

Original Article



The role of academic stress and scientific motivation in predicting research spirit among the students of medical sciences

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Abstract

Background: Among the many benefits of curiosity and knowledge, research stands out as it unveils an entirely new realm. A thorough research, when pursued with ample commitment, can lead to substantial advancements in the field. This study examined the impact of academic stress and scientific motivation on prognosticating research spirit among the students of medical sciences.

Methods: In this cross-sectional study, a statistical population was formed by all students of medical sciences in Ilam (Iran) in 2022, and a sample of 301 individuals was selected using the convenience sampling method. Data were collected using the Research Spirit Scale, Academic Stress Questionnaire, and Scientific Motivation Questionnaire. The data were then analyzed using the Pearson correlation coefficient and stepwise regression.

Results: The findings of the research indicated a significant negative correlation between academic stress and research spirit ($r=-0.36, P<0.001$), and a significant positive correlation between scientific motivation and research spirit ($r=0.53, P<0.001$). Academic stress and scientific motivation accounted for 35% of the variance in the research spirit among medical students. Furthermore, the results suggested that academic stress had a more substantial role in predicting the research spirit of the students.

Conclusion: Based on the findings, focusing on scientific motivation and strategizing to alleviate academic stress students in medical sciences can help enhance their research spirit.

Introduction

The production of scientific outputs, including the results and products of scientific communities, serves as a crucial measure of a society's scientific progress. The attainment and quantitative augmentation of these outputs are fundamental goals within these communities.¹ In other words, the primary determinant of a country's ability to compete on an international scale and in global markets is the extent of its technical and research knowledge development.² Countries that are not involved in worldwide scientific and technological production, or do not endeavor to acquire scientific knowledge and insights with well-defined objectives and strategic planning, will find it challenging to leverage the achievements of others. This lack of engagement and effort hampers their ability to establish a sustainable international presence and to manage and foster development.^{3,4} Therefore, pinpointing the factors that impact students' research performance can be crucial and illuminating. Investments in infrastructure, the quality of educational and research staff, and the

environment of educational and research institutions have facilitated the nurturing of a research spirit among university students.^{5,6} The spirit of research refers to a collection of personal traits and attitudes that inspire individuals to conduct research, thereby enhancing their perseverance and curiosity.^{7,8}

Universities, known as the main hubs for research and the training of researchers, typically maintain a strong focus on education, while research-oriented institutions structure their educational programs around research achievements, ensuring that their operations are consistently research-driven.⁹ Fostering and augmenting a research-oriented mindset in students is a paramount objective and a primary concern for universities and higher education institutions. A diminished research spirit and a lack of adequate interest in thoroughly following the journey of learning and practicing science are viewed as significant challenges within the higher education system of any nation.¹⁰ The production of knowledge and the conduct of research are viewed as the most crucial

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functions of the higher education system in human societies.¹¹ A scientific spirit, encompassing elements such as curiosity, deep understanding, inquisitiveness, broad perspective, and a propensity for creative thinking, is deemed one of the most valuable assets of universities that can be imparted through education.¹²

Various factors affect the research spirit in students of medical sciences, it seems that academic stress is one of these factors.¹³ The educational process largely involves academic stress, an important social and psychological factor, which is primarily due to the extensive volume of learning materials and the necessity for high-quality task performance.^{14,15} Academic fear and anxiety are terms used to describe the worries and concerns students experience due to academic events and pressures.¹⁶ Academic stress, which can lead to psychological pressures and the emergence of stress symptoms in students, can be attributed to factors such as exam periods, the anxiety of entering the job market post-graduation, and concerns about the extensive course load.^{17,18}

An increase in scientific motivation could potentially boost the research spirit among students. It is crucial to take fundamental steps such as establishing an efficient research system, enhancing students' motivation for conducting research, preparing research tools, and training capable researchers. Ultimately, solidifying the position of research and overcoming research barriers will be essential.¹⁹ Students who exhibit motivational characteristics during the research process are likely to engage more actively in project activities, thereby increasing the chances of successful research completion within this group.²⁰ Motivation in research acts as a driving force, initiating research by stimulating students' efforts and self-motivation toward conducting research.^{21,22} Low levels of student motivation, which consequently lead to poor performance in scientific subjects, are viewed as a significant risk for education, particularly in the field of research.²³ Therefore, it is of significant importance to study and examine students' research motivation, their research facilities, the material and spiritual support provided for nurturing their talents, and the overall factors influencing their educational and research performance.²⁴ In this regard, Afra et al²⁵ and Garavand and Pakmehr²⁶ demonstrated a significant correlation between scientific motivation and research self-efficacy.

This research was conducted in light of the positive effects of a research spirit on students and the lack of studies on the combination of variables in medical students who are grappling with numerous academic and job-related stresses. Beyond the aforementioned, this research holds practical significance as its findings can be applied in educational institutions and universities. Additionally, the novelty of the research and its potential to enhance the research spirit among students are other important aspects of this study. Based on these considerations, this study aimed to explore the impact of academic stress and

scientific motivation on predicting the research spirit among the students of medical sciences.

