



## The role of temperament and character dimensions in predicting state-trait anxiety in high school students

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### Introduction

Anxiety is the most common response to stressful situations and anxiety disorders are among the most common psychiatric disorders in children and adolescents. Recent epidemiological studies show that up to 9.9% of youths aged 9–16 suffer from anxiety that is severe enough to interfere with their daily functioning [1].

According to Eysenck's arousal theory, introverts are prone to suffer from anxiety disorders because they more easily develop

### Abstract

Studies advocate the role of temperament factors in development and persistence of anxiety. The aim of this study was to determine the role of temperament and character dimensions in predicting the state-trait anxiety in high school students. In this study, the statistical population consisted of all high school students (N=3416). One hundred and eighty students were selected randomly from this population by using multistage cluster sampling. They were asked to complete state-trait anxiety inventory, and cloninger's temperament and character inventory in the class in presence of the researcher. The findings of correlation analysis showed that anxiety was positively correlated with novelty seeking, harm avoidance, and reward dependence, while it was negatively correlated with persistence, cooperativeness, and self-directedness. The results of regression analysis indicated that 60% of variance of anxiety was explained by temperament and character dimensions. Based on the results of this study, temperament and character dimensions can provide a kind of predisposition for anxiety and can be used to identify anxiety symptoms in early stages.

**Keywords:** Anxiety, Character, State Anxiety, Temperament

classically conditioned (emotional) responses. In contrast to Eysenck's hypothesis, Gray identified a more compelling reason for rejecting the classical conditioning theory of anxiety. Gray's suggested that there is an innate mechanism, namely the Behavioral Inhibition System (BIS), which is essential for anxiety [2]. In the late 1980s, cloninger proposed the tridimensional temperament model, which later evolved to the psychobiological model of temperament and character. For cloninger,

temperament is expressed as harm avoidance, novelty seeking, reward dependence, and persistence. These dimensions are based on fear, anger, attachment and ambition. Since the dimensions of harm avoidance and novelty seeking are conceived similarly to Gray's model, our previous agreements and divergences also apply. In addition to temperament, character is expressed as self-directedness, cooperativeness, and self-transcendence. Our concept of volition and the new dimension coping are closely related to Cloninger's self-directedness. For us, self-directedness is the well-balanced, healthy interaction between the main emotional forces and volition and coping as the main components [3,4].

These temperament and character dimensions might be involved in the development and endurance of anxiety symptoms. Investigation of Jylha and Isometsa [5] pointed that there was a correlation between harm avoidance scores and symptoms of depression and anxiety. They also marked that scores of self-directedness dimension were negatively correlated with symptoms of these two disorders. Abolghasemi, Rafiei, and Naimani [6] in a research showed that novelty seeking, reward dependence, persistence, harm avoidance, cooperativeness, self-directedness, and self-transcendence dimensions had significant correlations with obsessive-compulsive symptoms.

The results of Kimbrel, Mitchell, and Nelson-Gray [7] revealed that Behavioral Activation System (BAS), as a temperamental aspect, was inversely related to social interaction anxiety, but it was unrelated to social anxiety. In addition, individuals with generalized social fears were found to report both higher levels of BIS and lower levels of BAS compared to individuals with few or specific social fears. Vervoort et al. [8] showed that BIS scores is higher in the anxious samples compare to non-anxious samples but BAS scores is equal in these two groups; also, higher levels of BIS-activity were related to an increase in symptoms of anxiety and depression. Nyman et al. [9] concluded that patients with symptoms of depression and anxiety show very similar

underlying temperament patterns. Strelau and Zawadzki [10] confirmed a relationship between temperament dimensions and fear. Mertol and Alkin [11] also showed that patients with adult separation anxiety disorder scored higher in Harm Avoidance (HA) and scored lower in Self-Directedness (SD) compared to patients with Panic Disorder (PD) and control group, as well. Both PD patients and separation anxiety disorder patients scored higher in reward dependency and self-transcendence dimensions than control subjects.

In the study of Rapee [12] almost 37% of inhibited preschool-aged children demonstrated social anxiety disorder at age 15, compared with 15% of uninhibited children. After controlling for baseline anxiety, Behavioral Inhibited (BI) participants were significantly more likely to meet criteria for a diagnosis with social phobia and generalized anxiety disorder at follow-up; furthermore, path analysis suggested that maternal anxiety significantly affected child anxiety over time, even after controlling for the effects of BI and baseline anxiety. No significant paths from parenting or attachment to child anxiety were found. Maternal over-involvement was significantly associated with BI at follow-up. In sum, research evidenced that anxiety in children and adolescents are influenced by their temperaments and characters. Previous studies have examined the relationship between temperament dimension and trait anxiety, but the relation of temperamental traits with state anxiety has not been investigated. Furthermore, since temperament and characters are observable since the early childhood, by identifying the role of these variables in anxiety, we are able to identify anxiety in early developmental stages and perform proper interventions to treat them timely. Regarding the roles of temperament and character variables in symptoms of anxiety disorder, this study was conducted in order to investigate the relationship between temperament and character dimensions with anxiety in high school students.

