not Sure | 344       | 33.93          |

(Continued)

**Table 5** (Continued).

| Variable   |          | Frequency | Percentage (%) |
|--|----------|-----------|----------------|
| MSP lacked perfect information system  | Yes      | 555       | 54.73          |
|  | No       | 86        | 8.48           |
|  | Not Sure | 373       | 36.79          |
| The MSP access system was unclear  | Yes      | 533       | 52.56          |
|  | No       | 80        | 7.89           |
|  | Not Sure | 401       | 39.55          |
| The nurse's hospital did not support it                                      | Yes      | 359       | 35.4           |
|  | No       | 164       | 16.17          |
|  | Not Sure | 491       | 48.42          |
| Nurses work in hospitals with heavy tasks and had no energy to carry out MSP | Yes      | 425       | 41.91          |
|  | No       | 146       | 14.40          |
|  | Not Sure | 443       | 43.69          |

**Notes:** "MSP" means "Multi-site practice". Questionnaires used with permission from Wang SX, Wu JM. Nursing students' cognition and willingness of nurses' multiple-site practice. *Chin J Nurs Educ.* 2021;18(6):520–525.<sup>11</sup>

## The Attitude and Willingness of Nursing Students to MSP

The attitude and willingness of nursing students to MSP were divided into three levels respectively, with different distribution of the number of nursing students at each level. The results are shown in [Table 6](#).

## Results of Univariate Analysis of Nursing Students' Willingness to Participate in MSP

Through the analysis, it was found that age, willingness to engage in nursing industry, knowledge about MSP, contact with MSP, the time of clinical practice, the grade of the practice hospital, and other factors had statistical significance in different MSP intentions ( $P < 0.05$ ), and the results are shown in [Table 7](#).

## Multivariate Analysis of Nursing Students' Willingness to Participate in MSP

The willingness to engage in MSP was taken as the dependent variable, and statistically significant factors such as age, willingness to engage in nursing industry, knowledge of MSP, contact with MSP, duration of clinical practice, and main practice hospital were taken as independent variables in the univariate analysis. Multivariate Logistic regression analysis was performed, and the results obtained are shown in [Figure 1](#).

**Table 6** A Description of Nursing Students' Attitudes and Intentions Towards MSP

| Variable                     |            | Frequency | Percentage (%) |
|------------------------------|------------|-----------|----------------|
| Support MSP or not           | Yes        | 763       | 75.25          |
|                              | Neutrality | 219       | 21.60          |
|                              | No         | 32        | 3.16           |
| Willingness to carry out MSP | Yes        | 545       | 53.75          |
|                              | Neutrality | 398       | 39.25          |
|                              | No         | 71        | 7.00           |

