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Research Article

THE RELATION BETWEEN EMOTIONAL SELF-EFFICACY AND META-COGNITIVE BELIEVES WITH STATISTICAL ANXIETY

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ABSTRACT

This study aims at studying the relationship among emotional self-efficacy and meta-cognitive believes with statistical anxiety in university students. The sample of study consists of 320 students of Tehran university (male: 85; female: 235), whom have been selected via random selection. Assessment instruments were Emotional Self-Efficacy Scale (ESES; Beverley & colleagues, 2008), Meta-Cognitions Questionnaire (MCQ-30; Wells & Cartwright, 2001) and Statistical Anxiety Scale (Cruise & colleagues, 1985). The data were analyzed using mean, standard deviation, Pearson correlation coefficient, and stepwise regression. The results showed that there is a negative and significant relation between emotional self efficacy and statistical anxiety; while there is a negative and significant relation between meta-cognitive believes and its 4 subscales (P= 0/01). There wasn't any relation between positive believes about worry and statistical anxiety (P= 0/01). Results of stepwise regression indicated that uncontrollability and danger, and cognitive awareness predicted 21 percent of statistical anxiety variance.

***Keywords**: Emotional Self- Efficacy, Meta-Cognitive Believes, Statistical Anxiety*

INTRODUCTION

As part of human's daily life, anyone has anxiety. In general, anxiety is physiological and psychological arousal, a conscious perception of panic, aversion, fear and tension in a given situation (Lakas *et al.*, 2005). While studying anxiety in educational environments, it's clear and vivid results can be seen on learning and education. For example, anxiety is one the most important motivational variables which has considerable effects on educational progress and performance, attention, concentration and data recall (Shunk *et al.*, 2000; Sizic and Barrage, 2006; Bembenutty, 2008). One of the main situational anxieties which is related to education, is statistical anxiety (which is considered as a stress provoking phenomenon). Wang *et al.*, (2009) considered statistical anxiety as a situational anxiety, and that's because this happens in a situation in which a student is learning new concepts and statistical usage in a special context. Some of the previous studies indicated that the majority of students experience high levels of statistical anxiety-while facing concepts, subjects and evaluations related to statistics (Anoyabazi and Rally, 1999; Balaglu, 2003).

In recent theories on anxiety disorders, meta-cognitive constructs has a special place (Wells *et al.*, 2004; Wells, 2009). According to Flavell (1988) meta-cognition is a concept which refers to an individual's information and awareness about his/her own cognitive system. Meta-cognition is a person's awareness and knowledge about his cognition and thoughts; additionally, it refers to the person's knowledge to use effective cognitive strategies based on different situations (Sterling *et al.*, 2004). Meta-cognition is a form of cognition which control and supervise cognitive procedures (Cacak and Bouyaci, 2010). Meta-cognition helps learners to expand their cognition and learning via evaluation, personal control and their enthusiasm; in order to be an active member of educational context (Wang *et al.*, 2009). Results of some

experimental studies indicated that teaching deep learning strategies and self regulation can reduce disruptive and negative effects of anxiety (Perry, 2004; Shuts and Davis, 2000; Lafmina, 2004; Bembenutty, 2008).

Spada *et al.,* (2009) find the relation between meta-cognition and statistical anxiety. The sample encompassed 142 students. Results indicated that some dimensions of meta-cognition (negative believes about uncontrollability thoughts and danger; cognitive trust and believes about need for control) have positive relations with statistical anxiety. However, there is a negative relation between meta-cognition and statistical anxiety. Zimenesc *et al.,* (2009) studied meta-cognitive roles to cope with special situations such as statistical anxiety. The sample consisted of 445 (182 male and 263 female) students. Results of analysis of regression indicated that negative cognitive variables such as individual's believes about uncontrollability, danger presence, lack of motivation, enthusiasm and different automatic thoughts are the best descriptions of student's statistical anxiety.

