Psychometric properties of the Depression Anxiety Stress Scales-21 (DASS-21) in a non-clinical Iranian sample

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The Depression Anxiety Stress Scales (DASS-21) was designed to measure the core symptoms of depression, anxiety and stress and has demonstrated excellent psychometric properties across studies mostly conducted in Western societies. However, the psychometric properties of this measure remained untested amongst non-clinical Iranian population. This paper presents the results of a preliminary study which examined the factor structure, reliability, convergent validity and discriminant validity of the DASS-21 Persian version amongst a non-clinical sample (n=378) of the Iranian population. All participants completed DASS-21, the Beck Depression Inventory and the Four Systems Anxiety Questionnaire. A 3-factor model for the 21-item DASS was supported by the data. Results also supported reliability and validity (convergent validity and discriminant validity) of the three scales of the DASS-21. These findings suggest that the Persian version of the DASS-21 has satisfactory psychometric properties and can be used amongst the Iranian adult population.

Keywords: depression, anxiety, stress, validity, reliability

Depression, anxiety and stress are amongst the most common problems treated by clinical psychologists (Borkovec, Echemendia, Ragusea & Ruiz, 2001). Thus, for conducting psychological assessment in both clinical practice and research, the availability of conceptually and psychometrically sound tests of mild to severe emotional disorders is important (Page &

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Stritzke, 2006). For fundamental psychological research to remain linked with clinical practice, it is useful for instruments to be appropriate for both clinical and non-clinical samples (Newnham, Harwood & Page, 2007). One promising measure for the assessment of negative affectivity in clinical and non-clinical samples is the Depression Anxiety Stress Scales (DASS) (Lovibond & Lovibond, 1995a). The DASS is based on a dimensional, as opposed to a categorical, concept of emotional syndromes, and was developed to assess the core symptoms of depression and anxiety whilst providing maximum discrimination between the two constructs. During the original factor analytic testing of the scale a third factor was identified, which was labelled "Stress" (Lovibond & Lovibond, 1995a)

DASS is a self-report measure. It consists of 42 items comprising 3 subscales of 14 items. Items refer to the past week. Each item rated on a 4 point Likert scale from 0 which means "did not apply to me at all" to 3 "applied to me very much or most of the time". The Depression subscale utilizes items which largely assess dysphoria, anhedonia, hopelessness, devaluation of life and inertia; The Anxiety subscale assesses acute responses of fear as well as somatic and subjective symptoms of anxiety, and the Stress subscale contains items which measure tension, agitation, irritability and difficulty in relaxing (Lovibond & Lovibond, 1995a). These 3 scales are considered to approximate facets of diagnostic categories as follows: Depression scale for mood disorders, Anxiety scales for panic disorders and Stress scale for generalized anxiety disorders (Brown, Chorpita, Korotitsch & Barlow, 1997).

There is strong empirical support for the use of DASS-42 amongst clinical and non-clinical populations (Lovibond & Lovibond, 1995a: Brown et al., 1997; Antony, Bieling, Cox, Enns, 1998; Crawford & Henry, 2003; Nieuwenhuijsen, de Boer, Verbeek, Blonk, & vanDijk, 2003; Page, Hooke & Morrison, 2007). Several studies have identified three factor solutions of DASS-42 in non-clinical samples (Lovibond & Lovibond, 1995a; Antony et al., 1998; Crawford & Henry, 2003) as well as in clinical samples (Brown et al., 1997, Antony et al., 1998). The current literature also supports the reliability of the DASS-42. For example, Lovibond and Lovibond (1995b), using a large non-clinical sample (n = 2914) reported

the internal consistency of the Depression Anxiety Stress Scales as 0.91, 0.84 and 0.90, respectively. These values are similar to those reported from clinical populations (Brown et al., 1997; Antony et al., 1998). In addition, Brown et al., (1997) using a sample of 20 psychiatric patients mostly with anxiety disorders (16 of 20), re-administered the DASS-42 two weeks following their initial intake evaluation. The test-retest correlations indicated that the 3 subscales of DASS-42 have favourable temporal stability (with rs of 0.71 for Depression, 0.79 for Anxiety and 0.81 for Stress).

