



Development and validation of the interpersonal stress scale: An Item Response Theory Analysis

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General Note



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ABSTRACT

Background: Interpersonal stress is associated with significant declines in physical health and is a significant predictor of risk for the onset of some mental disorders. In spite of this, little is known about the assessment of this construct. This study aimed to apply Item Response Theory (IRT) to develop and examine psychometric properties of the Interpersonal Stress Scale (ISS) to assess five domains of interpersonal stress. **Methods:** Exploratory factor analysis and IRT were utilized to test validity and reliability of ISS. The study was conducted on 512 participants aged 15-45 years ($M = 29.14$; $SD = 8.08$) who were selected using convenience sampling method. **Results:** Current results showed a five-factor structure of the ISS and revealed that 32 items of the ISS could be scored using IRT methods. The ISS also showed satisfactory test-retest reliability ($r = .83$; $p < .01$) and internal consistency, with Cronbach's alpha coefficients ranging from .67 to .89. Moreover, the ISS scores were correlated with other constructs, which provides evidence for the predictive and divergent validity of the scale. **Conclusions:** These findings supported the Interpersonal Stress Scale as a reliable and valid tool to measure interpersonal stress in Iranian population.

Keywords: Interpersonal Stress, Reliability, Validity, Item Response Theory.

1. INTRODUCTION

Interpersonal stress refers to stress caused by stressful episodes between individuals which involve arguments, inappropriate behavior, a tense atmosphere during a conversation or activity, and being worried about hurting others' feelings (Kato, 2014). This kind of stress, caused by interpersonal stressors including but not limited to conflicts with family, friends, and colleagues (Fuligni et al., 2009), is the most frequent type of stress that people experience in everyday life and it can influence everyone's well-being significantly (Maybery and Graham, 2001). In particular, there is evidence that shows interpersonal stress is associated with many health problems; for example, some studies indicated that perceived interpersonal stress is related to significant declines in physical health and performance outcomes (e.g. O'Brien et al., 2016). Chronic interpersonal stress and major interpersonal stressful life events have also been confirmed as significant predictors of risk for the onset of major depressive episode (Vrshek-Schallhorn et al., 2015). Moreover, some studies have shown that the negative impact of interpersonal stressors is more profound than the influence of other types of stressors (e.g. Bolger et al., 1989).

Given the high-frequency nature of the interpersonal stress and its negative effects on both physical and psychological health, a growing body of research has studied it a lot. For instance, in terms of clinical practice, Interpersonal Psychotherapy (IPT is a psychotherapy approach that has its main focus on defining a central interpersonal problem serving as the primary treatment target (Klerman et al., 1984). Furthermore, as suggested by Lipsitz and Markowitz (2013), decreasing interpersonal stress is the most crucial interpersonal change mechanism activated by the IPT. In line with this, some clinical trials have also shown significant effects of IPT on the reduction of depressive symptoms, mediated by changes on the perceived interpersonal stress (e.g. Toth et al., 2013).

In spite of the above-mentioned studies that have suggested the role of interpersonal problems and consequent stress in the development of mental health problems and the clinical importance of focusing on interpersonal stress in psychotherapy practice, little is known about the assessment of this construct; more specifically, although there are some measures for the assessment of interpersonal stress, their limitations make them difficult to be used as the primary assessment tool. For example, in some studies (e.g. Hammen, Shih and Brennan, 2004), semi-structured interviews have been used as an interpersonal stress measure. However, this kind of assessment needs interviewees' training and a longer period of time to be completed; moreover, at issue here is the inter rater reliability based on independent judges' ratings. Some measures used in other studies (Fuligni et al., 2009), only assess interpersonal stress across the primary domains of family, peers, and school and therefore, do not cover other types of interpersonal stressors; in addition, given the response option of the items (yes/no), this measure cannot yield an index of the severity of interpersonal stress experienced by respondents. Finally, some other studies (e.g. Hashimoto, 2005) have used assessment tools that measure interpersonal stressors within the past month only and thus, do not present a report of the stressful experiences existed before that period of time.

In summary, considering the above studies, it can be seen that although the interpersonal stress as a treatment target plays an important role in mental health-related problems, it has been widely ignored in the related literature, especially in the field of assessment. Given the limitations of the existing assessment tools of interpersonal stress and a real need for its comprehensive evaluation, it seems necessary to develop self-report measures with high reliability and validity that covers interpersonal stress in

different areas. Accordingly, this study aimed to use Item Response Theory (IRT) to develop and validate a measure to assess interpersonal stress in a group of Iranians.