Even with these large numbers of studies on anxiety, few studies have examined the roles of emotional strategies such as emotional self- efficacy on reducing, increasing and moderating situational anxieties such as statistical anxiety. Cognitive theories believe that no event can be considered as the mere cause of anxiety, but individual's interpretations of these situations cause anxiety. Self- efficacy refers to individual's belief about his ability to behave and act to obtain their desired results (Bandura, 1997). Since self- efficacy is a main predictor of performance in a special domain; self- efficacy on emotional performances can affect main emotional procedures and can be effective on results of adaptive and non-adaptive emotional performances (Beverley *et al.,* 2008). While Myer believes that emotional intelligence is the best receiver as a potential; Petrides and Furnham (2003) claimed that emotional intelligence can be perceived as a characteristic or a typical performance. Petrides and Furnham (2003); Petrides *et al.,* (2006) named this emotional intelligence as emotional self- efficacy. Emotional self- efficacy refers to sets of behavioral readiness and individual's preferences in recognition, processing and organizing emotional information. Emotional self- efficacy roots in concepts such as Thurndick's social intelligence (1920), and Gardner's intra-personal intelligence (1983). In fact, it can be said that emotional self-efficacy is a part of emotional intelligence, or it can be considered as characteristic implication versus potential based implication of emotional intelligence.

Jawin and Dawson (2009) studied the relationship between statistical anxiety and self- regulatory strategies among 232 students. The results indicated that all these strategies have negative and significant relations with statistical anxiety. Kapaidin (2009) studied this research question that: to what extent high school students' emotions (especially exam anxiety) can be predicted via emotional intelligence and its components. His sample consists of 1055 students. Results of analysis of regression indicated that components of emotional intelligence can significantly predict statistical anxiety. So the results proved that emotional intelligence have negative and significant relation with statistical anxiety.

Based on existent findings, because of its multi dimensional nature and effects, emotional intelligence is a powerful predictor of psychological adaptation and anxiety. It is predicted that emotional self efficacy (as a part of emotional intelligence) has a relation with students' statistical anxiety. So the present study was conducted to study the relation between emotional self- efficacy and meta- cognitive believes with students' statistical anxiety.

MATERIALS AND METHODS

Society, sample and sampling method:

The society of this research includes all BA and MA students of Tehran University during 2010-2011. The sample includes 320 university students (85 male and 235 female), whom were selected via random stratified selection. After obtaining participants' approvals for participating in this research, they were asked to answer to statistical anxiety scale (Cruise & colleagues, 1985); emotional self-efficacy scale (ESES; Beverley & colleagues, 2008); and Meta-Cognitive believes Questionnaire (MCQ-30; Wells & Cartwright, 2001). The mean score and standard deviation score of participants' ages (for all of them) were respectively 24/09 and 3/02; the mean score and standard deviation score for male participants were

respectively 24/88 and 2/81; while these indices for female participants were respectively 23/30 and 3/23. This study is a descriptive and correlation study. In order to analyze the results statistical indices such as mean score, standard deviation, correlation co-efficient and stepwise analysis of regression were used.

Instruments:

Statistical Anxiety by Cruise et al., (1985):

In order to assess participants' statistical anxiety levels, statistical anxiety scale was used. Statistical anxiety scale has 51 items which have been designed using Likert format with 5 degrees. This scale has been designed by Cruise and Wilkins (1980). At 1985, they divided this scale into two different parts. The first part consists of 23 items and is related to statistical anxiety (started from 1=no anxiety, to 5=too much anxiety); while the second part consists of 28 item and is related to engagement in statistical subjects (started from 1= completely agreed, to 5=completely disagreed). Statistical anxiety has 6 sub-scales which are: statistics-value, interpretation-anxiety, exam-anxiety and class anxiety, statistical self-concept, fear of support-seeking and fear of statistics-teacher. High score on any of these sub-scales indicates that statistical anxiety is high and vice versa. Total score of statistical anxiety is obtained from the sum of all the sub-scales' scores. In order to determine validity of the scale, confirmatory factor analysis was used. Results of goodness of feet indices for these sub-scales indicated a fine fitness of conceptual model with the experimental model, so it approves validity of statistical anxiety scale (Cruise *et al*.). In order to determine the reliability of the scale, α-Kronbach method was used. According to the results of Cruise *et al.*, (1985) reliability coefficient for sub-scales are: statistics-value (0/94), interpretation-anxiety (0/87), exam-anxiety and class anxiety (0/68), statistical self-concept (0/88), fear of support-seeking (0/89) and fear of statistics-teacher (0/80). In this study internal-consistency coefficients of subscales were determined via α-Kronbach method: statistics-value (0/84), interpretation-anxiety (0/81), exam-anxiety and class anxiety (0/72), statistical self-concept (0/90), fear of support-seeking (0/68) and fear of statistics-teacher (0/70).