The factor structure, concurrent validity and reliability of the Depression Anxiety Stress Scales (DASS-42) were examined amongst an adult Iranian sample (n = 420) recruited from the community (Asghari, Saed, Dibajnia & Zangeneh, in press). All participants completed the DASS-42, the Beck Depression Inventory (BDI) (Beck, Rush, Shaw & Emery, 1979) and the Four Systems Anxiety Questionnaire (FSAQ) (Koksal & Power, 1990). The results of the exploratory factor analysis revealed that while all the 14 items that make up the Stress scale loaded on the one factor, two items on the DASS-Depression scale (i.e., item 3 and item 5) had a complex structure also loading on the anxiety and stress factors. Furthermore, two items on the DASS-Anxiety scale (i.e., item 9 and item 40) had a complex structure also loading on the depression and stress factors. After deleting these 4 problematic items from the DASS, the results of exploratory factor analysis showed that a three-factor structure best fitted the data. The concurrent validity of the DASS scales was supported through the strong and positive Pearson correlation coefficients between the three scales of the DASS and the BDI and the FSAQ scales. Results also indicated excellent internal consistency (the Cronbach alphas range from 0.90 for anxiety to 0.93 for depression) and good test- retest reliability with a 3-week interval (the Pearson correlations range from 0.84 for depression to 0.90 for stress). From these findings it can be concluded that the Persian version of the DASS-38 (depression with 12 items, anxiety with 12 items and stress with 14 items) has satisfactory psychometric properties and can be administered amongst the Iranian adult population.

Subsequent research established a shorter version of DASS (DASS-21).

DASS-21 is composed of seven items taken from each of the three subscales of the DASS-42. The validity (factor structure) and reliability have been confirmed in a clinical sample (n = 258) (Antony et al., 1998). Further research confirmed the validity and reliability of DASS-21 in a large non-clinical sample (n = 1794) (Henry & Crawford, 2005) as well as in older primary care patients (Gloster, Rhoades, Novy, Klotsche, Senior, Kunik et al., 2008). It has been argued that the DASS-21 has several advantages relative to the DASS-42, including fewer items, a cleaner factor structure and smaller interfactor correlations (Antony et al., 1998).

Despite encouraging psychometric data with the DASS-21 in the English-speaking populations, there is no published paper addressing the psychometric properties of the DASS -21 amongst the Iranian general population. While the results obtained from the English-speaking populations may be generalizable to the Iranian population, to date this has not been well established. In this context, it is important to know that the ease of translating concepts and items into other languages for use with cultures other than the one(s) for which they were originally developed needs to be evaluated. Even if questions can be literally translated, it is important to consider whether the concepts are meaningful and are being interpreted similarly across cultures (Turk, Dworkin, Burke, Gershon, Rothman, Scott, et al., 2006).

The present study aimed to provide clinicians and researchers in this setting with a carefully translated version of the DASS-21 (DASS-21-Persian) and to present the results of a preliminary examination of its psychometric properties. Particularly, the study examined the factor structure, internal consistency, test-retest reliability, convergent validity and discriminant validity of the DASS-21-Persian, amongst a non-clinical sample of the Iranian population. We hypothesized that: 1) the three-factor solution of DASS-21 reported in previous studies would fit the data collected in this study; 2) the DASS-21 scales would demonstrate good convergent validity in this sample; 3) the DASS-21 scales would differentiate different diagnostic groups; and 4) the DASS-21 would demonstrate good internal consistency and test-retest reliability across all subscales.

