Study of Meta-Cognitive Beliefs and Learning Methods and Their Relationship with Exam Anxiety in High School Students Bandar Abbas City, 2014

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Abstract

Background: Nowadays, one of the principal difficulties faced by educational systems worldwide is anxiety, a mental problem, which is evidently difficult to be endured by many students and leads to various types of mental and physical disorders or reduction of educational efficiency, and has gained attention of sociologists for its consequent psychological, social, and economical impacts.
Objectives: The current study aimed at predicting exam anxiety based on meta-cognitive beliefs and learning methods among high school students of Bandar Abbas.
Methods: The study population included 351 students (197 males and 154 females), who were selected randomly by the cluster approach and answered the research tools including Meta-Cognitive Beliefs Questionnaires (MCQ-30), Learning methods questionnaires of Marton and Saljoo (1996) and also test anxiety questionnaire of Alpert and Haber (1960). The study plan was correlative-descriptive. Pearson simple correlation coefficient, multi variable regression, and multi variable variance analysis were used to analyze the obtained data.
Results: The study results indicated that there was a positive significant relationship between meta-cognitive beliefs and exam anxiety, a negative significant relationship between profound learning and learning methods and exam anxiety, and a positive significant relationship between smattering learning method and exam anxiety. The regression exam results also revealed that meta-cognitive beliefs and smattering learning methods could positively predict and determine exam anxiety in students. A significant relationship was observed between meta-cognitive beliefs in females and males, and female students showed greater intention and interest toward meta-cognitive beliefs than males, however, no significant difference was observed between learning methods and exam anxiety in females and males.
Conclusions: It was concluded from the study results that profound learning methods lead to the reduction of exam anxiety, and smattering learning methods and meta-cognitive beliefs lead to increased exam anxiety among students.

Keywords: Meta-Cognitive Beliefs, Learning Methods, Exam Anxiety

1. Background

Education is one of the important aspects of each individual lifetime, which considerably influences other aspects of life. Meanwhile, educational performance or failure of educational efficiency in students is an important issue to be considered during each student's educational life, due to its meaningful psychological, social, and economic impacts on educational systems (1).

Exam anxiety corresponds with competition among peers, negative perspectives toward classmates, particularly those with higher distinctive abilities, teacher performance, homework, exams, educational status, and future anxiety (2).

Indeed, it is an act, which appears once self-contempt and doubting about one's capabilities and skills begin and can occasionally lead to a negative cognitive assessment, decentralization, undesired physiological reactions as well as tachycardia, drop in blood pressure, and finally decline in educational status (3).

Students develop anxiety for numerous reasons, such as familial or educational system challenges or difficulties. It should be mentioned that anxiety is a general, ambiguous, and unpleasant mental problem, resulting in complications such as autonomic nervous system stimulus, headache, sweating, tachycardia, gastrointestinal complications, and dysphasia (4, 5).

In Iran, it seems that the fear of obtaining low grades and family reprehensions, friends ridicules, fear of inability to continue education or dropout, especially entering the university, are perpetually the key mental problems

of students and exam anxiety has been highly common among them.

A theoretical construct of learners' beliefs was then proposed and pedagogical implications were discussed (6).

The meta-cognitive model makes an important distinction between 2 different types of worrying in students; of particular importance is the type, known as exam anxiety (7), which emerges from negative meta-cognitive beliefs about worrying itself. Anxiety is a variable consisting of negative appraisal of worrying. A useful way to think of exam anxiety is as worry about worry. The occurrence and content of meta-worry is thought to be closely linked to underlying negative beliefs (trait variables) that individuals have about the nature and consequences of worrying. For example, some individuals believe that worrying is uncontrollable and harmful, and beliefs of this kind, are of particular significance in understanding the development of students (8).

Meta-cognitive beliefs play an important role in exam anxiety status and can change the exam grade and status by a variety of ways, which promote negative thinking, incompatible approaches or jeopardizetest status and prevail anxiety in students. Meta-cognitive beliefs are linked with uncontrollability, importance, and risk of thinking or cognitive experiences (9). These beliefs may result in tribulations, which influence one's thinking style and compatibility and will automatically move forward to focus on and reinforce emotional responses, which are dramatically affected by anxiety and thinking rumination, and cause anxiety perception (10).