**Note:** "MSP" means "Multi-site practice".



**Table 7** Univariate Analysis of Nursing Students' Willingness to Engage in MSP

| Variable  |                        | Willingness/% |             | X <sup>2</sup> /t | P      |
|---|------------------------|---------------|-------------|-------------------|--------|
|   |                        | Normal or No  | Yes         |                   |        |
| Sex   | Female                 | 407 (46.09)   | 476 (53.91) | 0.070             | 0.791  |
|   | Male                   | 62 (47.33)    | 69 (52.67)  |                   |        |
| Place of birth                                    | Chongqing              | 282 (47.39)   | 313 (52.61) | 0.756             | 0.385  |
|   | Other                  | 187 (44.63)   | 232 (55.37) |                   |        |
| Educational level                                 | Master                 | 8 (50.00)     | 8 (50.00)   | 0.187             | 0.911  |
|   | Undergraduate          | 42 (44.68)    | 52 (55.32)  |                   |        |
|   | Junior                 | 419 (46.35)   | 485 (53.65) |                   |        |
| Whether you want to work in nursing in the future | No                     | 19 (44.19)    | 24 (55.81)  | 13.193            | 0.001  |
|   | Yes                    | 268 (42.14)   | 368 (57.86) |                   |        |
|   | Not sure               | 182 (54.33)   | 153 (45.67) |                   |        |
| Have you learned about MSP from other sources     | No                     | 90 (57.32)    | 67 (42.68)  | 13.792            | 0.001  |
|   | Yes, From school       | 263 (42.01)   | 363 (57.99) |                   |        |
|   | Yes, From other places | 116 (50.22)   | 115 (49.78) |                   |        |
| Understanding of MSP                              | Know very well         | 8 (18.6)      | 35 (81.4)   | 27.723            | <0.001 |
|   | Understand             | 68 (35.98)    | 121 (64.02) |                   |        |
|   | Normal                 | 254 (48.75)   | 267 (51.25) |                   |        |
|   | Incomprehension        | 127 (53.14)   | 112 (46.86) |                   |        |
|   | Very ignorant of       | 12 (54.55)    | 10 (45.45)  |                   |        |
| Had too much contact with nurse practitioners     | Yes                    | 374 (49.87)   | 376 (50.13) | 15.137            | <0.001 |
|   | No                     | 95 (35.98)    | 169 (64.02) |                   |        |
| Clinical practice has been conducted              | 0                      | 279 (48.35)   | 298 (51.65) | 12.079            | 0.034  |
|   | < 3                    | 22 (30.56)    | 50 (69.44)  |                   |        |
|   | 3 ~ 6                  | 57 (42.54)    | 77 (57.46)  |                   |        |
|   | 6 ~ 9                  | 83 (46.63)    | 95 (53.37)  |                   |        |
|   | 9 ~ 12                 | 5 (35.71)     | 9 (64.29)   |                   |        |
|   | > 12                   | 23 (58.97)    | 16 (41.03)  |                   |        |
| Grade of your practice hospital                   | First                  | 113 (54.59)   | 94 (45.41)  | 7.522             | 0.023  |
|   | Secondary              | 126 (45.32)   | 152 (54.68) |                   |        |
|   | Tertiary               | 230 (43.48)   | 299 (56.52) |                   |        |
| Age   |                        | 19.34±1.77    | 19.59±1.84  | 2.202             | 0.028  |

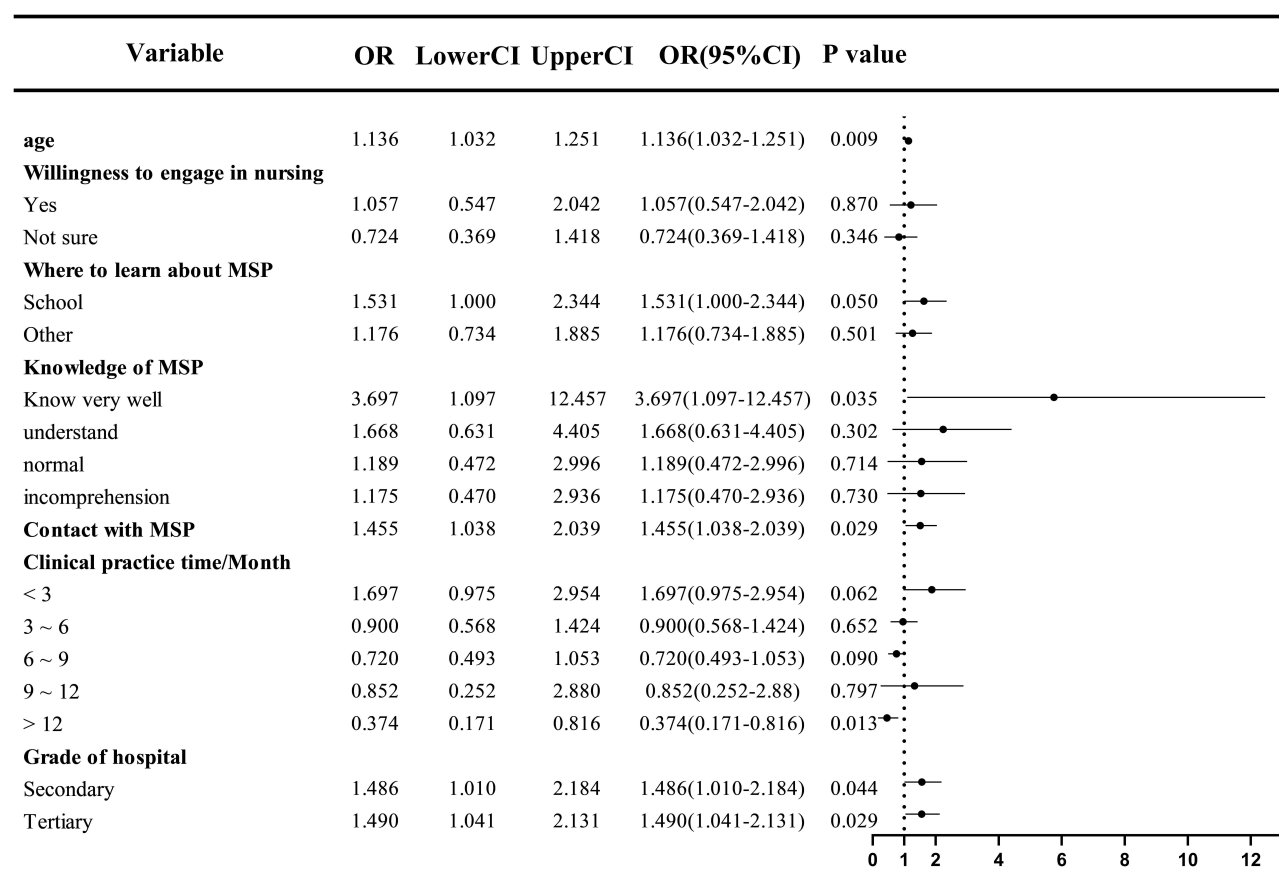
Note: "MSP" means "Multi-site practice".