As mentioned earlier, the DASS-21 has encouraging psychometric properties in the English speaking populations. Therefore, confirmation of similar psychometric properties of this measure should provide further support for its use in various settings in Iran and other Persian-speaking countries as well as amongst practitioners working with Persian-speaking clients in Western countries. We hope that this preliminary work will encourage researchers in these settings to further examine the psychometric properties of the test in clinical samples and in larger general-population samples.

Method

Participants

Sample for this study was comprised 390 persons who volunteered to participate in the study. The participants were drawn from two universities and 4 government organisations in Tehran, Iran. The participants were accepted into the study provided that they meet the criteria of (1) be able to read and speak Persian (Farsi), (2) aged 18 years and over; and (3) willing to participate in a research program. All participants completed a battery of questionnaires (please see section on Measures). They were also provided with information about demographic information (age, gender, education and marital status). All measures were given to each participant by a psychology student who explained the purpose of the study and how to complete the measures. All participants were informed that measures would be used for research purpose.

An inspection of the returned questionnaires revealed that 12 of them have missing data. The missing items in the questionnaires meant that they cannot be used in a confirmatory factor analysis. These 12 questionnaires were discarded from the final analysis. The resultant sample consisted of 378 participants.

Measures

Several measures were used in this study:

Persian version of Depression Anxiety Stress Scales (DASS-42). For cross-cultural adaptation of measures, Guillemin, Bombardier & Beaton

(1993) recommend a multi-step process, including forward and back translations and steps to ensure the conceptual equivalence of the measures. In our translation and preparation of the Persian version of the DASS-21 we took the following steps: (1) Translation of the original version of the DASS-21 (Lovibond & Lovibond, 1995b) from English into Persian language by two bilingual mental health practitioners independently. Any differences were resolved by agreement. (2) Back translation from Persian into English by another two mental health practitioners who were fluent in Persian and English independently. Again, any differences were resolved by agreement. (3) Revision of the final translation by the first author. (4) A pilot study with a sample of 50 Persian speaking university students to see if the DASS-42 was acceptable and understandable for them. The Persian version of the DASS-42 was very similar to the original version of the DASS-42. For the purpose of this study, data from 21 items of the DASS-42 (i.e, DASS-21) were used. As mentioned before, each of the three scales of the DASS-21 has seven items taken from each of the three scales of the DASS-42. The items of the DASS-21 refer to the past week. Each item rated on a 4 point Likert scale from 0 which means "did not apply to me at all" to 3 "applied to me very much or most of the time". For each scale, the score can range from 0 to 21. The greater the score, the more severe the depression, anxiety and stress.

Beck Depression Inventory (BDI) (Beck et al., 1979). The BDI was used to measure depression. The BDI consists of 21 categories of symptoms. A total score is obtained by summing scores on each category, and can range from 0 to 63. The greater the score, the more severe the depression. The psychometric properties (i.e., validity and reliability) of the BDI have been confirmed amongst Iranian samples (Rajabi, Attari & Haghighi, 2001). For the current study, the depression scale was found to have excellent internal reliability with a Cronbach α of 0.92.

The four Systems Anxiety Questionnaire (FSAQ) (Koksal & Power, 1990). The FSAQ was used to measure anxiety in this study. The FSAQ

consists of 60 Yes-No weighted items. The FSAQ measures anxiety in terms of four relatively independent components (affect, cognitive, behavioural and somatic). Each of these subscales has 15 items. These subscales have been developed so that the mean weights of each component are almost equal. Psychometric evaluation of the scale has shown satisfactory reliability and validity levels (Koksal & Power, 1990). The psychometric properties (i.e., validity and reliability) of the FSAQ have been confirmed amongst Iranian samples (Maredpour and Shairi, in press). For the current study, the four subscales of the FSAQ were found to have good internal reliability with a Cronbach α of 0.79 for affect, 0.83 for cognitive, 0.67 for behavioural and 0.66 for somatic. Furthermore, the Cronbach α for the whole FSAQ scale was 0.91.

Data analysis.

