doi: 10.22100/ijhs.v4i2.569
Original Article

IJHS 2018;4(2):20-23
ijhs.shmu.ac.ir

IJHS
International Journal of Health Studies

Investigating the Creativity and Its Influencing Factors among Medical Students

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Received: 28 April 2019
Accepted: 27 may 2019

Abstract

Background: *Creativity is among the fundamental and constitutive features of humans, playing an important role in the development and growth of human beings and human civilization. The present study was conducted to investigate the creativity and factors influencing it among medical students.*

Methods: *In this cross-sectional study, 320 medical students were randomly selected using stratified random sampling. Guilford's Creativity Questionnaire was used as data collection tool. Chi-Square test, and one-way analysis of Variance were used for data analysis, and the results were presented as frequency distribution tables.*

Results: *Most of the participants (232 students (72.5%)) had moderate levels of creativity. The mean score was obtained as 49.59±5.59, 22.02± 3.29, 35.06± 4.62, 25.81±3.53, and 135.56±13.80, respectively for fluency, elaboration, originality, flexibility, and overall creativity. There was no significant relationship between overall score of creativity with gender, major, educational level, and place of residence, marital status, employment, and term of study (P≥0.05). However, there was a significant relationship between flexibility (P=0.001) and marital status (P=0.045).*

Conclusions: *Given that about three-quarters of the participants had moderate scores while high creativity is indispensable for health care workers, educational planners need to foster this capability among the students.*

Keywords: Creativity, Elaboration, Fluency, Flexibility, Originality.
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Please cite this paper as: Amiri M, Valinejad Lajimi A, khojasteh L, Sadeghi Z, Sadeghi N, Khosravi A. Investigating the creativity and its influencing factors among medical students. Int J Health Stud 2018;4(2):20-23.

Introduction

Creativity is one of the essential and constructive features of humankind playing an important role in the development and growth of the individual as well as the human civilization. Creativity also forms the foundation of scientific and artistic inventions and achievements, and is not an endowment bestowed only upon certain people.[1] Creativity is defined as the tendency to create or recognize ideas or possibilities facilitating communication with others, and it serves to entertain oneself or others.[2,3] Guilford defines creativity as the skill and ability to create new things.[4] Creativity consists of four main factors of fluency (the ability to generate abundant ideas), elaboration (the ability to pay attention to the details), originality (the ability to produce novel, unusual, and novel ideas) ,and flexibility (the ability to generate ideas through different methods).[5] Some scholars believe that, the creativity is influenced by various factors such as personality, genetic makeup, social environments, biological and cultural factors, training, and experience.[6-9] Although there is some degree of creativity in all humans, some people are more skilled than others.[10] The most important features mentioned for creative people include fluency of thought, flexibility, originality, the ability to create new definitions of problems, and sensitivity to the problems.[11,12]

In recent years, higher education organizations as highly influential ones have progressed well to the extent that they have accepted the role and importance of scientific creativity as a distinct feature, and it is claimed that, the success of universities largely depends on creativity, innovation, discovery, and invention.[13-16] Along these lines, the highest goal of education at all levels is fostering the creativity and innovation in pupils and students.[17] Creativity is essential for providing skilled and multidimensional care in different environments and sectors.[18,19] Challenges such as quality of care for aging people, high prevalence of chronic diseases, advances in information technology, higher awareness of patients about their rights, etc. make the need for creativity in health care more conspicuous.[20]

The creativity in medical science is very important so that, healthcare personnel often need to provide innovative solutions in interacting with patients and clients, and in solving specific problems arising in their profession and in the provision of their services.[21,22] Hence, universities must play a key role in the creation, growth, and development of creativity, and identifying the current status of creativity among the students, recognizing the barriers to and causes of students' creativity is part of their responsibility, and the results of such studies can assist the planners in improving the current status of creativity and helping its growth.[8,11]

Results of a study conducted in the United States showed that, reforming the structure and providing opportunities for creativity led to the improvement of customer satisfaction and increased revenue and productivity of the company by 71%.[23] Another study found that, creativity not only plays a key role in providing quality care, but it is also very effective in the interaction of the medical team with the patient.[22] Some studies reported low creativity[9,24] and some reported high

creativity[11,14,17,19,25] among the students. Some studies have also found a relationship between creativity with gender and academic achievement.[17,24,25]

Given the importance of this topic, and since the promotion of creativity requires a more accurate understanding of it, also as there is no study investigated this topic in Shahroud University of Medical Sciences, Semnan province, Iran, this

study was carried out to investigate the creativity and identify the factors influencing it among the students in this university.

