

Health literacy of college freshmen in Jiangsu, China

A 3-year longitudinal survey

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Abstract

Health literacy (HL) has become an important public health issue and received growing attention in recent years. However, knowledge about the HL of adolescents and young adults is limited.^[1] This study aimed to investigate the awareness rate of HL and its related factors among college freshmen in Jiangsu, China. And the results were used to support the promotion intervention to improve the HL of at-risk groups among this population.

A total of 25,272 freshmen were surveyed through multi-stage stratified random sampling from 20 colleges and universities in Jiangsu province between 2016 to 2018. Data were obtained using the “Chinese Citizen Health Literacy Questionnaire” (2013 edition). Multiple logistic regression analysis was conducted to determine the factors influencing HL levels.

The awareness rate of HL of college freshmen in Jiangsu province was 26.6% among the 25,272 subjects. The awareness rate of HL tended to increase from 2016 to 2018, which was 17.9%, 21.5%, and 39.6%, respectively ($P < 0.001$). Specifically, except for chronic diseases, knowledge and attitudes, knowledge and attitudes toward health-related behavior and lifestyle, health-related skill and scientific views of health, infection diseases, safety and first aid, medical care, health information awareness rate all have improved to a certain degree ($P < .001$). The independent factors associated with HL awareness rate were sex (odds ratio [OR] = 1.099, (1.039–1.164)), residence (urban: OR = 1.141, (1.056–1.234)), educational system (OR = 2.133, (1.975–2.305)), only child or not (OR = 1.087, (1.018–1.161)), family structure (OR = 1.192, (1.078–1.319)) and maternal education level (high school: OR = 1.183 (1.067–1.313); university and more: OR = 1.481 (1.324–1.658)).

Awareness rate of HL of college freshmen is associated with multi-complex factors, further works are recommended to improve the HL levels of college freshmen, especially for the aspect of chronic diseases.

Abbreviations: BAL = knowledge and attitudes toward health-related behavior and lifestyle, CD = chronic diseases, HL = health literacy, KAA = knowledge and attitudes, MC = medical care, SAFA = safety and first aid, SVH = scientific views of health.

Keywords: college freshmen, health literacy, longitudinal survey

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1. Introduction

According to the World Health Organization (WHO) “Health Promotion Glossary”: “Health literacy (HL) represents the cognitive and social skills which determine the motivation and ability of individuals to gain access to, understand and use information in ways which promote and maintain good health. Poor HL can affect people’s health by limiting their personal, social and cultural development, directly, as well as hindering the development of HL.”^[2] As early as 1974, Simonds^[3] had pointed out that improving HL should be an important component of public social policy. At present, HL is widely appreciated all over the world. To promote residents’ self-health management, increase health knowledge and improve the effective use and fairness of medical and health services of the residents, many European and American countries have taken it as 1 of the main indexes to evaluate health policy and citizens’ health status.^[4,5] A recent meta-analysis conducted by Okan indicated that knowledge to inform effective interventions on HL among the children and adolescents is limited and it is required further improvement in HL instruments in the future.^[1] The research on HL in China began later. In 2008,^[6] the Chinese government launched a campaign to promote citizens’ HL, with “Health Literacy of The Public in China – Basic Knowledge and Skills (trial)” formulated and published, namely 66 HL items of Chinese citizens. In the same year, a nationwide survey on the HL of residents was

carried out.^[7] According to the results of national HL monitoring in 2008, 2012 to 2018 (6.5%, 8.8%, 9.5%, 9.8%, 10.3%, 11.6%, 14.2%, and 17.06%, respectively),^[8] the awareness rate of HL of Chinese residents was slightly on progress, but still at a low level.

In recent years,^[9] focus of HL in China has gradually shifted from the whole community or rural and urban residents to subdividing groups, such as pregnant women, students, or patients. In 2016, Chinese government proposed to “Incorporate health education into the national education system, and make health education an important part of quality education at all stages of education”. A comprehensive school health program has become an important part of the national health plan. However, the survey on HL of students in China mainly focuses on college students, few have examined the HL of high school students.^[10–13] Our study was aimed at college freshmen who have just entered university or college, so it can be considered to monitor the HL of middle school students in Jiangsu province indirectly and provide scientific data for health interventions in middle schools. On the other hand, the results were expected to provide references for health education and health promotion in colleges or universities.