Using the total sample of 378 participants, confirmatory factor analysis (CFA) was used to test whether a 3- factor solution of the DASS-21 reported in previous studies fits data collected in the present study. To examine convergent validity, Pearson correlations were examined between DASS-21 and measures known to assess similar construct. Finally, to test the discriminant validity of the DASS-21 scales with respect to differentiation between diagnostic categories, a sample of patients (n = 173) was used. These patients were assigned to 3 mutually exclusive diagnostic groups: mood disorder (major depressive disorder or dysthymia) (n = 113), generalised anxiety disorder (GAD) (n = 40) and obsessive compulsive disorder (OCD) (n = 20), using DSM-IV criteria (American Psychiatric Association, 1994).

Sample size calculations

As a general rule, Tabachnick & Fidell (2001) have recommended a minimum of 300 cases for factor analysis.

Results
Sample characteristics and descriptive statistics of measures

Table1
Demographic characteristics of the study sample (n =378)

Variable	Male (N = 214)	Female (N = 164)
Gender, %	56.6	43.4
Age, years[a]	27.62 ± 6.90	27.42 ±7.4
Education		
High School diploma %	43	60
Bachelor and Over %	54	40
Marital status		
Never married%	68	57
Married%	32	43

[a] = Values shown as mean ± standard deviation

Table 2
Means and standard deviations (SD) for DASS-21 scales, the BDI and the FSAQ scales

Variable	Mean	SD
DASS		
Total Score	13.7	11.82
Depression	4.73	4.59
Anxiety	3.08	3.95
Stress	5.35	4.67
BDI	11.27	10.52
FSAQ		
Total score	244.47	69.01
Affect	62.03	16.43
Cognitive	50.33	24.01
Behavioural	55.46	19.36
Somatic	56.79	21.61

Table 1 provides a full description of the total sample (N= 378). The mean age of the participants was 27.53 years (*SD*= 7.15, range 18-56 years). There were 214 (56.6%) males and 164 (43.4%) females in the study. Table 2 demonstrates means and standard deviations for all measures used in this study.

Influence of demographic variables on DASS-21 scores:

Table 3

Relationships between demographic variables (gender, educational attainment and marital status) and DASS-21 scale scores

Criterion variable: Gender	Male Mean (SD)	Female Mean (SD)	*t* (*p*)
Depression	5.03 (4.65)	4.35 (4.51)	*t* = 1.42, (0.15)
Anxiety	3.35 (4.16)	2.72 (3.63)	*t* = 1.53, (0.12)
Stress	5.45 (4.66)	5.23 (4.69)	*t* = 0.45, (0.64)
Criterion variable; Education	≤12 years of eduction	> 12 years of education	*t* (*p*)
Depression	4.55 (4.62)	4.92 (4.57)	*t* = -0.78 (0.43)
Anxiety	2.92 (3.76)	3.23 (4.14)	*t* = -0.77 (0.44)
Stress	5.13 (4.90)	5.58 (4.43)	*t* = -0.94 (0.34)
Criterion variable: Marital status	Never married	Married	*t* (*p*)
Depression	5.12 (4.60)	4.1 (4.40)	*t* = 1.89 (0.06)
Anxiety	3.11 (4.0)	3.01 (3.90)	*t* = 0.24 (0.80)
Stress	5.59 (4.75)	4.95 (4.53)	*t* = 1.27 (0.20)

The relationships of the DASS-21 scale scores with gender, education, marital status and age were examined, using a series of *t*-tests for gender, education, marital status and Pearson correlation for age. The results of *t*-tests are presented in Table 3. As can be seen, no significant relationships were found between the DASS-21 scale scores and gender, marital status or educational attainment. Also, the Pearson correlations between age and the DASS-21 scale scores were negligible and non significant (with *r*s range from 0.01 to 0.05). These findings indicate that at least in this

sample, there are no significant associations between DASS-21 scale scores and demographic variables (as measured in terms of age, gender, education and marital status). Therefore, the collected data can be analyzed as a group.

