The Study of Mediating Effects of Cognitive Factors on Links between Behavioral Inhibition and Social Anxiety

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The aim of this study was to investigate the interactional relationship between behavioral inhibition and cognitive factors in the development of social anxiety symptoms. This study has been done in a cross-sectional comparative framework. A sample of 408 students who were selected by the arbitrary sampling method completed the following questionnaires: Social Phobia Inventory, Behavioral Inhibition Scales, Focus Attention Questionnaire, and Consequences of Negative Social Events Questionnaire. Data were analyzed using the Lisrel software and the path analysis method. Results showed a correlation between each pair of the variables (p < 0/05). Behavioral inhibition and cognitive factors had significant effects on developing social anxiety. Also, the causal model that behavioral inhibition, mediated by cognitive factors, creates social anxiety is confirmed. These results may be used as a tool for screening and predicting the social anxiety in students. According to the meditating effect of the cognitive factors between the behavioral inhibition and the social anxiety, we can use this knowledge for prevention and treatment of social anxiety.

Keywords: mediating effects, cognitive factors, behavioral inhibition, social anxiety, path analysis

Social anxiety is a disorder characterized by excessive fear and anxiety in response to one or more social or performance situations (American Psychiatric Association, Diagnostic and Statistical Manual of Mental Disorders, Text Revision [DSM-IV-TR], 2000). People with Social anxiety experience severe disruption in their lives as a result of the disorder, particularly in the domains of career, academic, and interpersonal functioning (DSM-IV-TR, 2000). People with social anxiety usually avoid participating or attending social and functional situations or tolerate such situations with great anxiety (Rheingold, Herbert and Franklin, 2003). Recent prevalence estimates indicate that approximately 7–13% of the population in Western societies will meet diagnostic criteria for SP at some point during their lifetimes (Furmark, 2002). Obviously the prevalence of nonclinical and types of social anxiety in the general population is far more. Social anxiety, either clinical or nonclinical types, has many negative effects on the educational, occupational and relational functions of the individual. Therefore, special considerations have been made on its etiology and treatment. While, substantial progress has been made in our understanding of the maintenance factors associated with SP, far less progress has been made in our understanding of how SP develops (Rapee & Spence, 2004). In general, our knowledge about the pathology and etiology of Social anxiety disorder will be very useful in the prevention and treatment of it.

Many theoretical models have been presented about the psychopathology of social anxiety and each of them has focused on a specific aspect of this disorder. Cognitive models are mainly focused on the persistence of the social anxiety disorder and rarely proceed to the manner of its pathogenesis. The majority of these models are focused on proximal affects (present affects) like bias in judgment and memory and social stimuli explanation (Ledley, Fresco and Heimberg, 2006). The main aspect of Mineka and Zinburg's model is that it is not just focused on the Social anxiety disorder. Mineka and Zinburg (2006) believe that their etiology model based on the concepts of modern learning theories, has

high explanation potency and is testable, and many researchers have tested the theories of this model and have supported it. Furthermore, although the main emphasis is on the etiology of the disorder, modern learning theories are widely used for its prevention and treatment. The Hoffman and Barlow and the Mineka and Zinbarg's models have both emphasized on the role of evolution. The Hoffman and Barlow's model follows the triple vulnerability theory (Barlow, 2002) and tries to coordinate between different researches. This model is a compilation of the main encounters in social anxiety psychopathology, which have been brought together carefully. It presents a clear explanation of behavioral, cognitive and biologic factors, and also considers the role of weak social skills in this disorder. Rapee and Spence's model is known for its integrity. This model is designed on the basis of dimensional approach in psychopathology, and intends to clarify the spectrum of social anxiety disorder, describing it as a continuum. It has also indicated the role of different factors especially cultural elements.

