



Predictors of Academic Success in Students of Tabriz University of Medical Sciences: A Cross-Sectional Study

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Abstract

Introduction: Considering that academic success is one of the most important topics for medical sciences schools and faculty members, this study was conducted to determine the predictors of academic success in students of Tabriz University of Medical Sciences.

Methods: This cross-sectional study was performed on 542 students of the Tabriz University of Medical Sciences in Iran. The sampling method was stratified at random. The socio-demographic characteristics questionnaire, Multiple Intelligences Profiling Questionnaire (MIPQ), College Academic Self-Efficacy Scale (CASES), Personal Resource Questionnaire (PRQ-85-PART2), and the General Health Questionnaire (GHQ-28) were used to collect data. Data analysis was performed using the SPSS 16 software. The General Linear Model (GLM) was used to determine the predictors of academic success.

Results: According to the Pearson correlation test, there was a significant positive correlation between academic grade point average (GPA) and social support ($r=0.10$, $P=0.048$), academic self-efficacy ($r=0.36$, $P<0.001$) and there was a significant negative relationship between GPA and total mental health score ($r=-0.14$; $P=0.003$) and its subdomains including anxiety ($r=-0.10$, $P=0.027$), depression ($r=-0.15$, $P=0.002$), and social dysfunction ($r=-0.12$; $P=0.010$). According to GLM, the variables of academic self-efficacy, and level of education were among the predictors of academic success, so the GPA increased significantly with academic self-efficacy ($\beta:0.02$, $P<0.001$). The GPA was greater in bachelor's students than in professional doctorate students ($\beta:0.76$, $P<0.001$). The significance level was considered at $P<0.05$.

Conclusion: Due to the significant relationship between academic self-efficacy, and educational level with academic success, the promotion of self-efficacy is necessary for all students of all educational levels.

Keywords: Academic success; Social support; Self-efficacy; Intelligence; Mental health

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Introduction

Academic success, satisfaction, skill and competence acquisition, perseverance, fulfilling learning goals, and professional success are the six components of academic success (1). Academic success is an important aspect of life for university students (2). The results of A cross-sectional study at Shiraz University of Medical Sciences showed that many students (29.25%) tended to be late for completing academic assignments, which caused permanent problems and reduced academic progress (3). Academic performance and achievement may be influenced by a variety of factors such as intellect (4), academic self-efficacy (5), social support (6), and mental health (7).

Individuals' ability to achieve goals in a variety of situations is measured by intelligence (8). Multiple intelligence (MI) is a functional-cognitive theory and a learning philosophy proposed by Gardner in 1983, which described intelligence as a set of specialized talents for problem-solving and designing an idea rather than a single aptitude. According to this hypothesis, human intellect has a broad range that cannot be quantified in general, but each component can be measured separately (9). Multiple intelligence components include verbal-linguistic, logical-mathematical, visual-spatial, bodily-kinesthetic, musical, intrapersonal, interpersonal, and naturalistic intelligence. Each human has talents in eight intelligence components according to their abilities (10). Academic success is strongly linked to intelligence (11). In addition, two recent meta-analyses found that learning based on multiple intelligence theory improves academic success (12, 13). The emotional learning and maturation processes of graduates of medical science students are central to professional competence, self-awareness, and responsibility, despite mental health problems and inner existential pain (14).

Academic success is dependent on maintaining students' mental health and motivation (7). According to the World Health Organization, mental health is a state of well-being in which a person is aware of his or her abilities, can cope with the pressures of everyday life, is productive, successful, and contributes to the community (15). Depression, anxiety, and stress symptoms are common among medical students (16, 17). Depression affects 28% of medical students worldwide (18), leading to poor academic performance, academic dishonesty, pessimism, substance abuse, and suicide (19). The transition from school to university is a challenge for most university students and is linked to declines in

psychological adjustment. Social support can help students during this time of transition (20, 21).

Social support refers to non-professionals who provide social resources to individuals within the framework of formal support groups and informal support relationships and who will be available for help if needed (22). Students' understanding and adaptation to the university environment (23), mental health, and quality of life benefit from social support (24). According to a literature review, the effect of social support on academic success has yielded contradictory results. According to one study, while family support can be a predictor of academic success, perceived social support from friends and a specific person does not (25). Another study, on the other hand, found that different aspects of social support can be predictors of academic success (26). In another study among students with low levels of self-efficacy, social support had a relationship with academic performance (27).