Validity

In this study, the validity of the P-DASS-21 was established in three ways:

Confirmatory factor analysis

The adequacy of the three factor solution of the DASS-21 was tested using structural equation modelling (SEM) with the AMOS software package version 7 (Arbuckle, 2006). In this confirmatory factor analysis, the data were treated as continuous and the goodness of fit of the tested models was evaluated using the following indices: the root mean square error of approximation (RMSEA) with 90% confidence intervals, comparative fit index (CFI), goodness of fit index (GFI) the adjusted goodness of fit index (AGFI), the standardized root mean square residual (RMR) and the normal chi square (chi square divided by degree of freedom). Multiple indices were used, because they provide different information about the model fit and when used together provide a more conservative and reliable evaluation of the model solution (Jaccard & Wan, 1996). An acceptable model fit was defined according to the following cut-offs: RMSEA < 0.08, CFI > 0.90, GFI > 0.90, AGFI > 0.80 (Bollen & Long, 1993), RMR < 0.08 (Hu & Bentler, 1999) and normal chi square < 3 (Mulaik, James, Van Alstine, Bennett, Lind, & Stilwell, 1989).

In this study, confirmatory factor analysis (CFA) was used to test whether the 3-factor solution of the DASS-21 reported in previous studies fits data collected in the present study. CFA was performed on the covariance matrix of the DASS-21 items. The data was screened for normality of distribution. No outliers were detected. The model parameters were estimated using maximum likelihood. Three structural models were tested. In each of these 3 models, items 3, 10, 17, 26, 31, 38 and 42 loaded on a factor labelled Depression, items 2, 4, 20, 25, 28, 40 and 41 loaded on a factor labelled Anxiety and items 6, 8, 12, 18, 22, 35 and 39 loaded in a

factor labelled Stress. The goodness of fit indices for a correlated three-factor model are presented in Table 4.

In the first model, all covariances between measurement errors of the indicators were fixed. As can be seen in Table 3, this hypothesized model did not fit the data well. Inspection of the DASS-21 items suggested that some of the items have more similar contents than others. For example, item 2, "I was aware of dryness of my mouth" and Item 4, "I experienced breathing difficulty (e.g., excessively rapid breathing, breathlessness in the absence of physical exertion)". As Bentler (1990) has argued, on very rare occasions the assumption that all error covariances are uncorrelated with each other is applicable to real data. Based on the inspection of modification indices produced by the statistical package (i.e., AMOS), specific error covariance terms were freed sequentially. That is, after freeing error covariance between specific items the fit indices were examined to see if they improved.

As can be seen in Table 4, freeing 2 of the error covariance terms between items significantly improved the fit of the model. Also, the third model resulted in the best fit among the tested models and yielded an acceptable descriptive fit based on abovementioned cut offs. The fitness of the last two models was compared, using the parsimony principle. The result of this comparison indicates that the two models were significantly different ($\chi^2_{differnce}$= 32, 1.93, *df* = 1, *p <0.001)*. The final model is presented in Figure 1. Latent factors are represented by ovals, error covariances are represented by small circles and observed variables are represented by rectangles. Single-headed arrows represent a causal path, whilst double-headed arrows represent covariance between the latent factors. Standardized structure coefficients are presented and a factor loading of 0.40 and above was considered significant (Floyed & Widaman, 1995). As can be seen in Figure 1, all items loaded on their respective factors, having coefficients greater than 0.40, and implying that they are representative items for their relevant factors. Also, Figure 1 indicates that the three latent factors (Depression, Anxiety and Stress) are highly correlated. Correlations between the three factors were: 0.85 (Depression-Stress), 0.82 (Depression-Anxiety) and 0.80 (Anxiety-Stress).