## Method

This was a descriptive correlational study. All students enrolled in high schools in khalkhal city (Ardabil) during 2014-2015 school year comprised the statistical population of this research (N=3416). One hundred and eighty students were selected randomly by using multistage cluster sampling method and participated in this research. The sample size in correlational research has been suggested in the range of 5 to 40 participants for every predictor variable. Hence, in this study, 25 participants were considered for each predictor. By considering the existence of 7 predictor variables and given the drop-out rate, 180 participants were selected.

The following instruments were used to obtain the necessary data in this research: *Temperament and Character Inventory (TCI)*: The TCI is a 125-item, self-administered, true/false questionnaire developed by Cloninger et al. [13] to assess seven dimensions of personality including four temperament dimensions (novelty seeking, harm avoidance, reward dependence, and persistence) and three character dimensions (self-directedness, cooperativeness, and self-transcendence). In the research of Alonso et al. [14], Cronbach's alpha coefficient was reported 0.68 for this questionnaire. This inventory was standardized in Iran by Kaviani [15] and good reliability and validity in one Iranian sample was shown. He reported Cronbach's alpha coefficient for each dimension as follows: 0.86 for novelty seeking, 0.88 for harm avoidance, 0.73 for reward dependence, and 0.79 for persistence, 0.86 for cooperativeness, 0.90 for self-directedness, and 0.86 for self-transcendence. In the current study, the Cronbach's alpha coefficients were in range of 0.72 for self-transcendence to 0.95 for harm avoidance.

State/Trait Anxiety Inventory: this instrument is a self-reporting instrument developed by Spielberger in 1983. It was designed to assess the levels of state anxiety and trait anxiety, through 40 items scored in a Likert-scale. State anxiety can be defined as a transient

momentary emotional status that results from situational stress. Trait anxiety represents a predisposition to react with anxiety in stressful situations. Cronbach's alpha coefficients of state and trait anxiety have been reported as 0.92 and 0.90, respectively [16]. State/trait anxiety inventory has been standardized by Mahram [17] in Iran and its internal consistency was reported as 0.91 for state anxiety and 0.90 for trait anxiety.

Data collection began after having secured permission from the Ardabil province educational department and coordinating with educational office of Khalkhal city. In the first stage of sampling, among 12 high schools of the city, one girl and one boy high schools were selected randomly. From each of these high schools, one class in the first grade, one class in the second grade, and one class in the third grade were chosen randomly. For data collection, first, the researcher talked to the participants and explained the aim of the study and then asked them to fill out the state/trait as well as temperament and character inventories in the class in presence of the researcher. Among 180 selected students, 174 students filled out the questionnaires. Data were analyzed by Pearson's correlation coefficient and multivariate regression analysis.

## Results

One hundred and seventy four students with a mean age ( $\pm$ SD) of 15.5 ( $\pm$ 0.97) participated in this research. 50% (n=87) of these participants were female and 49.4% (n=86) were male, while 0.6% did not specify their gender. 47.7 % (n=83) of the participants were studying at the first, 21.8 % (n=21.8) at the second, and 29.9 % (n=52) at the third grade. 4.0% (n=7) of the participants reported having a weak socioeconomic status, while 45.5% (n=79) and 40.8% (n=71) of them reported being in a good and excellent socioeconomic status, respectively. The mean of participants' educational average was 16.54 with standard

**Table 1** The Pearson's coefficient correlations between temperament and character dimensions and anxiety

Variables	1	2	3	4	5	6	7	8	9
1. State anxiety									
2. Trait anxiety	0.65** 0.001								
3. Trait/state anxiety	0.90** 0.001	0.91** 0.001							
4. Novelty seeking	0.36** 0.001	0.30** 0.001	0.38** 0.001						
5. Harm avoidance	0.43** 0.001	0.52** 0.001	0.55** 0.001	0.50** 0.001					
6. Reward dependence	0.10 0.20	0.11 0.18	0.18* 0.04	0.08 0.27	-0.03 0.64				
7. Persistence	-0.16 0.05	-0.13 0.11	-0.17* 0.05	0.03 0.69	0.21** 0.009	0.99 0.001			
8. Self transcendence	-0.11 0.19	-0.10 0.21	-0.14 0.12	0.09 0.02	-0.07 -0.36	-0.04 0.58	-0.10 0.21		
9. Cooperativeness	-0.17* 0.05	-0.15 0.08	-0.18* 0.03	-0.05 0.47	-0.32** 0.001	-0.08 0.28	0.26** 0.001	-0.02 0.79	
10. Self directedness	-0.48** 0.001	-0.65** 0.001	-0.66** 0.001	-0.46** 0.001	-0.48** 0.001	-0.48** 0.001	-0.13 0.11	0.04 0.51	-0.03 0.74

deviation of 2.