## Results of a Univariate Analysis of Nursing Students' Attitudes Towards Participate in MSP

The results of a univariate analysis of nursing students' attitudes towards MSP are presented in Table 8. Different education levels, whether they knew the knowledge of MSP, and whether they had contact with nurses with too many practice points, there were differences in attitudes towards MSP nurses, and the difference was statistically significant ( $P<0.05$ ).

## Results of Multi-Factor Analysis of Nursing Students' Attitudes Towards Participate in MSP

Attitude was considered the dependent variable in this analysis. We examined several factors, including willingness to engage in the nursing industry, external knowledge about MSP, general knowledge of MSP, contact with nurses engaged



**Figure 1** Multifactor analysis of nursing students' willingness to engage in MSP.

**Note:** MSP means "Multi-Site Practice".

in MSP, the grade of the practice hospital, qualifications required for nurses to practice MSP, and the MSP process. Multivariate logistic regression analysis was conducted using independent variables that showed statistical significance, including concerns about protecting nurses' own interests, perceptions of the prospects for nurses in MSP, age, and both disadvantage and advantage dimensions are shown in [Figure 2](#).

**Table 8** Multi-Factor Analysis of Nursing Students' Attitude Towards MSP

| Variable  |               | Approve/%    |             | X <sup>2</sup> /t | P     |
|---|---------------|--------------|-------------|-------------------|-------|
|   |               | Normal or No | Yes         |                   |       |
| Sex   | Female        | 215 (24.35)  | 668 (75.65) | 0.601             | 0.438 |
|   | Male          | 36 (27.48)   | 95 (72.52)  |                   |       |
| Place of birth                                    | Chongqing     | 94 (22.43)   | 325 (77.57) | 2.062             | 0.151 |
|   | Other         | 157 (26.39)  | 438 (73.61) |                   |       |
| Educational level                                 | Master        | 1 (6.25)     | 15 (93.75)  | 7.594             | 0.022 |
|   | Undergraduate | 15 (15.96)   | 79 (84.04)  |                   |       |
|   | Junior        | 235 (26.00)  | 669 (74.00) |                   |       |
| Whether you want to work in nursing in the future | No            | 10 (23.26)   | 33 (76.74)  | 7.004             | 0.030 |
|   | Yes           | 141 (22.17)  | 495 (77.83) |                   |       |
|   | Not sure      | 100(29.85)   | 235 (70.15) |                   |       |

(Continued)

Table 8 (Continued).

