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Analysis of Current Situation and Influencing Factors of Medical College Undergraduates Participating in Scientific Research

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Abstract: ***Objective:*** ***To clarify the current situation and influencing factors of medical undergraduates participating in scientific research.*** ***Methods:*** ***Taking the undergraduate students from Zhanjiang Campus of Guangdong Medical University as the research objects, and using the Questionnaire Star Network survey platform as the carrier, the questionnaire was released to investigate and analyze the current situation and influencing factors of medical students participating in scientific research.*** ***Results:*** ***The male students were more interested in scientific research than the female students (P<0.05), and male students' self-evaluation of scientific research was more rewarding than female students (P<0.05). Major and grade had no significant effects on students' interest in scientific research, research harvest and time allocated to scientific research (P>0.05). There is a positive correlation between school policy and students' research achievements. There is a positive correlation between students' interest in scientific research and their harvest. There was also a positive correlation between students' interest in scientific research and their recognition of school policies (P<0.05).*** ***Conclusion:*** ***Gender is an important factor affecting medical students' interest in scientific research and recognition of their participation in scientific research. The interest of medical students in scientific research, the policy of supporting medical students to participate in scientific research and the harvest of medical students' participation in scientific research have significant positive effects on each other.***

Keywords: Medical students, Scientific research, Influencing factors**.**

1. Introduction

Under the background of new medical science, developing the medical higher education with the coexistence of theory, practice and innovation, and cultivating medical talents with "fine medicine and good innovation" are the latest requirements of the state for medical higher education [1]. It is very important to improve the scientific research quality and innovation ability of undergraduates, which not only requires medical students to have exquisite clinical skills, but also requires medical students to establish flexible scientific research thinking and scientific research innovation ability. At present, most universities in China have carried out scientific research ability training organizations, but because the traditional educational thinking has not changed and medical undergraduates are busy with school work, heavy learning tasks and lack of energy for scientific research, they can not improve the scientific research interest and ability of medical students. In recent years, the Ministry of Education has paid more and more attention to cultivating the scientific research and innovation ability of college students. At the same time, the quantity and quality of biological and medical papers published by medical undergraduates have also been on the rise, which puts higher requirements on the scientific research and innovation ability of medical undergraduates [2]. Therefore, we should actively explore the factors that affect medical undergraduates' participation in scientific research and the methods to improve their interest in scientific research and innovation ability.

2. Materials and Methods

2.1 Survey Objects

The undergraduate students in Zhanjiang Campus of Guangdong Medical University were selected as the research objects. The questionnaire was released on the platform of Questionnaire Star network. After the questionnaire link and QR code are generated by the questionnaire Star platform, the link and QR code will be played during recess and distributed on the Learning platform for students to fill in with the help of teachers. When releasing the questionnaire, the purpose of the survey will be explained to students, emphasizing that the activity is voluntary and confidential, and students are encouraged to scan the code to answer and submit. A total of 1178 questionnaires were submitted, all of which were valid.

2.2 Questionnaire

The questionnaire is divided into four modules. The first module is about students' interest in scientific research, including question items: 4,5,6,22,27; The second module is about the impact of the school's policies on scientific research, including the question items: 7-12; The third module is the gain of participating in scientific research, including question entries: 15-21; And the fourth module for the time allocated to research includes question entries: 25/26. The Likert scale ranged from 1 (strongly disagree) to 5 (strongly agree). (Table 1)