In the present study we intend to focus on different theories regarding the etiology of the social anxiety disorder, by focusing on the reinforcement sensitivity theory and its resulting model, i.e. the Kimbrel model, We will also discuss the pathology of this disorder in the Iranian population. Therefore, we will briefly elucidate the Kimbrel model here. Kimbrel (2008) believes his model on social anxiety disorder has the following characteristics: The proposed model is unique because it: (a) integrates a wide range of factors into a unified model of GSP, (b) incorporates recent updates to RST, (c) provides a potential explanation for the differences observed among social phobia subtypes, (d) considers the role of general stressors in the development of GSP, (e) provides a biologically-based framework for understanding the cognitive biases seen in GSP, and (f) predicts the conditions under which these cognitive biases are most likely to emerge. The Kimbrel model basically explains all risk factors according to the Reinforcement sensitivity theory. Among all other models, the Kimbrel model is unique in specificity. It tries to bring a

special explanation for the generalized type of social anxiety disorder; it also puts more emphasis on the protective factors. The role of the biological factors has been described more accurately and the new cognitive psychological studies have been added.

Temperament underlies social anxiety. This does not mean that temperament causes this disorder, but some of the temperamental patterns and the social anxiety disorder have the same functional mechanism. An important temperamental construct which has been studied the most in social anxiety is behavioral inhibition. Behavioral inhibition, a temperamental trait, is observed in infants and Young children characterized by behavioral withdrawal, decreased approach behavior, increased vigilance, and increased arousal in response to novel and unfamiliar situations (Kimbrel, 2008). Behavioral inhibition appears to be moderately heritable and moderately stable throughout childhood and early adolescence (Hirshfield-Becker, Biederman, & Rosenbaum, 2004). Moreover, behavioral inhibition appears to be a significant risk factor for the later development of SP (Kimbrel, 2008).

Bias and distortion in information processing, thoughts, attitudes, and beliefs related to social situations and functions, describe social anxiety. Studies show that these cognitive factors are even seen in children, and from the age of 8. Social anxiety forms before, during and after the time that the vicious cycle of negatively cognitive processing of social events starts, and results in anxiety and disturbed performance and the problem continues. Later avoidance and its negative consequences decrease the opportunity of cognitive growth and reinforce the belief that social events have specific outcomes. Cognitive models support the fact that special attention to the negative inputs, are effective in the social anxiety disorder. Different studies in this area have shown that people with social anxiety disorder pay more attention to negative or threatening information. Furthermore, they pay more attention to themselves and less attention to the neutral or positive information that disprove their negative beliefs (Hoffman and Barlow, 2002).

Most of the social information is vague. As a result of biased information processing, people with GSP are predicted to perceive (i.e., interpret) novel and ambiguous social situations as highly threatening. The end result of this powerful biasing process should be consistent fear and avoidance of actual or potentially threatening social situations. Additionally, over time, it is expected that people with GSP will come to develop negative beliefs, schemas, and expectancies concerning social situations and their ability to perform in them as a result of their chronically elevated perceptions of threat. Importantly, the proposed model provides a theoretical rationale for Hirsch and Clark's (2004) observation that memory biases among people with SP are most likely to occur following a social threat induction procedure. From the perspective of the proposed model, potentially threatening social situations should produce the most pronounced information processing biases as these situations often entail goal conflict and should result in the behavioral inhibition system entering into "control mode," which should lead to increased external scanning for threat cues as well as increased internal scanning for threat cues(Kimbrel, 2008).

According to the previous statements, the aim of the present research is to study the relation between behavioral inhibition (in adulthood and childhood), attention bias (focusing on self and the outside) and processing bias (negative self-appraisal and the perception of other people's negative appraisal. Next, We will evaluate the role and predictability of some of the temperamental and cognitive factors which predict social anxiety and finally the mediating effects of cognitive factors on links between behavioral inhibition and social anxiety.

Method

Some of the major indices which have been introduced in the Kimbrel method as predictors of social anxiety were assessed by research tools in the nonclinical population. We designed a cross-sectional comparative study. This study is a retrospective research, the social anxiety symptoms

are the dependent variable or a scale which other variables such as behavioral inhibition (in adulthood and childhood), attention bias (on self and the outside) and explanation bias (negative self appraisal and the perception of other people's negative appraisal) are its independent variables or its predictors. The project was approved by institutional ethical committee. The population that participated in this study consists of all the students studying in the Iran's universities in the years 2011-2012. Out of all these students, 408 participants were selected by the random sampling method and completed the questionnares of the study. All questionnares were translated into persianf, then backtranslated into Englisg language. Through the comparison of the two forms, we dicided on the final forms of the persian versions of the questionnares.