Emotional Self-Efficacy Scale (ESES):

This scale which has been devised by Beverley *et al.*, (2008), consists of 32 items. This has been devised according to 4-dimensional model of emotional intelligence by Salovay and Mayer (1997). Questions are devised based on a 5-degree Likert scale (started from 1=totally disagreed, to 5=totally agreed). Internal consistency of exam items is reported based on α-Kronbach (0/96). Reliability score for re-testing in a sample with 27 participants-within two weeks- is 0/85 (Beverely *et al.*, 2008). The validity of self-efficacy scale was measured using its correlation with correlated scales, and it was reported acceptable (Beverely *et al.*, 2008). First, this was translated by experts and then three experts in English Literature revised it. At last, its Persian version was devised and prepared. In the present study, re-test reliability of emotional self-efficacy is 0/74 (during two weeks administration); and internal consistency of the scale based on α-Kronbach is 0/83. Factor analysis indicated the uni-dimensional structure of emotional self-efficacy scale.

Meta-Cognitions Questionnaire (MCQ-30):

This scale was devised by Wells and Cartwright (2001); and consists of 30 questions which measures individuals' believes about their thoughts. The questions are devised using a 4-degree Likert scale (starting from 1=totally disagreed to 5=totally agreed). Meta-cognitions scale measures 5 sub-scales of meta-cognitive domains: 1-positive believes about worry (e.g. worry helps me come along with my problems); 2-negative believes about worry which are related to uncontrollability and danger (e.g. when my worry begins I can't stop it); 3-low cognitive assurance (e.g. I have a week memory); 4-need for control of thought (e.g. inability to control my thoughts is because of my weakness); 5- cognitive self-awareness (e.g. I closely care about how I think). Total Internal validity of scale in an Iranian sample (using α-Kronbach) is 0/91. Internal validity for sub-scales are: uncontrollability (0/87); positive thoughts (0/86); cognitive self-awareness (0/81), cognitive assurance (0/80); and for need for thought control is 0/71. Re-test reliability of scale within 4 weeks period for the scale is 0/73 and for its sub-scales is in the range of 0/59 to 0/83. Correlation of scale with trait anxiety scale is 0/43 and correlation of its sub-scales is in the range of 0/28 to 0/68 (Shirin Zadeh *et al.*, 2008). In the present study internal consistency of

scale was measured using α-Kronbach. The observed internal consistency for the scale is 0/80 and for the sub-scales (uncontrollability, positive thoughts, cognitive self-awareness, cognitive assurance, and need for thought control) is respectively: 0/83, 0/77, 0/86, 0/71 and 0/91.

***Findings*:**

Table-1 indicates participants' statistical indices based on their scores on emotional self-efficacy, meta-cognitions and its dimensions, and statistical anxiety scales (separately for male and female participants).

Table 1: Mean and standard deviation scores for emotional self-efficacy, meta-cognition and its sub-scales and statistics anxiety

Gender	**male**		**female**		**total**	
Variable index	mean	SD	mean	SD	mean	SD
Emotional self-efficacy	94/83	14/78	77/45	12/88	86/14	13/84
Meta-cognition(total)	73/16	13/17	61/68	12/51	67/42	12/84
Positive believes about worry	12/25	4/78	13/17	4/16	12/71	4/47
Uncontrollability and danger	13/22	6/32	11/94	4/98	12/58	5/65
Weak cognitive assurance	11/17	4/72	12/43	4/94	11/80	4/83
Need for thought control	16/32	4/94	15/86	5/76	16/09	5/35
Cognitive self-awareness	15/57	4/37	14/73	3/89	15/15	4/13
Statistical anxiety(total)	125/24	20/71	138/26	17/85	131/75	19/28

Results of correlation test among research variables have been reported in table 2. According to this table, emotional self-efficacy has a significant and negative correlation with statistical anxiety (P<0/01). There are significant and negative correlations among meta-cognitions and its 4 sub-scales with statistical anxiety (P<0/01). There was only no correlation between positive believes about worry with statistical anxiety (P<0/01).

