

Psychometric properties and validation of the depression, anxiety and stress scale (DASS-18) in a sample of Moroccan university students

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Abstract: Objective: This study aimed to examine the psychometric properties of the 21-item Depression, Anxiety, and Stress Scale (DASS-21) in a sample of Moroccan students. **Method:** A total of 208 Moroccan students participated in this study. The dimensionality of the DASS-21 scale was assessed using exploratory factor analysis. Construct validity was assessed using the Stress Perception (PSS-10), State Anxiety (SAI), and Depression (CESD-10) scales. **Results:** Correlation analyses between Depression, Anxiety, and Stress subscales showed significant results. The exploratory factor analysis results confirmed the DASS's three-dimensional structure. Furthermore, correlation analyses revealed positive correlations between the DASS-18 sub-dimensions and the three scales for Stress (PSS-10), Anxiety (SAI), and Depression (CESD-10). **Conclusion:** In line with previous work, the results of this study suggest that the DASS-18 reflect adequate psychometric properties, making it an appropriate tool for use in the university context.

Keywords: stress; anxiety; depression; PSS-10; CESD-10; SAI; DASS-21

1. Introduction

The first version of the 42-item Depression, Anxiety, and Stress Scale (DASS-42) was initially tested on a non-clinical group. Originally, this version included subscales to measure Depression and Anxiety. However, it became apparent that some items on the scale were irrelevant to Depression or Anxiety. Following a factor analysis by Lovibond and Lovibond (1995), it was proposed that these items, which did not appear to capture Anxiety or Depression, be grouped in a new stress-related dimension. The authors developed a shorter version called DASS-21 to simplify the assessment process. In this version, they selected seven representative items from each subscale of the DASS-42. The results of the DASS-21 psychometric evaluations revealed satisfactory internal reliability, with coefficients exceeding the acceptable threshold, both for the scale as a whole (Gloster et al., 2008; Henry and Crawford, 2005; Wang et al., 2016) and for the three individual subscales (Bottesi et al., 2015; Clara et al., 2001; Sinclair et al., 2012). Regarding factor structure, some studies have reported the presence of three distinct factors (Antony et al., 1998). However, other studies conducted in various contexts have produced divergent conclusions regarding the structure of DASS-21 (Bottesi et al., 2015; Le et al., 2017; Zanon et al., 2021). For example, Silva et al. (2016) put forward a two-factor structure, while Le et al. (2017) suggested a four-factor structure. Other studies have observed cross-loading on two or more factors (Ali et al., 2017; Clara et al., 2001;

Oei et al., 2013). Even in the Arab context, similar results raised questions when adapting DASS-21 (Ali et al., 2017).

The aim of the present study is to test the psychometric qualities of the measurement scale in a population of Moroccan students.

2. Materials and methods

2.1. Design and procedure

The data for this study were collected between September and December 2023 through a cross-sectional survey. Participants were recruited from universities in the Rabat-Salé- Kenitra region. The scale was translated from the original English into Arabic using the translation-back-translation method (Brislin, 1970).

2.2. Measures

2.2.1. Depression anxiety stress scale (DASS-21)

The DASS-21, developed by Lovibond and Lovibond (1995). comprised of three subscales: Depression (DASS-D), Anxiety (DASS-A) and Stress (DASS-S). There are 7-item in each subscale that is designed to measure the severity and frequency of experiencing symptoms of Depression, Anxiety and Stress. Items are scored on a 4-point Likert scale, ranging from 0 (did not apply to me at all) to 3 (applied to me very much). The total sum for DASS-21 is derived by summing the total scores of all individual items. The internal consistency as reported in the original scale validation study was 0.81 for Depression; 0.73 for Anxiety, and 0.81 for Stress (Lovibond and Lovibond, 1995).

2.2.2. The perceived stress scale (PSS-10)

The PSS-10 was designed to assess how stressful individuals perceived events of the previous month. The scale consists of ten items with five possible responses on a Likert scale: never (0); seldom (1); occasionally (2); frequently (3) and very frequently (4). Six PSS-10 items are considered negative (items 1, 2, 3, 6, 9, and 10) and measure the amount of distress; the other four are considered positive (items 4, 5, 7, and 8) and represent a person's view of their ability to cope with Stress. When calculating the total PSS-10 score, the positive items were coded in reverse. The PSS-10 total score ranges from 0 to 40, with higher levels indicating more Stress.