Materials and Methods

This cross-sectional study was conducted in 2015. In this study, a sample of 320 third-term and higher level students from the Faculty of Medical Sciences of the Islamic Azad University of Shahroud were selected as study sample through the stratified random sampling method. First, a list of students studying in the nursing, medicine, laboratory science, and anesthetics was prepared. According to the number of students, 126 medical students, 88 nursing students, 60 laboratory science and 46 anesthetics students were randomly selected, and studied using the Guilford Creativity Questionnaire translated by Abedi et al.[4,26] This questionnaire includes 60 three-option items and measures four sub-scales or dimensions of fluency, elaboration, originality, and flexibility. A higher score on this questionnaire indicates a higher level of creativity. In the study carried out by the designer of the instrument, the magnitudes of 0.85, 0.82, 0.84 and 0.80, respectively were reported for fluency, originality, flexibility, and elaboration.[26] To score the questionnaire, each item is assessed on a scale of 1 to 3, with a score of 1 showing low creativity, a score of 2 indicating moderate creativity, and a score of 3 indicating high creativity. Adding up the scores of individual items four sub-scores and one overall score are obtained. The total score is the sum of scores on four sub-scales, ranging from 60 to 180. Sub-scale of fluency includes items 1 to 22, sub-scale of elaboration includes items 23 to 33, sub-scale of originality includes items 34 to 49, and sub-scale of flexibility includes items 50 to 60 in the questionnaire. Fluency scores can range from 22 to 66, elaboration from 11 to 33, originality from 16 to 48, and flexibility from 11 to 33, with higher scores indicating higher levels of fluency, elaboration, originality, flexibility, and creativity.

The self-administered questionnaires were distributed among the students and they were asked to fill it out anonymously. Participation in the study was voluntary. The proposal of this study was approved by the Ethics Committee of Shahroud University of Medical Sciences (Code: IR.Iau.Shahrood.Rec.1394.4).

The collected data were fed into SPSS software 16 and were analyzed using the ANOVA, Chi-Square and Pearson Correlation Coefficient tests. The P.V of 0.05 was considered as statistically significant.

Results

The overall mean of age was equal to 22.6±2.8 years old. Most of the participants (65.9%) were female; 102 (31.9%) of them were residents in the dormitory; 173 (54.1%) of them lived in houses away from the family and 45 (14.1%) of them lived in their own homes with their families (Table 1).

Table 1. Frequency distribution of the participants based on some variables

Variable	N	%
Gender		
– Male	109	34.1
– Female	211	65.9
Major		
– Medicine	126	39.4
– Anesthetics	46	14.4
– Laboratory science	60	18.8
– Nursing	88	27.4
Level of education		
– Professional Doctorate	126	39.4
– Continuous BSc	191	59.7
– Non-continuous BSc	3	0.9
Marital status		
– Married	32	10
– Single	288	90
grade point average (GPA)		
– Less than 15 (on a scale of 20)	102	31.9
– 15-17	133	41.6
– 17 and higher	85	26.5
Employment		
– employed	12	3.8
– unemployed	308	96.2

The mean scores were obtained as 49.59±5.59, 22.02±3.29, 35.06±4.26, and 25.81±3.53, respectively for fluency, elaboration, originality, and flexibility and the total score of creativity was obtained as 135.56±13.80. In this study, 87 students (22.7%) had high level of creativity and most of the participants (232 students (72.5%)) had moderate levels of creativity (Table 2).