Self-efficacy refers to a person's judgment about their ability to plan and carry out the steps necessary to accomplish a set of objectives (28). Academic self-efficacy is crucial to academic success and has been linked to students' interest and satisfaction in learning tasks (29, 30). Self-efficacy affects students' learning emotions, metacognitive learning strategies, and academic performance (31).

Given that medical education is essentially hard and stressful and also considering that intelligence, academic self-efficacy, and perceived social support are all important and necessary in students' academic success (32), and due to that several studies have produced contradictory results and also improving medical students' academic performance is one of the most important topics for medical schools and faculty members (33). This study was conducted to determine the predictors of academic success in the students of Tabriz University of Medical Sciences.

Methods

Study design and participants, and setting

A cross-sectional study was conducted on different faculties of Tabriz University of Medical Sciences (Medicine, Dentistry, Pharmacy, Nursing-Midwifery, Health and Nutrition, Rehabilitation, and Medical and Paramedical Management, and Information) from September 22 to December 20, 2020. Final-year undergraduate and fourth-year professional doctoral students were included in the study. Exclusion criteria included failing to answer more than 20% of the questionnaire items.

Sample size

Linear equations with six or more predictors need at least 10 participants for each predictor variable. However, having approximately 30 participants per variable improves our ability to detect small effect sizes (34). Therefore, the n=542 sample in this study was sufficient to detect more than 16 possible predictive variables, even variables with a small effect size.

Sampling

Based on the faculty, the sampling method was stratified at random. As a result, each faculty provided a list of final-year undergraduate and fourth-year professional doctoral students, along with their phone numbers. The number of students chosen from each faculty was stratified based on the study sample size (n=542) and the number of selected students in each faculty was determined. Students were then randomly selected from a list via a website called www.random.org. The selected students were then briefed on the purpose and methodology of the research. An informed consent form and questionnaire were sent via WhatsApp to those wishing to participate in the study and asked to complete the questionnaire. The total grade point average (GPA) was used in this study to determine academic success.

Data collection tools

This study collected data using questionnaires of socio-demographic characteristics, the Multiple Intelligences Profiling Questionnaire (MIPQ), the College Academic Self-Efficacy Scale (CASES), the Personal Resource Questionnaire (PRQ-85-PART2), and the General Health Questionnaire (GHQ-28).

The socio-demographic questionnaire included gender, education level, BMI, student age, job and level of parents' education, adequacy of family income, employment with education, and cigarette or hookah smoking.

Gardner (1983) developed Multiple Intelligence Questionnaire with eight components including linguistic-verbal, logical-mathematical, visualspatial, bodily-kinesthetic, interpersonal, intrapersonal, musical and naturalistic intelligence with 80 testable items. Each item is scored according to the Likert scale from 1 to 5; not at all like me (score 1), a little like me (score 2), moderately like me (score 3), very much like me (score 4), quite similar to me (Score 5) (9). Pasha Sharifi et al. (2014) assessed the psychometric properties of this questionnaire in Iran and the reliability of the questionnaire based on Cronbach's alpha has been reported as follows: naturalistic scale 0.86, intrapersonal scale 0.76, interpersonal scale 0.82,

musical scale 0.89, body-kinesthetic scale 0.83, visual-spatial scale 0.80, logic-mathematics 0.83, verbal-linguistic scale 0.81 and for the overall questionnaire, it was 0.96 (35).

To measure students' beliefs about academic self-efficacy, Owen and Froman created CASES. The scale has 33 items, ranging from very low to very high, and scores range from 1 to 5, and it assesses students' ability to take notes, ask questions, pay attention in class, and use a computer. Students' academic self-efficacy is measured using total scores. Higher scores indicate greater self-efficacy in this test, while lower scores indicate decreased self-efficacy (36, 37). According to the psychometric tests performed on the Iranian population, this scale is a valid and reliable scale to measure academic self-efficacy. The internal consistency for the total scale has been reported as 0.90 for males and 0.91 for females (38).

In 1987, Weinert and Brandt created the PRQ-85 questionnaire to assess social support. There are two sections to this questionnaire. The second part assesses the five dimensions of friendship, assistance, social cohesion, value, and care. This 25-item questionnaire uses a Likert scale scored from 1 to 7 (1=strongly disagree, 2=disagree, 3=somewhat disagree, 4=do not know, 5=somewhat agree, 6=agree, 7=strongly agree) (39). The present study used the second part of this questionnaire. In an Iranian study on hemodialysis patients, the validity and reliability of this questionnaire were confirmed. The reliability was determined using the test-retest method, and the correlation coefficient was 0.8 (40).