| Variable                                      |                        | Approve/%    |             | X <sup>2</sup> /t | P      |
|---|------------------------|--------------|-------------|-------------------|--------|
|   |                        | Normal or No | Yes         |                   |        |
| Have you learned about MSP from other sources | No                     | 55 (35.03)   | 102 (64.97) | 13.211            | 0.001  |
|   | Yes, From school       | 134 (21.41)  | 492 (78.59) |                   |        |
|   | Yes, From other places | 62 (26.84)   | 169 (73.16) |                   |        |
| Understanding of MSP                          | Know very well         | 3 (6.98)     | 40 (93.02)  | 20.667            | <0.001 |
|   | Understand             | 34 (17.99)   | 155 (82.01) |                   |        |
|   | Normal                 | 130 (24.95)  | 391 (75.05) |                   |        |
|   | Incomprehension        | 75 (31.38)   | 164 (68.62) |                   |        |
|   | Very ignorant of       | 9 (40.91)    | 13 (59.09)  |                   |        |
| Had too much contact with nurse practitioners | Yes                    | 209 (27.87)  | 541 (72.13) | 14.99             | <0.001 |
|   | No                     | 42 (15.91)   | 222 (84.09) |                   |        |
| Clinical practice has been conducted          | 0                      | 153 (26.52)  | 424 (73.48) | 5.548             | 0.353  |
|   | < 3                    | 11 (15.28)   | 61 (84.72)  |                   |        |
|   | 3 ~ 6                  | 34 (25.37)   | 100 (74.63) |                   |        |
|   | 6 ~ 9                  | 43 (24.16)   | 135 (75.84) |                   |        |
|   | 9 ~ 12                 | 3 (21.43)    | 11 (78.57)  |                   |        |
|   | > 12                   | 7 (17.95)    | 32 (82.05)  |                   |        |
| Grade of your practice hospital               | First                  | 65 (31.40)   | 142 (68.60) | 6.625             | 0.036  |
|   | Secondary              | 68 (24.46)   | 210 (75.54) |                   |        |
|   | Tertiary               | 118 (22.31)  | 411 (77.69) |                   |        |
| Age   |                        | 19.19±1.50   | 19.57±1.90  | -3.257            | 0.001  |

**Notes:** "MSP" means "Multi-site practice". Questionnaires used with permission from Wang SX, Wu JM. Nursing students' cognition and willingness of nurses' multiple-site practice. *Chin J Nurs Educ.* 2021;18(6):520–525.<sup>11</sup>