2.2.3. The center of epidemiological studies for depression (CED-S-10)

The short version of CES-D-10 scale (Andresen et al., 1994) consists of 10 questions that assess depressed mood throughout the previous week. The questions assess the emotional and physical symptoms associated with depression. Participants were asked to rate the frequency of symptoms they experienced on a scale from "never" (0) to "occasionally" (1), "moderate" (2) and "frequently" (3). Total scores ranged from 0 to 30, with higher numbers indicating more depression.

2.2.4. State anxiety inventory (SAI)

The SAI (Spielberger, 1971, 1983) was developed to measure transient emotional reactions and is part of the State-Trait Anxiety Inventory (Spielberger, 1971). Twenty items measure feelings of apprehension, tension, nervousness and worry about the

current situation (i.e. State Anxiety). On a four-point Likert scale, ranging from “Not at all” (1) to “Very much” (4), respondents are asked to indicate the extent to which each item corresponds to their current feelings.

2.3. Data analysis

Validation of the measurement scales was based on internal consistency, internal coherence criteria, and exploratory factor analyses. Cronbach’s alpha coefficient (score fidelity) assessed internal consistency for each dimension. Internal consistency was also verified by the correlations between different items within the same dimension and the correlation between each item and its dimension using Pearson’s coefficient (internal reliability) (Carey and Seibert, 1999). According to Carey and Seibert (1999), a Cronbach’s alpha value equal to or greater than 0.7 is considered acceptable, and a correlation of 0.4 or more is recommended.

The approach used to carry out the sequential analysis (Anderson and Gerbing, 1988) was as follows: First, the instrument’s reliability was assessed using Cronbach’s coefficient for the three dimensions of the scale. Next, the data were subjected to exploratory factor analysis (EFA) to extract underlying factors and test the dimensional structure of the inventory. The factor structure was examined using Principal Component Analysis (PCA), followed by varimax rotation.

The Kaiser-Meyer-Olkin (KMO) measure was calculated to test our sample size. Ideally, a KMO value greater than 0.60 was sought, a sign of good sample fit. The internal consistency of both the overall scale and the specific dimensions, after rotation, was assessed using Cronbach’s coefficient. An alpha value between 0.6 and 0.8 is generally considered acceptable.

3. Results

3.1. Sample characteristics

Of the students, 75 are aged between 22 and 25 (57.5%), 43 are aged between 17 and 21 (38.1%) and the remaining five are aged between 24 and 28 (4.4%). Regarding geographical origin, 69% of students come from urban areas, while 31% come from rural areas. Similarly, 68.1% of students study in the Faculty of Science, 15 % in the Faculty of Economics, 14.2% in Medicine and 2.7% in the Humanities. In addition, 82.2% of students are enrolled in bachelor’s programs, 7.1% in master’s programs, and 0.9% in doctoral programs. Participants reported no psychiatric antecedents or mental disorders.

3.2. Psychometric properties of the DASS-21 scale (current version DASS-18)

The internal consistency coefficient (Cronbach’s alpha) for the scale as a whole was satisfactory (Cronbach’s alpha = 0.95). An initial PCA with varimax rotation was carried out (Bartlett’s sphericity test highly significant; KMO = 0.950) also supported the existence of three factors as mentioned in the DASS-21 literature. On the other hand, we found that items 9 (Depression) and 13 (Anxiety) saturated the factor specific to Stress, while item 18 (Stress) saturated the factor specific to

Depression. Therefore, we carried out a second forced three-factor analysis (Bartlett’s sphericity test highly significant; KMO = 0.943) with the deletion of the items mentioned above. The results were highly satisfactory (see **Table 1**), with factor loadings ranging from 0.54 to 0.79 and internal consistency of 0.94 for the DASS-18 scale. Furthermore, the proposed factor structure suggested good consistency coefficients for the dimensions of Stress (alpha = 0.90), Depression (alpha = 0.87), and Anxiety (alpha = 0.85). Correlations between items and the total score for each factor ranged from 0.51 to 0.83. We also report that the scale items correlated well with each other. The model proposes that Stress, Anxiety, and Depression explain 24%, 21%, and 17% of the total variance, respectively. This analysis led to the selection of an 18-item DASS version, equally distributed over the three dimensions of the scale (6 items each).

Table 1. Analysis of items and factor structure (threshold > 0.5) of the DASS-18 scale (N = 204).