The GHQ-28 has four domains of somatic, anxiety, social dysfunction, and severe depression symptoms, each with seven items. The four-point Likert scale has four options: not at all (score 0), slightly (score 1), very (score 2), and extremely (score 3). The following are the results: Scores over 21 for total score and over 7 for subscales demonstrated the presence of mental distress in students of the Tabriz nursing and midwifery school (41, 42). Taghavi confirmed the questionnaire's validity and reliability, and its Cronbach's alpha has been determined 0.90 (43).

In this study, the validity of the socio-demographic characteristics questionnaire was assessed using content and face validity. The reliability of MIPQ, CASES, PRQ-85-PART2, and GHQ-28 was assessed using Cronbach's alpha and the values were 0.904, 0.858, 0.847, and 0.935, respectively.

Statistical analysis

SPSS version 21 was used to analyze the

data. Socio-demographic characteristics were described using descriptive statistics such as mean (standard deviation) and frequency (percentage). Skewness and Kurtosis were used and all data had a normal distribution. In bivariate analysis, the relationship between socio-demographic factors and GPA was investigated using independent t-tests, one-way analysis of variance, and Pearson correlation. The socio-demographic characteristics that had a significant relationship with the GPA using the bivariate tests were entered into the univariate General Linear Model (GLM) along with the variables of academic self-efficacy, mental health

and its sub-domains, academic self-efficacy, and social support as independent variables and GPA was entered into the model as a dependent variable. The significance level was considered at $P < 0.05$.

Ethical Considerations

This study was performed after obtaining permission from the ethics committee of Tabriz University of Medical Sciences, (IR.TBZMED.REC.1399.1158). All participants were informed about the study's aims and procedures; written consent was obtained from students to participate in the study.

Table 1: Qualitative socio-demographic characteristics and their relationship with academic success

Characteristics	Number (%)	Mean±SD*	P
Gender			<0.001 [†]
Male	238 (43.9)	16.3±1.5	
Female	304 (56.1)	16.8±1.2	
Educational grade			<0.001 [†]
Bachelor	331 (57.6)	16.9±1.2	
Professional doctorate	211 (42.4)	16.1±1.4	
Employed with education			0.617 [†]
Yes	132 (24.4)	16.7±1.5	
No	410 (75.6)	16.6±1.3	
Mother's occupation			0.761
Employed	167 (30.8)	16.6±1.5	
Housewife	375 (69.2)	16.6±1.3	
Mother's education			0.934 [‡]
Illiterate	37 (6.8)	16.6±1.5	
Primary school	59 (10.9)	16.7±1.2	
Secondary school	62 (11.4)	16.6±1.5	
High school	159 (29.3)	16.5±1.3	
University	225 (41.5)	16.7±1.4	
Father's occupation			0.480 [†]
Unemployed	85 (15.7)	16.5±1.4	
Worker	8 (1.5)	17.1±1.8	
Employee	160 (29.5)	16.5±1.4	
Physician	21 (3.9)	17.0±0.1	
Freelance	268 (49.5)	16.7±1.3	
Father's education			0.083 [‡]
Illiterate	11 (2.0)	15.9±1.9	
Primary school	43 (7.9)	17.1±1.1	
High school	57 (10.5)	16.5±1.2	
Diploma	9 (1.7)	16.3±1.6	
Secondary school	147 (27.1)	16.7±1.4	
University	275 (50.7)	16.6±1.4	
Sufficiency of income for family expenses			0.195 [‡]
Sufficient	136 (25.1)	16.8±1.3	
Somewhat sufficient	320 (59.0)	16.6±1.4	
Insufficient	86 (15.9)	16.5±1.4	
Smoking			<0.001 [†]
Yes	36 (6.6)	15.6±1.6	
No	506 (93.4)	16.7±1.3	
Hookah			0.043 [†]
Yes	34 (6.3)	16.0±1.6	
No	508 (93.7)	16.7±1.4	

* Standard Deviation

Results

In this study, 542 participants were enrolled. The students' mean±SD age was 23.2±2.4, and their BMI was 23.3±3.4. Less than half of the students (N=304, 43.9%) were female. Over half of the students (N=231, 57.6%) were undergraduates, and (N=211, 42.4%) were doctorate students. Approximately a quarter of students (N=132, 24.4%) worked while studying. About a quarter of students' mothers (N=167, 24.4%) were employed, while the remainders were housewives, and nearly half of fathers (N=268, 49.5%) were self-employed. 41.5 percent (N=225) of mothers and 50.7 percent (N=275) of fathers had a graduate degree. Only 15.9% (N=86) of students had insufficient financial resources. The majority of students (N=506, 93.4%) did not smoke or use hookah (N=508, 93.7%) (Tables 1 and 2).