2. Objects and methods

The study approved by local ethic committee of student’s health literacy promotion and research, Jiangsu province and the Institutional Review Board of the School of Public Health.

2.1. Participants

The survey was conducted in October of each year from 2016 to 2018. A multi-stage stratified random sampling was used to obtain a representative sample of students. At the first stage, 20 colleges and universities were selected from the south, central and northern part of Jiangsu province by stratified sampling. In the second stage, 15 to 18 each of male and female students from 13 cities in Jiangsu province were randomly selected from the enrollment list. The investigators, physical education teachers, and school doctors from 2 universities in Jiangsu province were trained under uniform protocol before the survey to ensure the consistency of operation procedures. The student counselor gathered the selected students into the classroom on the day of the survey. A verbal informed consent regarding the goals of the study and the willingness to participate was given to the participants. The questionnaires were reviewed and recovered by the investigator after completion and revised again when recorded into the computer. The invalid questionnaires either with 3 or more missing items or randomly filled with the same options were not included in the analysis. Finally, a total of 26,160 questionnaires were issued and 25,272 of them were valid. Hence, the response rate of the questionnaire was 96.6%.

2.2. Instruments

The “Chinese Residents Health Literacy Monitoring Questionnaire (2013)”^[14] was used in this study, including demographic information and HL questions. Demographic information includes sex, ethnicity, residence, education system, only child or not, family structure and maternal education level. The pre-experiment showed that the questionnaire has high reliability and good internal consistency to measure the HL of college freshmen (Cronbach Alpha is 0.723 and Kaiser-Meyer-olkin is 0.917). HL questions include 3 dimensions and 6 aspects of HL: knowledge

and attitudes (KAA), knowledge and attitudes toward health-related behavior and lifestyle (BAL), health-related skill; scientific views of health (SVH), infection diseases, chronic diseases (CD), safety and first aid (SAFA), medical care (MC), health information.

The total score of this questionnaire is 74 points, and the total of KAA, BAL, and health-related skill scores are 32, 25, and 17 points, and those of the SVH, infection diseases, CD, SAFA, MC, and health information are 9, 7, 14, 14, 14, and 7, respectively. One who scored 80 percent and above was determined to have HL in that 1 aspect. The awareness rate of HL was defined as the proportion of participants who had adequate HL out of the total number.

2.3. Statistical analyses

All data were entered in duplicate into the Epidata version 3.1 database and analyzed with SPSS ver.22.0 for Windows (SPSS, Inc., Chicago, IL). The awareness rate of HL among different years and demographics were compared with the chi-square test. Variables with significant differences in univariate analysis ($P < .1$) were included in the multivariate logistic regression model for adjusting the risk factors associated with HL. P -values $< .05$ (2-sided) were considered to be statistically significant for all hypothesis tests.

3. Results

3.1. Demographic characteristics

A total of 25,272 college freshmen were enrolled in the study, including 49.2% of males and 50.8% of females. Most of the participants were of Han ethnicity (98.9%). Specifically, as shown in Table 1, 75.8% of the participants were undergraduates, 24.2% were freshmen of 3-year college students. Besides, 28.6% of the students came from rural areas, 20.9% from town, and 50.5% from urban areas. In addition, about one-third (33.1%) of the participants were the only child and 90% of the participants have a complete family (including families of origin, families in the case of father/stepmother or mother/stepfather). Of the participants, less than half (45.7%) said that their mothers had completed high school or higher education.