Measures

Social phobia inventory (SPIN). This scale was developed by Connor, et al. (2000) to assess social anxiety. It is a self report scale consisting of 17 items which contains three subscales of fear (6 items), avoidance (7 items) and physiological discomfort (4 items). Connor, et al. (2000) reported its internal consistency with the alpha method, between 0.82 and 0.94. Furthermore, the test-retest reliability coefficients were 0.78 to 0.82. Amoozadeh (2007) has reported the internal consistency with the alpha method; it was 0.82 for its first half, and 0.76 for its second half. Furthermore, the correlation between the two halves was 0.84. The alpha coefficients for each of the subscales are as follows: fear subscale, 0.74, avoidance subscale, 0.75, and physiological discomfort subscale, 0.75.

The retrospective scale of behavioral inhibition (RMBI). This scale is an 18-item scale which retrospectively assesses childhood (fewer than 13 years age) behavioral inhibition behaviors in adults (Goldstone & Parker, 2005). Myers, et al. (2012) reported that the internal consistency of this scale for the eighteen questions comprising AMBI total score, Kronbach's $\alpha=0.81$. The convergent validity of this scale was also found by

calculating it's correlation with the adult's behavioral inhibition index. This scale had a 0.55 correlation with the behavioral inhibition index of adults. Mohammadi (2007) reported the internal consistency of this scale in a nonclinical sample containing 400 people, 0.74. The reliability, tested by the test retest method, after two weeks in an 80 person sample was 0.71. The convergent validity of this scale was also found by calculating its correlation with the adult's behavioral inhibition index. This scale had a 0.55 correlation with the behavioral inhibition index of adults.

*The behavioral inhibition of adults' index (AMBI).*This scale is a 16-item scale which has been designed to assess the mental report of the present behavioral inhibition behaviors (Goldstone and Parker, 2005). Myers et al (2012) reported that the internal consistency of this scale for the sixteen questions comprising AMBI total score, Kronbach's α=0.84. The convergent validity of this scale was also found by calculating its correlation with the retrospective behavioral inhibition index. This scale has a 0.55 correlation with the retrospective behavioral inhibition index. Mohammadi (2007) reported the internal consistency of this scale to be .73 in a 400-person nonclinical sample.

The focus of attention questionnaire (FAQ). This questionnaire is designed to measure the focus of attention in social interactions in the people with social anxiety. This questionnaire has two subscales including self-focused attention and other-focused attention, each containing 5 items (Woody, Chambless and Glass, 1997). The participants answer the questionnaire items according to their previous social interactions. The Cronbach's alpha coefficient for the subscales of focus on self and focus on others were 0.76 and 0.72, respectively. The construct validity of this scale has been assessed by using the analysis of principal components, and its two components structure has been verified. The questionnaires reliability tested by using the internal consistency coefficient according to the Cronbach's alpha, for the self-focused attention and the other-focused attention subscales, the coefficients were .75 and .86, respectively (Khayyer, Ostovar, Latifiyan, Taghavi and Samani, 2008).

The consequences of negative social events questionnaire. This questionnaire was designed to explain the consequences of negative social events. In this questionnaire 16 negative social events were described in the four subscales of negative self appraisals, negative appraisals by others, short term and long term negative consequences of social events (Wilson and Rapee, 2005). Each of the scales has demonstrated high internal consistency (.95 for belief in negative appraisals by others, .97 for belief in negative self-appraisals, and .97 for belief in negative long-term consequences). In Iran, Ostovar (2007) used the two-scale form of this questionnaire and, by calculating the alpha, reported its reliability for the negative self-appraisal to be .89, and for the negative appraisal by others to be .90.

After completing the questionnaire, the data were collected and analyzed using the stepwise multiple regressions and the path analysis method by SPSS 16 and LISREL 8.51 softwares.

Results

The data collected by implementing the questionnaires were analyzed. The sample consisted of 408 university students, 96 percent single and 4 percent married. Females were 62 percent, and males were 38 percent. The average age was 23.41 with a standard deviation of 3.28, the mean and standard deviation of the scores of the participants on all the variables, that is, social anxiety, behavioral inhibition in adulthood, behavioral inhibition in childhood, self-focused attention, other-focused attention, negative self appraisal and the perception of other people's negative appraisal, are shown in Table 1.