Table 2: Correlation matrix for research variables

Variables	1	2	3	4	5	6	7	8
Emotional self-efficacy	1							
Meta-cognitive believes(total)	0/37*	1						
Positive believes about worry	0/46**	0/60**	1					
Uncontrollability and danger	031*	0/67**	0/11	1				
Weak cognitive assurance	0/51**	0/49**	0/19*	0/21*	1			
Need for thought control	0/42**	0/61**	0/17	0/08	0/12	1		
Cognitive self awareness	0/47**	0/51**	0/25**	0/30**	0/28**	0/11	1	
Statistical anxiety(total)	-0/39**	-0/32**	-0/15	-0/41**	-0/27**	-0/43**	-0/37**	1

The results of tables 3, 4 indicates that the best predictive variables are statistical anxiety, uncontrollability and danger, and cognitive awareness; while emotional self-efficacy, meta-cognitive

believes (total), positive believes about worry, weak cognitive assurance and need for thought control were omitted from regression equation. According to these results, the observed F score is significant (P<0/01) and predicts about 21 percent of statistical anxiety variable variance by uncontrollability and danger and cognitive awareness variables. Regression coefficients for predicting variables indicate that uncontrollability and danger (t = 5/49, β = -0/427), and cognitive awareness (t = 3/84, β = -0/171), can significantly explain statistical anxiety variance.

Table 3: Summary of stepwise regression mode and analysis of variance for emotional self-efficacy and meta-cognition and its dimension on statistical anxiety

Model	Variable	Index	SS	df	MS	F	P	R	R2
1	Uncontrollability and danger	Regression Residual	7842/45 28336/65	1 318	7842/45 89/11	88/01	0/001	-0/41	0/17
2	Uncontrollability –danger and cognitive awareness	Regression residual	9578/75 26600/35	2 317	4789/38 83/91	57/07	0/001	-0/46	0/21

Table 4: Summary of stepwise regression mode and analysis of variance for emotional self-efficacy and meta-cognition and its dimension on statistical anxiety

Index Variable	B	SE	β	t	P
Uncontrollability and danger	-23/45	0/22	-0/427	5/49	0/001
Cognitive self-awareness	-3/38	0/19	-0/171	3/84	0/023

DISCUSSION

This study aims at studying the relation among emotional self-efficacy and meta-cognitive believes with statistical anxiety in university students and predictability of statistical anxiety through these variables. Results of correlation test indicated that there is a negative and significant relation between emotional self-efficacy and statistical anxiety (P=0/01). It means, the more students are emotional self- efficient or have higher emotional intelligences, the less statistical anxiety they experience. This finding is in the line with the results of Elias *et al.*, (1999), which indicate a significant relation between emotional intelligence and psychological adaptation; and Moreira and Elior (2008) which indicate the relation between emotional intelligence and cognitive evaluation of stress provoking events. They understood that higher emotional intelligence is related to self-efficacy feeling, better coping with stress provoking events and evaluating stress provoking events as a challenge rather than a threat. Experimental results indicate that failure in emotional management (increase of anxiety and dysfunctional stress) is the direct result of low self-efficacy belief. People, who don't have faith in their own abilities, become helpless and frustrated in stress provoking settings. These people fear direct facing with challenging problems and consequently their performance fall, which in turn increase uselessness feeling. So that in a stress provoking situation, the one with higher emotional intelligence can control his emotions and more efficiently cope with his/her problems. Maybe that's why some of researchers have distinguished two different types of emotional intelligences (Petrides *et al.*, 2004). Emotional intelligence as a personality characteristic and emotional intelligence as a cognitive ability. Low trait emotional intelligence (emotional self-efficacy), can be the key element of any anti-social behaviors and deficient in emotion regulation. Meanwhile, the higher trait emotional intelligence is (emotional self-efficacy), the better coping with and performance in stress provoking situations such as statistical anxiety; vividly they experience lower levels of anxiety.