2. MATERIALS AND METHODS

Participants

In this methodological study, a total of 512 participants aged 15-45 years ($M = 29.14$; $SD = 8.08$), including 273 women and 239 men, were selected by convenience sampling from Shahid Beheshti University of Medical Sciences, Tehran, Iran. Of the total sample, 54.1% were single and 45.9% were married. Moreover, in terms of occupational status, 48.6% and 51.4% of the sample were employed and unemployed, respectively. Finally, 31.6% of the participants had a high school diploma and 68.4% had an academic degree.

Measures

Inventory of Interpersonal Problems (IIP): The IIP (Barkham, Hardy and Startup, 1996) is a self-report scale that consists of 32 items and measures difficulties people experience in their interpersonal relationships. The items are scored on a 5-point Likert scale ranging from 0 ('Not at all') to 4 ('Extremely'). Therefore, the total score ranges from 0 to 128, with the higher scores representing higher levels of interpersonal problems. In their study, Barkham et al. (1996) reported satisfactory internal consistency ($\alpha = .90$) for this scale. The Persian version of the IIP utilized in this study was prepared using translation and back-translation techniques from English into Persian; exploring psychometric properties of the Persian version of the IIP revealed that the scale has satisfactory internal consistency ($\alpha = .83$) and split-half reliability ($r = .82$), which confirms its applicability to Iranian samples (Fath et al., 2013). In the current study, the Cronbach's α coefficient for the total score of the IIP was .79.

Perceived Stress Scale (PSS): The PSS (Cohen, Kamarck and Mermelstein, 1983) is the most widely-used psychological scale for measuring the extent to which situations in someone's life are appraised as stressful. This self-report instrument consists of 14 questions in which respondents are asked how often they felt a certain way within the last month. Each item is scored on a 5-point Likert scale (from 0 for "Never" to 4 for "Very often"), with the higher scores indicating higher levels of perceived stress. In the study of Cohen et al. (1983), the Cronbach's alpha coefficient and test-retest reliability were .84 and .85, respectively, in a sample of college students. Investigation of the psychometric properties of the PSS in Iran has also indicated its sufficient internal consistency ($\alpha = .73$) and split-half reliability ($r = .74$) in a sample of Iranian college students (Behroozi, Shahani Yeylaq and Pourseyed, 2013).

Interpersonal Stress Scale Item Development

Based on the suggested constructs in other measures used for the assessment of interpersonal stress (e.g. Kato, 2014; Lipsitz and Markowitz, 2013; Hammen, Shih and Brennan, 2004; Hashimoto, 2005; Chon, Kim and Yi, 2000; Hashimoto, 1997; Compas et al., 1987) and the clinical experience of the authors, a total of 52 items were initially developed to assess four domains of interpersonal stress, including interpersonal conflicts-derived stress (18 items) role transition-derived stress (24 items), interpersonal deficits-derived stress (9 items) and grief-derived stress (1 item) with response options of each item including "Does not apply to me", "To a small extent", "To some extent", "To a moderate extent", "To a large extent". In the initial instruction, respondents were asked to read each item carefully and circle the response option which best describes their feelings in the past six months.

To develop the measure, items were selected in an expert panel which consists of four clinical psychologists who had more than 10 years of clinical experience in the field of interpersonal stress. These experts reviewed all items and refined ambiguous words and terms. After reviewing the qualitative content of the items, the whole measure was also examined by integrating the results of a pilot study and a focus group interview. Furthermore, before the administration of the measure, a representative sample of 10 participants was asked to answer the questions and their suggestions were used to revise the readability and comprehensibility of the items.

Procedure

Data collection was conducted individually within four months in Tehran, Iran, after receiving ethics approval from the ethics board of Shahid Beheshti University of Medical Sciences (Approval code: IR.SBMU.MSP.REC.1396.172). In doing so, at first, the age range of 15 to 45 years old was divided into six groups and sampling in each group was conducted independently to ensure equal distribution of participants in terms of age. Then, after providing participants with written consent forms, they were given a short description of the aim of this study. Moreover, the participants were assured of confidentiality and anonymity, and it was

emphasized that they were volunteers who could discontinue participating in the study at any time. It is worth noting that all measures were counterbalanced to eliminate the effect of administration; so that, at first, the instructions and demographics sheet (including age, gender, marital status, educational status, and occupational status) and then three measures were given to the respondents in different orders.

3. RESULTS

Factor Analysis

To examine the component structure of the Interpersonal Stress Scale, Exploratory Factor Analysis (EFA) was conducted using principal axis factoring followed by varimax rotation. Firstly, Bartlett's test of sphericity, which tests the overall significance of all the correlations within the correlation matrix, was significant ($\chi^2(496) = 6411.25, p < .001$), showing that it was appropriate to use factor analysis for this set of data. Then, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy revealed that the strength of the relationships among variables was high (KMO = .87), thus it was acceptable to proceed with the analysis.

