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The survey of simultaneous factor structure of alexithymia and type D personality instruments in students

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Abstract

The constructs of alexithymia and type D personality share many common characteristics theoretically and conceptually. Despite the fact that the measurement instruments of both constructs have been utilized widely in psychosomatic researches, there are a few researches, if any, in this area to date. This study aimed to do the simultaneous factor structure of alexithymia and type D personality. This was a descriptive-survey within the category of psychometric studies. All students in Hamadan universities constituted the statistical population of this study. Among the population, the number of 384 students (248 female and 136 male students) was selected through multi-stage sampling method. They answered the scales of Toronto alexithymia and type D personality. The results of exploratory and confirmatory factor analysis of type D (with two subscales) and alexithymia (with three subscales) showed that the five-factor model had a good fit with the data. The results also showed that alexithymia and type D personality are distinct and have separate constructs. However, it is necessary to conduct further researches on clinical and non-clinical samples for a more accurate understanding of the relationship between these two constructs.

Keywords: Alexithymia, Factor Analysis, Personality, Type D

Introduction

Since the prevention of psychological disorders imposes less cost on the society rather than the treatment of these disorders does, it is more than ever necessary to properly design and construct the instruments that can identify and classify people with undesirable characteristics such as personality type A, D, and C, and other properties. In this regard, such instruments should be examined in terms of psychometric properties before being used in native samples which necessitates the conduct of researches on the construction and standardization of efficient instruments [1]. The theoretical basis of type D personality returns to a study on cardiac patients in Belgium in which, the role of personality in the consequences of heart

disease was examined [2]. Unlike the theoretical construct of type A personality, the theoretical construct of type D personality has been derived from the core of personality theory and empirical evidences resulted from studies of factor analysis and cluster analysis. The traumatic flaw of this personality type in psychological and physiological aspects is based on both general and stable personality traits. These characteristics include negative affectivity and social inhibition [3]. Negative affectivity refers to one's tendency to experience negative feelings at different times and situations whereas social inhibition refers to one's tendency to avoid the expression of these negative emotions in social interactions [4,5]. High scores in both of these characteristics represent a person with type D personality. From a clinical point of view, people prone to anxiety, stress, feelings of sadness, and dark and negative view towards life simply become nervous and generally experience positive feelings to a lesser extent. In addition to simply undergoing negative feelings, these people avoid expressing their emotions in interaction with others due to the fear of rejection or debasement. In other words, they imprison their feelings. Generally, these people establish fewer interpersonal links with others and feel uncomfortable when they are with strangers. It should be necessarily taken into consideration that this personality construct emphasizes the normal characteristics of personality more than psychopathological aspects. Therefore, personality type is a homogeneous sub-group with clear principles in psychological theory. [6]. Although negative emotions are measured in type D personality, this is the amalgamation of both tendency to experience negative emotions and avoidance of emotional expression that has more harmful effects on health than the experience of negative emotions alone [7]. Overall, evidences [8,9] show that the development of negative affectivity and social inhibition as type D personality traits is partly influenced by genetic factors. The prevalence of this type of personality ranges from 13% to 32.5% in the general population and from 26% to 35% in patients with cardiovascular disease. Type D personality has been introduced as a risk factor associated with the growth of psychological distress, burnout symptoms, health issues, and adverse clinical outcomes (despite appropriate therapy) [10]. People with type D personality are at increasing risk of psychiatric and physical disorders. Type D personality can be considered as one of the psychopathological conditions that may affect health and longevity; therefore, it entails psychological and medical treatment. However, cognitive-behavioral treatment, training progressive muscle relaxation, meditation training, abdominal breathing, hypnosis, biofeedback, exercise, and other therapies can possibly reduce stress in people with type D personality and improve their ability to socialize and interact with others. In the same way, it is possible that antidepressants can help some people with type D personality [5]. Treatment with SSRIs can reduce harmful avoidance (one's tendency to severely respond to the symptoms of annoying stimuli), increase social confidence, and reduce hostility [4]. Alexithymia is a construct that was first introduced by Sifneos in 1973 [11] and refers to one's inability to successfully deal with cognitive processing of emotional information and emotional regulation [12]. This construct consists of the following components: difficulty in identifying feelings, difficulty in describing feelings, and thinking externally-oriented. Difficulty in distinguishing emotions from physical stimulation is known to be derived from emotional arousal and thinking externally-oriented [13]. These characteristics that constitute alexithymia construct represent some results in cognitive processing and emotional regulation. From the perspective of cognitive science, emotions are recognized as a category of the schema based on information processing that include symbolic and non-symbolic processes and visualizations. Reduction of expressing emotions primarily reflects a lack of emotion regulation or bad emotion regulation [14]. Studies have shown

