

The Influence of Health Literacy among Undergraduates on Health-Promoting Lifestyles mediated by Health Behavior Self-Efficacy: Evidence from Jiangxi Province, China

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Abstract. Purpose This study aims to investigate the relationship between undergraduates' health literacy, health behavior self-efficacy, and health-promoting lifestyles. Method In April 2021, a survey was conducted with 1050 undergraduates from 9 universities in Jiangxi Province, utilizing Health Literacy Scales, Health Behavior Self-efficacy Scales, and Health-Promoting Lifestyle Revision Scales. Results (1) The average health literacy score among undergraduates was (66.17 ± 10.01), with 81.6% of students having high or marginal health literacy. The average score for health-promoting lifestyles was (101.34 ± 16.09), indicating an above-average level. The total score for health behavior self-efficacy was (89.23 ± 18.43), indicating a general level of self-efficacy. (2) Positive correlations were found between undergraduates' health literacy, health behavior self-efficacy, and health-promoting lifestyles ($r = 0.259 \sim 0.759$, $P < 0.05$). (3) Health behavior self-efficacy was found to mediate the relationship between undergraduates' health literacy and health-promoting lifestyles. Conclusion To promote a healthy lifestyle among undergraduates, it is crucial to not only improve their health literacy but also enhance their health behavior self-efficacy.

Keywords: Health-promoting lifestyle; Undergraduates; Health literacy; Health behavior self-efficacy; Mediating effect

1. Introduction

Health-promoting lifestyle is a series of continuous daily activities or behavior patterns that individuals adopt to improve the level of their physical and mental health and achieve self-realization and self-satisfaction[1]. The World Health Organization (WHO) points out that 60% of the morbidity and mortality of non-communicable diseases depend on individual behavior and lifestyle. Implementing positive health behaviors can not only reduce morbidity and mortality, but also improve personal happiness and self-realization[1]. While schools are the key places to promote healthy behaviors of adolescents, and the college period is considered as a transitional stage for adolescents from family to society, is also a critical period for the development and stereotype of healthy behaviors[2]. Cultivating college students to develop a scientific and healthy lifestyle is not only of great importance to the health of adults and even later, but also of great significance to the realization of human health. However, domestic and foreign researches on influencing factors of health-promoting lifestyle mainly focus on demographic characteristics[3-8] and related analysis[9-14], and there are few studies on influencing path analysis.

Health literacy, as the knowledge, motivation and ability of individuals to obtain, understand, evaluate and apply judgments and make health information in order to maintain or improve the quality of life in daily life[15], is one of the most fundamental, economical and effective measures to improve the health level of the whole people, and has a positive correlation with health-promoting lifestyle[16]. Studies have shown that individuals with health literacy scored significantly higher on health-promoting lifestyle than those without health literacy[9]. At present, the researches on health literacy in China mainly focus on the investigation of current health literacy and the analysis of demographic influencing factors [17-19]. However, the studies on health behavior or health-promoting lifestyle are principally bent on some special groups, such as patients[9,13], while there are few studies on college students.

Health behavior self-efficacy is an individual's self-assessment and judgment of health behavior ability[20], as well as the belief and confidence in the ability to execute health promotion behavior, which has a significant positive correlation with health promotion behavior[12] and is a powerful predictor of health-promoting lifestyle[6]. While health literacy is remarkably positive correlated with self-efficacy[11,14], which directly affects patients' self-efficacy[13]. In conclusion, both health literacy and health behavior self-efficacy are considered to be the contributing factors of health-promoting lifestyle, but how they influence health promotion behavior style is seldom involved. According to the knowledge-belief-practice theory model[21] of health education, health knowledge is the foundation of health behavior change, and health belief is the motive force of behavior change. Only when people acquire health-related knowledge, think positively about this knowledge and have a strong sense of responsibility, can they gradually form health belief and adopt a positive attitude to alter behavior. The changes of health behavior can divide into three continuous processes: obtaining knowledge, generating belief and forming behavior . As health knowledge and skills, health literacy is the premise of generating health behavior self-efficacy, which can be used to predict health behavior, that is, health-promoting lifestyle. Therefore, this study hypothesizes that health literacy affects health-promoting lifestyle through health behavior self-efficacy, and health behavior self-efficacy play a mediating role in the relationship between undergraduates' health literacy and health-promoting lifestyle.

