Study on Seismic Consciousness of Adolescents in Earthquake-prone Areas

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Abstract. In this study, 75 people were selected from the P school of Sichuan Province in the earthquake-prone area for a 40-minute paper and pencil test with six open questions, including the explanation of earthquake, the understanding of the earthquake prone area, the reason for the earthquake prone area, the impression of the earthquake, the behavior at the time of the earthquake and the design of the earthquake prevention plan. It was found that the subjects' overall seismic consciousness level was high, but the level was uneven. In addition, except for the behavior at the time of the earthquake, the results of other earthquake awareness tests were higher in girls than in boys.

1. Introduction

Earthquakes occur as part of the earth's natural behavior. Its occurrence would bring huge influence to some countries or regions. Located in the Pacific ring of volcanic seismic belt and the Mediterranean-Himalayan seismic belt, China has five major seismic activity zones: Taiwan province and the adjacent waters; Southwest China, including Tibet, central and western Sichuan and central and western Yunnan; Western region, mainly in Gansu Hexi corridor, Qinghai, Ningxia and Xinjiang Tianshan southern and northern foothills; North China, mainly on both sides of Taihang Mountain, Fen-Wei river valley, Yinshan-Yanshan area, central Shandong and Bohai bay; Southeast coastal areas, Guangdong, Fujian and other places. According to the geological mechanics, China can be roughly divided into 20 seismic zones. As a country prone to earthquakes, earthquake disasters not only do harm to people's economy, but also have spiritual and psychological aspects. At present, the research at home and abroad mainly focuses on the causes, hazards and safety of frequent earthquakes. For example, some scholars mentioned that "from the data collected and processed, it can be seen that there is a serious misunderstanding on the perception of earthquake risk, considering that these results come from the population of algarve, one of the most dangerous regions in Portugal" [1]. Some foreign researchers noted that many countries, such as Turkey and Italy, have invested carefully in earthquake risk education and training programs and have published practical guidelines [1]. However, there was relatively little research on seismic consciousness [2]. Kung and Chen believed that it is easier for people to raise awareness and develop risk and crisis communication strategies after experiencing disasters [3]. One of the most important paradoxes in the risk-perception literature, Covero has pointed out that the risk of death or injury, as well as the risk of panic and insecurity, are often very different. [4]. at the same time,
he said that part of the reason for this contradiction is the factors that influence how people perceive risk. [4]. G.K. Jimee, b. Upadhyay and S.N. Shrestha put forward the idea that earthquake awareness planning was the key to earthquake preparation and risk reduction[5]. Romeu Vicentea, Tiago Miguel Ferreira, Rui Maioa and Herbert Kochb investigated the awareness, perception and transmission of earthquake risk in Portugal in the form of a public survey [6].

It can be seen that current scholars are also paying more or less attention to seismic consciousness. However, the study on the overall grasp of earthquake consciousness has not yet appeared. As an important part of geography, disaster prevention is significant. However, how to truly achieve disaster risk reduction is a serious problem that many researchers are concerned about. Perhaps many scholars believe that uncontrollable disasters such as earthquakes need only be considered by scientists. However, as potential researchers and adolescents who have experienced disasters, their earthquake awareness has an important impact on their development and the development of earthquake research.

In view of this, the main purpose of this paper is to test the seismic consciousness of high school students in an earthquake-prone area with open questions. Specific questions need to be answered include: (1) what content does the earthquake consciousness of teenagers include (2) What is the overall earthquake awareness level of the students in this school (3) What is the specific situation of the students in this school?

2. The research methods

2.1. Research Objects
In consideration of the convenience and accuracy of the research, this paper, with reference to the number of high school students in a certain school, the situation of arts and sciences, and the situation of participating in the courses related to the practical ability and accomplishment of geography, adopts the method of stratified simple random sampling to select 75 people from P school in Sichuan province for a 40-minute paper and pencil test, and finally collects 75 effective test papers.