Findings of correlation coefficient test indicated that there is significant and negative relation among meta-cognitive believes and its sub-scales with statistical anxiety (P=0/01). In the other words, students

with more meta-cognitive believes, have less statistical anxiety; while those students with disrupted meta-cognitive believes, experience more statistical anxiety. This finding is in the line with the findings of Tobias (1985); Luna and Sherry (2004); Zidner *et al.,* (2006); Schunk *et al.,* (2008); Jain and Dawson (2009); Lafmina (2004); Voslu *et al.,* (2009). In the line with Dweck's and Legette's perspective (1998), this finding claims that students with mastery goals and meta-cognitive perspectives, value learning and compare themselves with social criteria(such as scores and social privileges) less than the others. So they experience less anxiety and have better self-regulation. Studies have indicated that meta-cognitive believes are underlying causes of developmental and psychological disturbances, such as anxiety (specifically statistical anxiety). These findings can afford some evidences for effects of meta-cognitive believe on statistical anxiety.

On the matter of predictability of statistical anxiety via emotional self-efficacy and meta-cognitive believes, stepwise regression test indicated that between emotional self-efficacy and meta-cognitive believes and its sub-scales, uncontrollability and danger, and cognitive awareness could explain 21 percent of statistical anxiety variance. Uncontrollability and danger variable could explain 17 percent of this variance by itself; so that it is stronger than cognitive awareness. This finding- which approves the possibility of predicting anxiety via uncontrollability and danger and cognitive awareness- is in the line with the findings of Cartwright and Wells (1997); Spada *et al.,* (2006); Rassis and Wells (2006); Spada *et al.,* (2008); Bahrami and Rezvan (2007); Williams *et al.,* (2007); Sika *et al.,* (2008), and Cohen and Calamari (2004). Research findings of Spada *et al.,* indicated that negative believes about uncontrollability and danger is related to cognitive damage, obsessive thoughts and anxiety. Additionally, findings of Rassiss and Wells indicated that meta-cognitive negative believes about uncontrollability and danger has a positive and significant relation with stress continuity and an increase in anxiety level. A probable explanation for this finding is that in order to have a good performance, individuals' believes about uncontrollability of thoughts should be controlled. So existence of this meta-cognitive believes makes people to have less personal control and as a result their anxiety level increase. Meta-cognitive believes about uncontrollability and danger makes people doubt their abilities and capabilities, as a result their anxiety level increase. Findings of Cohen and Calamary indicated that cognitive self-awareness is related to anxiety and obsessive signs. Given the effects of meta-cognitive believes about uncontrollability and danger on individual's perceptions of his believes about ability to face anxiety provoking situation, these believes can increase the individuals' anxiety levels. While students are in a stress provoking situation, self awareness about their mental functions, pathways and results can reduce their anxiety.

Generally, these findings indicate that there is a negative and significant relation between emotional self-efficacy and statistical anxiety. Moreover, there is a negative and significant relation among meta-cognitive believes and its dimensions with statistical anxiety. Additionally, it is revealed that among emotional self-efficacy, meta-cognitive believes and its dimensions; uncontrollability and danger and cognitive awareness can only explain statistical anxiety. According to the obtained findings, we can distinct two types of theoretical and functional results. At functional level, preparing educational plans related to emotional self-efficacy and meta-cognitive believes can clarify the relation between this construct with situational anxieties (especially statistical anxiety), and as a result reduce this kind of anxiety. Given the positive relation between meta-cognitive believes and statistical anxiety, students can be thought to change their meta-cognitive believes and have better mental health; and as a result their educational and vocational performance increase significantly. Preparing these plans can aware students of their knowledge about their knowledge and believes and additionally help them recognize, process and organize their emotional information. At theoretical level, the relation between emotional self-efficacy and statistical anxiety has not been considered sufficiently; so this study can attract researchers' attention to these variables. The present study has only studied the relation among emotional self-efficacy and meta- cognitive believes with statistical anxiety. So administering studies about variables which effect statistical anxiety can be helpful. In order to make a better judgment about these findings and their distributions, administering more comprehensive studies in wider samples is recommended. For example

it is suggested that to measure the relation between statistical anxiety and deterministic thinking among students (Younesi & Mirafzal, 2013; Younesi *et al.*, 2014) because this type of thinking has negative effects on some performances in computer's games (Bagheri *et al.*, 2011). Moreover deterministic thinking has significant relation with pathologic defense mechanisms in students (Younesi *et al.*, 2014).

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