that male patients act worse than female patients in emotional recognition because the prevalence and severity of alexithymia are higher among males than those among females [15]. This construct has been observed in different patients with a wide range of psychiatric and clinical pathologies and even in non-clinical populations [16]. Studies have also shown that alexithymia is associated with depression and anxiety disorders [17] and substance abuse disorders [18]. It has also been revealed that alexithymia has implications in physical diseases such as coronary heart disease [19]. Similarly, it has been found that type D personality correlates with symptoms of psychological diseases such as anxiety and depression; and predict poor clinical consequences in cardiac patients [5]. In the context of studies on cardiovascular health, there are considerable debates concerning the distinction or overlap between psychological risk factors [20]. Although the instruments pertaining alexithymia and type D personality have been widely employed in the domain of psychosomatic diseases, only one study by Williams, Curren & Bruce [21] has investigated the similarities between these two constructs. It is noteworthy that the definitions of alexithymia and type D personality indicate the existence of a potential conceptual overlap between these two constructs. For example, De Fruyt & Denollet [22] have shown that the two components, namely negative affectivity and social inhibition, are highly correlated with neuroticism and extraversion-subscales of big five personality scale. Similarly, Luminet, Bagby, Wagner, Tayler & Parker [23] showed that alexithymia has a high positive correlation with neuroticism and a high negative correlation with extraversion. Therefore, it is possible that both instruments are likely to show different measurements of the constructs with same backgrounds (i.e., high neuroticism and low extraversion). In Iran, Esazadegan & Fathabadi [24] showed that alexithymia is highly correlated with negative affectivity and social inhibition. People with high scores in alexithymia avoid expressing emotions which is social inhibition as one of the main features of type D personality. Hence, the conduct of the present study was inspired by the following motives: the two constructs can predict mental, physical, and cardiovascular disorders; there is a lack of national and international researches in the field of similarities and differences of these two widely-used instruments; and the development of instruments that can measure variables and constructs with fewest questions is very important in psychometric science. The current study attempts to combine the items of the two instruments together, which have been conducted on one sample, and to employ exploratory and confirmatory factor analyses to show whether these two instruments measure the same variables or are distinct from each other and cannot be used interchangeably. In other words, it is to observe whether the factor analysis of these two instruments will lead to five distinct factors or the number of factors reduces due to conceptual overlap.

Method

This study falls within the category of validation and standardization studies. The statistical population of the study consisted of all university students in Hamedan (Iran) in 2012, out of whom a sample of 384 participants (Islamic Azad University: 124 students, Bu-Ali Sina University: 76 students, and Medical University: 84 students) was selected based on Krejcie & Morgan's Table [25] via multi-stage random sampling method (university, college, major, and class). In terms of sampling, the researcher personally referred to each of the aforementioned universities, received information on the number of students in each university and colleges, and selected a sample from each university in proportion to the number of students of each university so that the generalizability of results to the entire population can be raised. After the determination of the number of students in each college, some classes were randomly selected from the various classes of that college. Then, in coordination with the

relevant authorities and permission from the professors, the questionnaires were distributed among the students who agreed on cooperation. It should be mentioned that 81 participants were associate's students, 192 participants were bachelor's students, 88 participants were master's students, and 22 participants were PhD students. In addition, 248 participants were female students and the remaining 136 participants were male students.

Instrument: Type D personality scale: This scale was constructed by Denollet in 2005 [3] and contains two sub-scales, namely negative affectivity (items 2, 4, 5, 7, 9, 12, and 13) and social inhibition (items 1, 3, 6, 8, 10, 11, and 14), which are scored in a Likert scale from zero (false) to 4 (true). The reliability coefficients of this scale were reported equal to 0.81 and 0.86 via test-retest method and Cronbach's alpha, respectively [3]. The findings suggest that concurrent validity and discriminant validity of this scale are desirable. The correlation coefficient of affectivity with neuroticism as one of the subscales of big five personality scale was obtained equal to 0.74 and those of social inhibition with extraversion and neuroticism were respectively obtained equal to -0.61 and 0.50; therefore, all the coefficients are significant at the level of 0.01 [3]. Psychometric properties of this scale in Iran were examined by Bagherian & Bahrami in 2011. In this study, it was found that this instrument is composed of two sub-scales and all the questions of the foreign version had factorial loading on their related factors in the national version and none of the questions were deleted. Test-retest reliability coefficient was obtained equal to 0.86 and 0.77 within a 2-month interval for negative affectivity and social inhibition, respectively while Cronbach's alpha value was obtained equal to 0.87 and 0.85 for healthy people [1]. Moreover, Abolghasemi et al. [26] reported the internal consistency of the scale by Cronbach's alpha equal to 0.88.