The other factors relating to exam anxiety in students is the style and methods of studying. Studying is considered as a development index and is important in education and students can experience less challenges during their education years due to appropriate and suitable studying approaches (11).

One substantial element for educational progress is to apply the correct study method in an appropriate time. If students use incompatible irregular methods when studying and waste time, they will certainly lessen their efficiency and develop different types of anxieties (12).

Considering the factors relevant to exam anxiety in students, this study could assist defining different factors that play a role in developing such problems and considerably reduce the phenomenon complications. Thereby, educational progress is an important variable in research. Research of meta-cognitive beliefs and learning methods may be correlated with exam anxiety in the high school student society intending to take the university entrance exam, and characterizing these relations is necessary for improvement of the problem and provides a useful feedback to the officials of educational organizations.

Students generally expect failure more than success; these students blame themselves for failing. These thinking mistakes can result in vulnerability or anxiety increment and affect good incentives for education progress, the most outstanding of which is exam motivation (13).

2. Objectives

Therefore, the present study evaluated meta-cognitive beliefs, learning methods and their relationship with exam anxiety in high school students of Bandar Abbas, during the educational year of 2013 to 2014.

3. Methods

The study statistical population included all high school students of Bandar Abbas, including 4000 subjects (2250 females and 1750 males), who were studying in the educational year of 2013 to 2014. The study sample was selected by random cluster with the Morgan table; including 351 students, composed of 197 females and 154 males. A list of girl and boy schools from district education and nurturing organizations was obtained and 4 girl schools and 5 boy schools were randomly selected and 2 grades were chosen from the 4 grades of each high school. Afterwards, a list of students studying in those grades was prepared and the sample was selected, according to the number of subjects and the Morgan table (14). The questionnaire was distributed among the subjects.

The present study was correlative descriptive with respect to the study goals and nature of the study assumptions. In this study, the relationship between meta-cognitive beliefs, learning methods, and exam anxiety in high school students was discovered and discussed. Subjects were randomly selected from clusters and then the author provided the required information to the students. The results obtained from each predictor variable (meta cognitive beliefs and learning methods) were evaluated by the standard variable (exam anxiety) using correlative analysis.

For ethical purposes, the study objectives were explained for the participants and consent was obtained.

Data collection tools included 3 questionnaires:

A) Meta Cognitive beliefs Questionnaire (MCQ 30): This questionnaire is a 30 item self-report tool, which measures personal beliefs about thinking style. This tool was designed for measuring multiple trait meta-cognitive belief elements, some of which play a vital role on meta-cognitive model of psychiatric disorder. The responses are measured based on a 5-point Likert type scale, ranging from strongly

disagree to strongly agree. These scales included five subscales:

1) Positive beliefs towards anxiety
2) Beliefs on uncontrollability and thinking risks
3) Beliefs on cognitive confidence
4) Beliefs on the need to control thinking
5) Cognitive self-consciousness (15).

In the study of Whales et al. (16) Cronbach's alpha coefficient range was 0.72 to 0.93, and its stability was reported as 0.75 for total score using retest method during a 22- to 118-day period and 0.59 to 0.87 for subscales. In a similar study (9), using Cronbach's alpha coefficient exam, the questionnaire stability was obtained as 0.81 for the entire questionnaire and 0.60, 72.74, 50.0, 0.51, and 0.0 for subscales as well as positive beliefs on anxiety, uncontrollability and risk, cognitive confidence, need to control thinking, and cognitive self consciousness, respectively.

B) Learning approach questionnaire: This questionnaire was firstly prepared by Marton and Seljova (1976 to 1996), and was supplemented by the Entwistle et al. (17) and translated by Navidi (18). The questionnaire was designed for regular description of studying and learning approaches in students. The questionnaire measures 3 key approaches, each composed of a number of subscales. The key approaches and subscales are:

1) Profound learning approach: This approach is composed of 4 subscales, the measurement of which was done by 4 items:

a) Seeking for meaning: items 4, 30, 17, and 43
b) Linking ideas and meanings to each other: items 11, 21, 36, and 46
c) Using evidence and documents: items 9, 23, 36, and 49
d) Interests in course subjects: items 13, 26, 39, and 52.