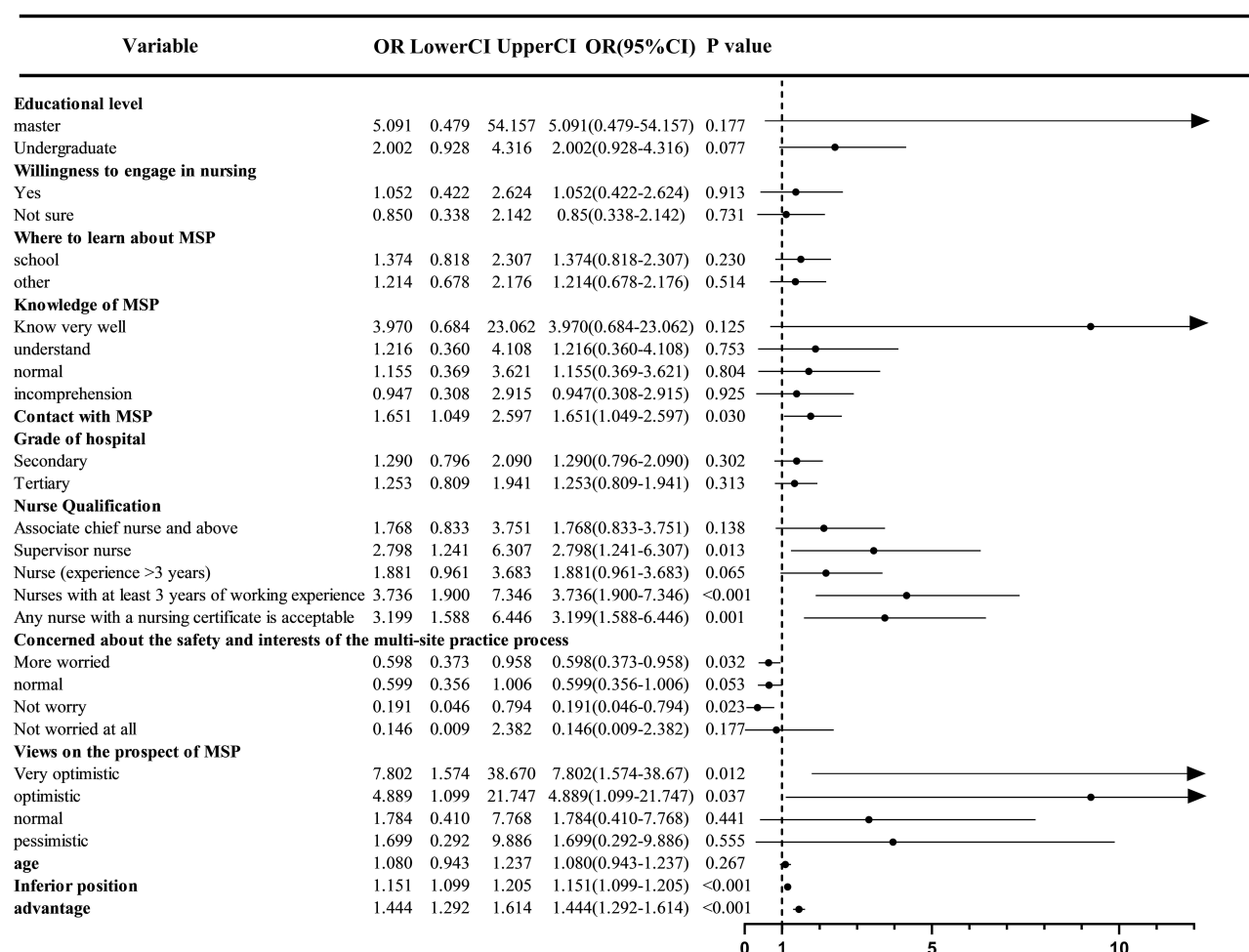
## Discussion

### Chinese Nursing Students Had a Positive Attitude Toward MSP

In terms of awareness, more than 75% were in favor of or very much approved of nurses' MSP, and more than half of the nursing students are optimistic about the prospect of MSP, which was consistent with the results of Zhao's research.<sup>13</sup> As the content and connotation of nursing services become affluent, the nursing practice continues to expand.<sup>14</sup> Nursing services were extended to communities and families, no longer limited to a single medical institution.<sup>15</sup> National policy support and the popularity of the Internet provide a platform for MSP, a new direction for nursing professional development.<sup>16</sup> However, 21.45% still hold a wait-and-see attitude towards MSP. Although MSP can balance nursing resources, meet the needs of patients at different levels, flexibly arrange a working time and content, and choose practice places independently, the training and security system still needs to be developed.<sup>17</sup> There are no successful pilot experiences to replicate, so nursing students are still waiting for further improvements in the field before making their choice. On the other hand, focusing on the occupational health of nurses is also a key issue in the development of nursing worldwide. In the process of MSP, how to ease the workload of nurses, rationally allocate the working hours of nurses and staff outside the hospital, and balance work and life were also issues worthy of attention in future research.

### Chinese Nursing Students Have a Specific Cognitive Basis for MSP

The survey results indicated that 84.42% of participants reported having learned about relevant aspects of MSP, demonstrating a strong initiative among nursing students to acquire related knowledge. Further analysis revealed that 522 students (51.13%) had a general understanding of MSP, while 264 students (25.86%) reported limited or minimal understanding. This lack of awareness regarding nurses' engagement in MSP was evident in the following aspects:



**Figure 2** Multifactor analysis of nursing students' attitude to engage in MSP.

**Note:** MSP means "Multi-Site Practice".

## Nursing Students Have a Comprehensive Understanding of the Advantages and Disadvantages of MSP

Most nursing students believe that MSP can improve the utilization rate of medical resources and facilitate patients. It indicated that nursing students better understand the advantages, disadvantages, and risks of MSP, which was consistent with the previous research.<sup>18</sup> In order to improve the service capacity and level of primary medical and health institutions and realize the equal allocation of medical resources,<sup>19</sup> the Guangdong provincial government began to explore the reform of the nurse practice registration system, gradually implemented the MSP registration of nurses in the whole district, and encouraged qualified areas to explore the professional development plan for nurses.<sup>20</sup> With the integration of the Internet and the medical field, the implementation platform had been expanded for the MSP, and patients with chronic diseases, aging, and those requiring specialized nursing operations can all benefit.<sup>21</sup> Relying on the Internet platform and carrying out MSP, more patients can get equal access to quality health services at home. At the same time, because the nurses' MSP had not been fully carried out in China, there were still shortcomings in the development process, such as the limitation of the region to carry out MSP, the law of MSP was not perfect, the salary of MSP was not unified, and the fixed hospital where the nurses engaged in MSP lacks a complete system.