Table 1: Contents of the questionnaire

Item	Answer Options
1.Gender	Male/female
2.Specialty	Clinical/imaging/anesthesia/pediatrics
3.Grade	One/Two/three/four/five
4.Do you think that scientific research is very important for the study of professional knowledge, postgraduate entrance examination and future work?	1/2/3/4/5
5.You often follow and read medical scientific research progress through wechat public accounts and other channels.	1/2/3/4/5
6.You are very interested in scientific research.	1/2/3/4/5
7.The content and importance of scientific research have been effectively communicated to the teacher.	1/2/3/4/5
8.There are many opportunities and channels in the school to contact and participate in scientific research projects.	1/2/3/4/5
9.Teachers actively publicize their own scientific research status and that of their disciplines.	1/2/3/4/5
10.The lecturer actively introduces the new development of scientific research frontiers of relevant disciplines in daily lectures.	1/2/3/4/5
11.Teachers actively accept and guide students to participate in scientific research activities.	1/2/3/4/5
12.The study of professional courses is too intense, affecting your enthusiasm to participate in scientific research activities.	1/2/3/4/5
13.Have you participated in any scientific research activities	Yes/no
14.What kind of scientific research activity did you take part in.	
15.Participating in scientific research practice allows you to learn a lot, and your vision is broadened and improved.	1/2/3/4/5
16.Participation in scientific research activities makes you feel very happy.	1/2/3/4/5
17.Participating in scientific research practice can effectively promote your study of specialized courses.	1/2/3/4/5
18.Participation in scientific research activities will help you in your future development (postgraduate entrance examination, career)	1/2/3/4/5
19.Participating in scientific research practice occupies a lot of your energy, which affects your life and study.	1/2/3/4/5
20.your advisor actively guide your research study and work	1/2/3/4/5
21.The research team and platform you participate in have a good learning atmosphere, which will benefit you a lot.	1/2/3/4/5
22.If necessary, you are willing to use your vacation time to do scientific research.	1/2/3/4/5
23.You have published a research paper as the first or lead author.	yes/no
24.If you encounter difficulties in scientific research, what channels will you try to solve the (multiple choice).	Table
25.How many hours per week do you take part in scientific research practice.	
26.The number of times you participate in scientific research activities per week	0-5 times
27.Your specific reasons for participating in scientific research	

2.3 Statistical Methods

Statistical analysis was performed using GraphPad prism9.0 and Spss25.0 statistical analysis software. The influence of gender on students' scientific research interest and scientific research harvest was used by T-test. The influence of major on students' research interest and research harvest and grade on students' research interest, research harvest and time allocated for research were analyzed by Variance analysis; Pearson correlation analysis was used to analyze the correlation between each module in the questionnaire, and $P<0.05$ was considered statistically significant.

3. Results

Of the 1,178 undergraduate medical students who participated in the study, 507 were male and 671 were female; 604 were in clinical medicine, 228 in imaging, 183 in anesthesiology and 163 in pediatrics; 162, 759, 94, 46 in grades 1, 2, 3, 4 and 117 in the finish school.

Male students scored higher than female students ($P<0.05$) on the part of interest in scientific research. Male students scored significantly higher ($P<0.01$) than female students on the question "pay attention through network platforms such as WeChat Highly passion in scientific research" (Table 2). To analyze the impact of gender on the two modules of gains from scientific research and time allocated to scientific research among participants, the t-test was employed for those who chose to engage in scientific research in response to question 13. In the module of scientific research achievements, there is no significant difference ($P>0.05$) between male and female students in the following five aspects: "Participating in scientific research practice has taught you a lot"; "Participating in scientific research activities makes you feel very happy"; "Scientific research practice effectively promotes your major course learning"; "Participating in scientific research activities is very helpful for your future development (postgraduate entrance examination, career)"; "The learning atmosphere of the scientific research team and platform you participate in is good". The score of the question "Participating in scientific research has taken up a lot of your energy and affected your life and study" is higher for male students than for female students ($P<0.05$). In the time assigned to scientific research, There was no significant difference ($P>0.05$) that male and female students in the question "weeks of time to participate in scientific research practice" "the number of scientific research activities" (Table 3).

Table 2: Effect of gender on medical students' research interests ($\bar{x}$+s).

Interest in scientific research	1. Your gender is (mean ± standard deviation)		*t*	*p*
	Male (*n=507*)	Female (*n=671*)		
4. Do you think that scientific research is very important for the study of professional knowledge, postgraduate entrance examination and future work?	4.34±0.77	4.35±0.70	-0.325	0.745
5.You often follow and read medical scientific research progress through wechat public accounts and other channels.	3.69±1.05	3.45±0.92	4.165	0.000**
6.You are very interested in scientific research.	3.84±0.93	3.70±0.82	2.665	0.008**
22.If necessary, you are willing to use your vacation time to do scientific research.	-1.77±2.79	-1.76±2.75	-0.062	0.950
27.your specific reasons for participating in scientific research	-2.18±1.91	-2.13±1.96	-0.363	0.717

* $p<0.05$** $p<0.01$

Table 3: The impact of gender on the gains of medical students' research and the time allocated to research ($\bar{x}$+s).