According to the results of the analysis of the Pearson correlation test: Social support and GPA had a statistically significant positive relationship ($r=0.10$, $P=0.048$). Also, academic self-efficacy and GPA had a statistically significant positive correlation ($r=0.36$, $P=0.001$); there was a significant negative relationship between academic GPA and overall mental health score ($r=-0.14$, $P=0.003$), as well as anxiety ($r=-0.10$, $P=0.027$), depression ($r=-0.15$, $P=0.002$), and social dysfunction ($r=-0.12$, $P=0.010$)

subdomains, an inverse correlation was found to be statistically significant. However, there was no significant correlation between physical health ($r=-0.09$, $P=0.067$), and a student's GPA. Also, there was no statistically significant correlation between overall intelligence and its subdomains and GPA (Table 3).

The variables of gender ($P<0.001$), degree of education ($P<0.001$), BMI ($P=0.045$), cigarette smoking ($P<0.001$), and hookah use ($P<0.001$) were shown to be significantly related to GPA using one-way ANOVA, independent t, and Pearson correlation tests (Tables 1 and 2). These variables along with the social support, academic self-efficacy, total mental health score, and the anxiety, depression, and social dysfunction subdomains were all included in the GLM. According to GLM, the variables of academic self-efficacy, and level of education were among the predictors of academic success, so the GPA increased significantly with academic self-efficacy ($\beta: 0.02$, $P<0.001$). The GPA was greater in bachelor's students than in professional doctorate students ($\beta: 0.76$, $P<0.001$). The significance level was considered at $P<0.05$ (Table 4).

Discussion

The findings revealed that the variables of social support, academic self-efficacy, and an overall score of mental health, as well as anxiety,

Table 2: Quantitative socio-demographic characteristics and their relationship with academic success

Characteristics	Mean±SD	Correlation coefficient	P*
Age	23.2±2.4	0.065	0.189
BMI	23.3±3.4	0.087	0.045

*Pearson Correlation test

Table 3: Status of academic intelligence, social support, academic self-efficacy, mental health and its relationship with academic success

Variable	Mean±SD	Obtained score range	Obtainable score range	Correlation with GPA r (P)*
Total intelligence	259.1±33.4	54-390	80-400	-0.02 (0.671)
Linguistic-Verbal Intelligence	31.1±6.2	13-50	10-50	-0.001 (0.981)
Logical-Mathematical intelligence	30.1±6.0	14-48	10-50	-0.05 (0.258)
Spatial intelligence	35.5±6.4	17-50	10-50	-0.01 (0.845)
Bodily-Kinesthetic intelligence	32.7±5.8	18-49	10-50	-0.06 (0.182)
Musical intelligence	29.4±7.4	11-49	10-50	-0.02 (0.714)
Intrapersonal intelligence	34.6±5.1	20-49	10-50	0.06 (0.247)
Interpersonal intelligence	33.7±6.5	14-50	10-50	-0.002 (0.963)
Naturalistic intelligence	31.7±6.1	13-49	10-50	-0.01 (0.804)
Social Support	124.9±19.6	60-168	25-175	0.10 (0.048)
Academic self-efficacy	82.2±15.5	36-120	33-165	0.36 (<0.001)
Total score mental health	41.8±13.5	17-77	0-84	-0.14 (0.003)
Physical health	10.3±3.8	1-21	0-21	-0.09 (0.067)
Anxiety	11.0±4.2	3-21	0-21	-0.10 (0.027)
Social dysfunction	11.4±4.0	2-21	0-21	-0.12 (0.010)
Depression	9.0±4.2	1-21	0-21	-0.15 (0.002)

*Pearson Correlation test

Table 4: Predictors of academic success based on the general linear model

Variable	B (95% Confidence Interval)	P
Smoking		
Yes	-0.71 (-1.24 to -0.18)	0.126
No (Reference)	0	
Hookah		
Yes	0.52 (-1.11 to 0.07)	0.083
No (Reference)	0	
BMI	-0.05 (-0.09 to -0.01)	0.103
Educational grade		
Bachelor	0.76 (0.4 to 1.13)	<0.001
Professional doctorate (Reference)	0	
Gender		
Male	-0.16 (-0.43 to 0.12)	0.335
Female (Reference)	0	
Social Support	0.00 (-0.01 to 0.01)	0.575
Total score of mental health	-0.30 (-0.02 to 0.07)	0.245
Academic self-efficacy	0.02 (0.03 to 0.01)	<0.001

depression, and social dysfunction subdomains, had a statistically significant correlation with the GPA in bivariate analysis. Academic self-efficacy and educational level were found to be predictors of academic success in a multivariate analysis.