2) Learning approaches: This approach includes 5 subscales, the measurement of which was done by 4 items:

a) Regular studying: items 1, 14, 27, and 40
b) Time management: items 5, 13, 18, and 44
c) Awareness towards expected learning homework assessment: items 2, 15, 28, and 41
d) Progress and success: items 10, 24, 37, and 50
e) Monitoring effectiveness: items 7, 20, 34, and 47

3) Smattering apathy approach: This approach includes 4 subscales, the measurement of which was done by 4 items:

a) Aimlessness: items 3, 16, 29 and 41
b) Memorizing meaningless and unrelated contexts: in this case the learner only performs routine memorization without understanding the relations and cognition of benefits of the content: items 6, 19, 32, and 45
c) Commitment to syllabus: items 12, 25, 38 and 51
d) Fear of failure: items 8, 22, 35, and 48.

Response to this scale is Yes /No and the more the score the more it indicates time management [15]. In a similar study, using Cronbach's alpha test, the stability was reported as 0.88, 0.87, 0.83, 0.83, 0.85, 0.85, 0.79, 0.86, 0.87, 0.85, 0.86, 0.82, 0.89 and 0.80 for: seeking for meaning, linking ideas, using evidence and documents, interest, regular studying, time management, awareness toward homework assessment, progress and success, monitoring effectiveness, aimlessness, rote memorization, commitment to syllabus, fear of failure, and time, respectively (19).

Confirmatory Factor Analysis; the principal components model was used in order to assess the validity of the scale, for which 0.9012 was obtained for the KMO index and 3092.93 (P = 0.0001) for 2X index in Kruit Barteld test, which suggested the adequacy of the sample population and the selected variables for factor analysis. Furthermore, Zaree (20) obtained 0.67 for stability index using halving method. In the present study, using Cronbach's alpha coefficient test, the stability index of the questionnaire was obtained as 0.84, 0.81, and 0.82 for profound learning, learning method, and smattering learning method, respectively.

C) Exam anxiety questionnaire: Exam anxiety exam was preliminarily proposed by Alpert and Haber in order to evaluate anxiety relevant to educational progress (21). The scale was a self-report tool composed of 19 phrases. Scoring was on a 4-option Likert Scale (22). Validity of the questionnaire was reported as 0.51 by correlating with exam anxiety scale (P = 0.001) and the stability was obtained as 0.80 and 0.81 through Cronbach's coefficient test and halving methods, respectively, which confirmed high stability for the questionnaire.

In another study conducted by Yazdani (23), the questionnaire stability coefficient was reported as 0.87 using Cronbach's alpha coefficient method.

Dada was analyzed via regression analysis and data correlation techniques after collecting data, using SPSS 20 software.

Research limitations were:

A: Early ending of the educational year made the study trend and the process of completing questionnaires limited in time

B: Some questionnaires were incomplete in some cases, which were completed via further referral to the high schools and arrangements with the school officials.

4. Results

The study findings are presented in 2 parts; descriptive findings and inferential hypothesis findings:

a) Descriptive Findings:

The study findings include mean scores, standard deviation, and number of subjects for all the studied variables, which are available in Table 1. As it can be observed from Table 1, mean and SD values obtained were 11.89 and 2.13 for positive meta cognitive beliefs toward anxiety, 12.10 and 2.99 for low cognitive confidence, 9.98 and 1.45 for cognitive self-consciousness uncontrollability and risk, 9.35 and 1.06 for need to control thinking, 11.85 and 1.46 for learning method, 2.95 and 9.85 for smattering learning method, 13.24 and 1.11 for profound learning method, and 38.10 and 1.76 for exam anxiety.