Table 2. The mean scores of creativity and its dimensions in the participants

Variable	Mean ±SD	Min.	Max.
GPA	15.35±1.59	12	19
Fluency	49.59±5.59	33	65
Elaboration	22.02±3.29	14	35
Originality	35.06±4.62	24	48
Flexibility	25.81±3.53	16	33
Overall creativity	135.50±13.80	99	179

No relationship was observed between creativity and gender, major, level of education, place of residence, marital status, employment, Grade Point Average (GPA), and term of study (P≥0.05). However, there was a significant relationship between the flexibility with gender (P=0.001) and marital status (P=0.045) (Table 3).

No significant relationship was observed between levels of creativity and gender, major, level of education, place of residence, employment, and GPA (P≥0.05). Results are displayed in Table 4.

Table 3. Association between Mean scores of creative and its dimensions with some variables

Variable	Creativity dimension (Mean ± SD)				
	Fluency	Elaboration	Originality	Flexibility	Overall creativity Mean ± SD
Gender					
– Male	50.28±5.63	22.43±3.51	35.26±4.79	24.86±3.64	132.84±14.82
– Female	49.23±5.56	21.81±3.15	34.96±4.54	26.31±3.38	132.32±13.28
– F	2.55	2.568	0.300	12.507	0.102
– P	0.111	0.110	0.584	0.001	0.749
GPA					
– Less than 15 (on a scale of 20)	49.09±5.66	22.10±3.48	35.18±5.22	25.90±3.83	132.29±15.04
– 15-17	49.50±5.38	22±3.18	35.03±4.30	25.74±3.32	132.27±12.76
– 17 and higher	50.32±5.85	21.95±3.24	34.98±4.39	25.83±3.53	133.09±13.96
– F	1.13	0.06	0.05	0.06	۰.۹
– P	۰.۳۲	0.95	0.95	0.94	۰.۹
Major					
– Medicine	49.66±5.51	22.26±3.32	35.34±4.69	26.15±3.31	133.43±13.76
– Anesthetics	50.69±5.08	21.34±2.83	34.69±3.58	25.97±3.64	132.71±12.06
– Laboratory science	48.33±4.93	21.50±3.01	34.48±3.85	24.81±3.43	129.13±11.02
– Nursing	49.76±6.26	23.38±3.71	35.26±5.43	25.93±3.79	133.34±16.10
– F	1.65	1.74	0.62	2.07	1.50
– P	0.18	0.16	0.6	0.10	0.21
Level of education					
– Professional Doctorate	49.67±5.52	22.26±3.23	35.34±4.69	26.15±3.31	133.43±13.76
– Continuous BSc	49.47±5.52	21.85±3.33	34.88±4.60	25.59±3.67	131.80±13.90
– Non-continuous BSc	54±3.60	22.66±3.21	35±2.64	26±3.60	137±7.50
– F	۰.۹۹	0.64	0.38	0.98	0.74
– P	۰.۳۸	0.53	0.68	0.38	0.48
Residence					
– Dormitory	49.91±5.82	21.97±3.30	35.48±4.89	26.31±3.58	133.67±14.39
– House (away from family)	49.35±5.64	21.99±3.33	34.82±4.38	25.51±3.55	131.68±13.34
– House (with family)	49.77±5.68	22.24±3.14	35.06	25.86±3.31	132.95±14.27
– F	0.35	0.12	0.64	1.65	0.69
– P	0.71	0.89	0.53	0.19	0.50
Marital status					
– Married	50.08±4.36	22.67±2.93	35.35±3.72	26.97±2.38	135.08±10.38
– Single	49.53±5.73	21.94±3.32	35.03±4.72	25.68±3.63	132.19±14.14
– F	0.3	1.51	0.14	4.07	1.34
– P	0.58	0.22	۰.۷۱	۰.۰۵	0.25