2.2. Selection and Scoring of Evaluation Tools
Given that this test is mainly to investigate the high school students' earthquake awareness, it mainly includes the explanation of the noun "earthquake", the understanding of the earthquake prone areas, the causes of the earthquake in a certain area, the impression of the earthquake, the earthquake when the behavior and seismic design and other contents. A questionnaire containing six open-ended questions was selected for the students to answer in the test. These questions were: A. please describe the term "earthquake", B: describe the earthquake prone areas in China, C. please talk about why there are so many earthquakes near Chengdu, Sichuan province, China, D. Please tell me your impression of ya 'an earthquake, E. please talk about what you would do when an earthquake comes, F. Please design a reasonable shockproof plan for no. 1 middle school in zone P, respectively.

In order to facilitate quantification, this study assigned scores according to the actual conditions of the six questions as follows: 10, 15, 15, 15, 20 and 25. The detailed scoring rules of each question are shown in the following table:
### Table 1. Juvenile Earthquake Awareness Test Scoring Criteria.

| Question number | Rating rules |
|-----------------|--------------|
| a               | The cause of the earthquake (2 points); The performance of the earthquake (3 points); The hazard (or impact) of the earthquake (2 points); |
| b               | Taiwan Province and nearby waters (3 points); Southwest China, including Tibet, the central and western Sichuan, and the central and western Yunnan (3 points); The western region is mainly in the Hexi Corridor of Gansu, Qinghai, Ningxia, and the north and south of the Tianshan Mountains in Xinjiang (3 points); North China, mainly on both sides of Taihang Mountain, Weihe Valley, Yinshan-Yanshan area, Shandong Province and Bohai Bay (3 points); Southeast coastal areas, Guangdong, Fujian and other places (3 points). |
| c               | Plate junction (5 points); Seismic zone name (5 points); Geological conditions are complex (5 points). |
| d               | Accurately name the earthquake (5 points); Describe the general feelings at the time (5 points); Describe the directionality of the earthquake (5 points). |
| e               | How to do indoors (5 points); How to do outdoor (5 points); How to do in the vehicle (5 points). How to do it in a public place other than the above (5 points). |
| f               | Design from a spatial orientation perspective, an information perspective, a scientific argument perspective, and a shared communication perspective, but need to include buildings, shelters, escape routes, etc. (25 points). |

2.3. Analysis Software

SPSS19.0 was used in this test to analyze the overall level of seismic consciousness of the selected objects of the high school students of this school. The noun "earthquake" explains the situation, the understanding of the earthquake prone area, the reason of the earthquake prone area, the earthquake in the impression, the behavior when the earthquake occurs and the design of the earthquake prevention plan.

3. Research results and discussion

3.1. Overall Situation

According to the statistical analysis, the average score of this test was 70.227, which can be inferred that the overall seismic awareness of students in this school was strong, but the level of seismic awareness of students in this school was uneven, as shown in Figure 1:
Figure 1. The specific segment of the total seismic awareness score

It can be seen from the test that there are still a considerable number of groups below the qualified level. Even if the number of the injured is below 80, the majority of them are above 80, which only accounts for 24% of the total number of people tested. It can be inferred that there is still room for students to improve their earthquake awareness. In addition, the earthquake awareness of students in this school is composed of the explanation of the noun "earthquake", the understanding of the earthquake prone areas, the reasons for the high frequency of earthquakes in a certain area, the impression of the earthquake, the behavior when the earthquake occurred, and the design of the earthquake prevention plan. There is a possibility that the results of the students in this school will be boosted by the fact that the first three questions can be completed in memory. The gender difference may also be a factor. Then we carried on the concrete score measurement and the sex ratio measurement.