After performing Bartlett's test for sphericity and KMO test for sampling adequacy, the factor structure of the measure was examined and items with a factor loading of .40 or greater were retained. The results showed that the Interpersonal Stress Scale (ISS) consists of five factors; the eigen values of the factors 1 to 5 were 5.01, 3.77, 2.91, 2.01, and 1.33, with each of them accounting for 15.65, 11.87, 9.09, 6.25, and 4.16% of the total variance. Moreover, these factors explained 46.94% of the total variance. Based on the existing literature and considering items loaded on each factor, the factors 1 to 5 were named stress resulted from conflicts with family members, stress resulted from conflicts with colleagues, stress resulted from conflicts with friends and relatives, stress resulted from changes in the environment, and stress resulted from changes in personal life, respectively (Table 1).

Table 1 Confirmatory factor-analytic & descriptive statistics and classical psychometric item analyses

Factors	Items No.	Factor Loading	<i>M</i>	<i>SD</i>	<i>R</i>	α	Adj α
1	1	.79	1.67	.79	.75	.88	-.02
	2	.76	1.73	.77	.70	.88	-.02
	3	.76	1.73	.75	.71	.88	-.02
	4	.73	1.52	.81	.81	.87	-.03
	5	.72	1.50	.76	.70	.88	-.02
	6	.65	1.38	.83	.65	.89	-.01
	7	.61	1.48	.86	.60	.89	.00
		Eig: 5.01	Var: 15.65				
2	8	.80	.96	.86	.73	.85	-.03
	9	.78	1.18	1.01	.72	.86	-.02
	10	.77	1.14	.87	.71	.86	-.02
	11	.74	1.04	.78	.68	.86	-.02
	12	.70	.93	.84	.65	.86	-.02
	13	.66	1.18	.95	.62	.87	-.01
	14	.60	.75	.78	.55	.88	.00
		Eig: 3.77	Var: 11.78				
3	15	.74	1.33	.66	.65	.76	-.04
	16	.70	1.37	.62	.62	.77	-.04
	17	.58	1.50	.69	.59	.77	-.03
	18	.56	1.38	.61	.49	.79	-.02
	19	.55	1.49	.62	.51	.79	-.02
	20	.54	1.31	.76	.52	.79	-.02
	21	.40	1.53	.72	.45	.80	-.01
		Eig: 2.91	Var: 9.09				
4	22	.77	.52	.85	.64	.72	-.06
	23	.72	.39	.94	.59	.72	-.05

Factors	Items No.	Factor Loading	<i>M</i>	<i>SD</i>	<i>R</i>	α	Adj α
	24	.63	.52	.92	.48	.75	-.02
	25	.57	.54	1.05	.55	.73	-.04
	26	.51	.54	.94	.48	.75	-.02
	27	.48	1.13	1.25	.45	.77	-.01
		Eig: 2.01	Var: 6.25				
	28	.78	.29	.85	.61	.51	-.13
	29	.57	.31	.89	.47	.61	-.07
	30	.54	.36	.85	.43	.63	-.05
5	31	.45	.40	.79	.33	.67	-.01
	32	.43	.45	.93	.34	.67	.00
		Eig: 1.33	Var: 4.16				

Note: *M* = Mean; *SD* = Standard Deviation; *r* = Correlation Coefficient (coefficient of determination); α = Cronbach's Alpha; Eig = Eigen value for each factor; Var = % of total variance explained by each factor.

The preliminary ISS consists of 52 items of which 32 items were retained after factor analysis (see Table 2). As indicated in Figure 1, the scree plot also confirms the 5-factor structure of the scale.