## Nursing Students Have a Good Understanding of the Risks and Constraints of MSP

Nursing students believe that solid legal and institutional support was needed to promote the successful implementation of MSP for nurses. At the same time, some students worry that MSP will lead to an increased workload and lower occupational happiness index and even cause medical disorders, such as the inability to determine the person in charge

after medical disputes.<sup>22</sup> This indicates that nursing students are aware of the legal risks and constraints faced by nurses in the MSP process. Therefore, to promote the ongoing development and improvement of MSP, further research on the legal risks and ethical standards associated with MSP is essential. By establishing relevant laws, regulations, and institutional safeguards, clarifying the division of responsibilities, and fully protecting the interests of both nurses and patients, we can effectively mitigate practice risks and foster the successful development of MSP.<sup>23</sup>

### **There Were Differences in the Awareness of Nursing Students on the Admission Qualification of MSP**

There are 28.11% of nurses believed that individuals with three years of work experience should be eligible to participate in MSP, which is lower than the entry qualification requirements set by the National Health Commission of China. This suggests that nursing students do not fully understand the policy interpretations and specific requirements associated with MSP.<sup>24</sup>

Although the information on MSP can be learned through the Internet, news media, schools, and other channels, there needs to be a systematic and comprehensive knowledge acquisition path.<sup>25</sup> 61.80% of the students said they mainly learned more about MSP from the school. However, the school still needs to form a unique training content and curriculum, and the student's understanding of the relevant knowledge was scattered and superficial. Therefore, the school could explore and improve the subject teaching system, increase the theoretical teaching of MSP knowledge and clinical practice,<sup>26</sup> and improve the awareness of nursing students.

### **Willingness and Motivation of Nursing Students to Participate in MSP in China**

Our results showed no statistical difference in gender regarding willingness to participate in MSP. The willingness of nursing students in different grades to participate in MSP was statistically different. Further analysis showed that with the increase in nursing students' grades, the stronger their willingness to participate in MSP, the more they may know about MSP and think that the benefits of MSP outweigh their disadvantages.<sup>27</sup> More than 80% of nursing students were motivated to participate in MSP to improve their economic income, which may be related to the low nursing charge standard in China and the unequal pay of nurses.<sup>28</sup> The motivation to participate in MSP may be related to the following facts: nursing students hope to give full play to their advantages and expand their career development path with the help of multiple platforms.<sup>29</sup>

### **Advantages and Limitations**

The participants in this study included over 1000 nursing students from eight cities in China, representing multiple educational levels, which enhances the results' generalizability to some extent. However, the cross-sectional design may limit the ability to establish predictive relationships regarding the true causes and effects of the studied variables. Additionally, due to the pandemic, this study was conducted as an online survey, and self-reported data may be subject to social desirability bias and response bias. In future research, we aim to incorporate qualitative research designs and conduct a nationwide field investigation to enhance the depth and rigor of the study on nurse MSP.

### **Conclusions**

This study indicates that Chinese nursing students possess a strong willingness to engage in MSP and have a foundational understanding of its admission qualifications, advantages, disadvantages, and future prospects. Most nursing students acquire knowledge about MSP from their educational institutions. Therefore, moving forward, we should focus on the field of nursing education to explore innovative educational models, enrich the content of nursing curricula, enhance clinical practice, and integrate future career planning for MSP into course teachings and practical experiences. This approach will deepen career planning and professional development for nurses. Additionally, it is essential to strengthen research on the legal risks and ethical considerations surrounding MSP, with the goal of incorporating relevant laws and regulations into MSP curriculum education in the future, thereby improving the overall framework for nurses' participation in MSP.

## Relevance to Clinical Practice

As the reserve force of human resources, the willingness of nursing students to participate in MSP was of great significance to national policy guidance. This study investigated the awareness and willingness of nursing students to MSP and provided the reference for establishing the MSP education model of nursing specialty in China and other developing countries.

## Data Sharing Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

## Ethics Approval

Informed consent was obtained from respondents prior to the start of the survey, and for some minors, informed parental consent was obtained before the survey was conducted. This study was reviewed and approved by Chongqing General Hospital, the ethical approval number was S2020-203-01.

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## Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work. FL and QH contributed equally to this work and should be considered co-first author.

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## Disclosure

The authors report no conflicts of interest in this study.

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