Materials and Methods

This was a cross-sectional study. The statistical population consisted of all students of Ilam University Medical Sciences in the academic year 2022-2023. The study's research sample was comprised of 301 students, selected based on various factors and who completed the research questionnaires. The sample size was calculated with the number of research variables in mind, the necessity for reliable parameter estimation, and the aim to achieve adequate power for identifying significant relationships via power analysis.

Inclusion criteria encompassed both physical and mental health, informed consent for participation, absence of recent stressful events such as the loss of a relative in the past six months, and completion of at least one semester of study.

Exclusion criteria included reluctance to continue participation in the research, incurable illness affecting the participant or their family, any event that could negatively impact the student's regular life, behavior, and performance, and incomplete questionnaire responses.

Measurement tools

Research Spirit Scale: The Research Spirit Scale, developed by Shirzad et al,²⁷ is comprised of 30 items divided into four subscales: perseverance, management of impulsive behaviors, curiosity, and teamwork ability. The scale utilizes a four-point Likert spectrum, ranging from (very low, low, high, and very high). Scores on this scale can range from a minimum of 30 to a maximum of 120. The reliability of the Research Spirit Scale has been reported as 0.81, as measured by Cronbach's alpha.²⁷

Academic Stress Questionnaire: The Academic Stress Questionnaire, developed by Sun et al,²⁸ is a tool made up of 16 items. These items are scored using a five-point Likert scale, ranging from one (strongly disagree) to five (strongly agree). The total score for this tool can vary from 16 to 80, with higher scores indicating greater levels of academic stress. The reliability of this questionnaire for assessing academic stress in Persian-speaking populations is suggested by a Cronbach's alpha of 0.73.²⁹

Scientific Motivation Questionnaire: The Scientific Motivation Questionnaire was developed by You et al³⁰ and consists of 25 items on a five-point Likert scale ranging from never (0), rarely (1), sometimes (2), often (3), to always (4). This scale includes five factors: intrinsic motivation, job motivation, autonomy, self-efficacy, and achievement motivation. The higher the score on these variables, the greater the level of scientific motivation. In this study, the relative validity coefficient for the questionnaire questions ranged from 0.78 to 0.99. Moreover, Cronbach's alpha coefficient for the entire questionnaire and the subscales of intrinsic motivation,

job motivation, autonomy, self-efficacy, and achievement motivation were 0.92, 0.90, 0.90, 0.78, 0.89, and 0.86 respectively.³¹ Furthermore, the authors established good construct validity of the Scientific Motivation Questionnaire with a content validity index (CVI) of 0.89 and a content validity ratio (CVR) of 0.87.³¹

Data analysis

The data collected from this research were analyzed using SPSS-27 software. Descriptive statistics, including mean and standard deviation, were utilized for descriptive analysis. For inferential analysis, statistical methods such as the Pearson correlation coefficient and stepwise regression were employed.

Results

The demographic analysis indicated that the students' mean age was 26.16 ± 2.51 years. Of these students, 250 (83.06%) were single, and 51 (16.94%) were married. In terms of gender distribution, 164 (54.49%) were females, and 137 (45.51%) were males. The mean, standard deviation (SD), skewness, and kurtosis of the research variables are outlined in Table 1.

The correlation coefficients of the research variables are detailed in Table 2. The findings indicated a significant negative correlation between academic stress and research spirit ($r = -0.36$, $P < 0.001$). Furthermore, there was a significant positive correlation between scientific motivation and research spirit ($r = 0.53$, $P < 0.001$).

A stepwise regression analysis was conducted to identify the variable with the most significant predictive influence on research spirit. The predictor variables were academic stress and scientific motivation, with research spirit serving as the criterion variable. The results of this analysis are detailed in Table 3.

The first model revealed that scientific motivation was the primary predictor of research spirit, with a correlation coefficient of 0.53. This variable accounted for 28.0% of the variance in research spirit. In the second model, academic stress was added to the equation following scientific motivation. The combined correlation coefficient of these two variables with research spirit was 0.60, predicting 36.0% of the variance in research spirit. The inclusion

Table 1. Mean, standard deviation, skewness, and kurtosis in research variables

Variables	Mean	SD	Skewness	Kurtosis
Research spirit	65.48	8.08	-0.10	-1.12
Academic stress	46.31	6.95	0.08	-0.53
Scientific motivation (total)	80.69	21.26	-0.28	-0.91
Achievement motivation	16.91	5.01	-0.38	-0.70
Job motivation	15.20	6.19	-0.29	-1.13
Autonomy	14.51	5.42	-0.30	-1.05
Self-efficacy	17.75	7.13	-0.39	-0.88
Intrinsic motivation	16.32	5.64	-0.22	-1.27

of the academic stress variable increased the predictive power by 8.0%.

The results indicated that scientific motivation had the most substantial impact on predicting changes in research spirit ($\beta = 0.53$, $P = 0.001$). Following this, both scientific motivation and academic stress variables significantly contributed to the prediction of research spirit ($\beta = -0.28$, $P = 0.001$).