Dimensions and entries	1. Your gender is (mean ± standard deviation)		*t*	*p*
	Male (*n=83)*	Female (*n=114)*		
Gains from scientific research 15. Participating in scientific research practice allows you to learn a lot, and your vision is broadened and improved.	4.47±0.70	4.31±0.67	1.653	0.100
16.Participation in scientific research activities makes you feel very happy.	4.11±0.91	3.95±0.84	1.266	0.207
17.Participating in scientific research practice can effectively promote your study of specialized courses.	4.04±1.06	3.87±0.85	1.188	0.237
18.Participation in scientific research activities will help you in your future development(postgraduate entrance examination, career).	4.47±0.75	4.39±0.63	0.759	0.449
19.Participating in scientific research practice occupies a lot of your energy, which affects your life and study.	3.51±1.07	3.16±0.87	2.430	0.016*
21.The research team and platform you participate in have a good learning atmosphere, which will benefit you a lot.	4.22±0.84	4.04±0.77	1.547	0.124
Time allotted for scientific research 25.How many hours per week do you take part in scientific research practice. 26.The number of times you participate in scientific research activities per week.	2.01±1.04 2.19±1.32	2.07±1.01 2.12±1.23	-0.393 0.381	0.694 0.703

* *p<0.05*** *p*<0.01

To investigate the impact of major choice on research interest, within-group comparisons were conducted using analysis of variance (ANOVA). The results indicated a statistically significant difference (p<0.05) among students of varying majors when it came to their responses to the questions "Do you believe that research is crucial for the advancement of professional knowledge, graduate studies, and future employment?" and "Are you interested in conducting research?" (Table 4). The impact of interest in scientific research showed significant differences among students of different grades in their responses to the following questions: "Do you think scientific research is important for the learning of professional knowledge?"; "Is scientific research important for postgraduate entrance exams and future work?"; "Do you often follow and read medical research progress through various channels such as WeChat public accounts?"; and "Are you interested in scientific research?" (P<0.05) (Table 5).

The scores for the questions regarding interest in research among students involved in research across different grades do not exhibit any significant difference (p>0.05). There is no significant difference in the responses of students from different grades when it comes to their perspectives on the following statements: "There are numerous opportunities and avenues to engage and participate in scientific research programs at our school," "Lecturers are proactive in promoting their own scientific research and the research conducted by their respective disciplines," and "Specialized courses are overly intense and impact one's enthusiasm for participating in scientific research activities" (P>0.05). There is no significant difference (P<0.05) in the answers of students participating in scientific research from different grades to the questions of "Schools and teachers have effectively advocated the content and importance of scientific research", "Teachers actively introduce the latest research developments in related subjects during daily teaching", and "Teachers are very active in accepting and guiding students to participate in scientific research activities". (Table 6)

Table 4: Differences in students' interest in scientific research in different majors

Interest in scientific research	2. Your major is (mean± standard deviation)				*F*	*p*
	Clinical (*n=604)*	Imaging (*n=228)*	Anesthesiology (*n=183)*	Pediatrics (*n=163)*		
4. Do you think that scientific research is Very important for the study of professional knowledge, postgraduate entrance examination and future work?	4.40±0.74	4.29±0.71	4.25±0.73	4.34±0.71	2.744	0.042*
5.You often follow and read medical scientific research progress through WeChat public accounts and other channels.	3.60±1.04	3.55±0.93	3.46±0.92	3.50±0.93	1.170	0.320
6.You are very interested in scientific research.	3.82±0.92	3.64±0.83	3.67±0.80	3.82±0.79	3.410	0.017*

* *p<0.05*** *p*<0.01

Table 5: Differences in interest in scientific research among different grades

Interest in scientific research	3. Your grade level (mean± standard deviation)					*F*	*p*
	One (*n=162).*	Two (*n=759).*	Three (*n=94).*	Four (*n=46).*	Five (*n=117).*		
4. Do you think that scientific research is very important for the study of professional knowledge, Postgraduate entrance examination and future work?	4.40±0.75	4.31±0.71	4.32±0.72	4.35±0.82	4.54±0.76	2.785	0.025*
5.You often follow and read medical scientific research progress through wechat public accounts and other channels.	3.65±0.95	3.60±0.96	3.56±1.09	3.20±0.93	3.27±1.09	4.717	0.001**
6.You are very interested in scientific research.	3.84±0.85	3.80±0.85	3.65±0.92	3.70±0.73	3.50±0.99	3.800	0.004**

* *p<0.05*** *p*<0.01

Table 6: Among the medical students participating in scientific research, the perception and evaluation of the interest in scientific research and the policy of the school in different grades

