Current Status and Influencing Factors of Medical Science Popularization Ability among Medical Students

Juan Wang†, Shuai Liu†, Yang Bai, Mengquan Qiao, Wenyue Liu, Chenchen Du, Tao Zhang, Lishuo Gao*

Department of Medical-Surgical Nursing, School of Nursing, Tianjin Medical University, Tianjin 300070, China
†These authors contributed equally to this work.

Corresponding author: Lishuo Gao, gaolishuo@tmu.edu.cn

Abstract: *Objective:* This study aims to understand the medical science popularization abilities of medical students and their influencing factors, providing a reference for improving medical students' medical science popularization capabilities. *Methods:* From November 2024 to January 2025, 310 medical students from Tianjin, Baotou, Fuzhou, and Yinchuan were selected as the study subjects. Surveys were conducted using a general information questionnaire and an evaluation scale for medical students' medical science popularization abilities. *Results:* The median score for medical science popularization abilities among the 310 medical students was 172 (interquartile range: 159, 198). Multiple linear regression analysis revealed that the students' place of origin, grade level, and whether they had experience in medical science popularization were the primary influencing factors, accounting for 10% of the total variance. *Conclusion:* Medical students' medical science popularization abilities are at a moderate level. School administrators need to develop targeted intervention measures based on these influencing factors to enhance medical students' medical science popularization capabilities.

Keywords: Medical students; Science popularization; Ability; Influencing factors

1. Introduction

The *Healthy China Initiative (2019–2030)* clearly states that improving the health literacy of the entire population is one of the most fundamental, cost-effective, and efficient measures to enhance overall public health. It also identifies the dissemination of health knowledge as one of the fifteen major actions aimed at improving residents' health levels [1]. Science popularization plays a crucial role in making scientific knowledge easily understandable and acceptable to the general public [2]. Medical science popularization is a practical activity that utilizes easy-to-understand text, illustrations, videos, and other resources to disseminate

medical knowledge, health information, and wellness tips to the public [3]. It involves professionals with medical backgrounds or relevant institutions as primary communicators, providing the public with reliable, scientific, and practical health knowledge to prevent diseases and maintain health [4]. As the "Healthy China" strategy advances and public demand for health information grows, the importance of medical science popularization as a bridge between medical expertise and society becomes increasingly prominent. The development of medical science popularization relies on the cultivation of talented individuals in this field. Existing research [5–9] indicates that current medical students lack sufficient science popularization literacy, and a systematic science popularization teaching system and evaluation criteria for science popularization abilities have yet to be established domestically [10]. Evaluation is crucial for enhancing medical students' medical science popularization abilities, as it helps identify their weaknesses and enables the implementation of effective improvement strategies [11]. Currently, there is limited research on medical students' medical science popularization abilities. This study employs a medical science popularization ability scale for medical students to assess their current abilities and analyze influencing factors, providing references for school administrators to develop intervention measures aimed at improving medical students' medical science popularization abilities.

2. Subjects and methods

2.1. Research subjects

The convenience sampling method was employed to select 310 medical students from Tianjin, Baotou, Fuzhou in Fujian Province, and Yinchuan in Ningxia Hui Autonomous Region as the research subjects. Inclusion criteria: (1) Full-time undergraduate students majoring in medicine; (2) Willing to participate voluntarily. Exclusion criteria: Those who were unable to fill out the questionnaire during the survey period due to illness or other reasons. Among the medical students surveyed, there were 93 males (30%) and 217 females (70%); 191 students (61.6%) were from urban areas, 72 (23.2%) from rural areas, and 47 (15.2%) from townships; 59 students (19%) were in the first year of university, 65 (21%) in the second year, 140 (45.2%) in the third year, 27 (8.7%) in the fourth year, and 19 (6.1%) in the fifth year; 208 students (67.1%) were majoring in nursing, and 102 (32.9%) in other majors; 91 students (29.4%) were student leaders, and 219 (70.6%) were non-student leaders.

2.2. Data collection method

This study adopted a questionnaire survey method. From November 2024 to January 2025, the researchers distributed paper questionnaires on-site. Before distributing the questionnaires, the researchers used standardized instructions to explain the research purpose to the surveyed students and obtained their consent. The students filled out the questionnaires based on their actual situations, and it took approximately 8 minutes to complete the entire questionnaire. When collecting the questionnaires, the researchers checked on-site for any unanswered items. During data entry, questionnaires with regular responses were regarded as invalid. A total of 345 questionnaires were distributed, and 310 valid questionnaires were collected, resulting in an effective response rate of 89.86%.

2.3. Research tools

2.3.1. General information questionnaire

The self-designed questionnaire includes 8 items: gender, place of origin, grade, major, whether a student leader, whether having learning experience in medical science popularization or communication courses, whether having experience in medical science popularization, and willingness to engage in medical science

popularization.

