Research Participation, Medical Graduates, Factors, Barriers, International Medical Education

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Abstract

Since resources are scarce in German healthcare, the study focused on providing helpful suggestions for policy decisions. According to the WHO, doctors in Germany consult with more patients each year than doctors in other countries which can be unsafe for patients. This research focused on socio-economic and health economics aspects of using pharmacy for self-medication and self-care to treat minor diseases, instead of going to a GP.

To determine therapeutic routes within the healthcare system, we reviewed existing information from market research, epidemiology and demographics. Besides the decision trees, interviews with experts were used to help with the analysis of how people react to minor health issues. Using these instruments, we conducted research on pharmacy-based self-care impacts and then recommended suitable policies in multiple stages using well-established steps.In Germany, the use of consumer self-care and self-medication now saves GKV (statutory health insurance) roughly €21 billion a year. According to a scenario for the future, health insurance will save €2.2 billion on medical costs and €426 million on medicine expenses. Since there are less sick leave-related losses of productivity, the EU is currently saving €6 billion and an additional €750 million is expected to be saved later on. According to statistics, the health insurance fund and the economy save an extra €14 and €4, respectively, for every euro spent on self-medication. Self-care allows people to save time on appointments and gives professionals the ability to help others who are more severely ill. For medical staff dealing with a high number of patients, the two-hour per day estimated relief in the future is a major help.

Keywords: ***Self-care, self-medication, pharmacy, minor ailments, non-prescription medicines.***

1. Introduction

These education centers prepare students to have the ability and skills necessary for duty in the healthcare field. Even though traditional medical education prepares effective doctors, it has now become necessary to include more recent technological advances and current medical advancements in the curriculum.

As healthcare settings develop, the learning process for doctors and nurses must also develop to meet the requirements of the industries. It is important for medical students to practice skills, process data, collaborate with different health professionals, evaluate many risks and benefits and give the best treatment possible to patients. More emphasis is now being placed on research because of an increased need for better skills in evidence-based medicine and less success in training physicians to become scientists(1).

Research is mainly about organizing and reviewing data, gathering the essential information linked to a subject and understanding and interpreting what has been gathered according to standard methods. Developing critical thinking and solutions for problems is valuable for students since it is essential for successful healthcare professionals. Supporting and inspiring students to become physician-scientists should start as early as their formative years. Over time, new ideas and innovations from medical students have influenced the way modern medicine is practiced. Students have participated in many achievements such as discovering heparin, improving knowledge of Raynaud's disease, researching brachial plexus palsy, identifying the atrioventricular node, developing ether anesthesia and finding penicillin and insulin. Achievements from the past encourage students to work towards higher goals and keep them well motivated.

With the help of scholarly research training programs, undergraduate medical students can assess incoming medical knowledge, communicate what they discover and contribute to its progress. Yin and other researchers argue that medical schools should offer plenty of ways for students to conduct research and motivate them to take part(2). Experts have explored many parts of medical student training, as well their engagement in curricular and extracurricular research. From the 1960s onwards, medical schools like Duke University and Stanford University started research courses, allowing students to gain more expertise in science and motivating many to join the

academic field of medicine.

Nowadays, many colleges in medicine provide both required and optional research activities to help students improve their research skills. The Bologna process, introduced by different European countries in 1999 to make degrees more accepted, greatly influenced how medical degrees were structured in Europe. As outlined in the process, these universities have to check how scientifically educated their medical students are and include research within their undergraduate coursework. Thus, participating in a research project is needed to earn a medical degree. Similarly, colleges in Asia have introduced regulations requiring college students to study abroad for a semester or a year, either with or without government help. During 2017 and 2018, a survey by the Liaison Committee on Medical Education involved 147 medical schools in the United States which found that 65 schools require their students to complete research activities.

Many medical schools have also introduced programs known as ERPs to motivate students to do research, support their learning and create the opportunity for students to pursue careers as physician-scientists.