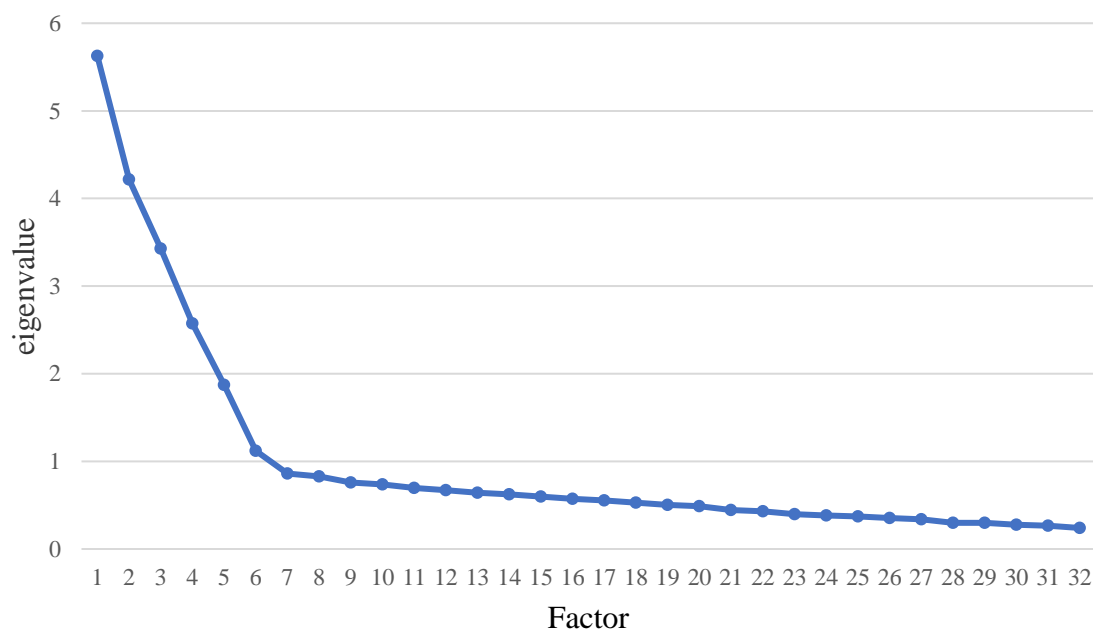


Figure 1 Scree plot

Table 2 Final items of the Interpersonal Stress Scale (ISS)

Factors	Item No.	Items
	1	I feel annoyed because of being badly treated in intimate relationships with my parents/children/wife/husband/partner
1	2	I am under pressure because of unreasonable expectations in intimate relationships with my parents/children/wife/husband/partner
	3	I feel helpless after having an argument with my parents/children/wife/husband/partner

	4	I am under pressure because of the anger resulted from an argument with my parents/children/wife/husband/partner
	5	I am sad that I do not feel close to my parents/children/wife/husband/partner because of having an argument with them
	6	Although I have relationships with my parents/children/wife/husband/partner, I feel lonely
	7	I feel that there is no one in my life to support me
	8	I am under pressure because of the anger resulted from an argument with my neighbors/colleagues/boss
	9	I feel helpless after having an argument with my neighbors/colleagues/boss
	10	I am under pressure because of unreasonable expectations in relationships with my neighbors/colleagues/boss
2	11	I feel annoyed because of being badly treated in relationships with my neighbors/colleagues/boss
	12	I am sad that I do not feel close to my neighbors/colleagues/boss because of having an argument with them
	13	I feel ashamed when I have an argument with my neighbors/colleagues/boss
	14	I am sad because of feeling lonely in my workplace
	15	I am under pressure because of the anger resulted from an argument with my friends/relatives
	16	I feel annoyed because of being badly treated in relationships with my friends/relatives
	17	I feel helpless after having an argument with my friends/relatives
3	18	I am sad that I do not feel close to my friends/relatives because of having an argument with them
	19	I am under pressure because of unreasonable expectations in relationships with my friends/relatives
	20	Although I have relationships with my friends/relatives, I feel lonely
	21	I feel ashamed when I have an argument with my friends/relatives
	22	I feel lonely in my school/university
	23	I have been feeling stressed out since I started studying a new degree
	24	I feel bad because of problems related to my academic performance (e.g. bad grades, dropping out of school/college, etc.)
4	25	I have had problems adapting to new life circumstances since I moved out of my parents' home and started living alone.
	26	I am distressed because of breaking up my relationships after moving to my new place (e.g. neighborhood, city, etc.)
	27	I feel upset because of being away from one of my beloved people (e.g. parents, wife/husband, or another important person)
	28	I have been under pressure since I got married
	29	I have been under pressure since my son/daughter was born
	30	I am feeling upset because of my wife's/husband's responsibilities in her/his new job.
5	31	I have been feeling distressed since one of my relatives moved to a new place (e.g. neighborhood, city, etc.)
	32	I am feeling depressed because of one of my beloved people's death (e.g. parents, children, wife/husband, friends, or relatives).

Descriptive Statistics and Classical Psychometric Item Analyses

The results of classical analysis and descriptive items statistics are reported in Table 1. As indicated, coefficients of determination for all items are higher than .43, except for two items of factor 5 (i.e. items 50 and 31 with coefficients of .33 and .34, respectively).