Table 1

Means and Standard Deviations of the Variables

variables	Mean (SD)
Social Anxiety	21.69 (7.11)
Behavioral inhibition in adulthood	16.72 (5.23)
Behavioral inhibition in childhood	29.81 (5.48)
Self-focused attention	13.54 (4.67)
Other-focused attention	14.87 (6.89)
Negative self appraisal	23.19 (10.31)
Perception of other people's negative appraisal	33.43 (13.80)

The first goal of this research is to study the relation between temperamental factors (behavioral inhibition in adulthood and behavioral inhibition in childhood) and cognitive factors (self-focused attention, other-focused attention, negative self-appraisal and perception of other people's negative appraisal). The correlations between the pairs of variables are shown in Table 2. As revealed, all of the temperamental and cognitive variables of social anxiety have a significant and positive relation with each other.

The second and the main goal of this research are to study the causal and etiological model of social anxiety on the basis of temperamental and cognitive factors. Path analysis was applied to examine the etiological model described in the Kimbrel model, which has been derived from the reinforcement sensitivity theory. Because the two cognitive variables of other-focused attention and the perception of other people's negative appraisal had low weights in predicting social anxiety symptoms, they were deleted from the model and further analysis were done using the path analysis method. The path analysis method assesses whether the predicted relations between the variables match with the relations existing between the real data collected. If the two matrixes (the proposed matrix and the matrix of the real data) match, the proposed model will be a reliable explanation for the hypothetical relations (Meyers, Gamst, Guarino, 2006).

37

This study is to assess the variables making the Kimbrel model. This model claims that behavioral inhibition, as a primary and remote factor, is accompanied with the cognitive factors, causing social anxiety symptoms. The hypothetical causal model was assessed by the LISREL software version 8.51. This model was analyzed with six fit measures.

Table 2

Matrix of the Correlation between the Variables

variable	AMBI	RMBI	SFA	OFA	NSA	PONA	SA
AMBI	1						
RMBI	0.67**	1					
SFA	0.37*	0.34*	1				
OFA	0.36*	0.26*	0.57*	1			
NSA	0.39*	0.35*	0.55*	0.49*	1		
PONA	0.32*	0.29*	0.39*	0.62*	0.38*	1	
SA	0.61**	0.50*	0.45*	0.44*	0.45*	0.46*	1

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

AMBI= behavioral inhibition of adults' index, RMBI= retrospective scale of behavioral inhibition, SFA= self focused attention OFA= other focused attention, NSA= negative self assessment, PONA= perception of negative other perception, SA= social anxiety

Figure 1 shows the hypothetical causal relations between the temperamental behavioral inhibition factors and the cognitive factors (the self-focused attention and negative self-appraisal). The one-ended arrows present the regression coefficients and the two-ended arrows present the correlation between the variables.
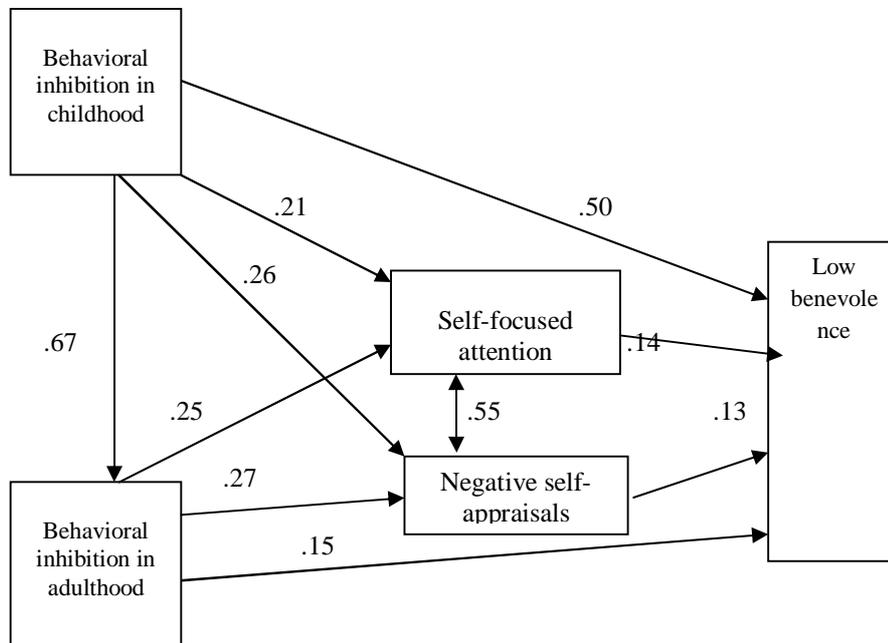
Figure 1. Structural Relations of Etiological Model of Social Anxiety