3.2. Calculation Results of Specific Dimensions

3.2.1. Basic Information of Specific Dimensions. In order to more accurately grasp the basic situation of the subject group in each dimension, this study measured the maximum, minimum and average values of each dimension, as shown in the following table:

| Dimension                                | N  | Minimum value | Maximum | Average |
|-------------------------------------------|----|---------------|---------|---------|
| Explanation of the term "earthquake"      | 75 | 2.0           | 10.0    | 8.040   |
| Understanding of earthquake-prone areas  | 75 | 5.0           | 15.0    | 12.133  |
| Causes of frequent earthquakes in a certain area | 75 | 2.0           | 15.0    | 10.867  |
| Impression of the earthquake              | 75 | 3.0           | 15.0    | 11.293  |
| Behavior at the time of the earthquake    | 75 | 5.0           | 20.0    | 13.760  |
| Anti-seismic design                       | 75 | .0            | 25.0    | 14.427  |

According to the above results, there are full mark winners in any dimension of the test volume. It can be concluded that a considerable number of students in the school have a higher level in a certain project. However, we can find that low scores also exist. It can be seen that it is extremely urgent to improve the level of earthquake awareness of our students. However, we have carried out further analysis on the specific situation of each dimension.
3.2.2. Specific Score Results of Specific Dimensions. To clarify the specific situation, we made a detailed analysis between each dimension, and the specific results are shown in the following table (table 3 to table 8):

### Table 3. Explanation of terms for “earthquake”

| Frequency | Percentage | Effective Percentage | Cumulative Percentage |
|-----------|------------|----------------------|-----------------------|
| 2.0       | 1          | 1.3                  | 1.3                   |
| 5.0       | 20         | 26.7                 | 28.0                  |
| 6.0       | 3          | 4.0                  | 32.0                  |
| 7.0       | 1          | 1.3                  | 33.3                  |
| 8.0       | 11         | 14.7                 | 48.0                  |
| 9.0       | 2          | 2.7                  | 50.7                  |
| 10.0      | 37         | 49.3                 | 100.0                 |
| Total     | 75         | 100.0                | 100.0                 |

### Table 4. Understanding of earthquake-prone areas.

| Frequency | Percentage | Effective Percentage | Cumulative Percentage |
|-----------|------------|----------------------|-----------------------|
| 5.0       | 6          | 8.0                  | 8.0                   |
| 8.0       | 1          | 1.3                  | 9.3                   |
| 10.0      | 16         | 21.3                 | 30.7                  |
| 12.0      | 14         | 18.7                 | 49.3                  |
| 13.0      | 10         | 13.3                 | 62.7                  |
| 14.0      | 6          | 8.0                  | 70.7                  |
| 15.0      | twenty two | 29.3                | 100.0                 |
| Total     | 75         | 100.0                | 100.0                 |

### Table 5. Reasons for earthquakes in a certain area.

| Frequency | Percentage | Effective Percentage | Cumulative Percentage |
|-----------|------------|----------------------|-----------------------|
| 2.0       | 1          | 1.3                  | 1.3                   |
| 5.0       | 8          | 10.7                 | 12.0                  |
| 7.0       | 1          | 1.3                  | 13.3                  |
| 10.0      | 32         | 42.7                 | 56.0                  |
| 12.0      | 7          | 9.3                  | 65.3                  |
| 13.0      | 11         | 14.7                 | 80.0                  |
| 14.0      | 6          | 8.0                  | 88.0                  |
| 15.0      | 9          | 12.0                 | 100.0                 |
| Total     | 75         | 100.0                | 100.0                 |

### Table 6. Earthquakes in Impression.

| Frequency | Percentage | Effective Percentage | Cumulative Percentage |
|-----------|------------|----------------------|-----------------------|
| 3.0       | 1          | 1.3                  | 1.3                   |
| 5.0       | 7          | 9.3                  | 10.7                  |
| 10.0      | twenty one | 28.0                | 38.7                  |
| 12.0      | 25         | 33.3                 | 72.0                  |
| 13.0      | 7          | 9.3                  | 81.3                  |
| 14.0      | 2          | 2.7                  | 84.0                  |
| 15.0      | 12         | 16.0                 | 100.0                 |
| Total     | 75         | 100.0                | 100.0                 |
Table 7. Behavior at the time of the earthquake.