Table 4
Summary of the model fit indexes

Model	Free parameters	IFI	NFI	RMR	RMSEA (90% Confidence Interval)	CFI	AGFI	GFI	X^2	df	X^2/df	P Value
1	Diagonal error Covariance	0.91	0.86	0.039	0.068 (0.061-0.075)	0.91	0.85	0.88	513.36	186	2.76	0.000001
2	Error Covariance 2.4 = Free	0.92	0.87	0.037	0.066 (0.059-0.073)	0.92	0.85	0.88	490.77	185	2.65	0.000001
3	More than above Error Covariance 4.20	0.93	0.88	0.036	0.064 (0.057-0.071)	0.93	0.86	0.90	470.43	184	2.55	0.000001

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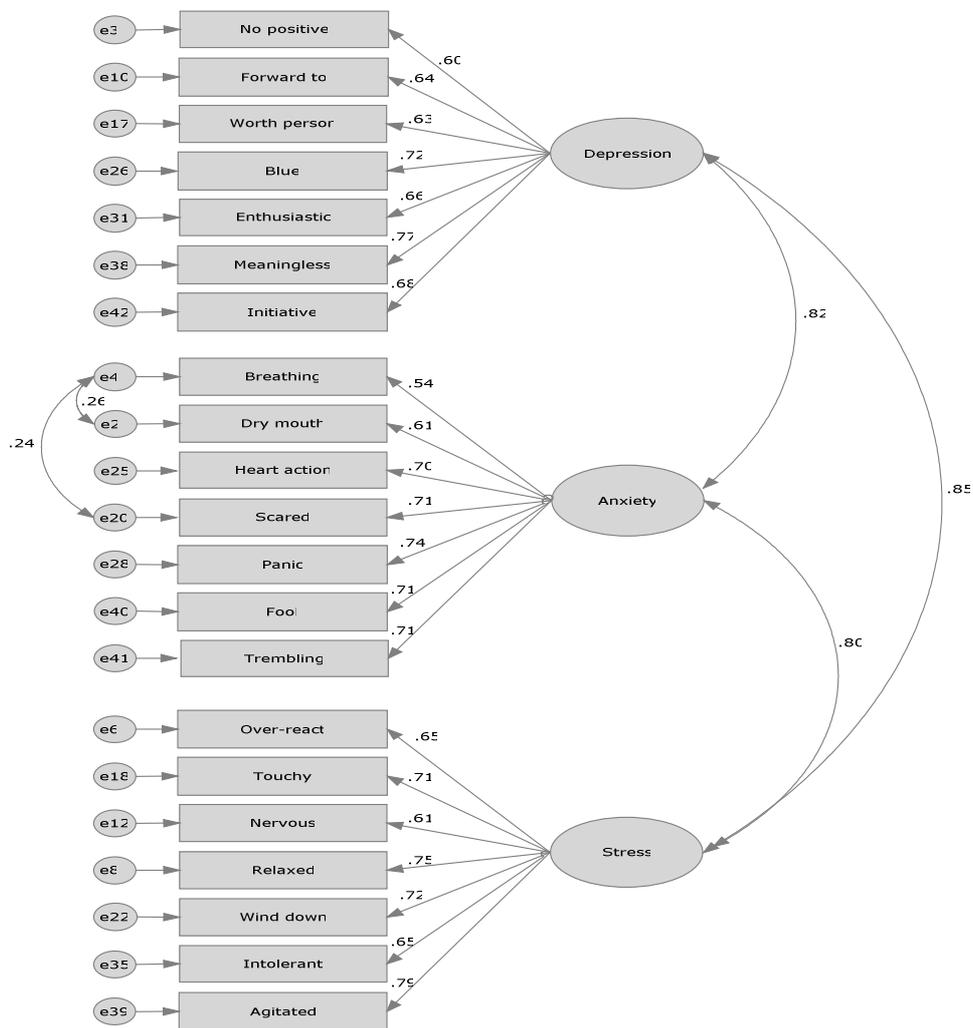
Figure1
Confirmatory factor analysis of DASS-21 final model

Convergent validity

To examine convergent validity, patterns of correlations were examined between the DASS-21 scales and other measures known to measure related constructs (i.e., BDI and FSAQ). These results are presented in Table 5. As expected, significant positive correlations emerged for the 3 scales of the DASS-21 and measures assumed to represent similar constructs (i.e., BDI and FSAQ). All correlations were statistically significant ($p \leq 0.001$).