2.3.2. Evaluation scale for medical science popularization ability of medical students

This scale was developed by Ye *et al.* [11] in 2023. It consists of 42 items divided into 6 dimensions: popular science cognition (6 items), popular science creation ability (7 items), popular science dissemination ability (8 items), professional values and personality traits (9 items), quality of popular science works (10 items), and popular science effects and feedback (3 items). The scale uses a Likert 5-point scoring system, with options set as strongly agree, agree, neutral, disagree, and strongly disagree, scored as 5, 4, 3, 2, and 1, respectively. The total score ranges from 42 to 210, with a higher score indicating stronger medical science popularization ability. The overall Cronbach's α coefficient of the scale is 0.967.

2.4. Statistical analysis

SPSS 27.0 software was used for statistical description and analysis of the data. The Kolmogorov-Smirnov (K-S) test was used to test the normality of the sample data, and the data showed a non-normal distribution. Count data were expressed as frequencies, rates, and percentages, while measurement data were expressed as [M(P25, P75)]. Non-parametric tests were used to compare the medical science popularization ability of medical students with different characteristics, and multiple linear regression analysis was used to analyze the influencing factors of medical students' medical science popularization ability. A *P*-value < 0.05 was considered statistically significant.

3. Results

3.1. Scores on the evaluation scale for medical science popularization ability of medical students

The median score for medical science popularization ability among the 310 surveyed medical students was 172 (159, 198) points, with a score rate of 81.9%. Among the various dimensions, the dimension with the highest score rate was popular science cognition (88%). For further details, see **Table 1**.

Table 1. Scores on the evaluation scale for medical science popularization ability of medical students

Dimension	Maximum	Minimum	M(P25,P75)	Score rate (%)
Science popularization cognitive dimension	25	5	22(20,25)	88
Science popularization creative ability dimension	35	7	28(24,34)	80
Science popularization communication ability dimension	40	8	32(27,38.25)	80
Professional values and personality traits dimension	45	9	36(36,45)	80
Science popularization output quality dimension	50	10	42(40,50)	84
Science popularization effectiveness and feedback dimension	15	3	12(12,15)	80
Total score	210	42	172(159,198)	81.9

3.2. Analysis of influencing factors for medical students to conduct medical science popularization

3.2.1. Univariate analysis of medical students' medical science popularization ability

The results of the univariate analysis showed that there were statistically significant differences in the medical science popularization ability among medical students with different characteristics (gender, place of

origin, grade, major, whether being a student leader, whether having learning experience in medical science popularization or communication courses, and whether having experience in medical science popularization) (P < 0.05). For details, see **Table 2**.

Table 2. Univariate analysis of medical students' medical science popularization ability

Item	Group	Frequency	Percentage (%)	Median (P25, P75)	Z/H	*P*
Gender	Male	93	30.00	188 (161.5, 210)	-2.86	0.004**
	Female	217	70.00	169 (157, 191)		
Place of origin	Rural	72	23.20	167 (153, 185.75)	11.48	0.003**
	Town	47	15.20	169 (156, 192)		
	City	191	61.60	176 (163, 209)		
Grade	Year 1	59	19.00	185 (168, 210)	21.72	<0.001**
	Year 2	65	21.00	163 (153, 185.5)		
	Year 3	140	45.20	168 (160, 192.5)		
	Year 4	27	8.70	190 (157, 209)		
	Year 5	19	6.10	208 (163, 210)		
Major	Nursing	208	67.10	168 (158.25, 191)	-2.26	0.024*
	Other majors	102	32.90	184.5 (162, 209)		
Student leader or not	Yes	91	29.40	187 (163, 210)	-3.73	<0.001**
	No	219	70.60	168 (156, 191)		
Experience in medical science popularization or communication courses	Yes	124	40.00	181.5 (163.25, 210)	-3.42	<0.001**
	No	186	60.00	168 (154, 191.25)		
Experience in medical science popularization	Yes	139	44.80	184 (167, 209)	-4.55	<0.001**
	No	171	55.20	168 (153, 187)		
Willingness to engage in medical science popularization	Yes	287	92.60	172 (161, 198)	-1.83	0.067
	No	23	7.40	158 (126, 210)		

Note: Significant at the 0.05 level, *Significant at the 0.01 level

3.2.2. Multivariate analysis of medical students' medical science popularization ability

Variables that were statistically significant in the univariate analysis, namely gender, place of origin, grade, major, whether being a student leader, whether having learning experience in medical science popularization or communication courses, and whether having experience in medical science popularization, were included in the multivariate analysis, and dummy variables were set. The variable assignments are shown in **Table 3**. The results of the multiple linear regression analysis indicated that place of origin, grade, and whether having experience in medical science popularization were influencing factors affecting the scores on the Evaluation Scale for Medical Science Popularization Ability of Medical Students. The adjusted R^2 of the regression equation was 0.100, explaining 10% of the total variance in medical students' medical science popularization ability. For details, see **Table 4**.