According to Table 1, mean scores and SD values were 11.02 and 1.12 in females and 8.13 and 1.42 in males for positive meta cognitive beliefs toward anxiety, 12.02 and 1.08 in females and 8.05 and 1.16 in males for low cognitive confidence, 11.10 and 1.13 in females and 7.11 and 1.09 in males for uncontrollability and risks, 11.07 and 10.01 in females and 8.25 and 1.35 in males for cognitive self-consciousness, 7.42 and 1.55 in females and 11.07 and 1.10 in males for need to control thinking, 7.42 and 1.55 in females and 11.07 and 1.10 in males for learning method, 15.25 and 0.87 in females and 15.16 and 1.02 in males for smattering learning method, 9.68 and 1.88 in females and 10.89 and 1.91 in males for profound learning method, and 39.13 and 1.08 in females and 38.25 and 1.44 in males for exam anxiety.

b) Lnferential Findings Relevant to the Sstudy Hypotheses:

Pearson simple correlative coefficient test, step by step multi variable regression and variance analysis were used to evaluate the first hypothesis of the study.

1) H1: Meta cognitive beliefs influenced test anxiety in students. As it can be observed from Table 2, correlation coefficient between positive beliefs and exam anxiety obtained r = 0.52 and r = 0.54 for low cognitive confidence and exam anxiety, r = 0.59 for uncontrollability and exam anxiety, r = 50 for cognitive self-consciousness and exam anxiety, and r = 0.55 for need to control thinking and exam anxiety (P = 0.001 for all coefficients). In other words, there is a positive significant relationship between meta-cognitive beliefs and exam anxiety. Therefore the first Hypothesis is confirmed.

2) H2: Learning methods influence exam anxiety in students. As it is depicted in Table 2, the correlation coefficient was obtained as r = -0.27 for learning method and exam anxiety in students, and r = -0.29 and r = 0.50 (P = 0.001) for profound and smattering learning methods and exam anxiety, respectively. In other words, there is a significant negative relationship between learning and profound learning method and exam anxiety in students and a positive significant relationship between smattering learning method and exam anxiety in students.

Correlation coefficients between exam anxiety by:

a) Meta cognitive belief parameters were as follows: positive beliefs on anxiety was 0.52, low cognitive confidence was 0.5, uncontrollability was 0.59, cognitive self-consciousness was 0.5, and need to control thinking was 0.55.

b) Learning method parameters were as follows: learning method was -0.27, profound learning was -0.29, and smattering learning was 0.52. Significance level in all was 0.001.

3) H3: Meta-cognitive beliefs and learning methods could predict exam anxiety in students: As shown in Table 3, according to the results obtained from step by step regression analysis, low cognitive confidence ($\beta = 0.68$), cognitive self-consciousness ($\beta = 0.52$), uncontrollability ($\beta = 0.40$), positive belief on anxiety ($\beta = 0.41$) and need to control thinking ($\beta = 0.37$) among meta cognitive beliefs variables, and smattering learning method ($\beta = 0.35$) among the 3 learning methods could predict exam anxiety in students from which low cognitive confidence was the most efficient predictor for exam anxiety in students (largest β value). Multiple correlation coefficient obtained MR = 0.58 and the determinant coefficient was RS = 0.34. The determinant coefficient showed that 34% of the exam anxiety variance was interpretable using meta-cognitive beliefs and smattering learning method variables.

4) H4: Meta-cognitive beliefs, learning methods, and exam anxiety were different between female and male students. Before analyzing H4 data, they were evaluated to ensure that the study data met principal assumptions of multi variable variance analysis. To do this, variance homogeneity assumptions were assessed. Levin test was used to consider equality of the study variable variances, the results of which are presented in Table 4. Levin test was not meaningful for meta-cognitive beliefs, learning methods, and exam anxiety. Therefore, variances of the 2 groups (female and male students) were not significant for meta-cognitive beliefs, learning methods, and exam anxiety. As a result, variances in homogeneity hypothesis were approved and 0 was confirmed for the score variance equality of all the study variables in the 2 groups. This means that the assumption of score variance equality is confirmed for the 2 groups.

5) H5: Multi variable variance analysis results (MANOVA) for meta-cognitive beliefs, learning methods, and exam anxiety in female and male students. Significance levels of all tests suggest that there was a significant difference between females and males for at least 1 dependent variable (meta-cognitive beliefs, learning methods, and exam anxiety) (P < 0.001 and F= 120.65).

