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Original Article

The study of predictive model of social anxiety, based on behavioral inhibition and cognitive factors

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Abstract

Introduction: The aim of this research was to study the predictive model of symptoms of social anxiety based on behavioral inhibition and cognitive factors. The research hypothesis is that behavioral inhibition, as a temperamental factor, along with cognitive factors lead to social anxiety symptoms.

Materials and Methods: This is a cross-sectional study (2012-13). Number of 408 students were selected through random sampling. They completed the following questionnaires: Social Phobia Inventory (SPIN), Behavioral Inhibition Scales (AMBI and RMBI), Focus of Attention Questionnaire (FAQ), and Consequences of Negative Social Events Questionnaire (CNSEQ). Data were analyzed through multiple regression method by SPSS software version 16.

Results: All of the variables were correlated with social anxiety significantly (P<0.05). Behavioral inhibition and cognitive factors have a significant effect on the development social anxiety. Also, the predictive model that behavioral inhibition along with cognitive factors creates social anxiety is confirmed.

Conclusion: These results may be used as a tool for screening and prediction of social anxiety in students. Also, according to the effect of cognitive factors on the development of social anxiety, we can train the children in cognitive skills in order to prevent social anxiety. In addition, we can use these skills in treatment.

Keywords: Behavior, Cognition, , Inhibition, Social anxiety

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Introduction

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 (1). People with social anxiety usually avoid participating or attending social and functional situations or tolerate such situations with great anxiety (2). 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 (3). 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 (4). 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

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majority of these models are focused on proximal affects (present affects) like bias in judgment and memory and social stimuli explanation (5). The main aspect of Mineka and Zinbarg's model is that it is not just focused on the Social anxiety disorder. Mineka and Zinbarg (6) 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 model have both emphasized on the role of evolution. The Hoffman and Barlow's model follows the triple vulnerability theory (7) 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 considers the role of weak social skills in this disorder. Rapee and Spence 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 attend 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 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 (8).

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 is a temperamental trait 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 (8). Behavioral inhibition appears to be moderately heritable and moderately stable throughout childhood and early adolescence (9) Moreover, behavioral inhibition appears to be a significant risk factor for the later development of SP (8).

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 from the age of eight. 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 consists. Later avoidance and its negative consequences decrease the opportunity of cognitive growth and reinforce the belief that social events have specific outcomes. The cognitive models support that special attention to the negative inputs, are effective in 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 have more attention toward themselves and pay less attention to the neutral or positive information those that disprove their negative beliefs (10).

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 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 (8).

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

Materials and Methods

Some of the major indices that 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 that 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 as its independent variables or its predictors. Institutional ethical committee approved the project. The population participated in this study consists of all the students studying in the Iran's universities in the years 2011-2012. Among all of these students, 408 people were chosen by random sampling method and completed the questionnares of the study. All questionnares translated to persian form, then backtranslate to Englisg language an then with comparison of two form, applied final form of persian questionnares.

Research instruments

- *Social Phobia Inventory (SPIN):* This scale developed by Connor et al (11) to assess social anxiety. This questionnaire is a self-report scale consisting of 17 items that contains three subscales of fear (6 items), avoidance (7 items) and physiological discomfort (4 items). Connor et al (11) reported its internal consistency with the alpha method, 0.82 to 0.94. Furthermore, the test retest reliability was 0.78 to 0.82. Its internal consistency has reported 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 physiologic discomfort subscale, 0.75.

- *Retrospective Scale of behavioral inhibition (RMBI):* This scale is an 18-item scale that retrospectively assesses childhood (younger than 13 years) behavioral inhibition behaviors in adults (13). Myers et al. (14) reported that the internal consistency of this scale for the eighteen questions comprising AMBI total score, Cronbach's α=0.81. The convergent validity of this scale was also confirmed by calculating its correlation with adult's behavioral inhibition index. This scale had a 0.55 correlation with the behavioral inhibition index of adults. Mohammadi (15) 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.

- *Behavioral inhibition of adults' index (AMBI):* This scale is a 16-item scale that has been designed to assess the mental report of the present behavioral inhibition behaviors (13). Myers et al (14) reported that the internal consistency of this scale for the sixteen questions comprising AMBI total score, Cronbach's α=0.84. The convergent validity of this scale was also confirmed by calculating its correlation with the retrospective behavioral inhibition index. This scale had a 0.55 correlation with the retrospective behavioral inhibition index. Mohammadi (15) reported the internal consistency of this scale is 0.73 within a 400 nonclinical person 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 (16). The participants answer the questionnaire's 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 through analysis of the principal components, and its two components structure has

been verified. The questionnaires reliability tested by using the internal consistency coefficient according to Cronbach's alpha, for the self-focused attention and other-focused attention subscales, was 0.75 and 0.86 respectively (17).

- *Consequences of Negative Social Events Questionnaire (CNSEQ):* This questionnaire designed to explain the consequences of negative social events. In this questionnaire 16 negative social events were described, and four subscales: negative self appraisals, negative appraisals by others, short term and long term negative consequences of social events were also included (18). Each of the scales demonstrated high internal consistency (0.95 for belief in negative appraisals by others, 0.97 for belief in negative self-appraisals, and 0.97 for belief in negative long-term consequences). In Iran, Ostovar (19) used the two-scale form of this questionnaire and, by calculating the alpha, reported its reliability for the negative self-appraisal, 0.89, and the negative appraisal by others, 0.90.