Table 3. Variable settings and assignments

Variable	Coding scheme
Gender	Male = 1, Female = 2
Place of origin	Yes = 1, No = 2
Grade	Year 1 = 1, Year 2 = 2, Year 3 = 3, Year 4 = 4, Year 5 = 5
Major	Nursing = 1, Other majors = 2
Student leader or not	Yes = 1, No = 0
Experience in medical science popularization or communication courses	Yes = 1, No = 0
Experience in medical science popularization	Yes = 1, No = 0

Table 4. Results of multiple linear regression analysis

Variable	B	β	t	P
Constant	167.845	—	29.60	<0.001**
Gender (reference: Male)				
Female	-2.328	-0.039	-0.68	0.498
Place of origin (reference: Rural)				
Town	7.753	0.101	1.58	0.116
City	4.986	0.176	2.60	0.010**
Grade (reference: Year 1)				
Year 2	-13.459	-0.199	-2.67	0.008**
Year 3	-2.599	-0.094	-1.17	0.244
Year 4	-0.040	-0.001	-0.02	0.985
Year 5	1.357	0.047	0.77	0.443
Major (reference: Nursing)				
Other majors	-3.919	-0.067	-1.06	0.291
Student leader or not (reference: No)				
Yes (Student leader)	6.513	0.108	1.85	0.066
Experience in medical science popularization or communication courses (reference: No)				
Yes	5.520	0.091	1.56	0.120
Experience in medical science popularization (reference: No)				
Yes	3.164	0.056	0.89	0.376
Having experience in medical science popularization (reference: No)				
Yes	9.192	0.166	2.59	0.010**

Note: Significant at the 0.05 level, *Significant at the 0.01 level

4. Discussion

4.1. Medical students' medical science popularization ability is at a moderate level

This study, through the analysis of data from 310 medical students, reveals that the overall medical science popularization ability of medical students is at a moderately high level, which is consistent with the findings of

Li [12] and others. In this study, the dimension of popular science cognition performed the best, indicating that medical students have a sufficient understanding of the importance of popular science work, aligning with the recent trend of medical schools strengthening health communication education. Meanwhile, the score rates for the dimensions of popular science creation ability and popular science dissemination ability are relatively low, with a large interquartile range and a polarized distribution, suggesting significant individual differences among students in their ability to transform professional knowledge into accessible content. This also explains why "planning difficulties" emerged as the most significant practical obstacle in the survey. Based on this, schools should establish multidimensional platforms for medical science popularization, leveraging the resources of medical schools to introduce popular science activities into the campus. It is recommended to construct a tiered training system of "popular science training–club activities–professional competitions" [13] to systematically enhance medical students' medical science popularization ability.

4.2. Factors influencing medical students' medical science popularization ability
4.2.1. General information of medical students
Medical students from urban areas scored higher in the evaluation of medical science popularization ability compared to those from rural areas, with statistically significant differences. This may be related to the uneven distribution of educational resources between urban and rural areas, as urban areas concentrate more medical institutions and research units, providing students with abundant platforms for popular science practice. Additionally, students from urban areas often have earlier access to the internet and digital tools, potentially giving them an advantage in video production and graphic design, whereas students from rural areas have fewer opportunities to use digital tools and may need to spend more time learning to create popular science works during university [14]. This study found that sophomore medical students scored lower in medical science popularization ability than freshmen, with statistically significant differences, possibly because sophomores are in a critical transition period from basic medical courses to specialized courses, and heavy academic workloads may crowd out time for popular science practice, consistent with the findings of Zhang [15] and others.

4.2.2. Popular science experience of medical students
The results of this study show that medical students with popular science experience demonstrate stronger popular science abilities. Through practice, students can more systematically master the creative patterns and presentation techniques for disseminating health knowledge, which not only helps deepen their understanding of the value of popular science work but also promotes a comprehensive improvement in their communication skills. Meanwhile, interactions with the audience can significantly enhance students' expressive abilities, enabling them to more accurately grasp the public's demand for health information. This aligns with the findings of Lü [16] and others, who emphasize the need for medical schools to focus on strengthening the popular science abilities of lower-grade students, suggesting that, in addition to organizing special lectures and workshops, more emphasis should be placed on practical training to accumulate experience. Therefore, medical schools should create more opportunities for popular science practice for students, incorporating popular science activities into the practical teaching system to systematically enhance medical students' health communication abilities through a "practice-driven learning" approach.

5. Conclusion

In this study, the medical science popularization ability of the 310 surveyed medical students was at a moderate

level, with partial active participation in medical science popularization and room for improvement. Place of origin, grade, and whether having medical science popularization experience were identified as influencing factors for medical students' popular science ability. School administrators should establish diversified platforms for medical students' popular science practice in the future, construct a systematic popular science teaching system, and conduct targeted skill training to comprehensively enhance medical students' medical science popularization ability. This study primarily focused on nursing students, with insufficient sample sizes from other medical majors, potentially limiting the professional representativeness of the findings. Additionally, this study only surveyed medical schools in four regions, with a relatively narrow sample coverage that makes it difficult to fully reflect the overall status of medical students' medical science popularization ability across different regions in China. Future research could expand the sampling scope in terms of majors and regions and consider incorporating qualitative research methods to more comprehensively assess medical students' medical science popularization ability.

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