Multi-variance analysis results (MANOVA) for meta-cognitive beliefs, learning methods, and exam anxiety in female and male students showed that the value for Pil-

Table 1. Mean and Standard Deviation Scores of Meta-Cognitive Beliefs, Learning Methods and Exam Anxiety in High School Students

Statistical Indices of Variables			Mean and SD Scores	Gender	Meanand SD Scores
Predictor variables	Meta cognitive beliefs	Positive on anxiety beliefs	11.89 ± 2.13	Female	11.02 ± 1.12
				Male	1.42 ± 8.13
		Low cognitive confidence	12.10 ± 2.99	Female	12.02 ± 1.08
				Male	8.05 ± 1.16
		Uncontrollability and risk	9.35 ± 1.06	Female	11.10 ± 1.13
				Male	1.09 ± 7.11
		Cognitive self-consciousness	9.98 ± 1.45	Female	11.07 ± 1.1
				Male	1.35 ± 8.25
		Need to control thinking	11.85 ± 1.46	Female	7.42 ± 1.55
				Male	1.1 ± 11.07
	Learning methods	Learning method	14.38 ± 1.78	Female	15.25 ± 0.78
				Male	1.02 ± 15.16
		Smattering method	9.85 ± 2.95	Female	9.68 ± 1.88
				Male	1.91 ± 10.89
		Profound method	13.24 ± 1.11	Female	14.46 ± 1.75
				Male	77.0 ± 15.25
Standard variable	Exam anxiety	Exam anxiety		Female	39.13 ± 1.08
				Male	38.25 ± 1.44

lai effect test was 0.79, for Wilks Lambda test was 0.11, for Hotling effect test was 16.68, and for Biggest root square test was 16.68 (DF assumption = 4, DF error = 344, F = 120.65, P = 0.001, and statistical power = 1).

In order to specify the differences, ANOVA test was conducted for MANOVA context, the data of which is presented in Table 4. The statistical power was 1, i.e. second type error was impossible to occur.

According to Table 4, one could realize that there was a significant difference between females and males in their positive beliefs toward anxiety (F = 97.3 and P < 0.001), low cognitive confidence (F = 85.87 and P < 0.001), uncontrollability and risk (F = 101.91 and P < 0.001), cognitive self-consciousness (F = 110.83 and P < 0.001), and need to control thinking (F = 90.32 and P < 0.001). In other words, given the mean scores of Tables 2 - 4, female students had greater positive intentions toward anxiety, low cognitive confidence, uncontrollability and risk, cognitive self-consciousness, need to control thinking and in general, meta cognitive beliefs in comparison with male students, however, there was no significant difference in learning method and exam anxiety between female and male students regarding the study expected level (0.05).

5. Discussion

This study aimed at discussing the impacts of meta-cognitive beliefs and learning methods on exam anxiety among high school students of Bandar Abbas. According to the study results, there was a positive significant relationship between meta cognitive beliefs and exam anxiety in students, which was in accordance with the study of Mehdipoor indicating that meta-cognitive beliefs significantly influenced exam anxiety in students (24), and the study of Harington discussing variables such as positive beliefs on anxiety, uncontrollability and risk, low cognitive confidence, need to control thinking and cognitive self-consciousness, which had a direct significant relationship with exam anxiety (25).

Moreover, the obtained results revealed that positive meta-cognitive beliefs about anxiety, uncontrollability and risk, low cognitive confidence, need to control thinking, and cognitive self-consciousness showed a positive significant relationship with exam anxiety among students. It should be noted that negative characteristics of meta-cognitive beliefs could lead to anxiety and accordingly weak educational performance and psychiatric harms in students, who were potentially active in their educational systems. According to Whales meta-cognitive model, meta-

Table 2. Prediction of Exam Anxiety Using Meta-Cognitive Beliefs and Learning Methods