2. Method

2.1 Sample Selection

This study was designed as an online questionnaire survey. The objects of this research came from 9 universities in Jiangxi Province in May 2021. The sampling method is stratified convenience sampling. Counselors and teachers distributed electronic questionnaires to college students, and the students filled them out voluntarily on the basis of informed consent. In order to improve the effectiveness and scientificity of measurement tools, the tests are divided into two parts: pre-test and formal test. 395 pre-test questionnaires were collected, and 304 were valid, with an effective rate of 76.97%. A total of 1300 formal questionnaires was collected, and 1050 were valid, with an effective questionnaire rate of 80.8%. Sample statistics are as follows (Table 1).

Table 1. Sample Demographic Statistics

Background Variables	Projects	Number of People	Percentage(%)
Gender	male	579	55.1
	female	471	44.9
Native Place	town	460	43.8
	country	590	56.2
Only-Child or not	yes	295	28.1
	no	755	71.9
Major	arts	127	12.1
	science	175	16.7
	engineering	489	46.6
	medicine	158	15.0
	others	101	9.6
Grade	freshman	564	53.7
	sophomore	195	18.6
	junior	213	20.3
	senior and above	78	7.4

2.2 Instruments

2.2.1 Health Literacy Questionnaire

Zhuang Runsen's questionnaires for rapid assessment of urban public health literacy were adopted [22]. The questionnaire consists of 20 questions and three dimensions: health knowledge (8), healthy lifestyle and behavior (8), and health skills (4). Each question is worth 5 points, 5 points for each correct answer, no point for a wrong answer, the full score is 100. The defined standard of health literacy uses 60% and 75% as the cut-off value, and divides the health literacy level into three grades: below 60 points are low health literacy, above 75 points is high health literacy, and 60 ~74 points is marginal cost health literacy. The Cronbach's α coefficients of the total questionnaire are 0.84, and the Cronbach's α coefficients of each dimension are 0.87, 0.78 and 0.90.

2.2.2 Health Behavior Self-efficacy Scale

This scale was developed by Becker et al. [20], translated and revised by Taiwan Province scholars Huang and Qiu [6], with a total of 28 questions. After pre-test questionnaire item analysis and factor analysis, three items in the scale, "I can brush my teeth on time", "drink enough water every day" and "I can know where to find information about health care", were deleted, and 25 items were retained. They can be divided into four dimensions: health responsibility efficacy (6), psychological well-being efficacy (7), nutritional efficacy (6), and exercise efficacy (6). The Likert five-point scoring method was adopted, and according to the degree of self-assessment, 1-5 points were given from "almost completely uncertain", "a little certain", "moderately certain", "relatively certain" to "absolutely certain" respectively. The higher the score is, the higher the self-efficacy of performing healthy behaviors is. In this study, the Cronbach's α coefficient of the scale is 0.97, and the Cronbach's α coefficient of each subscale ranges from 0.86 to 0.91.

2.2.3 Health-Promoting Lifestyle Revision Scale II

The scale was derived from the Health Promotion Behavior Scale developed by Pender et al. [1], which was revised in Chinese by Taiwan Province scholar Wu Mingcang in 2014, with a total of 29 items. This study through pre-test questionnaire item analysis and factor analysis, deleted two items, "I practice relaxation and meditation every day" and "I resolve disputes with others through discussion and tolerance", and reserved 27 items with six dimensions: interpersonal relationship (4 questions), health responsibility (6 questions), stress management (4 questions), nutritional behavior (3 questions), physical activity (4 questions), and spiritual growth (6 questions). Likert five-point scoring method was adopted, and the scores ranged from 1 to 5 for "strongly disagree", "disagree", "uncertain", "agree" and "strongly agree", with the total score ranging from 27 to 135. The higher the score, the higher the level of health promotion behavior. Cronbach's α coefficient of this scale is 0.97, and Cronbach's α coefficient of each dimension is between 0.74 and 0.89.

2.3 Statistical Method

Adopt SPSS 22.0 to do data analysis, and descriptive analysis is used to analyze the overall situation of samples; Pearson and regression coefficient is adopted to analyze the relationship between health literacy, health behavior self-efficacy and health-promoting lifestyle, and Bootstrap is used to test the mediating effect.

Since the variable data of this study are mainly collected by self-report method, there may be common method deviation. In order to avoid the deterioration caused by common method, the study adopts voluntary filling, anonymous investigation and scattered items in various dimensions, etc, and the obtained datas are tested by Harman single factor test, resulting in 15 factors. The first factor explains the variance variation of 33.3, which is less than the critical value of 40%. It shows that there is no serious common method deviation in this study.