The results of the analysis done by the means of the six fitness indices confirm the hypothetical causal structure. The chi square and the root mean square error of approximation (RMSEA) are the absolute fit measures. The chi square statistics were performed in order to examine the difference between the predicted relations and the observed relations (correlations and covariance). Because the researcher predicts the fitness or similarity (and not the difference), the insignificant chi square is ideal. The chi square is a powerful test. The more the sample size, the more potent the test will get and the chi square statics will have significant statistics even though the model is logically accepted. Therefore, in the sample sizes of over 200, the chi square is significant despite the fact that the difference is little and the model acceptance is weak. According to these considerations, the model which has the smallest chi square is preferred (Meyers, et.al, 2006). In this study the chi square in the causal structure, was 421.14 (df =407, N=408), p<0.001. The other index which

is introduced to obviate the limitation of the chi square statistics is the x^2/df, which if less than 3, confirms the fitness of the model (Meyers et.al, 2006). In this study the x^2/df is 1.03 which confirms the fitness of the causal structure under study.

Lohelin (2004) recommended this index as an indicator of the root mean square error of approximation (RMSEA) fitness: less than .08 shows good fitness, .08 to 0.1: medium fitness and greater than 0.1 shows weak fitness. In this study, the RMSEA was .051 which indicates good fitness of the data with the causal structure. The comparative fit index (CFI) and the normed fit index (NFI) are the comparative indexes of fitness. These indices compare the hypothetical model with the null model. In this study these indexes were .94, and .85, respectively. These values represent the moderate to good fitness of the hypothetical causal model (Meyers, et.al, 2006).

In general, the results of the path analysis show that the causal model presented has good fitness with the research data. Therefore, by generalizing the results of this study to the general population, it can be said that the temperamental behavioral inhibition factor causes the social anxiety disorder, via the cognitive factors of self-focused attention and negative self-appraisal.

Table 3
Goodness of Fit Summaries for the Proposed Model

Goodness of fit summary					
df	x^2	x^2/df	RMSEA	CFI	NFA
407	421.14	1.03	.051	.94	.85

x^2/df= less than 3, indicates the fitness of the model, **RMSEA**= root mean square error of approximation less than .08 indicates adequate fit, **CFI**= Comparative fit index and **NFI**= Normed fit index, greater than .80 indicate acceptable fitness.

Discussion

The first aim of this research was to study the relation between temperamental factors (the adulthood behavioral inhibition and childhood behavioral inhibition) and cognitive factors (self-focused attention, other-focused attention, negative self appraisal and perception of other's negative appraisal). As reported above, a significant relation was observed between all these variables. This shows that the behavioral inhibition factor is related to the cognitions of people with social anxiety disorder. This result is in concordance with the Kimbrel hypothesis and conclusions (Kimbrel, 2008). In this study there was a significant relation between behavioral inhibition in childhood and adulthood, and social anxiety and it also corresponds with the findings reports by Hirshfield-Becker, Biderman and Rosenbaum (2000). They emphasized the relation between behavioral inhibition and social anxiety. The temperamental structure of behavioral inhibition has always been considered as a fundamental and basic factor in causing clinical anxiety. Behavioral inhibition is an important risk factor in causing social anxiety (Kimbrel, 2008). The two variables of negative self-appraisal and perception of other people's negative appraisal have positive relations with social anxiety. This result matches with the results of stoopa and clark's (2000) studies. Stoopa and Clark (2000) believe that people with social anxiety have more negative self-appraisal thoughts than normal people. Furthermore, they found a positive relation between negative self-appraisal and perception of other people's negative appraisal and social anxiety. In addition, there are relations between self-focused attention and other-focused attention and social anxiety symptoms. But, we can only accept the relation, because the type of relation is a correlation one. Therefore, we cannot tell the direction of the relation. In order to clarify the direction of the relation and the manner of the effect of the temperamental factors (behavioral inhibition) and cognitive factors, further studies and analysis are needed.