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 software.

Results

The data collected with the questionnaire were analyzed. The sample contained 408 university students, among them 96% were single, 4% were married. Female constituted 62% of the sample, and males 38%. 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 the all variables, which are 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, have been shown in Table 1.

Table 1. Mean and standard deviation of variables

Variable	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 relationship 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 matrix of the correlation between the variables is presented in Table 2. As revealed, all of the temperamental and cognitive variables of social anxiety have a significant and positive relationship with each other.

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 0.1 level (2-tailed)

* Correlation is significant at the 0.5 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

The second goal of this research is to study the prediction of social anxiety on the basis of temperamental and cognitive factors. In order to examine the etiologic model described in the Kimbrel model, which has been derived from reinforcement sensitivity theory, multiple regression test was performed. Because the all variables have meaningful correlation with each other, we can use them for prediction of social anxiety symptoms. Social phobia scores was dependent or predicted variable and 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) were independent or predictive variables. The results of multiple regression are in Table 3 and 4.

Table 3. Analysis of variance and step by step regression of relationship of predictive variables and social anxiety

Regression Model	df	F	Significance	R	R^2	R^2 Adj
Regression	6	87.45	0.001	0.821	0.674	0.668
Residual	401					
Total	407					

Table 4. Statistical indices of Regression of predictive variables of social anxiety

Regression Model	B	Beta	t	Significance
Fixed	-21.43	-	-5.36	0.001

behavioral inhibition in adulthood	0.392	0.498	10.13	0.001
behavioral inhibition in childhood	0.307	0.149	3.12	0.009
self-focused attention	0.345	0.142	3.46	0.002
other-focused attention	0.153	0.089	2.66	0.013
negative self-appraisal	0.198	0.135	2.89	0.019
perception of other negative appraisal	0.128	0.087	2.42	0.036

According to results of analysis of variance and statistical indices of regression of predictive variables of social phobia, F index were statistically significant for all six predictive variables (F=87.45, $P<0.001$). Also based on regression model, predictive variables can explain variations of social anxiety. There were meaningful relationships between 6 predictive variables and social anxiety (R=0.821) and 67% of social anxiety were explained ($R^2=0.674$)).

Discussion

The first aim of this research was to study the relationship 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 relationship between all these variables observed. This shows the fact that the behavioral inhibition factor is related to the cognitions of people with social anxiety disorder. This result is in concordance with the Kimbrel Model and conclusions (8). In this study, there was a significant relationship between behavioral inhibition in childhood and adulthood, and social anxiety and it corresponds with the findings reports by Hirshfield-Becker, Biderman and Rosenboum (9). They emphasized on relationship 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 (8). In this study the two variables of negative self-appraisal and perception of other people's negative appraisal, have positive relationship with social anxiety. This result matches with the results of Stopa and Clark's (20) studies. Stopa and Clark (20) believe that people with social anxiety have more negative self-appraisal thoughts than normal people. Furthermore, they found a positive relationship between negative self-appraisal and perception of other people's negative appraisal and social anxiety. In addition, there is a relationship between self-focused attention and other-focused attention and social anxiety symptoms but as a causal discussion, we can only admit the relationship, because the type of relationship is a correlation type. Therefore, we cannot tell the way of relationship and which the factors that have more effect on this relationship. In order to clarify the way of relationship and the manner of effect of the temperamental factors (behavioral inhibition) and cognitive factors, further studies and analysis are needed.

According to the relationships 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 relationship 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 (8) 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 prepotent behavior, increasing attention, increasing emotional arousal, and by actively engaging in risk assessment behaviors (21). The risk assessment behaviors include searching the environment and the memories relevant to risk and threat. However, presumably due to evolutionary pressures, the behavioral inhibition system has 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 (22). 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 Kimbrel model (8) makes a number of assumptions that should be delineated. First, consistent with the principle of equi-finality, the proposed model assumes that there are multiple pathways to GSP involving both genetic and environmental risk factors. Second, consistent with the principle of multi-finality, the proposed model assumes that common starting points can lead to different outcomes. Thus, not all children who are behaviorally inhibited are expected to develop GSP, just as not all individuals with GSP are expected to have been behavioral inhibition. Also according to the linear pattern of the relationships in the Kimbrel 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 (23). Amir, Foa and Coles (24) 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 that show that people with general social anxiety have more tend in focusing on threatening social information. Spector, Pecknold and Libman (25) 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 (26).

In general, temperamental factors such as behavioral inhibition and cognitive factors that 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.

Conclusion

Behavioral inhibition and cognitive factors have a significant effect on the development social anxiety. Also the predictive model that behavioral inhibition along with cognitive factors create social anxiety is confirmed. These results may be used as a tool for screening and prediction of social anxiety in students. Also according to the effect of cognitive factors on the development of social anxiety, we can train the children in cognitive skills in order to prevent social anxiety. In addition, we can use these skills in treatment.

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