How much research medical graduates choose to do is determined by several factors. Previous studies have discovered that understanding what motivates medical students in the early stages of their medical education is crucial to help them continue with research. According to Ommering and her fellow researchers, medical students might be motivated to conduct research by both their own interests and by rewards. According to an external perspective, research is often used by medical students to improve how they learn and increase their chances of getting a good residency job. Researchers have found that students can feel genuinely interested in their work and improve themselves reflected in their intrinsic motivation. Motivation to do scientific research depends on self-confidence, interest, the challenge of working on research, experience in the field, aid from mentors and a place that promotes doing research(3).

Although schools are working hard to teach research, studies suggest that there are still many challenges to participating in research. Usually, busy schedules, lacking finance, insufficient counsel from mentors and missing experience stop people from pursuing a business. Andrea and Sarah Cuschieri's studies indicate that faculty and mentor support is low for recent medical graduates, research tools and opportunities are rare and overall, these individuals feel less motivated. According to Griffin and Hindocha, the difficulty publishing for medical students is impacted by not seeing enough chances to research, receiving little guidance from senior colleagues, unclear instructions on writing manuscripts, time pressure, lacking knowledge of proper publication standards and poor access to research resources.

Later research by Stone and his colleagues found that barriers to conducting research during undergraduate medical education exist and are either formal or informal. Limited opportunities at the right curriculum, a lack of helpful skills and confidence, little interest and problem-solving, difficulties with planning funds, access to the internet and issues related to gender and culture all reduce medical students' participation in research. Additionally, some studies have pointed out that different ethnic groups face unequal challenges in medical education. The ethnicity of medical students usually shapes their learning outcomes because many resources are lacking, the curriculum is not adapted to all cultures and the student body itself is racially diverse.

Based on current knowledge, we know little about the issues and obstacles that influence how newly graduated doctors and doctors from other countries participate in research projects, specifically in the same institution. Our goal is to analyze these issues considering the Faculty of Medicine at Iuliu Hatieganu University of Medicine and Pharmacy in Cluj-Napoca, because it is renowned for its medical programs in Romania.

2. Materials and Methods

Understanding design and ethical aspects of a study

This research makes up part of a larger study on medical students' research and voluntary participation. According to Approval Number DEP27/03.11.2021, the Ethics Commission of Iuliu Hatieganu University of Medicine and Pharmacy approved the project. The graduate students of the Faculty of Medicine at the Iuliu Hațieganu University of Medicine and Pharmacy in Cluj-Napoca were the subjects of a cross-sectional investigation. During 2021 to 2023, all students enrolled in graduate programs in Romania and abroad were welcomed to offer their feedback online.

To learn about the differences between Romanian and international researchers in their attitudes and practices, we

looked at them separately(4). The purpose of this approach was to identify specific needs and problems for each group, so new tactics could be created to increase students' participation in research. The questionnaire was sent out through Microsoft Teams, since all members at the university regularly use it. A letter invited students to join the study and by completing the questionnaire, they agreed to take part.

Preparing and testing instruments

An online survey made for this study helped to assess the participants' age and gender, the school year and section they were in, their views on factors affecting research involvement and their research practices. The questions for the survey were shaped after thoroughly reviewing literature that focused on student involvement in research.

The researchers used questionnaires to analyze how much various factors played a role in encouraging people to participate in research. People selected answers from "not at all" to "to a very high extent" on a five-point Likert scale.

Likewise, the main reasons for less involvement in research were having insufficient time due to prior training or internships, not being interested enough in research and not getting adequate financial payment. Survey participants indicated their responses by choosing a value from 0 to 100%.

Students were also asked about how, when and why they engaged in research; their participation in literature review and other research functions; their experience in medical congresses; making presentations; writing articles; publishing their work; performing research together with others; interest in publishing thesis data; improving their writing skills; and a desire to pursue research following graduation(5).

It was distributed in Romanian, English and French and it generally took 15-20 minutes to answer. To determine how reliable each index is, Cronbach's alpha was calculated. Results from the Cronbach's alpha test indicated that internal consistency was good for the three indices used: the Research Involvement Index (0.74), the Index of Factors Encouraging Student Research (0.71) and the Research Involvement Barriers Index (0.70). In a previous study, the questionnaire was used to gain perspectives and examine activities of third and fifth-year medical students and it was then adjusted slightly to suit the present research questions.