3.2. The awareness rate of health literacy of college freshmen in Jiangsu province

The awareness rate of HL of the college freshmen in Jiangsu province from 2016 to 2018 was 17.9%, 21.5% and 39.6% ($P < .001$). Besides, all of the dimensions of HL had been improved to a certain extent ($P < .001$), except for chronic diseases, of which the awareness rate in 2018 was lower than that in 2017 (16.3% versus 17.9%). However, the awareness rate among the 3 dimensions and 6 aspects of HL was unbalanced. As shown in Figure 1, SAFA had the highest awareness rate (86.1%), followed by SVH (69.4%) and BAL (53.4%). On the contrary, the awareness rate of CD was the lowest (16.3%), followed by KAA (27.5%) and MC (29.2%).

3.3. The distribution of health literacy awareness rate among different demographic characteristic

The awareness rate of HL of 25,272 college freshmen was 26.6%. The distribution of awareness rate of HL among sex,

Table 1
Demographic characteristics of the participants.

Demographic Characteristic	Numbers	Proportion (%)
Year		
2016	8321	32.9
2017	8140	32.2
2018	8811	34.9
Sex		
Male	12441	49.2
Female	12831	50.8
Ethnicity		
Han	24984	98.9
Other	288	1.1
Educational system		
three-year College	6108	24.2
Undergraduate Colleges	19164	75.8
Residence		
Rural	7240	28.6
Town	5276	20.9
Urban	12756	50.5
Only Child or Not		
Yes	8353	33.1
No	16919	66.9
Family Structure*		
Incomplete	2528	10
Complete	22744	90
Mother* Education Level		
Primary and Less	3679	14.6
Middle School	10044	39.7
High School	6933	27.4
University and More	4616	18.3
Total	25272	

* Complete Family: families of origin, families in the case of father/stepmother or mother/stepfather; Incomplete family includes: single parent, divorced parents did not remarry, long-term not living with parents and other parents at least one of the family.

education system, residence, only child or not, family structure, and maternal education level was significantly different ($P < .05$). Specifically, the awareness rate of females was 27.4%, which was higher than that of males (25.8%). As shown in Table 2, the awareness rate of undergraduates (30.1%) was 2 times higher than that of 3-year college students (15.5%). The participants of those living in urban areas (30.4%) had the highest awareness rate of HL. Moreover, those who were the only child (28.3%) and had a complete family (27.1%) had a higher awareness rate than those who were not (23.2%) and had incomplete family structure (21.8%). The influence of the maternal education level on student's awareness rate of HL increased with higher education level of mothers.

3.4. Multiple logistic regression analysis of factors influencing health literacy

Dependent variables were factors with statistical differences in Table 2. The forward stepwise-wald method was used in multivariate logistic regression analysis to adjust the risk factors associated with HL. As shown in Table 3, compared with male, female had a higher awareness rate of HL (OR=1.099, CI (1.039~1.164)). Undergraduates and those from urban areas were significantly more likely to have a higher awareness rate than 3-year college students (OR=2.133,95% CI [1.975–2.305]) and students from rural areas (OR=1.141,95% CI [1.056–1.234]). Also, students had a complete family were likely to have a higher

awareness rate than those who live with a single parent or long-term not living with parents or 1 of their parents (OR=1.192,95% CI (1.078–1.319)). Among the participants, those who were only child also had a higher awareness rate of HL than those who were not (OR=1.087,95% CI (1.018–1.161)). Compared to students whose maternal education level was primary and less, students whose mother have attended middle school or had higher education had a significantly higher awareness rate of HL (OR=1.183,95% CI (1.067–1.313);OR=1.481,95% CI (1.324–1.658)).

4. Discussion

The awareness rate of HL of college freshmen in Jiangsu province between 2016 to 2018 were higher than that of the national residents^[8] (17.9% vs 11.6%, 21.6% vs 14.2%, 39.6% vs 17.06%), and also higher than other scholars study of the similar group.^[15,16] The awareness rate of HL in 2018 even had reached 1 of the goal of “National Health Literacy Promotion Action Plan (2014–2020)”^[17] —“24% of the HL awareness of residents in East China by 2020.” The awareness rate of HL of adolescent and young adult students in Jiangsu province has been greatly improved in recent years as showed in this study. However, it is particularly noteworthy that the awareness rate of chronic disease was only 16.3%. Although it seems that chronic diseases are more common in older people, it is important for adolescents when they begin to take on more autonomy and responsibility regarding their health behaviors to have adequate HL skills.^[18] Studies had shown that patients with chronic illness have higher HL as adolescents, they will potentially have better outcomes during and after the transition.^[19]