Table 1 reveals that state anxiety was positively related to novelty seeking ( $r=0.36$ ;  $p<0.001$ ), harm avoidance ( $r=0.43$ ;  $p<0.001$ ), and negatively related to cooperativeness ( $r=0.17$ ;  $p<0.03$ ), persistence ( $r=0.16$ ;  $p<0.05$ ) and self directedness ( $r=0.48$ ;  $p<0.001$ ). Trait anxiety was positively related to novelty seeking ( $r=0.30$ ;

$p<0.001$ ), harm avoidance ( $r=0.52$ ;  $p<0.001$ ) and negatively related to self directedness ( $r=-0.65$ ;  $p<0.001$ ). Total score of state-trait anxiety was positively related to novelty seeking ( $r=0.38$ ;  $p<0.001$ ), harm avoidance ( $r=0.55$ ;  $p<0.001$ ), reward dependence ( $r=0.18$ ;  $p<0.04$ ) and negatively related to persistence ( $r=-0.17$ ;  $p<0.05$ ), cooperativeness ( $r=-0.18$ ;  $p<0.03$ )

**Table 2** The results of regression coefficient analysis of state/trait anxiety based on temperament and character dimensions

Criterion variable	Predicting variable	R <sup>2</sup>	F	Sig of E	B	SEB	B	T	P
		0.60	15.78	0.001					
	Constant				105.43	16.52		16.52	0.001
	Novelty seeking				1.12	0.52	0.18	2.13	0.03
	Harm avoidance				1.63	0.45	0.31	3.58	0.001
Anxiety	Reward dependence				0.09	0.85	0.09	0.10	0.91
	Persistence				-2.60	0.23	0.16	2.10	0.13
	Self-transcendence				-1.08	0.67	0.13	1.61	0.56
	Cooperativeness				-0.26	0.46	0.04	0.57	0.56
	Self-directedness				-1.94	0.47	-0.4	4.13	0.001

and self directedness ( $r=0.66$ ;  $p<0.001$ ).

As can be seen in Table 2, 60% of variance of anxiety was explained by temperament and character dimensions. The model of anxiety regression based on the temperament

and character dimensions was proven to be significant ( $F=15.78$ ;  $p<0.001$ ). Regression coefficient analysis showed that novelty seeking ( $t=2.12$ ;  $p<0.03$ ) and harm avoidance dimensions ( $t=3.58$ ;  $p<0.001$ ) could positively

predict anxiety symptoms in students, while self-directedness ( $t=-4.13$ ;  $p<0.001$ ) negatively predicted them.

## Discussion

The results of this study showed that there was a positive significant relationship between novelty seeking dimension and state/trait anxiety. This finding is consistent with the results obtained by Abolghasemi *et al.* [6], Nyman *et al.* [9], and Strelau and Zawadzki [10]. Since novelty seeking dimension shows individual differences in behavioral activation system in the brain, people with this feature, due to low level of dopamine, have a low level of stimulation and arousal that causes them to actively avoid uniformity and punishment in order to compensate this characteristic. These two factors may keep their anxiety level higher.

The results indicated that there was a positive significant relation between harm avoidance and state/trait anxiety. This finding is in agreement with those achieved by Jylhä and Isometsa [5], Abolghasemi *et al.* [6], Kimbrel *et al.* [7], Vervoort *et al.* [8], Nyman *et al.* [9], Strelau and Zawadzki [10], Mertol and Alkın [11], and Rapee [12]. Based on Coninger's theory, high harm avoidance is associated with low level of serotonin. Since excessive inhibition of serotonergic system predisposes the individual to develop anxiety, depression, and low self-confidence, those who have a high level of harm avoidance, are usually cautious, nervous and shy. They are generally hesitant, sensitive to punishment, and do not adjust appropriately with environmental changes [3].