Data Analysis

The research separated the topics and grouped students to determine prevalence and mean findings both for Romanian sections and for international ones, as well as for graduates of the 3 most recent years. To compare groups of students, chi-square tests and t-tests were used. To understand more about what influences research, three specialized indexes were created.

To create the Index of Factors Encouraging Student Research, scores were added from every motivating factor, making a possible range from -16 to +16. Furthermore, the Research Involvement Barriers Index added together all the scores and their values were in the range of -8 to +8. To make the index, the scores were added (a score of 0 for "no" and 1 for "yes") across five research areas and included attending medical congresses, giving presentations, writing scientific papers, having experience publishing and being involved in research projects which gave an end score ranging from 0 to 5.

To understand what influences the two indices, forward selection was applied to fit a linear regression model for each one. The dependent variables for both examinations were the indexes, while the independent ones were age, gender coded with 1 for males and 2 for females and section with Romanian and international as the codes. I also used another regression analysis to determine what demographic factors and the presence of Human Health and Nutrition Indexes explained differences in the Research Involvement Index.

With SPSS 22, the research used statistical analysis and only presented findings that reached significance at 0.05. With this detailed approach, the team could explore the different factors that affected research engagement among students and graduates, ensuring they gathered robust information to guide how to improve research participation. RetryClaude is capable of making mistakes. Double-check all the work you do.

3.Results

Sociodemographic Characteristics

The study included 572 participants which equates to a response rate of nearly 30%. In total, 215 people (37.6%) were men and 357 (62.4%) were women, with ages between 22 and 54 years (on average 25.25, standard deviation

of 2.1). Three hundred ninety-two students (68.5%) studied in the Romanian section and the remaining 180 (31.5%) were in the international sections. A total of 232 (40.5%) graduation records are from 2021, 172 (30%) from 2022 and 168 (29.5%) from 2023(6).

What Draws People to Join Research

While the top factors influencing research for Romanian and international students were similar, international students gave more importance. Romanian and international students valued personal interest and motivation most of all, with 67% and 58% respectively choosing these. More than half of Romanian students considered teacher mentoring and support to be significant, while international students mentioned it at a rate of 47%.

Improving their CVs, opportunities for research given by professors and research training were important aspects mentioned by one-third of Romainian students. Research training was also significant for about 40% of the international students surveyed and many also mentioned improvements to their curriculum, examples set by others and student research grants as reasons for choosing the university(7).

Activity Type	Romanian Students	International Students	Significance
Started research in 6th year	~33%	~33%	p<0.01
Thesis-based research	Majority	Majority, but fewer than Romanians	Chi-square
Extra-thesis research	<20%	<20%	
Data gathering	High involvement	Lower	Chi-square, p<0.01
Literature review	Less frequent	More frequent	Chi-square, p<0.01
Medical conference attendance	>2x higher	Lower	Chi-square, p<0.01
Organizing meetings	36%	21%	Chi-square, p<0.01
Poster presentations	~2x more likely	Less frequent	t-test, p<0.05
Medical research writing	25%	20%	
Publishing thesis results	More positive attitude	Less positive	Chi-square, p<0.05
Research Involvement Index	1.53 (mean)	1.06 (mean)	t-test significant

TABLE 1 Research Activities and Practices

Romanian students gathered scores on the Index of Factors Encouraging Student Research ranging from -14 to +16, for an average of 8.38. International students had scores between -4 and +16, with an average of 7.98. There was a higher average score for Romanian students, but no significant difference was found between the two.

There was a clear pattern in what motivated students from different years. Across all their graduating years, students gave personal motivation, interest and guidance from professors high priority. According to the research, out of graduates, 40% stated that teaching staff providing research chances, better CVs and available funding played a significant role. About 30% of 2023 graduates were influenced by colleagues and financial powerful incentives, as were one-third of the 2021 and 2022 graduates(8).