In this study, the awareness of female students was higher than that of male students. This phenomenon also appeared in the research of others,^[20,21] and has been explained as females would like to pay more attention to health than males, and are good at using health knowledge to promote the formation of healthy behaviors.^[22] Undergraduates in this study had a higher awareness rate of HL than 3-year college students, also drawing similar conclusions with Li^[23] and Liu et al.^[24] The academic performance of students is considered to have a positive effect on the improvement of their HL. Therefore, undergraduates may have a better ability to learn and acquire health knowledge, actively.^[25] There was a significant difference in HL awareness rate among urban, town and rural. The higher awareness rate of HL was associated with economic factors that may interpret as urban students had better living conditions and better medical resources and health services.^[10] Another reason could be that there were many children of absent parents (often raised by grandparents) in rural areas, and the awareness rate of the HL of their intergenerational guardians is relatively low. The lack of parental care and education is an important factor affecting the HL of adolescents and young adults.^[26] The influence of the maternal education level on HL reflects the positive significance of family education in promoting children's and adolescents' HL.^[27] Other family environments such as family structure and how many children are there in a family may affect the awareness rate of adolescent HL by building closer parent-child relationships. Adolescents in such families can get more attention, and get more health-related guidance from their parents.^[28]

HL is the result of multiple factors in the social environment and multiple systems such as education and health.^[29] In this study, the multivariate logistic regression analysis indicated that

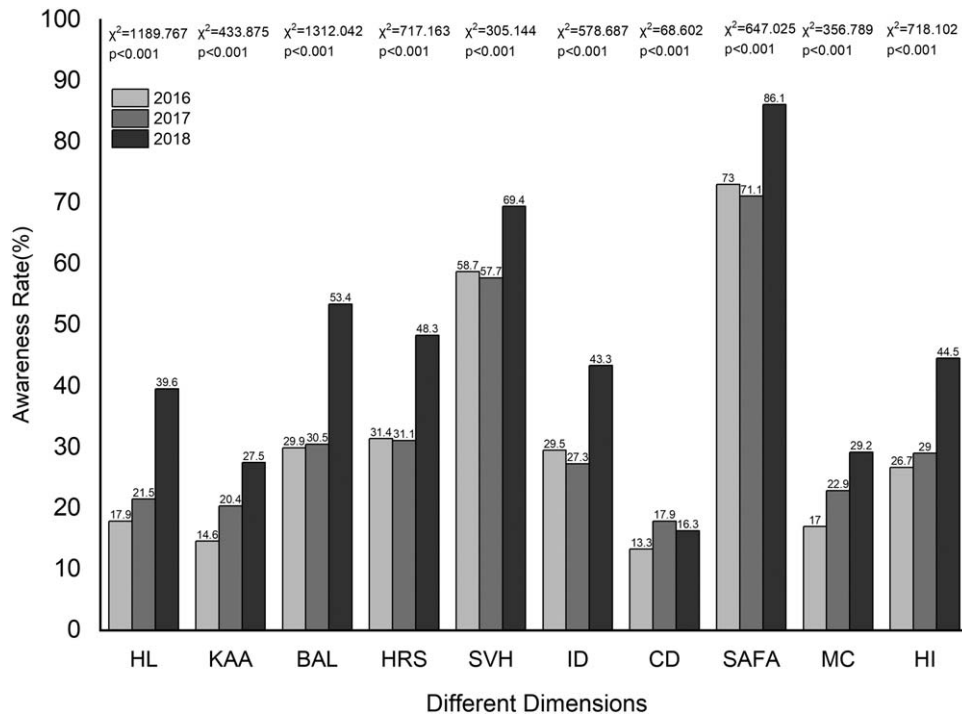


Figure 1. Comparison the awareness rate of health literacy between 2016 to 2018. Comparison the awareness rate of health literacy between 2016 to 2018, including the three dimensions: knowledge and attitudes (KAA), knowledge and attitudes toward health-related behavior and lifestyle (BAL), health-related skill and 6 aspects of HL: scientific views of health, infection diseases (ID), chronic diseases (CD), safety and first aid (SAFA), medical care (MC), health information (HI).