Interest in scientific research	3. Your grade level (mean± standard deviation)					*F*	*p*
	One (*n=33).*	Two (*n=122).*	Three (*n=21).*	Four (*n=8).*	Five (*n=13).*		
4. Do you think that scientific research is very important for the study of professional knowledge, postgraduate entrance examination and future work?	4.70±0.53	4.62±0.54	4.48±0.75	5.00±0.00	4.77±0.44	1.642	0.165
5.You often follow and read medical scientific research progress through wechat public accounts and other channels.	4.18±0.81	4.27±0.80	4.33±0.80	4.13±1.25	3.85±1.07	0.882	0.476
6.You are very interested in scientific research.	4.21±0.74	4.30±0.75	4.19±0.93	4.38±0.52	3.85±1.14	1.084	0.366
22.If necessary, you are willing to use your vacation time to do scientific research.	4.36±0.55	4.43±0.62	4.14±1.01	4.25±1.04	4.31±0.63	0.889	0.471

Interest in scientific research	3. Your grade level (mean± standard deviation)					*F*	*p*
	One (*n=33).*	Two (*n=122).*	Three (*n=21).*	Four (*n=8).*	Five (*n=13).*		
27.your specific reasons for participating in scientific research	2.09±1.01	2.09±1.04	2.05±0.86	2.25±1.16	1.77±0.93	0.363	0.835

School Policies

7.The content and importance of scientific research have been effectively communicated to the teacher.	3.61±1.03	3.95±0.99	3.81±1.17	3.25±1.28	3.15±0.99	2.819	0.026*
8.There are many opportunities and channels in the school to contact and participate in scientific research projects.	3.67±1.19	3.89±0.96	3.76±0.94	3.00±0.93	3.46±0.97	1.981	0.099
9.Teachers actively publicize their own scientific research status and that of their disciplines.	3.52±1.03	3.81±0.98	3.71±1.15	3.00±0.93	3.38±1.19	1.880	0.116
10.The lecturer actively introduces the new development of scientific research frontiers of relevant disciplines in daily lectures.	3.64±1.03	4.04±0.87	3.95±0.92	3.38±1.30	3.46±1.13	2.701	0.032*
11.Teachers actively accept and guide students to participate in scientific research activities.	3.76±1.03	4.08±0.83	3.76±1.04	3.13±1.25	3.46±1.05	3.641	0.007**
12.The study of professional courses is too intense, affecting your enthusiasm to participate in scientific research activities.	3.55±1.03	3.69±0.93	3.90±1.04	4.13±0.64	3.62±0.87	0.899	0.466

* *p<0.05*** *p*<0.01

Pearson correlation analysis shows that there is a good correlation between some questions of the scientific research interest module and the school policy module of all the students who participated in the questionnaire survey (R>0.4, P<0.01) (Figure 1). Among the students participating in scientific research, there is also a good correlation between the two modules of interest in scientific research and harvest from scientific research (R>0.4, P<0.05) (Figure 2) and between the school's policies on scientific research and some of the gains from scientific research (R>0.4, P<0.05) (Figure 3). The results suggest that teachers and schools actively promoting scientific research can effectively guide students to actively understand scientific research through various channels (Figure 1). Among students who participate in scientific research, the gains and sense of achievement from participating in scientific research can increase students' interest in scientific research (Figure 2). The policies recommended by schools and teachers' guidance on scientific research can help students obtain scientific research gains but there is a certain conflict between participating in scientific research and professional course learning in terms of time and energy (Figure 3).

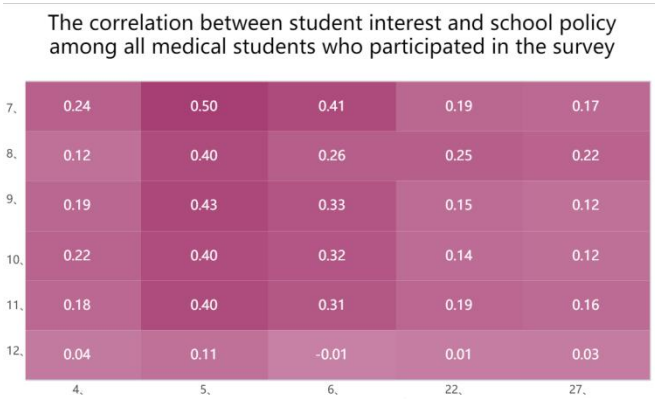

Figure 1

Note: The values in the above box are all correlation coefficients (R values), the darker the background color, the larger the R value, and the P values are<0.05