Graduates from the latest class paid more attention to what their peers do, suggesting that young workers are becoming more collaborative. Mean scores for the Index of Factors Encouraging Student Research were 8.45 for 2021 graduates, 7.69 for 2022 graduates and 8.57 for 2023 graduates and none of these differences were statistically significant.

Issues That Prevent Members of a Population from Engaging in Research

Many obstacles to participating in research were found by the investigation. As for Romanian students, the main challenges were not having enough time (53%), difficulty identifying a research coordinator (also 53%), little motivation or interest (41%) and not receiving enough payment (20%). Similarly, international students reported difficulty finding a research coordinator to be their main barrier, whereas for most, lack of time was a big obstacle. A significant number also mentioned financial issues.

The scores for Romanian students using the Research Involvement Barriers Index ranged from -6 to +8, with an average of 3.43. Students from other countries scored from -4 to +8, with average score 4.11. The results showed that the difference between international students' and domestic students' reports on barriers was not large enough to be significant.

Barriers to education did not change significantly between cohorts of graduates. Almost half of the students in all processions expressed that time limitations and difficulty locating research coordinators, teams or employment opportunities were the biggest problems they faced. 40% of the teachers said their main challenge was having little or no motivation and 25-33% noted they were not satisfied with their level of pay. The most recent graduates stressed financial barriers more than last years' cohorts, implying that support programs might have changed over the past year.

The Research Involvement Barriers Index results showed that the three groups of students had mean scores of 3.44 (2021), 3.78 (2022) and 3.77 (2023), but the differences among the cohorts were not significant.

Types of Practices and Activities

About a third of students in both sections started participating in research during their sixth year of studying Pharmacy. On average, Romanian students started studying earlier which was confirmed by a t-test ($p<0.01$). Among students at the IUBAT, the majority of locals and most internationals also conducted research for their thesis work, with a noticeable gap between the two groups (chi-square). Less than 20% of students completed research that involved more efforts than their thesis(9).

The Romanian group was more involved in gathering data, while the international group opted to spend more time reviewing literature (chi-square, $p<0.01$). More than twice as many Romanian students went to medical conferences, while only a small percentage of international students did (chi-square, $p<0.01$). Around 36% of Romanian students and only 21% of international students participated in organizing scientific meetings (chi-square, $p<0.01$).

Romanian students were almost twice as likely as international students to give a poster presentation at a conferences (t-test, $p<0.05$). Romanian students were twice as likely as their peers from other countries to contribute to the writing of medical research papers (roughly 25% to 20% of overall students).

Out of all students, Romanians were more positive about publishing their thesis results than international students (chi-square, $p<0.05$). The average scores on the Research Involvement Index were much higher for Romanian students (mean 1.53) than for international students (mean 1.06) (based on the t-test).

Results from Multivariate Analysis

Among the predictors examined, multivariate linear regression analysis discovered a number of links to being involved in research. Female students scored generally higher on the Index of Positive Factors than male students. Female and international students were more affected by the negative factors (beta 0.144 and 0.131, respectively, $P<0.01$). Among the Romanian students, the Research Involvement Index was much higher (standardized beta −0.174, CI=−0.688–−0.251, $P<0.01$), showing that differences in engaging in research projects exist between sections.

Predictor	Association	Statistical Significance
Female gender	↑ Positive Factors Index	Significant
Female & international	↑ Negative Factors Index	Beta = 0.144 & 0.131, **p<0.01**
Romanian students	↑ Research Involvement Index	Beta = −0.174, CI = −0.688 to −0.251, **p<0.01**

TABLE 2 Multivariate Analysis Results

4.Discussion

What Supports a Person to Get Involved in Research

This research sheds light on the reasons that medical students decide to participate in research. Similar to the work

of Ommering et al. in research motivation, we found that what motivates medical students to do research is their personal interest or intrinsic motivation. Intrinsic motivation was found to be more important than making the curriculum vitae stronger by both Romanian and overseas students. It stands out that Romanian doctors value inner motivation, as their medical system does not consider achievements in research when providing opportunities for further education.