sex, educational system, residence, only child or not, family structure, maternal education level may affect the HL level of college freshmen in Jiangsu province. Research has proven that HL is closely related to education and socioeconomic status,^[27]

and that family culture predominated as an influence in developing a love of reading.^[30] Hence, from the perspective of the factors affecting the HL of college freshmen in Jiangsu province, the 3-year college should pay more attention to the HL of students in subsequent health education. And more attention should be paid to health education in rural areas. To note in this study, the influence of the family environment on adolescent HL cannot be ignored.

Nonetheless, there were several limitations to this study. First, the findings are based on the results of a cross-sectional design, which described a single point in time and was lack of interventions. Therefore, it was unable to determine if the associations found in this study were actual predictors of HL. Second, this study only focused on the population of adolescent students in Jiangsu province, and there was a lack of investigation on the population of non-students. Therefore, the awareness rate of HL may be overestimated when used to reflect the HL level of all the adolescents and young adults in Jiangsu province. Finally, there was an important limitation in this study. During the time between graduating from high school and enrolling in college, freshmen may have been actively preparing for the upcoming university life, or they have received early health education at the beginning of school. This may affect the awareness of HL of college students in this study.

5. Conclusion

This study investigated the status and determinants of adolescent HL using a large number of school-based samples. It is suggested that in order to further improve the awareness rate of adolescent and young adult’s HL, health education on chronic diseases are at top priority. Related administration should pay more attention to health education in 3-year colleges and rural areas, and

Table 2
Comparison of health literacy among different demographic characteristic.

Parameters	Awareness Rate (%)	χ^2	P
Sex		8.784	.003
Male	25.8		
Female	27.4		
Ethnicity		1.674	.196
Han	26.7		
Other	23.3		
Educational system		506.061	<.001
three-year College	15.5		
Undergraduate College	30.1		
Residence		189.234	<.001
Rural	22.3		
Town	23.4		
Urban	30.4		
Only Child or Not		73.381	<.001
Yes	28.3		
No	23.2		
Family Structure*		32.847	<.001
Incomplete	21.8		
Complete	27.1		
Mother’ Education Level		263.531	<.001
Primary and Less	21.3		
Middle School	23.9		
High School	27.9		
University and More	35.0		
Total	26.6		

Table 3
Analysis on the influencing factors of health literacy of college freshmen in Jiangsu province.

Parameters	B	S.E.	Wald	P	OR	95%CI of OR
Sex						
Male	reference					
Female	0.095	0.029	10.751	.001	1.099	(1.039~1.164)
Educational system						
three-year College	reference					
Undergraduate Colleges	0.758	0.039	368.944	.000	2.133	(1.975~2.305)
Residence						
Rural	reference					
Town	-0.062	0.045	1.912	.167	0.940	(0.862~1.026)
Urban	0.132	0.040	11.098	.001	1.141	(1.056~1.234)
Only child or not						
No	reference					
Yes	0.084	0.033	6.273	.012	1.087	(1.018~1.161)
Family Structure*						
Incomplete	reference					
Complete	0.176	0.052	11.623	.001	1.192	(1.078~1.319)
Mother' Education Level						
Primary and Less	reference					
Middle School	0.080	0.048	2.766	.096	1.083	(0.986~1.190)
High School	0.168	0.053	10.133	.001	1.183	(1.067~1.313)
University and More	0.393	0.057	46.852	.000	1.481	(1.324~1.658)

B=beta, CI=confidence interval, OR=odds ratio, S.E=standard error.

encourage families to actively participate in the program of adolescent HL promotion.

Author contributions

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