Toronto Alexithymia Scale: This scale was developed by Bagby et al. in 1994 and contains 20 items and three sub-scales, namely difficulty in identifying feelings with 7 items, difficulty in describing feelings with 5 items, and thinking externally-oriented with 8 items, which are scored based on a 5-Likert scale from 1 (strongly disagree) to 5 (strongly agree). A total score is calculated for alexithymia from the sum of three sub-scales [27]. Psychometric properties of Toronto alexithymia scale have been reviewed and approved in numerous studies [11,12,28]. The Persian version of Toronto alexithymia scale, which has been standardized by Besharat [29], has led to Cronbach's alpha coefficients of 0.85, 0.82, 0.75, and 0.72 for the total scale, difficulty in identifying feelings, difficulty in describing feelings, and externally-oriented thinking, respectively [29]. Test-retest reliability of the total scale and sub-scales was obtained within the range of 0.80 to 0.87 during a 4-week interval on a 67-respondents sample. Confirmatory factor analysis of the Persian version of Toronto alexithymia scale was also indicative of the existence of three aforementioned subscales, i.e. difficulty in identifying feelings, difficulty in describing feelings, and externally-oriented thinking [29]. In another study, Ghorbani et al. validated this scale on Iranian and American samples and obtained Cronbach's alpha coefficients of 0.50, 0.74, and 0.61 for the Iranian sample and 0.60, 0.82, and 0.77 for the American sample respectively for difficulty in identifying feelings, difficulty in describing feelings, and externally-oriented thinking [30].

Data were analyzed using Pearson correlation, exploratory factor analysis (by SPSS-19) and first order confirmatory factor analysis (by LISREL-8.5).

Results

The number of 384 students (248 females and 136 males) constituted the participants of this study. The age mean score of female students, male students, and total students was 24.16 (SD=3.94), 23.01 (SD=4.47), and 23.58 (SD=4.30).

The data of this study were analyzed in two parts. In the first part, a pilot study was

Table 1 *Mean and standard deviation of participants' scores of TAS-20* and DS-14***

Difficulty in describing feelings		Difficulty in identifying feelings		Externally-oriented thinking		Alexithymia		Negative affectivity		Social inhibition		Type D	
M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
19.23	8.21	20.33	3.56	16.61	2.33	56.17	10.07	11.20	4.55	12.33	4.64	23.55	7.85

*Toronto Alexithymia Scale-20
**Type D Scale-14

conducted to examine whether the items of alexithymia and type D personality overlap with each other or they are distinct from each other. To this end, exploratory factor analysis was performed. In the second part, the data were analyzed using confirmatory factor analysis whose results are presented in detail as following: The investigation of sample adequacy index (measured by the Kaiser-Meyer-Olkin (KMO) statistics) (0.82) and Bartlett's sphericity index ($p<0.01$, df= 190) showed that the necessary criteria for conducting factor analysis have been met. Principal components analysis was used for the extraction of factors. In addition, orthogonal Promax rotation was used for factor rotation and the items with loading factors equal or above 0.30 were maintained in the model and the other ones were omitted (Table 2). The investigation of factor loadings showed that all the items had high factor loadings on the factors and the previous two-factor and three-factor structures of type D personality and alexithymia were repeated with some minor changes. For example, in alexithymia scale, items numbered 15, 16, and 20 were loaded on the subscale of difficulty in describing feelings instead of being loaded on the subscale of externally-oriented thinking. Furthermore, item numbered 4 was loaded more highly on externally-oriented thinking rather than on difficulty in describing feelings; and item numbered 2 was loaded on difficulty in identifying feelings rather than on difficulty in describing feelings; and item numbered 8 was not loaded on any factor while it had been loaded on externally-oriented thinking in the foreign sample. In contrast, none of the questions of two-factor type D personality scale was removed or substituted. Thus, as shown in the scree plot (Figure 1), the combination of 20 questions from alexithymia scale and 14 questions from type D personality scale was indicative of five independent factors through exploratory factor analysis.