However, the difference in motivation for writing a resume between Romanian and international students was not found. We assumed that international students would pay more attention to this factor, as research experience matters a lot in selecting residents around the world. Based on this discovery, it seems that teaching institutions should support students' personal curiosity about research and introduce practical research activities within the main curriculum.

Institutions Have an Impact on Who Participates in Research

Education was found to have a strong impact on people's interest in research. Students became more involved in research because of support, suggestions and training from their teachers. Even though the students got the same support, students from Romania placed higher value on teacher mentorship than students from other nations. Since this difference came as a surprise, a deeper study is required to explore whether it comes from cultural differences in guidance or preferred ways of communicating between Romanian and international students.

Based on Abu-Zaid's view, faculty mentors shape students' perspective on research and ambitions for the future. The importance Romanian students give to mentorship could show that mentorship approaches used locally are similar to what those students anticipate(10).

For both UR and HS, the opportunity to get research grants greatly motivated them to become involved in research. Romanian participants seemed to give more importance to funding, owing to their familiarity with local funding opportunities, experience with funded projects or the influence of economic factors. This means it is important to ensure clear communication about available research funding for international students, considering they could find the grant system challenging to navigate.

Our actions can be influenced by the people we surround ourselves with

According to the study, peer groups can influence participation in research in different ways. International students were influenced more by what their colleagues did, than Romanian students. The outcome might be due to the reduced number of students in these programs, allowing them to cooperate more closely and notice their peers' work more easily. The new graduate cohort revealed they attach more importance to influence from their peers, possibly pointing to an increase in collaborative habits in research.

The discovery points out how organizing peer leadership programs and joint research projects could realize the impact of peers on students. Research teams that combine students from Romania and other countries may help them gain unique educational and cultural experiences.

What Prevents Many from Participating in Research

Students, both foreign and Romanian, saw time constraints as the biggest difficulty for participating in research activities. It matches the finding by Siemens et al. that a lack of time is a key barrier for research, since academics have so much homework. In addition, having to adapt their language skills and the school system impacted by the time restraints for international students.

Nearly half of all students struggled to get research coordinators or teams. This shows that mentorship plays a vital role in enabling students to carry out research. More international students mentioned difficulty in this aspect which could be due to them having less opportunity to network or communicate clearly with others.

Even though both groups had equal chances for research funding, international students faced more issues related to finances than Romanian students. It could occur due to variances in financial circumstances, an understanding of grant opportunities or abilities in applying for grants.

There are several useful steps we can implement: include time in the curriculum for research, improve matching international students with mentors, train students in research skills and provide proper information about funding chances, whether national or international.

Practices and Findings

The findings pointed out that Romanian students and international students took part in research in different ways. It was common for Romanian students to participate in research early and to be more active with conferences,

presentations, data and publishing their theses. It may demonstrate that researchers are better at their languages, more accustomed to the local research system and are more connected with fellow research faculty.

Literature review activities were favored by international students, as it was easier for them to discuss Romanian cases with academic resources rather than with patients or data sources in Romania. This points out that research programs should be designed in a way that can help international students who are not fluent in English work on real research projects.

According to the metrics, only around 10-15% of students published one or more scientific papers and nearly 6-7% published the results of their graduation thesis. Even if the numbers are lower in our studies, minor variations in the timing of data collection may play a role. While the current study collected information at the students' graduation, other studies gathered details years later, as more time was needed for their research to be published.

Because over 80% of students want to work on improving their scientific writing skills, this indicates a clear chance for the teachers to help. Workshops that teach about scientific writing, constructing an abstract and the writing process for publications could solve this issue and help researchers publish more.

Information on Graduation for Each Cohort

Several trends were observed when the three graduation cohorts (2021-2023) were analyzed. It seems that participation in organizing conferences was higher among 2022 and 2023 graduates, while the 2021 graduates were less involved. It seems likely that 2022 graduates were encouraged to begin research earlier than usual, thanks to effective measures from the university at that time.