Outcomes of this study revealed that there was a positive significant relationship between reward dependence dimension and state/trait anxiety. Findings of Abolghasemi *et al.* [6] and Vervoort *et al.* [8] also confirmed this outcome. As Cloninger [3] states, in people with high level of reward dependence, the level of norepinephrine is low. Excessive reduction of norepinephrine secretion by clonidine results in diminution of associative learning. Also, it is assumed that reward dependence is the reflection of individual differences in the brain system that are linked

to regulation of conditioned clues of reward, especially social rewards. Therefore, having tendency to accept others' opinions, sensitivity to rejection and gaining others' conformation are features of those who have a high degree of reward dependence. In fact, these people are in dire need of being accepted and confirmed by others; they resist against extinction of behaviors that were previously correlated with reward or escape from punishment. This solicitude for losing reward can make them anxious.

One of the findings of this study was that there was a negative significant correlation between persistence dimension and state/trait anxiety. This result is congruent with the findings of Abolghasemi *et al.* [6], Nyman *et al.* [9], and Strelau and Zawadzki [10]. It is expected for persistent people to be patient, meet their goals, and have high self-confidence; these features act for them as defensive shield against anxiety.

The research illustrated that a negative significant relationship existed between self-transcendence dimension and state/trait anxiety. This result is in line with those obtained by Abolghasemi *et al.* [6], Nyman *et al.* [9], and Strelau and Zawadzki [10]. To explain this result, it can be said that people who have a high degree of self-transcendence are apt to have summit experience; they also accept the world as it is and have a tendency toward idealism. It is assumed these individuals are less apt to become anxious.

Cooperativeness showed a negative significant relation to state anxiety and state/trait anxiety. This is similar to the results of Abolghasemi *et al.* [6]. Individuals, who gain high scores in cooperativeness dimension, usually have strong social skills; they are supportive and sympathetic. These features can protect them against developing anxiety.

According to these results, self-directedness dimension was correlated negatively to anxiety. This result is in agreement with the results of Jylhä and Isometsa [5], Abolghasemi *et al.* [6], and Mertol and Alkın [11]. In fact, those who gain high scores in self-directedness

dimension are generally purposeful and have a high self-confidence, while those who gain low scores in this dimension are usually depended on external rather than internal stimulus; they also believe that they have no control over tasks, and are more hesitant about their goals. Such persons are more apt to develop anxiety.

Regression analysis showed that 60% of variance of anxiety was positively predicted by novelty-seeking, harm avoidance, and persistence dimensions and negatively predicated by self-directedness dimension. This finding is in line with the findings of Cloninger [3], Jylha and Isometsa [5], Abolghasemi et al. [6], Kimbrel et al. [7], Vervoort et al. [8], Strelau and Zawadzki [10], Mertol and Alkın [11], and Rapee [11]. Persons with high scores in novelty-seeking dimension usually like exploratory activities and stimulus; they also do not like routine activities and become excite when they confront new ideas. In contrast, those, whose scores on novelty-seeking dimension are low, have a tendency to repeat former experiences and are resistant against changes. Therefore, it seems internal anxiety makes novelty seeking persons to try to experience exciting activities. According to Gary's motivation theory [18], harm avoidance is a part of nervous system that its high sensitivity can create an increasing state of anxiety and a tendency for privation of inhibition. This leads to more readiness for developing anxiety. In fact, harm avoidance acts as a defending system in cognitive level that every minute predicts the next probable event and creates outputs of behavioral inhibition system. Cloninger [3] declares that among the temperament dimensions, it is only harm avoidance that temporally increases in the case of depression and excitement. Persistence and self-guide dimensions also protect individuals against anxiety by promoting positive traits such as trust and precision.

### Conclusion

The findings of this study revealed that novelty seeking, reward dependence, and harm avoidance dimensions had positive significant relations to symptoms of psychological pathology.

But cooperativeness, self-directedness, and self-transcendence had negative significant correlations with symptoms of psychological pathology. Therefore, it seems that novelty seeking, reward dependence, and harm avoidance can be regarded as the primary influencing factors in anxiety symptoms. In our research, the study population was restricted to high school students of Khalkhal city, data gathered by using self-reporting tools, and also correlation approach was used that did not provide the possibility of inferring casual results; hence, there were some of the limitations of this research. In regard to the findings of this study and the fact that anxiety in students has different sources and may be consisted of different congenital and environmental factors, it is suggested to perform similar researches on students of lower grades. To prevent protection of data in later studies, it is better to equalize the groups based on cultural, social, and economic situations as well as other background factors. The results of this study could be applied in recognizing childhood anxiety through temperament and character dimensions to use proper interventions to treat them as soon as possible.

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### Contribution

Study design: SB, AA, PM

Data collection and analysis: SSM, IJ.

Manuscript preparation: SB, AA, PM.

### Conflict of Interest

"The authors declare that they have no competing interests."

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