According to the relations between temperamental and cognitive factors, we can conclude that temperamental factor of behavioral

inhibition accompanied with the cognitive factors of self-focused attention and negative self-appraisal develop the social anxiety. Investing the validity of this causal presumption and determining the amount and nature of this relation is the second and main goal of this study. The results of the path analysis showed that the data or observations of this study are correspondent with the causal pattern resulted from the Kimbrel model (2008) about the development of social anxiety disorder. Therefore we can conclude that behavioral inhibition as a temperamental factor in combination with cognitive factors develops social anxiety symptoms. In this way that behavioral inhibition (a temperamental-biologic factor) with mediation of cognitive factors (the factors that more resulted from learning) develops the physical, behavioral and cognitive symptoms of social anxiety. In general, the results of the path analysis show that the etiologic model presented, is well coordinated with the observed data. Hence, by generalizing the results of this research to the general population, it can be understood that the temperamental factor of behavioral inhibition, with mediation of the cognitive factors of self-focused attention and negative self-appraisal, cause the social anxiety symptoms.

The behavioral inhibition system is now viewed as the defensive approach subsystem of the brain. As such, its primary responsibility is to resolve conflicts among competing goals (e.g., approach–avoidance conflict) by inhibiting proponent behavior, increasing attention, increasing emotional arousal, and by actively engaging in risk assessment behaviors (McNaughton and corr, 2004). The risk assessment behaviors include searching the environment and the memories relevant to risk and threat (Corr, 2004). However, presumably due to evolutionary pressures, the behavioral inhibition system have a bias for potentially threatening information so that avoidant responses are always favored. The behavioral inhibition system is also proposed to be the neural substrate underlying anxiety, and hyperactivity in the behavioral inhibition system is proposed to underlie several disorders, including generalized anxiety disorder and

neurotic depression (Gray and McNaughton, 2000). Therefore, those who have a higher sensitivity of the behavioral inhibition system must have the most intensive anxiety and avoidance in reaction to social threatening situations.

The Kimbre (2008) model makes a number of assumptions that should be delineated. First, consistent with the principle of equifinality, the proposed model assumes that there are multiple pathways to GSP involving both genetic and environmental risk factors. Second, consistent with the principle of multifinality, the proposed model assumes that common starting points can lead to different outcomes. Thus, not all children who have behavioral inhibition are expected to develop GSP, just as not all individuals with GSP are expected to have behavioral inhibition. Also, according to the linear pattern of the relations in the Kimberl model, cognitive factors are the mediator for the effect of the temperamental factor of behavioral inhibition in causing social anxiety symptoms.This result seems to be logical in coordination with the causal model of Kimbrel. Cognitive bias (such as negative beliefs and expectations, negative attention and memory bias on threatening social information) has an important role in the continuum of the social anxiety symptoms (Clark and Wells, 1995). Amir, Foa and Coles (1998) found that people with GSP were more likely to interpret ambiguous social scenarios negatively in comparison to non-anxious controls and people with other anxiety disorders. There is also some evidence which show that people with general social anxiety focus more on the threatening social information. Spector, Pecknold and libman (2003) found that people with GSP exhibited longer response latencies than non-anxious controls for words associated with negative appraisal (e.g., "criticize") and noticeable aspects of anxiety (e.g., "blushing"). In addition, people with SP also tend to exhibit increased self-focused attention during social situations, which, in turn, leads to higher levels of state anxiety (Bogels and Mansell, 2004).

In general, temperamental factors such as behavioral inhibition and cognitive factors which are mostly resulted from learning can have an

individual and mutual role in the etiology of many psychological disorders especially social anxiety disorder. It is assumed that there are points and predictions that will need to be revised, improved upon, or discarded due to the results of future studies. Nevertheless, it is hoped that this model will provide a common frame of reference for GSP researchers that will lead to increased interdisciplinary research, and, eventually, more effective means of preventing and treating GSP.

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