Reliability

Current results showed good internal consistency of the factors, with Cronbach's alpha coefficients being .89, .88, .80, .77, and .67 for factors 1 to 5, respectively. Moreover, correlation coefficients between factors and total score ranged from .40 to .66. Test-retest analysis also showed satisfactory reliability, with coefficients being .75, .87, .69, .96, and .95 for stress resulted from conflicts with family members, stress resulted from conflicts with colleagues, stress resulted from conflicts with friends and relatives, stress resulted from changes in the environment, and stress resulted from changes in personal life, respectively. The total test-retest reliability was also .83 (Table 3).

Table 3 Correlation matrix of factors in test and retest

	F1	F2	F3	F4	F5	T1	rF1	rF2	rF3	rF4	rF5
F1											
F2	-.02										
F3	.39 *	.04									
F4	.01	.02	.29 *								
F5	.05	.07	.16 *	.04							
T1	.56 *	.49 *	.66 *	.52 *	.40 *						
rF1	.75 *	.12	.42 *	.16	-.13	.58 *					
rF2	.25	.87 *	.30 *	.02	-.08	.67 *	.43 *				
rF3	.41 *	.19	.69 *	.28 **	-.15	.61 *	.69 *	.55 *			
rF4	.01	.05	.30 **	.96 *	-.19	.55 *	.26	.17	.38 *		
rF5	-.07	.01	.01	-.11	.95 *	.11	-.01	.03	-.05	-.11	
rT1	.44 *	.44 *	.55 *	.47 *	-.01	.83 *	.77 *	.74 *	.84 *	.60 *	.11

Notes: $N = 512$; $n_{retest} = 52$; * $p < .01$; ** $p < .05$

Validity

Table 4 represents the Pearson correlation coefficients between the subscales of ISS and Inventory of Interpersonal Problems (IIP) and Perceived Stress Scale (PSS). The results indicated that the IIP has a significant positive relationship with ISS subscales (except for stress resulted from changes in personal life), which shows the predictive validity of the ISS. As represented in Table 4, the strongest relationships were found between IIP and stress resulted from conflicts with friends and relatives ($r = .68$; $p < .05$) and stress resulted from conflicts with family members ($r = .60$; $p < .05$). In addition, a significant negative relationship between PSS and subscales of ISS (except for stress resulted from conflicts with colleagues and stress resulted from changes in the personal life) confirms divergent validity of the scale, with stress resulted from changes in the environment having the strongest relationship with PSS ($r = -.34$; $p < .05$).

Table 4 Correlation matrix of factors and variables

	F1	F2	F3	F4	F5
F1					
F2	-.02				
F3	.39 *	.04			
F4	.01	.02	.29 *		
F5	.05	.07	.16 *	.04	
Inventory of Interpersonal Problems (total score)	.60 *	.29 **	.68 *	.27 **	-.10
Perceived Stress Scale (total score)	-.24 **	-.17	-.24 **	-.34 *	-.07

Notes: $N = 512$; * $p < .01$; ** $p < .05$

Parameter Estimates and Item Information Functions

In addition to the classical item analysis, Item Response Theory (IRT) analysis using the Graded Response Model (GRM; Samejima, 1968) was also utilized to analyze retained items. This model is appropriate for use with those items possessing two or more ordinal response categories (e.g. Likert-type item responses). The GRM is a two-parameter model (i.e. discrimination and difficulty) that estimates a unique slope (α) and threshold parameter (β), which is $k - 1$, where k is the number of categories, for each item. As each item on the ISS has five ordered response categories, there are $5 - 1 = 4$ threshold parameters to be estimated for each item. The item threshold parameter refers to the point at which a respondent with a given latent trait has an equal probability (50:50) of responding in or above a category threshold. As indicated in Table 5, threshold parameters estimated for factors one, two, and three show that the items were spread appropriately over the latent trait continuum; however, threshold parameters estimated for factors four and five are mostly above 1.