| Anti-seismic design | frequency | percentage | Effective percentage | Cumulative percentage |
|---------------------|-----------|------------|----------------------|----------------------|
| 5.0                 | 1         | 1.3        | 1.3                  | 1.3                  |
| 8.0                 | 1         | 1.3        | 1.3                  | 1.3                  |
| 9.0                 | 1         | 1.3        | 1.3                  | 4.0                  |
| 10.0                | 14        | 18.7       | 18.7                 | 22.7                 |
| 12.0                | 6         | 8.0        | 8.0                  | 30.7                 |
| 13.0                | 4         | 5.3        | 5.3                  | 36.0                 |
| 14.0                | 2         | 2.7        | 2.7                  | 38.7                 |
| 15.0                | 33        | 44.0       | 44.0                 | 82.7                 |
| 16.0                | 6         | 8.0        | 8.0                  | 90.7                 |
| 17.0                | 1         | 1.3        | 1.3                  | 92.0                 |
| 18.0                | 5         | 6.7        | 6.7                  | 98.7                 |
| 20.0                | 1         | 1.3        | 1.3                  | 100.0                |
| total               | 75        | 100.0      | 100.0                |                      |

Table 8. Design of anti-vibration scheme.

| frequency | percentage | Effective percentage | Cumulative percentage |
|-----------|------------|----------------------|----------------------|
| .0        | 4          | 5.3                  | 5.3                  |
| 2.0       | 1          | 1.3                  | 1.3                  | 6.7                  |
| 10.0      | 16         | 21.3                 | 21.3                 | 28.0                 |
| 11.0      | 1          | 1.3                  | 1.3                  | 29.3                 |
| 12.0      | 3          | 4.0                  | 4.0                  | 33.3                 |
| 13.0      | 2          | 2.7                  | 2.7                  | 36.0                 |
| 14.0      | 1          | 1.3                  | 1.3                  | 37.3                 |
| 15.0      | twenty three | 30.7                | 30.7                | 68.0                 |
| 16.0      | 1          | 1.3                  | 1.3                  | 69.3                 |
| 17.0      | 2          | 2.7                  | 2.7                  | 72.0                 |
| 18.0      | 5          | 6.7                  | 6.7                  | 78.7                 |
| 20.0      | 8          | 10.7                 | 10.7                 | 89.3                 |
| 22.0      | 4          | 5.3                  | 5.3                  | 94.7                 |
| 25.0      | 4          | 5.3                  | 5.3                  | 100.0                |
| total     | 75         | 100.0                | 100.0                |                      |

The above results present our previous view that the middle value group of each dimension of the students in this school is larger, and the maximum and minimum value is smaller. Therefore, it just reflects a problem that the overall level of earthquake awareness of students in this school needs to be improved from the perspective of minimum and maximum. In addition, the promotion of the middle layer can also play a key role in promoting the earthquake awareness of students in this school to a certain extent. In addition, gender differences

3.3. Gender Difference
According to the statistical analysis, the gender differences of the subjects are shown as follows:
According to the results, girls scored higher than boys except for their behavior during the earthquake. It may have something to do with the way they learn and how men and women perceive things differently. This will continue to be a concern in our follow-up work.

4. Research conclusions

4.1. Research Conclusions
According to the above research findings, the overall seismic awareness of the test group was strong, but the level of seismic consciousness of students in the school was uneven. Surprisingly, the term "earthquake" accounted for the largest share of the explanation in specific projects. In other specific projects, the low score is relatively small, but the high score is also very few.

In addition, an interesting finding found in this survey is that in addition to the behavior of the earthquake, the level of earthquake awareness of girls is significantly higher than that of boys. All these indicate that the mode of education and the cognitive state may have an important impact on earthquake awareness.

4.2. Insufficient Research
However, we need to face up to many deficiencies in our research. First of all, what is the relationship between the factors in this study, especially the earthquake awareness and family education, social education and school education? Secondly, what is the relationship between earthquake awareness in this study and students' subsequent earthquake related study, research or occupation? Thirdly, what is the relationship between earthquake awareness and geographic literacy, comprehensive thinking, human-earth coordination and regional cognition in this study? And so on are not yet involved in this study but the crucial part. This needs our follow-up study.

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