Scale	Item	Alpha	M	SD	Item total correlation	Alpha if item deleted	Factor1 (Str)	Factor2 (Anx)	Factor3 (Dep)
DASS (21)		0.95							
DASS (18)		0.94							
DASS (S)		0.90							
	Item1		1.637	1.019	0.721	0.942	0.765		
	Item6		1.591	0.824	0.834	0.94	0.791		
	Item8		1.74	1.094	0.707	0.942	0.709		
	Item11		1.471	1.019	0.807	0.94	0.721		
	Item12		1.392	1.056	0.797	0.94	0.728		
	Item14		1.402	1.034	0.753	0.941	0.630		
DASS (A)		0.85							
	Item2		1.157	1.000	0.511	0.945		0.575	
	Item4		1.142	1.052	0.631	0.943		0.762	
	Item7		1.059	1.085	0.538	0.945		0.532	
	Item19		1.27	1.119	0.665	0.943		0.778	
	Item20		1.098	1.059	0.694	0.942		0.663	
	Item15		1.064	1.105	0.764	0.941		0.561	
DASS (D)		0.87							
	Item3		1.152	0.983	0.613	0.944			0.545
	Item5		1.426	0.946	0.576	0.944			0.575
	Item10		1.162	1.109	0.728	0.941			0.634
	Item16		1.441	1.051	0.685	0.942			0.654
	Item17		0.98	1.031	0.602	0.944			0.778
	Item21		1.029	1.077	0.663	0.943			0.692

4. Discussion

Following an initial exploratory factor analysis, our results highlighted a loading defect in three items. After eliminating the three items, the second exploratory factor analysis revealed a three-factor structure. In agreement with

previous work (Lovibond and Lovibond, 1995; Antony et al., 1998), the present results support a three-dimensional factor structure of the DASS-18. As our results suggest, the factor structure of DASS-21 and the model identified in this study (DASS-18) support the theoretical three-dimensional model (Stress, Anxiety, and Depression).

Regarding the correlational analyses between the three subscales (see **Table 2**), the results revealed that Depression was positively correlated with Anxiety (0.73) and Stress (0.76). On the other hand, Anxiety was similarly correlated with Stress (0.713). This finding indicates strong links between the three dimensions and that individuals suffering from Depression could also present Anxiety and Stress. In the same vein, our correlational analyses highlighted good convergent validity. The levels of Depression obtained in the CESD-10 scale and the DASS-A subscale were highly significant (0.801). Similarly, the relationships between Stress and Anxiety scores from the PSS-10 and SAI-20 scales were highly correlated with those obtained from the DASS-S (0.774) and DASS-A (0.582) subscales.

Table 2. Correlation matrices between the perceived stress scale (PSS-10), state anxiety inventory (SAI-20), center for epidemiologic studies depression scale (CESD-10), depression anxiety stress scales (DASS), and DASS subscales.

Scale	1.	2.	3.	4.	5.
1. PSS-10	1				
2. SAI-20	0.713**	1			
3. CESD-10	0.743**	0.759**	1		
4. DASS(S)	0.774**	0.690**	0.784**	1	
5. DASS(A)	0.597**	0.582**	0.739**	0.739**	1
6. DASS(D)	0.654**	0.647**	0.801**	0.769**	0.718**

Given the literature review, it is worth mentioning that the DASS-21 has a solid theoretical foundation, and many studies have tried to test short versions to make assessment less time-consuming. With this in mind, we attempted to conduct confirmatory factor analyses testing the Arabic versions that have already been proposed (Ali et al., 2021). The analyses were not satisfactory, which might be due to the limited size of our sample. Future work will aim to carry out confirmatory factorial analyses on a larger sample.

5. Conclusion

In summary, the results of this study indicate that the Moroccan version DASS-18 reflects suitable psychometric properties in terms of internal consistency and validity (Bottesi et al., 2015; Zanon et al., 2021). They also demonstrate that the DASS-18 can be made available to clinicians and academic psychologists and can be used in various non-clinical sample groups. While the results of this study affirm the DASS-18 as a psychometrically reliable and valid tool for evaluating psychological distress in non-clinical populations, the use of a cross-sectional survey with a

convenience sampling method restricts the generalizability of the study's findings beyond the specific sample studied.

Author contributions: Conceptualization, YR and BB; methodology, YR, ZA; software, YR and BB; validation, BB and JET; formal analysis, YR and ZA; investigation, YR and ZA; resources, YR and ZA; data curation, YR and ZA; writing—original draft preparation, YR; writing—review and editing, YR, JET; visualization, YR; supervision, BB; project administration, BB; funding acquisition, YR. All authors have read and agreed to the published version of the manuscript.

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