3. Results

3.1 Current Situation of undergraduates' Health Literacy, Health Behavior Self-Efficacy and Health-Promoting Lifestyle

The scores of undergraduates' health literacy are (66.17 ± 10.01), which is generally at the upper-middle level. Its horizontal distribution is similar to that of "football", and most of them are at the marginal cost level, that is, the numbers of students at the intermediate level with marginal cost health literacy level are the largest, accounting for 56.5% of the total sample. College students with low health literacy account for 18.4% of the total sample, while those with high health literacy account for 25.1% of the total sample. The average score of each level of health literacy is the highest in health knowledge literacy, followed by health skill literacy, and the lowest in health behavior literacy.

The scores of health behavior self-efficacy of college students are (89.23 ± 18.43), and the average value of each question is 3.57. The average score of each level of self-efficacy is the highest in the level of psychological well-being efficacy, followed by health responsibility efficacy, exercise efficacy and nutrition efficacy.

The total scores of undergraduates' health-promoting lifestyle are (101.34 ± 16.09), the score range is 27~135, and the average value of each question is 3.75, which indicates that undergraduates' health-promoting lifestyle is on the upper-middle level. The average score of each level of health promotion is the highest in interpersonal relationship, followed by mental growth, stress management, nutritional behavior and physical activity, and the lowest is in health responsibility (Table 2).

Table 2. Descriptive Statistics of the Status of Health Literacy, Health Behavior Self-Efficacy and Health-Promoting Lifestyle (n=1050)

Name of Scale	Average	Standard Deviation	Number of Questions	Average Score per Question	Average score order of sub-table
a1 Health Knowledge Literacy	31.43	6.58	8	3.93	1 3 2
a2 Health Behavior Literacy	21.63	6.34	8	2.70	
a3 Health Skill Literacy	13.11	2.84	4	3.28	
a Health Literacy	66.17	10.01	20	3.31	4 1 3 2 1 3
b1 Nutritional Efficacy	21.00	4.68	6	3.50	
b2 Psychological Well-being Efficacy	25.34	5.38	7	3.62	
b3 Exercise Efficacy	21.30	4.93	6	3.55	
b4 Health Responsibility Efficacy	21.59	4.70	6	3.60	
b Health Behavior Self-Efficacy	89.23	18.43	25	3.57	
c1 Stress Management	15.26	2.47	4	3.81	3 2 6 5 1 4
c2 Mental Growth	23.37	3.71	6	3.89	
c3 Health Responsibility	21.23	4.54	6	3.54	
c4 Physical Activity	14.76	2.94	4	3.69	
c5 Interpersonal Relationship	15.58	2.43	4	3.90	
c6 Nutritional Behavior	11.15	2.07	3	3.72	
c Health-Promoting Lifestyle	101.34	16.09	27	3.75	

3.2 Correlations among Health Literacy, Health Behavior Self-Efficacy and Health-promoting Lifestyle

The results of Pearson product-moment correlation analysis show that there is a significant positive correlation among undergraduates' health literacy, health behavior self-efficacy and

health-promoting lifestyle ($r=0.259\sim0.759$, $P < 0.05$, as shown in Table 3), which indicated that it is suitable for mediating effect analysis.

Table 3. Correlation Matrix of Health Literacy, Health Behavior Self-Efficacy and Health-Promoting Lifestyle

Name of Scale	Health Literacy	Health Behavior Self-Efficacy	Health-Promoting Lifestyle
Health Literacy	-		
Health Behavior Self-Efficacy	0.306*	-	
Health-Promoting Lifestyle	0.259*	0.759*	-

* $p < .05$

3.3 Analysis of the Mediating Effects of Health Behavior Self-Efficacy in the Relationship between Health Literacy and Health-Promoting Lifestyle

According to Wen Zhonglin's mediating effect test procedure [23], a three-step test is adopted: the first step is to check out the predictive effect of health literacy on health-promoting lifestyle, the second step is to test the predictive effect of health behavior self-efficacy on health-promoting lifestyle, and the third step is to test the predictive effect of health literacy and health behavior self-efficacy on health-promoting lifestyle. The results show that health literacy has a predictive effect on health-promoting lifestyle, but the standardized regression coefficient decreases from 0.259 to 0.029 when self-efficacy is added, suggesting that health literacy can explain health-promoting lifestyle through health behavior self-efficacy. The results are shown in Table 4 and Figure 1.