Table 5 Parameter estimates

Items No.	Subdomain	Discrimination (α)	β_1	β_2	β_3	β_4
1		2.73	- 3.23	- .09	1.26	2.54
2		2.53	- 2.56	- .29	1.17	3.15
3		2.51	- 2.78	- .33	1.36	2.81
4	1	3.63	- 2.27	.23	1.38	2.29
5		2.17	- 2.47	.21	1.68	2.98
6		1.73	- 1.95	.55	1.78	3.22
7		1.50	- 2.00	.16	1.82	3.55
8		2.89	- .50	.81	1.98	3.29
9		2.52	- .64	.39	1.56	2.83
10		2.44	- .78	.46	2.03	3.81
11	2	2.31	- .88	.85	2.32	3.57
12		2.07	- .57	1.05	2.17	4.11
13		1.81	- .84	.56	1.79	3.50
14		1.47	- .24	1.39	3.72	4.99
15		2.46	- 1.86	.44	2.25	3.70
16		2.06	- 2.75	.51	2.27	3.73
17		1.81	- 2.67	.14	2.07	3.71
18	3	1.47	- 3.01	.44	3.03	4.67
19		1.53	- 3.35	.14	2.60	5.03
20		1.45	- 1.87	.52	2.42	4.69
21		1.20	- 3.23	.10	2.37	4.95
22		3.32	.60	1.29	2.08	3.20
23		3.07	1.21	1.37	1.71	2.81
24	4	2.48	.78	1.34	2.01	3.18
25		1.11	1.49	1.63	2.66	4.20
26		.87	1.28	1.93	3.94	5.96
27		.84	- .05	.65	2.07	4.63
28		3.56	1.33	1.44	1.88	2.46
29		2.09	1.50	1.59	2.00	2.70
30	5	1.57	1.39	1.56	2.57	4.75
31		1.08	1.29	2.11	3.81	6.36
32		1.27	1.30	1.64	2.67	4.18

Notes: α = item discrimination parameter estimates; β_1 , β_2 , β_3 , β_4 = item severity parameter estimates.

Finally, figure 2 shows item information curves for each factor. As mentioned, in factors four and five (i.e. stress resulted from changes in the environment and stress resulted from changes in the personal life), only abilities above zero have been assessed and respondents with low abilities cannot be discriminated.