Table 5
Pearson correlations amongst study variables

Variable	1	2	3	4	5	6	7	8
1-Depression (DASS)	__							
2-Anxiety (DASS)	0.68	__						
3- Stress (DASS)	0.73	0.67	__					
4- Anxiety (Somatic) (FSAQ)	0.61	0.54	0.59	__				
5- Anxiety (Cognitive) (FSAQ)	0.57	0.52	0.58	0.79	__			
6- Anxiety (Behavioural) (FSAQ)	0.44	0.43	0.41	0.63	0.58	__		
7- Anxiety (Affect) (FASQ)	0.42	0.52	0.40	0.58	0.54	0.54	__	
8- Total Anxiety (FASQ)	0.61	0.59	0.59	0.90	0.89	0.81	0.76	__
9- Depression (BDI)	0.70	0.57	0.59	0.57	0.55	0.41	0.48	0.60

Discriminant validity

To examine the discriminant validity of the DASS-21 scales with respect to differentiation between diagnostic categories, a sub sample of patients (n = 173) was assigned to three mutually exclusive diagnostic groups: mood disorder (major depressive disorder or dysthymia) (n = 113), generalised anxiety disorder (GAD) (n = 40) and obsessive compulsive disorder (OCD) (n = 20). These 3 groups were compared against 378 participants recruited from the general population (no diagnosis or non-clinical group), using a series of ANOVAs. A priori hypothesis for each scale was as follows: With respect to the Depression scale of the DASS-21 we predicted that patients with a mood disorder would score higher than those without. Because the Anxiety scale of the DASS-21 assesses acute responses of fear, autonomic arousal as well as somatic and subjective symptoms of ill health, patients in any of the three psychiatric diagnostic categories would score significantly higher than the non-clinical group. Finally, because the Stress scale of the DASS-21 contains items which

measure tension, agitation, irritability and difficulty in relaxing, we also predicted that patients in any of the three psychiatric diagnostic categories would score significantly higher than the non-clinical group. The results of a series of ANOVAs which examined the above hypotheses are presented in Table 6.

Table 6
Comparison of the diagnostic groups on the DASS

DASS Scale	Mood disorder N = 113 1	GAD N = 40 2	OCD N = 20 3	No diagnosis N = 378 4	F (*p*)	Significant group comparison
Depression						1>2,4
M	12.80	8.80	9.80	4.70	82.94	2>4
SD	4.90	5.70	5.52	4.60	(0.0001)	3>4
Anxiety						1>4
M	9.05	9.35	9.55	3.08	80.07	2>4
SD	4.60	5.320	4.90	3.95	(0.0001)	3>4
Stress						1>4
M	13.39	11.15	12.0	5.35	95.41	2>4
SD	4.40	4.79	4.92	4.67	(0.0001)	3>4

As can be seen in Table 6, our hypothesis that patients with mood disorders would score significantly higher than those without was partially supported. More specifically, while the non-clinical people as well as patients with GAD scored lower on the depression scale of the DASS-21 compared to patients with mood disorder, the two mood disorder and OCD groups did not significantly differ from each other in relation to the Depression scale of the DASS-21. As can be expected, patients with GAD and OCD scored higher on the depression scale of the DASS-21 compared to non-clinical sample. Furthermore, **o**ur predictions that all three diagnostic categories (i.e., Mood, GAD and OCD) would score significantly higher on the Anxiety and Stress scales of the DASS-21 than the non-clinical people were supported. There were no significant differences across the three diagnostic categories on the Anxiety and Stress scales of the DASS-21.