Table 4. Analysis of the Mediating Effects of Health Behavior Self-Efficacy in the Relationship between Health Literacy and Health-Promoting Lifestyle

Dependent Variable	Independent Variable	Standardized β	Standard Error	T Value	R^2	ΔR^2
Step1 Health-Promoting Lifestyle	Health Literacy	0.259	0.036	8.665***	0.067	0.066* **
Step 2 Health Behavior Self-Efficacy	Health Literacy	0.306***	0.043	10.403***	0.094	0.093* **
Step 3 Health-Promoting Lifestyle	Health Literacy	0.029	0.025	1.372	0.577	0.577
	Health Behavior Self-Efficacy	0.751***	0.014	35.566***		

*** $p < .001$



Figure 1. Mediating Model of Health Behavior Self-Efficacy between Health Literacy and Health-Promoting Lifestyle

In order to further test whether the mediating effect coefficient is significant or not, the Bootstrap Command in Hayes' process plug-in is adapted to check out the mediating effect coefficient. On the basis of the original sample ($n=1050$), 5,000 samples are taken. If the 95% confidence interval of the mediating effect coefficient does not contain 0, the mediating effect is significant. The results suggest that the intermediate effect of health behavior self-efficacy is significant, and the 95% confidence interval is $[0.181, 0.283]$, excluding 0. The direct effect of health literacy is not significant, and the 95% confidence interval is $[-0.013, 0.07]$, including 0. This shows that although health literacy can predict health-promoting lifestyle, this predictive power mainly needs intermediary variables to explain, that is, individual health literacy does not directly affect their health-promoting lifestyle, but mainly affects their health-promoting lifestyle by influencing their health behavior self-efficacy.

4. Discussion

4.1 Current Situations of health literacy, health behavior self-efficacy and Health-Promoting Lifestyle among college students

This survey found that the total score of college students' health literacy (66.17 ± 10.01), which was above the average level, The health knowledge literacy score was the highest, and the health behavior literacy score was the lowest. This result is basically in line with the current situation of health education, and assessment of knowledge and ability focuses more on knowledge and skills. It further shows that college students have a good knowledge of knowledge and skills, and it is difficult to transform "knowledge" into "action", will be the key and difficult point of health education.

The self-efficacy score of college students' health behavior was (89.23 ± 18.43), and the average value of each question was 3.57, which exceeded the theoretical median value of 3 and was generally above the average level, indicating that college students were still confident in the implementation of their own health behavior. The highest psychological psychological the highest, followed by health responsibility, and the lowest exercise and nutrition scores. May be due to the difference between age and region, the physical condition of the college students is the best period in their life, but due to the increased learning pressure, the perception of exercise execution is weak. In addition, Jiangxi is located in central China, and the long-term eating habits do not change so quickly, so the performance perception of choosing healthy and nutritious food is the lowest.

The total score of health-promoting lifestyle of college students (101.34 ± 16.09), and the average value of each question was 3.75, indicating that the overall performance of healthy lifestyle was better. The results of this study are consistent with those of Jia-Ru Yang [24] on college students in Taiwan, China. Compared with the gap between Taiwan college students such as Hong Jingfang and Li Zheng [24] more than 10 years ago, there is no significant gap between Chinese mainland college students and Taiwan college students in health-promoting lifestyle, which shows that the health promotion behavior of Chinese college students in China has developed rapidly under the background of big health in recent years. The interpersonal score is the highest in all dimensions, consistent with the research results of Wang Yang et al. [8], which indicates that Chinese college students can generally consciously and actively deal with and maintain good interpersonal behaviors; other studies also found that exercise and health responsibility of Chinese college students are at a low level [7, 25, 26], and exercise and health responsibility changed little in recent 10 years, thus to value and help college students establish the sense of health responsibility.

4.2 Relationship between undergraduates' Health Literacy, Health Behavior Self-Efficacy and Health-Promoting Lifestyle

This study found that undergraduates' health literacy has a significant positive impact on their health behavior self-efficacy and health-promoting lifestyle. The higher their health literacy level, the better their health behavior self-efficacy and health-promoting lifestyle. In order to cultivate

undergraduates' healthy lifestyle, it is essential to master health knowledge and skills, and to comb the concept of health. Only with certain health knowledge and skills can they have certain faith and confidence in performing healthy behaviors.

5. Conclusion

This study confirmed that health behavior self-efficacy not only has a significant positive predictive effect on health-promoting lifestyle, but also plays a mediating effect between health literacy and health-promoting lifestyle, which verifies the hypothesis of this research and further verifies the "knowledge-belief-practice health model". In this study, health literacy does not directly affect health-promoting lifestyle, but through health behavior self-efficacy. It shows that only by imparting and mastering health knowledge and skills, the cultivation and improvement of healthy lifestyle cannot be achieved, and improving undergraduates' health behavior self-efficacy is the key and core. The stronger the self-efficacy, the more implementable the health-promoting lifestyle, and the greater the possibility. In addition, as the samples of this study are limited to universities in Jiangxi Province, if the research results are to be inferred to the national college students, it is necessary to increase samples and expand the sampling range for verification.

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