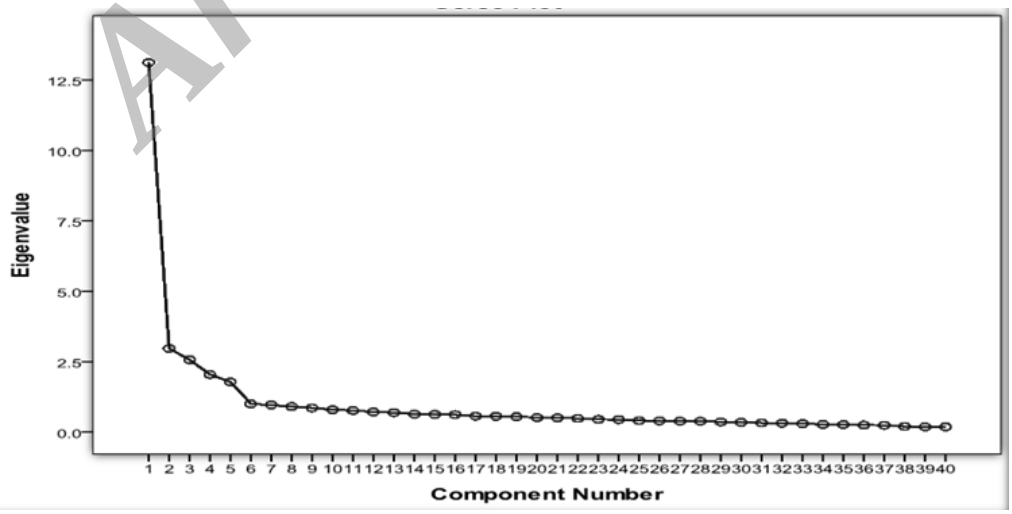

Figure 1 *Scree plot of the extracted factors*

Table 2 *Varimax rotation factorial matrix of TAS-20 and DS-14*

Factors Items	DIF	EOT	DDF	NA	SI
Difficulty in identifying feelings					
I am often puzzled by sensations in my body	0.711				
I am often confused about what emotion I am feeling	0.707				
I don't know what's going on inside me	0.706				
I have feelings that I can't quite identify	0.659				
I often don't know why I am angry	0.653				
When I am upset, I don't know if I am sad, frightened, or angry	0.646				
It is difficult for me to find the right words for my feelings	0.626				
I have physical sensations that even doctors don't understand	0.448				
Externally-oriented thinking					
Being in touch with emotions is essential		0.705			
I find examination of my feelings useful in solving personal problems		0.640			
I can feel close to someone, even in moments of silence		0.60			
I am able to describe my feelings quite easily		0.469			
I prefer to analyze problems rather than describe them		0.451			
Difficulty in describing feelings					
It is difficult for me to reveal my innermost feelings, even to close friends			0.627		
I prefer talking to people about their daily activities rather than their feelings			0.625		
I prefer to watch 'light' entertainment shows rather than psychological dramas			0.535		
People tell me to describe my feelings more			0.448		
Looking for hidden meanings in movies or plays distracts from their enjoyment			0.438		
I find it hard to describe how I feel about people			0.363		
Negative affectivity					
I often make a fuss about unimportant things				0.715	
I often feel unhappy				0.711	
I am often irritated				0.689	
I take a gloomy view of things				0.651	
I am often in a bad mood				0.643	
I often find myself worrying about something				0.595	
I am often down in the dumps				0.547	
Social inhibition					
I make contact easily when I meet people					0.782
I often talk to strangers					0.761
I often feel inhibited in social interactions					0.738
I find it hard to start a conversation					0.710
I am a closed kind of person					0.621
I would rather keep other people at a distance					0.521
When socializing I don't find the right things to talk about					0.484

In order to conduct confirmatory factor analysis, the structure of exploratory factor analysis was used since all the items were highly loaded on the relevant factors. In other words, the number of five factors was considered and the data were analyzed by means of first order factor analysis considering the independent structure shown by exploratory factor analysis. It should be noted that some assumptions should be met before conducting factor analysis which are as follows: 1) The number of observations should be 20 times as large as the number of independent variables (predictors), which is satisfied in this study due to the high number of participants (384) in the current study. 2) The sampling method must be random which is met here. 3) Since outliers significantly affect the proposed model, they should be removed or modified so that this effect can be declined. In this study, outliers were identified and excluded from the analysis via scatterplot and distribution Table 4) Multi-collinearity between independent variables that is the correlation value close to one between the independent variables or the predictor variables: this assumption can be examined via correlation matrix, square multiple correlation, and tolerances. 5) The distribution of observed variables should be multivariate normal. Normal p-p plot of regression standardized residual also suggests the satisfaction of this assumption. The investigation of standardized factor loadings and corresponding t values indicated that all the path coefficients were significant and there is no need to remove any of the questions.