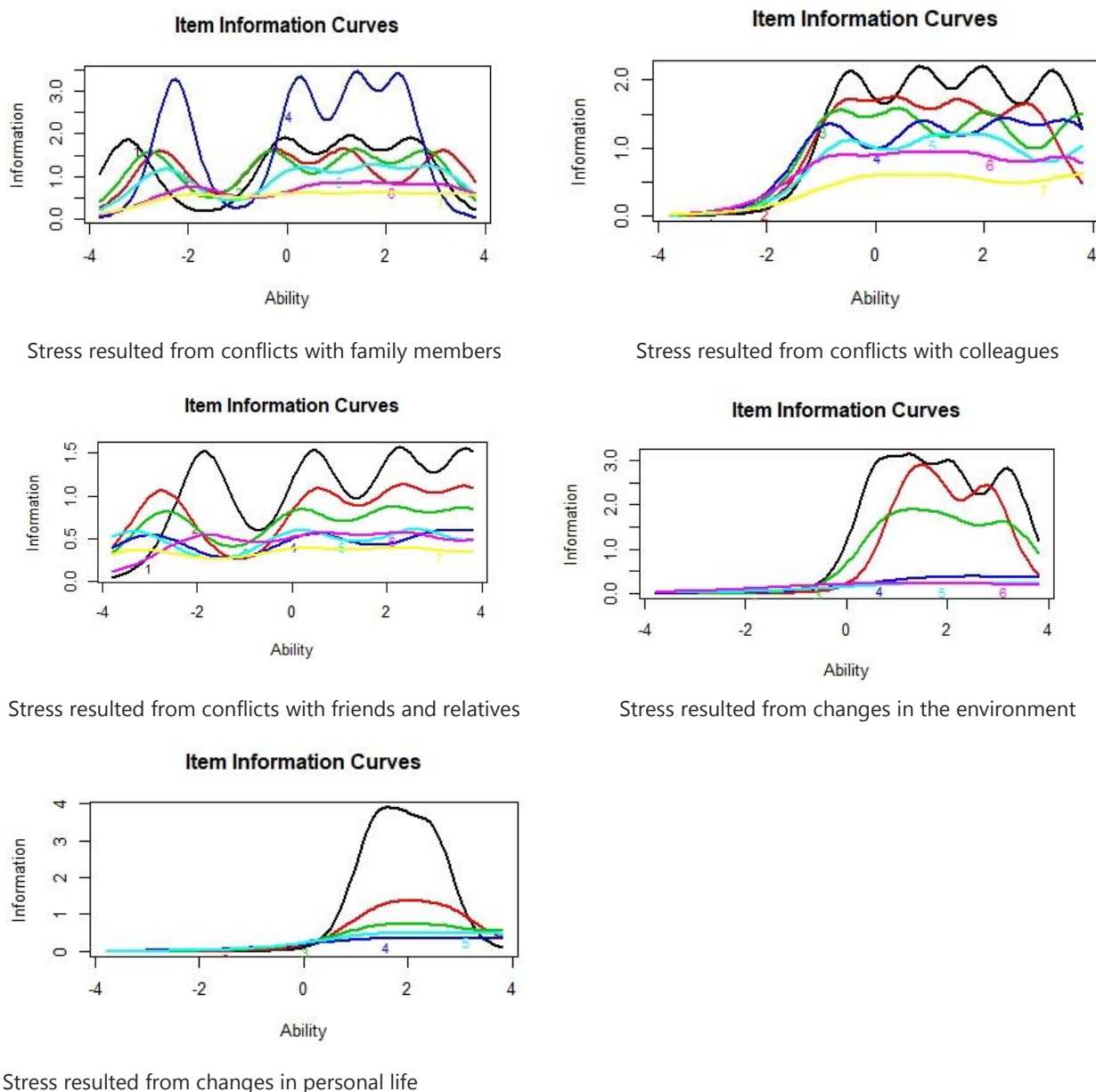


Figure 2 Item information functions for each of the five sub domains of the interpersonal stress scale

Note: The 32-item interpersonal scale was analyzed in one single item response theory calibration, and the item information functions are displayed in five graphs of separate interpersonal stress sub domains.

4. DISCUSSION

Conducting more research on different aspects of interpersonal stress, particularly its assessment, is of importance. Accordingly, the aim of this study was to develop a measure for the assessment of interpersonal stress, Interpersonal Stress Scale (ISS), and to examine its factor structure and psychometric properties in a sample of Iranians. One of the advantages of the ISS as a brief measure is that it can assess the severity of interpersonal stress in important aspects of life within a relatively long period of time. These aspects include stress experienced in the relationship with relatives, neighbors, and colleagues as well as stress caused by specific experiences and environmental changes (Lipsitz and Markowitz, 2013).

One of the most fundamental psychometric properties of a measure is its dimensionality which refers to the number of scores representing the target construct well. Exploratory Factor Analysis (EFA) is a method often used to examine the dimensionality or construct validity of the instrument. It summarizes the information contained in all items with a smaller number of latent variables called "factors". Then, these factors are interpreted as latent dimensions of a measure (John et al., 2013). In this study, EFA using principal axis factoring followed by varimax rotation indicated that interpersonal stress can be measured in five areas; factor loadings of the items were .40 or greater showing that reported indicators are good indices of the assessment of interpersonal stress in five areas which explain about 47% of the total variance. Therefore, this finding confirms the satisfactory construct validity of the interpersonal stress as a five-component construct. Current results also showed that conflicts with relatives and colleagues are especially important since they result in the highest level of interpersonal stress. Moreover, a non-significant relationship between subscales confirmed the independence of the factors which shows experiencing a specific type of interpersonal stress does not necessitate experiencing interpersonal stress in other areas. This independence can help in interpreting interpersonal stress scores more simply.

As mentioned, the relationship between interpersonal problems and the ISS was examined to test the predictive validity of the scale. Interpersonal problems refer to those problems arise in the relationship with others which cause little chance of satisfactory health and life. Our results demonstrated that interpersonal problems were positively associated with stress resulted from conflicts with family members, stress resulted from conflicts with colleagues, stress resulted from conflicts with friends and relatives, and stress resulted from changes in the environment. However, there was no significant relationship between interpersonal problems and stress resulted from changes in personal life; this kind of interpersonal stress particularly addresses items such as grief that is not related to interpersonal problems. This finding is consistent with previous studies showing a significant relationship between interpersonal stress and interpersonal problems (e.g. Buitron et al., 2016). A possible explanation for this finding is that those relationships which cause interpersonal stress usually involve arguments, tensions, negative beliefs and behavior, a dysfunctional atmosphere, and being worried about hurting others' feelings (Kato, 2014). Given the high level of conflicts in such relationships, experiencing interpersonal stress is quite possible.

To examine the divergent validity of the ISS, its relationship with perceived stress was tested. The results showed that perceived stress was negatively correlated with stress resulted from conflicts with family members, stress resulted from conflicts with friends and relatives, and stress resulted from changes in the environment, whereas no significant relationship was found between perceived stress with stress resulted from conflicts with colleagues and stress resulted from changes in the personal life. Given evidence that shows interpersonal stress has a more profound impact on mental health than other kinds of stressors (Aanes, Mittelmark and Hetland, 2010; Jackson and Finney, 2002), a possible explanation for our finding is that experiencing interpersonal stress may be different from experiencing other non-interpersonal stressors and each one has different consequences. Although some studies have suggested different effects of interpersonal and non-interpersonal stressors (Sheets and Craighead, 2014), this finding has not been explained well yet by other studies and more research is needed in this area.