This study revealed that academic self-efficacy and academic success had a substantial positive correlation. Several researchers have found a positive association between academic self-efficacy and academic success, which is consistent with the findings of this study. According to the studies conducted on dental students (44) and medical students (45), academic self-efficacy was positively connected with GPA. Also, the results of Abd-Elmotalieb & Saha's study on final year students showed that academic self-efficacy was also strongly connected with GPA (46). Khan (2013) in a study on college students found that academic self-efficacy was positively correlated with GPA, positive reinterpretation and growth, acceptance, and planning (47). Similarly, Ismail et al. demonstrated a significant positive correlation between GPA and academic self-efficacy (48). The mechanisms by which academic self-efficacy affects academic performance are mediated by variables such as effort regulation, academic procrastination, intensive processing strategies, parental involvement, and goal orientation (49). Considering that several studies showed a positive relationship between academic self-efficacy and academic performance, useful strategies such as team-based learning activities, and exercise programs should be used to promote self-efficacy in students (50, 51).

This study proved a significant positive correlation between social support and academic success. Among nursing, midwifery, and crisis management students. Tayfur et al. (2016) discovered a substantial positive correlation

between perceived social support and academic success (52). Seo et al. (2017) also discovered a correlation between nursing students' academic success and social support (53). Social capital refers to the resources that are embedded in the fabric of society, that can be accessed and/or mobilized for action towards goals, and that help achieve various goals (54). A social support and supportive environment help boost students' self-esteem, which in turn improves their academic performance and protects them from emotional exhaustion (55).

The overall score of mental health and the sub-domains of anxiety, depression, and social dysfunction had a significant negative relationship with academic success in the current study. Consistent with the findings of this study, Heidari et al. (2019) discovered a correlation between mental health and nursing students' academic success (56). Anbari et al. (2013) also found a substantial and negative relationship between mental health scores and academic success among medical, paramedical, nursing, and midwifery students in their study (57). Sadeghi et al. (2013) found no significant correlation between mental health and academic success among 240 medical, health, nursing, and midwifery students. In the Sadeghi et al.'s study, the last semester's grade point average above 14 (out of 20) was considered an academic success for students who had completed at least one semester (58). However, in this study, the entire grade point average of final-year students was evaluated and the sample size of our study was too large. Positive mental health causes students to engage more effectively with learning opportunities in the university environment (59, 60). In addition, social and emotional abilities positively influence children's learning outcomes

and ability to behave appropriately (61).

Undergraduate and graduate students had better GPAs than doctorate students in this study. One possible explanation for this finding is that undergraduate students put forth more effort to achieve higher academic success. Another reason could be that those other characteristics, such as mental health or smoking, indirectly impact academic success. Final-year dental students had significantly higher psychological illnesses than first-year dental students, according to Rezaei et al. (2019) In dentistry students, Fujita et al. (2018) discovered a strong relationship between smoking and a more extended academic year (62, 63). Other researchers have reported the effects of mental health on academic success and life quality (19) and the negative impact of smoking on GPA, consistent with this study's findings (64).

Strengths and Limitations

The use of valid and reliable questionnaires to assess multiple intelligence, academic self-efficacy, perceived social support, and mental health was one of the strengths of this study. The large sample size and research on various educational levels (undergraduate, graduate, and doctoral) were among the strengths.

One of the limitations of this study was that the participants were selected only from the Tabriz University of Medical Sciences, which probably limits the generalizability of the findings to students of other universities. Another limitation of the present study was due to its cross-sectional nature, in which the associations between GPA and educational levels, and academic self-efficacy may not always indicate a cause-and-effect relationship.

Therefore, conducting studies with strong design such as longitudinal or experimental design is recommended to facilitate a robust analysis of causal relationships between GPA and academic self-efficacy, and educational levels.

Conclusion

According to the findings of this study, academic self-efficacy and educational level were predictors of academic success. The findings of this study can be helpful for university administrators and educational planners to have more accurate and scientific planning for students' academic success. Promoting academic self-efficacy in all students of all educational levels is recommended.

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Authors' Contribution

All authors contributed to the discussion, read and approved the manuscript and agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated resolved.

Conflict of Interest

The authors declare that they have conflicting interests. This study was financially supported by National Agency for Strategic Research in Medical Education. The funder had no role in the study design, data collection, analysis, or manuscript production.

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