Discussion

This study aimed to explore the impact of academic stress and scientific motivation on the research spirit among students of medical sciences. The findings suggest that both academic stress and scientific motivation significantly correlate with the students' research spirit. Together, these factors could account for 36.0% of the variance in the research spirit of these students.

One key discovery was the significant negative relationship between academic stress and the research spirit of the students of medical sciences, aligning with the results of Kristensen et al.³¹ This suggests that academic stress, often perceived as a distressing and worrisome condition during the study period, could potentially dampen the research spirit of students.¹³

Research spirit is identified as a mental and behavioral state where individuals engage actively and creatively in research activities. This spirit could potentially enhance the research activities of the students of medical sciences by fostering increased interest, focus, effort, and creativity.⁵ Students with a higher research spirit typically show greater acceptance of tasks and are more capable of handling responsibilities, thereby experiencing less academic stress.

Possessing a research spirit not only motivates the initiation and completion of research activities but also fosters a sense of competence in students.

Another key insight from the research was the positive and significant correlation between scientific motivation and the research spirit among the students of medical sciences, a finding that aligns with the research conducted by Zhang and Chen.³² This correlation suggests that a student's motivation and interest in learning and conducting research in scientific fields significantly influence their research spirit.

Research spirit is characterized by the propensity and focus on research and the discovery of new findings. Students with robust scientific motivation actively engage in research activities for various reasons, including personal interest, confidence in their abilities, and well-defined goals. They aimed to discover new findings and

Table 2. Correlation coefficients of research spirit with academic stress and scientific motivation

Variables	Research spirit	P
Academic stress	-0.36	0.001
Scientific motivation	0.53	0.001

Table 3. Results of stepwise regression analysis

Model	Predictor variable	F	R	R ²	B	SE	β	t	P
1	Scientific motivation	117.27	0.53	0.28	0.20	0.02	0.53	10.82	0.001
2	Scientific motivation and academic stress	83.39	0.60	0.36	-0.33	0.06	-0.28	-5.98	0.001

F: F statistic; R: Correlation coefficient; R²: Coefficient of determination; B: Unstandardized regression coefficient; SE: Standard error; β: Standardized regression coefficient; t: t-statistic.

contribute novel insights to their field of science.²⁶

When students are motivated and interested in undertaking research projects, they develop a sense of ownership over their learning. This sense of ownership, combined with the necessity to learn diverse research methods and execute research tasks, lays the groundwork for students to fully utilize their capabilities in conducting research projects.¹⁹ As a result, students attain a high level of research spirit.

Conversely, a lack of research motivation can impede effort and persistence, leading individuals to avoid assigned tasks and experience a sense of inefficiency. In general, research results suggest that graduate students play a crucial role in improving educational processes and expanding scientific services in society. Therefore, acquiring research skills is of utmost importance. Fostering and developing a research-oriented mindset is one of the most important steps towards building a scientific community. Through research, we can pave the way for a future that is more scientifically advanced than today. A significant challenge facing the education system at all levels is the decline in research spirit, which results in subpar academic performance, loss of valuable human resources, and unnecessary expenditure.

This study was conducted among postgraduate students at Ilam University of Medical Sciences. As such, care should be taken when extrapolating these results to students from other universities, cities, and cultural backgrounds. Another limitation of this research was the inability to control for other cognitive, motivational, and environmental variables. Factors such as gender, employment status, age, and economic status may have influenced the results of this study. Building upon these findings, future research could delve into other factors that might influence the research spirit in students of medical sciences, such as institutional support, faculty mentorship styles, and the perceived value of research in the medical field. Longitudinal studies that examine the effects of interventions aimed at reducing stress or boosting motivation could further enhance our understanding of how these factors shape research paths in medical education.

Conclusion

Our initial hypotheses were supported by the findings, which demonstrated a significant negative correlation between academic stress and research spirit, and a significant positive correlation between scientific

motivation and research spirit. Moreover, the results revealed that academic stress and scientific motivation collectively accounted for 35% of the variance in research spirit, with academic stress exerting a stronger negative impact on research spirit than the positive impact of scientific motivation.

These findings provide valuable insights for stakeholders interested in cultivating research interest among students of medical sciences. Given the adverse effect of academic stress on research spirit, it is imperative to implement effective stress management programs in schools of medical sciences. Such programs could provide students with strategies for managing academic workload, alleviating test anxiety, and promoting overall well-being. Techniques such as mindfulness meditation, time management workshops, and access to mental health resources could prove beneficial.

As scientific motivation significantly influences the research spirit, it is crucial to nurture this motivation. By implementing these practical recommendations, schools of medical sciences can foster a supportive environment that mitigates the negative effects of academic stress while nurturing the scientific curiosity and research spirit vital for a successful career in medical sciences.

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Authors' Contribution

Conceptualization: Parviz Asgari.

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Investigation: Parastoo Hosseinabadi.

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Competing Interests

The authors declared no conflict of interest.

Ethical Approval

The study was approved by the Ethical Committee of Islamic Azad University- Ahvaz Branch (IR.IAU.AHVAZ.REC.1401.191).

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