Cronbach's alpha coefficient was used to test the internal consistency of the ISS. The results showed an alpha coefficient of .80 for the total score and alpha coefficients higher than .70 for the subscales of the ISS (except for stress resulted from changes in personal life), which shows satisfactory internal consistency of the scale in a non-clinical sample. Furthermore, test-retest results in a period of three weeks indicated that all subscales (except for stress resulted from conflicts with friends and relatives) had a correlation coefficient higher than .70, showing good reliability of the ISS.

In addition to the classical item analysis, IRT was also used to examine psychometric properties of the ISS. The findings are summarized as follows. Firstly, our results indicated that the 32-item ISS covered a wide range of interpersonal stress severity and item discrimination. In particular, some items represented a higher level of interpersonal stress severity and were more discriminating in comparison with others. Secondly, referring to item and test information, our findings indicated that all 32 items of the ISS were conducive to the assessment of interpersonal stress in various degrees of precision and that the ISS was applicable in the measurement of a wide range of interpersonal stress severity in non-clinical participants.

Our first part of findings, item properties from the IRT analysis, suggests that some items of the ISS reflected more discrimination and higher levels of severity than others. For example, based on the item discrimination, we found that stress resulted from conflicts with relatives and stress resulted from changes in personal life had the highest level of discriminating power whereas items 14, 18, 20, 21, 25, 26, 27, 31, and 32 had a discriminating power below 1.5. Moreover, between-category threshold parameters indicated that respondents with lower and higher levels of the latent trait of interpersonal stress chose low and high response options, respectively. For this reason, items discrimination power in distinguishing people has the lowest measurement error and the highest precision when the ability is zero.

The second most discriminating set of indicators included several items of the stress resulted from changes in the environment all of which were about educational stressors and were informative in assessing interpersonal stress at slightly high levels. The importance of this subscale, stress resulted from changes in the environment, in reflecting interpersonal stress indicates that main life transitions, particularly educational ones, influence interpersonal stress level significantly. Consistent with this finding, some other studies have suggested that developmental transitions from adolescence to adulthood make people vulnerable to experiencing stress (e.g. Brougham, Zail, Mendoza and Miller, 2009). Moreover, experiencing interpersonal issues such as conflicts with family and relational problems can exacerbate interpersonal stress in this period of time (Lumley and Provenzano, 2003). Therefore, those items that focus on educational performance can be helpful in the assessment of interpersonal stress in Iranian population.

The second finding shows that the ISS is useful in the assessment of symptomatology in the continuum of interpersonal stress levels. The test information for the 32-item scale indicated that the ISS yields a reliable assessment of interpersonal stress over a wide range of severity levels, ranging from below clinical threshold to above clinical threshold. Based on the findings of the current study, the ISS seems to be useful in both community and clinical settings.

5. CONCLUSION

In conclusion, current results showed that the ISS has satisfactory reliability, validity, and psychometric properties in a non-clinical sample. Given the focus of the ISS on various areas of life, the scale can be utilized for the assessment of interpersonal stress in different situations either as a screening tool or as a measure for the assessment of treatment outcomes.

Limitations and Future Directions

In spite of the advantages of utilizing the IRT approach, this study had several limitations that should be taken into account. Firstly, the ISS is a self-reported measure that was not cross-referenced with interview-based clinical tools assessing interpersonal stress; this can limit the validation process used in our study. Incorporating a gold standard instrument of interpersonal stress can be helpful in verifying construct validity of the scale. Secondly, given that data collection was conducted from a non-clinical community where most of the participants had academic degrees, the samples may not be representative of the population and therefore, the results must be generalized with caution. Thirdly, although we collected our data from various academic and social backgrounds, our sample was not randomly selected from the population. Future studies should take these considerations into account. In addition, the scale equivalence between the Persian and English versions of the ISS should be tested before generalizing these results to an English version. Finally, Since the ISS is a new measure developed and validated in Asian and particularly Iranian culture, it is necessary to validate the scale in other populations and cultures to verify its validity and usefulness as a tool for the assessment of interpersonal stress in clinical and non-clinical populations.

Conflict of Interest

The author(s) declared no conflicts of interest.

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Contributors

HA, AMA, MB and AB contributed to the conception and design of the study. HA, AMA, ARB, AO contributed to acquisition of data. HA, ARB, AMA, MB, AB and AO contributed to data analysis and interpretation. HA, AMA, MB, AB and AO contributed to the drafting of the manuscript and critical revision of the manuscript for important intellectual content. All authors participated in writing and approving the final draft of the manuscript.

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