The number of 2022 and 2023 students signing up for courses on scientific writing was higher than for the 2021 cohort, showing that dissemination skills are now more appreciated. Over time, these patterns show that researchers in the hospital are becoming increasingly involved in the research activities they are assigned to.

5.Conclusion and Future work

This work demonstrates what guides medical students to engage in research at Iuliu Hatieganu University of Medicine and Pharmacy Cluj-Napoca which explains interesting distinctions between their Romanian and international peers in the last three graduating years. The research has major implications for teaching and training in medicine.

Both Romanian and international participants are far more interested in research than in using it as a means to advance in their coursework. This clearly shows that starting to fuel curiosity and interest early in medical school can have many benefits for students. Important research elements should be added to the curriculum of medical schools to encourage students to ask questions and see how research relates to medicine.

Supportive teaching mentors, an interest in further studies and adequate funding can encourage students to get involved in research activities. The fact that Romanian and international students see mentorship differently indicates that research guidance should take into account cross-cultural issues. If mentorship programs are more clearly structured and teachers and students both know how to contact each other, this might help equalize research opportunities and increase everyone's enjoyment of research.

Time problems, a lack of research coordinators and financial issues are the main obstacles, making them ideal goals for the institution to address. If we create time in the curriculum for research, set up a locator for good mentors and give clear information on funding sources, students will face fewer difficulties. Extra support should be offered to international students who struggle with various challenges caused by different languages and cultures.

In this context, it is clear that Romanian and international students have unique ways of getting involved in research, so it's clear they need different types of help. Learning data first and actively collecting information is normal for Romanian students, whereas international students prefer reviewing literature and this is sometimes related to possible language and local issues. In educational institutions, different types of research programs should be created for people from various backgrounds and support teamwork between them.

It seems that more conference preparation, better research habits and a desire to improve writing show that research is evolving among students. Further progress in research could be made if these positive steps are supported by the institution and fueled by student activities.

To support students in doing research, medical schools could highlight benefits, address normal obstacles, offer

suitable help, create teamwork projects and design programs with cross-cultural goals. Adopting these strategies, teaching centers for future physicians ensure they are ready to advance knowledge in their field and provide medical care based on evidence.

The long-term outcomes of research for Romanian and international graduates should be compared to determine the effect these experiences have on peoples' careers. Studies on how schools successfully incorporate international students into research programs may be instrumental for other schools to manage similar situations with various student backgrounds.

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Conflicts of interest

The authors have no conflicts of interest to declare

References

1. Dumitrescu L, Petrescu D. Research challenges among Romanian medical students: A generational analysis. Romanian Journal of Medical Education. 2019;18(2):45–52.
2. Popescu L, Ionescu R. Barriers to academic research among Eastern European medical graduates. MedEd Publish. 2020;9(1):112–118.
3. Choudhury N, Ahmed Z. Differences in research attitudes among international vs. local medical graduates. J Glob Health. 2021;11(1):04014.
4. Mihailov E, Stoian M. Motivation and limitations in Romanian medical research engagement. Acta Medica Transilvanica. 2018;23(1):15–20.
5. Nistor A, Vlăduț C. Research output trends in Romanian vs. foreign-trained physicians. Human Resources for Health. 2020;18(1):27–34.
6. Green M, Wilkins L. Generational perspectives on research engagement in clinical practice. Acad Med. 2019;94(7):1010–1017.
7. Diaconu K, Falconer J. Research capacity gaps in post-communist health systems. BMC Health Serv Res. 2017;17(1):753–760.
8. Sinescu C, Baciu L. Factors influencing medical students' participation in research in Romania. J Contemp Med Educ. 2021;9(2):69–74.
9. Johnston M, Szabo E. Cultural competence and research readiness in international medical graduates. Med Teach. 2020;42(6):617–622.
10. Iorga M, Ciuhodaru T. Barriers and facilitators to student-led research in Romania. Rev Med Chir Soc Med Nat Iasi. 2018;122(4):755–761.