Reliability

In this study, the reliability of the DASS-21 was established in two ways:

Internal consistency

Internal consistency of items was calculated, using Cronbach's alpha coefficient. For the total score of DASS-21, the Cronbach alpha was 0.94. The Cronbach alpha for Depression, Anxiety and Stress scales were 0.85, 0.85 and 0.87, respectively. These values indicate that the DASS-21 has acceptable internal consistency (Nunnally & Bernstein, 1994; Anastasi & Urbina, 1997). These findings are similar to results reported among a large non-clinical sample in UK (Henry & Crawford, 2005).

Test-retest reliability

This was tested on a different sample of participants who were working in a public organisation ($n = 40$). Twenty of the participants were females and 20 were males. The mean age of the participants was 27.4 years (SD = 7.38). The test-retest period was 3 weeks. The intraclass correlation with absolute agreement between Time 1 and Time 2 assessment occasions for depression, anxiety and stress scales were 0.77 (95% CI: 0.56-0.88), 0.89 (95% CI: 0.81-0.94) and 0.85 (95% CI: 051-0.94), respectively. Intraclass correlation values above 0.74 indicate good reliability (Nunnally & Bernstein, 1994). These results are consistent with those previously reported amongst clinical sample (Brown et al., 1997).

The above findings would suggest that the Persian version of DASS-21 has a reasonable degree of reliability, both internally and across an extended period of at least 3 weeks.

Discussion

This study examined the factor structure, convergent and discriminant validity and reliability of the DASS-21-Persian amongst a non-clinical Iranian population. Before commenting on the results, some limitations of the study should be mentioned. The samples used in this study were not randomly selected and therefore may not be representative of the Iranian

population. This means the generalizability of the results to the entire Iranian population cannot be assumed. Secondly, all instruments examined in this study are self-report measures and are subject to similar sources of method error.

Confirmatory factor analysis indicated that a three-factor solution fit the data well. This is consistent with findings from a large non-clinical sample in UK (Henry & Crawford, 2005), adult anxiety disordered patients (Antony et al., 1998), adult Spanish patients (Daza, Novy, Stanley & Averill, 2002); adult mood disordered patients (Clara, Cox & Enns, 2001), older primary care patients (Gloster et al., 2008) and adult Iranian chronic pain patients (Asghari, Mehrabian, Paknejad and Saed, in Press).

Results of this study strongly support the convergent validity of the DASS-21 in non-clinical Iranian population. The pattern of correlations between the DASS-21 scale scores and the BDI and the FSAQ scale scores were consistent with a priori prediction.

Results also provide qualified evidence for the discriminant validity of the DASS-21 scales in a non-clinical Iranian Population. The three DASS-21 scales were tested for their ability to detect group mean differences between participants diagnosed with mood disorders, GAD, OCD, and (no diagnosis (non-clinical sample). Participants diagnosed with mood disorders, GAD and OCD scored significantly higher on each of the scales than people with no diagnosis. Furthermore, scores on the depression scale of the DASS-21 were higher for participants with mood disorders than patients with GAD. Similarly, scores on the Anxiety and Stress scales were higher in the GAD and OCD groups than in the non-clinical sample group. In contrast, no significant differences emerged across the three diagnostic groups (i.e., mood disorders, GAD and OCD) on the Anxiety and Stress scales of DASS. It should be noted, however, that the patterns of the means more or less were consistent with all a priori hypotheses. In summary, it seems that all 3 scales of the DASS-21 are able to differentiate clinical and non-clinical samples. Furthermore, the Depression scale of the DASS-21 appears to be able to differentiate patients with mood disorders from patients with GAD.

In conclusion, the DASS-21 demonstrated positive psychometric

properties amongst the Iranian population. Results of the study indicate that the DASS-21 has overall good-to-excellent internal consistency, good stability over time, a three factor structure consistent with previous findings amongst mostly English speaking population, very good convergent validity and acceptable discriminant validity, especially with respect to the Depression scale. The DASS-21 psychometric strengths provide support for its use in both clinical and research settings in the Iranian population.

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