Table 4. Association between levels of creativity and some variables

Variable	Creativity (%) number			X^2	P
	high	Moderate	Low		
Gender					
– Male	30(27.5)	79(72.5)	0(0)	0.523	0.770
– Female	57(27)	153(72.5)	1(0.5)		
Major					
– Medicine	41(32.5)	84(66.7)	1(0.8)		
– Anesthetics	13(28.3)	33(71.7)	0(0)	11.104	0.085
– Laboratory science	7(11.7)	53(88.3)	0(0)		
– Nursing	26(29.5)	62(70.5)	0(0)		
Level of education					
– Professional Doctorate	41(33.5)	84(66.7)	1(0.8)		
– Continuous BSc	44(23)	147(77)	0(0)	7.549	0.110
– Non-continuous BSc	2(66.7)	1(33.3)	0(0)		
Marital status					
– Married	12(35.3)	22(64.7)	0(0)	1.357	0.507
– Single	75(26.2)	210(73.4)	1(0.3)		
GPA					
– Less than 15 (on a scale of 20)	1(1)	74(72.5)	27(26.5)		
– 15-17	0(0)	99(74.4)	34(25.6)	4.26	0.587
– 17 and higher	0(0)	59(69.4)	26(30.6)		
Employment					
– employed	5(41.7)	7(58.3)	0(0)	1.345	0.510
– unemployed	82(26.6)	225(73.1)	1(0.3)		
Residence					
– Dormitory	29(28.4)	73(71.6)	0(0)		
– House (away from family)	44(25.4)	128(74)	1(0.6)	1.504	0.826
– House (with family)	14(31.1)	31(68.9)	0(0)		

Discussion

The mean score of fluency was equal to 49.59±5.59 and the mean score of the flexibility was equal to 25.81±3.53. Moshirabadi et al reported the score of these dimensions as 48.67 and 23.39, respectively[19] which is in line with our study results. Peyvastegar et al reported the scores of 37.42 and 23.7 for fluency and flexibility, and Gandomani et al. reported that, the scores of fluency and flexibility were equal to 45.8 and 21.8, which are less than the findings of the present study.[3,14] However, Noferesti reported the mean scores of 55.1 and 27.4, respectively for fluency and flexibility, which is more than the current results.[25] This discrepancy can be justified by the difference in the educational field of studies and methods of measurement.

The mean score of elaboration in this study was equal to 22.02±3.29 and the mean score of originality was equal to 35.06±4.62. Some studies conducted in Iran reported higher mean scores for this dimension which is not consistent with recent results.[3,19,25]

The total mean score of creativity was obtained as 135.50±13.80, which is less than the findings of a number of studies.[3,17,19,24] In some studies, the mean score of creativity is less than that of the present study.[1,9,14] This discrepancy can be attributed to the differences in the type of universities and disciplines, and social and cultural environments.

There was no significant difference between creativity and gender, which is consistent with the results of some studies[19,27] but inconsistent with some others.[25,28] It seems that the reason for this difference lies in various factors, such as differences in educational systems, teaching methods, and educational content in recent years.

The results showed that, there was no significant relationship between creativity with the place of residence, marital status, employment, GPA, major, and academic term. The results of this study are consistent with the findings of a study conducted at the University of Tehran.[19] Some studies, however, reported a significant relationship between creativity and academic terms which is not consistent with the results of the present study.[14,29]

There was no significant relationship between gender and dimensions of creativity other than flexibility. The mean score of flexibility was higher in female students. This finding is not in line with the results of the study by Moshirabadi et al showing that the mean scores of fluency and elaboration were higher among female students,[19] but it is in line with the findings of the study by Daemi et al.[5]

Moreover, no significant relationship was observed between the academic term and all dimensions of creativity (elaboration, flexibility, fluency, and originality), which does not tally the results of some studies,[19] but corresponds with the results of a study conducted in Tehran.[3]

The results showed that, there was no significant relationship between aspects of creativity (elaboration, flexibility, fluency, and originality) with the mean score, major, educational level, place of residence, and marital status. This finding is consistent with the results of some studies[19] but does not conform to the findings of some others.[3,30]

Lack of a full review on the studies conducted among medical students is one of the main limitations of this study.

The findings of the present study showed that, apart from gender and marital status other factors investigated in this study have little effect on the students' creativity. Considering that about three-quarters of the participants had moderate and high levels of creativity and since high creativity is a necessity for those involved in the healthcare profession, the use of new educational methods including PBL, critical thinking skills, and problem-solving, and creativity as part of the curriculum or in the form of extracurricular workshops for instructors and students seems to play an important role in improving the students' creativity.

Acknowledgement

Appreciation is expressed to all students for their participation.

Conflict of Interest

The authors declare that they have no conflict of interest.

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