Table 3 *Goodness-of-fit indices of the model*

index	df	x^2	RMESA	AGFI	CFI	NFI	SRMR
Value	164	245.63	0.03	0.93	0.97	0.99	0.00

Goodness-of-fit indices of the model (Table 3) are all indicative of the fitness of five-factor model with the data. The ratio of Chi square to the degree of freedom in adequate models is less than 2 and it is more desired as it is close to zero. This value in this study is less than 2. Root mean square error of approximation (RMSEA) and standardized root mean square residual (SRMR) are lower than 0.05 in good models. Here, these values are representative of the model fit. Normed fit index, comparative fit index, and adjusted goodness of fit index are more desired as they are close to 1. In good models, these values are greater than 0.90. As shown in the Table 3, all theseindices show the model fitness.

Discussion

This study aimed to answer the question whether Toronto alexithymia scale and type D personality scale measure the same variables or they differ structurally and measure separate constructs. The results showed that alexithymia and type D personality scales have distinct factor structures although they almost overlap each other conceptually and structurally. The results of confirmatory factor analysis showed that the five subscales aimed to measure these two psychological constructs (with the sub-scales of difficulty in identifying feelings, externally-oriented thinking, difficulty in describing feelings, negative affectivity, and social inhibition) fitted the data well. Thus, although there is conceptual overlap between the two constructs, the results of this study showed that alexithymia and type D personality are generally distinct constructs. These results are consistent with those of other studies conducted in this area [20]. Williams et al. [20] conducted a research at the University of Western Scotland and found that alexithymia and type D personality are two independent constructs although they share common features and there is conceptual overlap between them.

The bottom line in this study was the importance

of the identification of a distinction between type D personality and alexithymia, which is used in clinical activities and in the treatment of cardiovascular patients [20]. In agreement with the results of the aforementioned foreign study, the results of exploratory and confirmatory factor analysis showed that factor loadings for difficulty in identifying feelings, difficulty in describing feelings, negative affectivity, and social inhibition were significant and higher than acceptable level of 0.30. However, the factor loadings for externally-oriented thinking were problematic as shown in Table 2 where the items numbered 15, 16, and 20 were significantly loaded on the sub-scale of difficulty in describing feelings. Cronbach's alpha test results for alexithymia scale also showed that the omission of some problematic items in externally-oriented thinking could raise internal consistency although there was an acceptable internal consistency for the whole scale (0.71). Thorberg et al. [31] also confirmed this finding. The results of the present study and previous studies [20,28,29] showed that some revisions are needed for this sub-scale. It should also be noted that alexithymia scale, especially the sub-scale of externally-oriented thinking entails more complex and longer questions than the 14-item type D personality scale. This complexity may increase the time to read and think about the questions and thereby, some problems may happen to the factor structure of the scale. One of the limitations of this study was the fact that it was just limited to the student's population. Therefore, it is suggested that this research, which is in its incipient boom, be conducted on other populations, especially on the clinical community and patients with coronary heart disease because this study was conducted on the normal population of students. In addition, it is also recommended that the scales' varieties used in this study be applied in other studies for examining the similarities and commonalities of the two scales since there are other varieties of the two scales, as well. Overall, the results of the present study suggested that these two personality constructs are distinct from each other.

Conclusion

This study was carried out for the first time in Iran and only one study of this type has been undertaken abroad, which examines the overlap between alexithymia and type D personality. The results of this study came to the conclusion that the five-factor model perfectly fitted the data. More researches are needed to replicate the five-factor model in other samples. In general, the results of the current study showed that alexithymia and type D personality are two independent constructs although they are similar in some features.

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Contribution

Study design: MAT-S
Data collection and analysis: AKh, MAT-S, MN
Manuscript preparation: MATS, AKh

Conflict of Interest

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

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