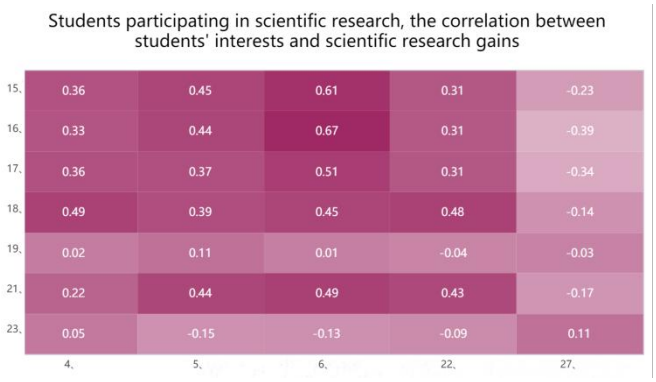

Figure 2

Note: The values in the above box are all correlation coefficients (R values), the darker the background color, the larger the R value, and the P values are<0.05

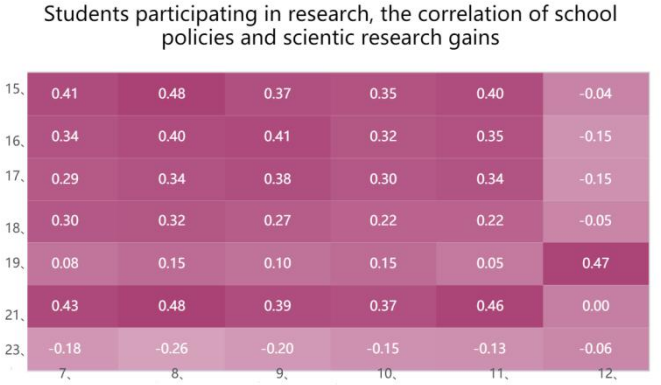

Figure 3

Note: The values in the above box are all correlation coefficients (R values), the darker the background color, the larger the R value, and the P values are<0.05

Students involved in scientific research participated in a variety of solutions to problems encountered in scientific research (Figure 4), in which most of the students were accessing relevant literature through CNKI and PubMed, followed by searching for information using various websites,

indicating that the Internet is an important platform for medical students to understand scientific research, contact scientific research and an important tool for learning scientific research, and that there was no significant difference in the number of people who consulted their instructors and older siblings while the number of people who took the initiative to go to library to check the information is less.

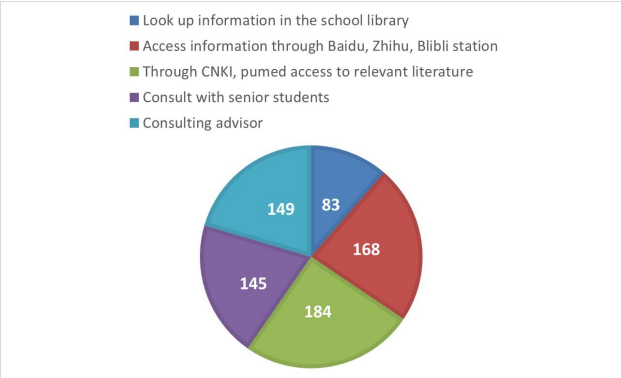

Figure 4

4. Discussion

This study found that among all the personnel participating in the questionnaire survey, men's scores about some issues of interest modules in scientific research are higher than women. They will be more interested in scientific research, and they will be more active to pay attention to and understand through various channels. Scientific research shows that men's interest in scientific research is higher than women ($P < 0.05$). However, research on people participating in scientific research found that men have taken the energy to consider scientific research and affect the scores of life and learning than women ($P < 0.05$).

In the survey of professional selection on the impact of scientific research interests, the score of the clinical interest in scientific research is the highest, followed by pediatrics, images, and anesthesia among all the personnel participating in the questionnaire survey. In the survey of different grades on the impact of scientific research interests, the module of the interested in scientific research is the highest is the first grade, followed by the second, third, fifth, and fourth grades. This prompt may be because students in the first or second grades have more spare time than students in the third, fourth, and fifth grades. Therefore, students in the first and second grades will have a stronger interest in scientific research.

For students who are different and grades, students who participate in scientific research are not much different from scientific research and the time assigned to scientific research. Different grades have different views on the school's policies for scientific research. Among them, the second grade believes that it benefits the school's policies more, followed by the third grade, the first grade, the fourth grade, and the fifth grade.