Step	Standard variable	Predicting variable	B	β	P	t	R^2	MR	F	P
First		Low cognitive confidence	0.63	0.66	0.001	2.78	0.26	0.52	157.37	0.001
Second		Cognitive self-consciousness	0.59	0.59	0.001	2.11	0.28	0.53	135.23	0.001
		Low cognitive confidence	0.64	0.65	0.001	2.35				
Third		Uncontrollability	0.48	0.47	0.001	2.82	0.32	0.57	128.81	0.001
		Cognitive self-consciousness	0.58	0.59	0.001	2.30				
		Low cognitive confidence	0.65	0.67	0.001	2.36				
Fourth		Positive belief on anxiety	0.46	0.41	0.001					
		Uncontrollability	0.51	0.43	0.001					
		Cognitive self-consciousness	0.62	0.58	0.001	2.42	0.31	0.56	110.63	0.001
		Low cognitive confidence	0.66	0.71	0.001					
Fifth	Exam anxiety	Need to control thinking	0.43	0.38	0.001					
		Positive belief on anxiety	0.47	0.41	0.001					
		Uncontrollability	0.51	0.42	0.001	2.05	0.35	0.57	103.26	0.001
		Cognitive self-consciousness	0.62	0.53	0.001					
		Low cognitive confidence	0.67	0.68	0.001					
Sixth		Smattering	0.42	0.35	0.001	1.03				
		learning method	0.44	0.37	0.001	1.13				
		Need to control thinking	0.48	0.41	0.001	1.21				
		Uncontrollability	0.52	0.40	0.001	1.23	0.43	0.58	97.36	0.001
		Cognitive self-consciousness	0.63	0.52	0.001	1.29				
		Low cognitive confidence	0.68	0.68	0.001	1.73				

Table 3. Levin Exam Results for Score Variance Equality Assumption of the Study Variables in the Two Groups

Variable	F	First Degree of Freedom	Second Degree of Freedom	P
Positive beliefs about anxiety	1.53	1	348	0.31
Low cognitive confidence	0.92	1	348	0.78
Uncontrollability and risk	1.08	1	348	0.35
Cognitive self consciousness	1.97	1	348	0.44
Need to control thinking	1.42	1	348	1.68
Learning method	1.38	1	348	0.52
Profound learning method	1.23	1	348	0.54
Smattering learning method	1.57	1	348	1.37
Exam anxiety	1.68	1	348	1.63

cognitive beliefs could predict negative emotions experiences, such as anxiety and depression and also could develop and endure different types of anxiety (26).

Meta-cognitive beliefs caused worries whenever a stu-

dent represented negative self-evaluations, which could eventually lead to mental disorders or inefficiency during education. Meta-cognitive beliefs could also cause negative emotion experiences such as anxiety and depres-

Table 4. Analysis of Variance Obtained Results in Multi-Variante Analysis of Variance (MANOVA) Analysis of Mean Scores of Meta-Cognitive Beliefs, Learning, and Exam Anxiety in Female and Male Students

Variables	Sum of Squares	Degree of Freedom	Mean of Squares	F	P
Positive beliefs on anxiety	308.15	1	308.15	97.03	0.001
Low cognitive confidence	552.73	1	552.73	85.87	0.001
Uncontrollability and risk	296.81	1	296.81	101.91	0.001
Cognitive self-consciousness	13417.20	1	13417.20	110.83	0.001
Need to control thinking	3921.51	1	3921.51	90.32	0.001
Learning method	39.25	1	39.25	21.38	0.001
Profound learning method	51.44	1	51.44	18.32	0.001
Smattering learning method	44.33	1	44.33	21.01	0.001
Exam anxiety	61.32	1	61.32	14.02	0.001

sion and the students probably believed they experienced memory loss, so could not get along with difficult conditions and had negative beliefs.

The assumption outputs were in accordance with the study of Weem suggesting that there was a positive relationship between smattering learning and exam anxiety in high school students and profound learning and emotional balance revealed a negative significant relationship with exam anxiety in students [26]. Pier also indicated that there was a direct significant relationship between smattering learning method and exam anxiety, however, there was a negative relationship between profound learning and exam anxiety [27].

In verifying the obtained results of the study, it should be noted that regardless of their gender, students of today's schools attempt to use an appropriate learning method for their progress and development once they face emotional and educational mental pressures and both females and males experience relatively equivalent exam anxiety levels relating to their progress owing to the expectations of their schools and families.

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Footnotes

Authors' Contribution: Ghazal Motazedi Keyvani, study concept and design, analysis and interpretation of data, and critical revision of the manuscript for important intellectual content; Asghar Mousavi, acquisition of data

and statistical analysis; Yusef Dehghani, drafting of the manuscript.

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