All students' questionnaires use relevant analysis to study the related relationship between scientific research and research and school policy modules, which are basically positive correlation. This shows that students' interest in scientific research is related to school policy. Therefore, the active promotion of teachers and schools for scientific research can effectively guide students to understand scientific research. Schools can improve the interest in scientific research by improving relevant policies to improve relevant policies. It can be seen in students participating in scientific research that most of the correlation between the interests of scientific research and the two modules of scientific research are positively correlated. This shows that students participating in scientific research in scientific research can increase students' interest in scientific research. Most of the two modules of the school's policies and scientific research on scientific research are positively correlated. It shows that the school's policies and the active guidance of the teacher's scientific research are helpful for students to gain scientific research. There is a certain conflict in time and energy to participate in scientific research and professional courses in terms of time and energy.

It can be recommended through this study:

1) Clinical and pediatrics are more interested in scientific research. It may be that the clinical and pediatric majors and scientific research are greater. This makes them know more about scientific research. In order to improve the overall medical students' interest in scientific research and innovation, schools can provide more opportunities and channels to allow students with images and anesthesia to learn and participate in scientific research. This can improve their interest in scientific research and innovation ability. Teachers should encourage medical undergraduates to understand and participate in scientific research activities. They can also provide some basic scientific research skills teaching for undergraduates, such as database query, thesis writing and other skills teaching to promote the cultivation of undergraduate scientific research and innovation capabilities [3].

2) Students in low grades are more interested in scientific research. It may be that because there are fewer professional courses in low -grade students. And they can have more time to learn more about scientific research. High -level students have more professional courses, less time and energy to pay attention to and engage in scientific research. In this regard, the school can propose a teacher to actively preach the scientific research of themselves and their subjects in the spare time. It can help senior students to learn about scientific research as much as possible. Under the principles of security and correctness, students who register for scientific research activities as soon as possible to participate in scientific research in order to improve their interest in scientific research.

3) According to the analysis of PEARSON correlation, teachers and schools' active promotion of scientific research can effectively guide students to understand scientific research. Schools can improve their interest in scientific research by improving relevant policies. Many colleges and universities do not provide students with a suitable scientific research environment, nor do they conduct courses and topics related to scientific research and innovation. As a result, students do not understand the basic knowledge and methods of scientific research, so it is difficult to actively participate in scientific research activities [4]. Schools can implement more relevant policies that help students participate in scientific research: 1) Take targeted measures and guidance to students with interest in scientific research, improve their interests in

scientific research and can get scientific research gains from scientific research institutes. Take interested guidance for students who do not have scientific research, so that they have more understanding of scientific research and increase their interest in scientific research. 2) Create appropriate conditions for medical students and encourage students to participate in scientific research. Build a more complete scientific research platform for students who are willing to participate in scientific research. 3) Enhance scientific research training. Investigation research shows that receiving scientific research training plays an important role in stimulating innovation awareness, training scientific research skills, and encouraging students to participate in scientific research practice. However, the proportion of students who have received scientific research training only accounts for 20.0%, so it is very important to strengthen scientific research training.

4) Ma Ning et al. [6] found in the study that the training model of scientific research and innovation ability of Japanese medical undergraduates has the characteristics of "early" and "true". t It means that early entering the laboratory for scientific research activities, and conducting experimental activities "seeking truth and pragmatism". Ji Bo et al. [7] found in the study of undergraduate training in the United States that many universities in the United States advocated and encouraged "undergraduate scientific research". At the same time, many universities in the United States set up many undergraduate scientific research projects and establish an undergraduate research journal in the school to encourage undergraduates to conduct scientific research. Chinese medical institutions can refer to the scientific research and training methods of Japan and the United States for undergraduates in Japan and the United States. Scientific research registration and training were conducted in the low grade. This can strengthen the training of scientific research and operation of medical undergraduates, create a good scientific research atmosphere and improve students' scientific research interests and scientific research and innovation ability.

The results of this study show that gender is an important factor affecting college students' scientific research interests and scientific research harvest. Students' research interests and students' scientific research gains and school policy support will affect each other. Therefore, schools can provide more opportunities and channels to make students better understand scientific research, improve their interest in scientific research and innovation ability. Under the principles of security and correctness, students who participate in scientific research activities as soon as possible to participate in scientific research personally in order to improve their interest in scientific research. Through the above -mentioned measures, medical students can have a good understanding of scientific research from the lower grade. It can not only improve students' scientific research interests, but also improve students' scientific research ability and thinking, so as to better improve students' innovation of innovation ability and thinking.

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