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Psychometric properties of the Spanish version of Depression, Anxiety and Stress Scales (DASS)

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The psychometric properties of the Spanish version of the Depression, Anxiety and Stress Scales (DASS), and its short form (DASS-21), were studied in 365 Spanish university students. According to the confirmatory factor analysis of the DASS, none of the models (3 factors, a second-order factor underlying the three factors) had an acceptable fit. With regard to the DASS-21 the three-factor model had the best fit; this fit can be said to be acceptable but not good enough. Correlations with other questionnaires of anxiety, depression and positive/negative affect revealed a satisfactory convergent validity and an acceptable divergent validity. The discriminant validity was satisfactory, although the anxiety scale did not distinguish between anxious ($n=23$) and depressed ($n=12$) patients.

Propiedades psicométricas de la versión española de las Escalas de Depresión, Ansiedad y Estrés (DASS). Se examinan las propiedades psicométricas de la versión española de las Escalas de Depresión, Ansiedad y Estrés (DASS) y de su forma abreviada (DASS-21) en 365 universitarios. Según el análisis factorial confirmatorio del DASS, ni el modelo de 3 factores ni el de un factor de segundo orden subyacente a los tres factores tuvieron un ajuste aceptable. En el DASS-21 el modelo de tres factores fue el que mejor ajustó; puede decirse que el ajuste fue aceptable, pero no lo suficientemente bueno. Las correlaciones con otros cuestionarios de ansiedad, depresión y afecto positivo y negativo demostraron una validez convergente satisfactoria y una validez divergente aceptable. La validez discriminante fue satisfactoria, aunque la escala de ansiedad no diferenció entre pacientes ansiosos ($n=23$) y deprimidos ($n=12$).

There are strong correlations between the instruments used to measure anxiety and depression (Clark & Watson, 1991). Because of that, several authors have used factor analysis to develop anxiety and depression scales with a greater divergent validity. The most recent is that of Lovibond and Lovibond (1995a, 1995b). Their work led to the Depression, Anxiety and Stress Scales (DASS), each of which contains 14 items. The Depression scale assesses dysphoria, hopelessness, devaluation of life, self-deprecation, lack of interest or involvement, anhedonia, and inertia. The Anxiety scale concerns somatic and subjective symptoms of fear, and assesses autonomic arousal, skeletal musculature effects, situational anxiety, and subjective experience of anxious affect; however, the threat of future harm is not considered. The Stress scale measures non-specific, persistent arousal and tension; it assesses difficulty relaxing, nervous arousal, and being easily upset/agitated, irritable/over-reactive and impatient. Lovibond and Lovibond (1995a) have also derived a short-form of the questionnaire containing 21 items, 7 for each scale, and called DASS-21.

The correlation between the Anxiety and Depression scales of the DASS is moderately high, although it is lower than that found

with other instruments; for clinical samples it is .44 to .51 (Antony, Bieling, Cox, Enns and Swinson, 1999; Brown, Chorpita, Korotitsch and Barlow, 1997) and for non-clinical samples .54 (Lovibond and Lovibond, 1995a, 1995b).

The psychometric properties of the DASS have been studied in samples from Australia (Lovibond and Lovibond, 1995a, 1995b; Lovibond, 1998), the United States (Antony et al., 1998; Brown et al., 1997), Canada (Clara, Cox and Enns, 2001) and the Netherlands (de Beurs, van Dyck, Marquenie, Lange and Blonk, 2001). The internal consistency (Cronbach's alpha) of the Depression, Anxiety and Stress scales has been found to be .91, .84 and .90, respectively, in university students, and somewhat higher in clinical samples.

In terms of their correlations with other measures of anxiety and depression the Depression and Anxiety scales of the DASS show a satisfactory convergent validity and an acceptable divergent validity. First, the Depression and Anxiety scales of the DASS have correlated from .74 to .84 with the Beck Depression Inventory (BDI; Beck, Rush, Shaw and Emery, 1979) and the Beck Anxiety Inventory (BAI, Beck and Steer, 1993) respectively. Second, these correlations have been stronger than those between the Depression scale and the BAI (.40 to .54) and between the Anxiety scale and the BDI (.49 to .58).

Furthermore, relative to the other two DASS scales, (a) the Depression scale has correlated more strongly with another measures of depression, (b) the Anxiety scale has correlated more strongly with another measures of anxiety, and (c) the Stress scale has correlated more strongly with measures of negative affect and worry.

With respect to discriminant validity, the three DASS scales have been shown to discriminate between clinical (anxiety and depressive disorders) and non-clinical (university students) samples. The Depression scale discriminates between people with depressive disorders and those with anxiety disorders; the Anxiety scale discriminates between people with panic disorder and those with other anxiety or depressive disorders; and the Stress scale discriminates between people with depressive or generalized anxiety disorders and those with phobic or obsessive-compulsive disorders. However, in the study by Antony et al. (1998) patients with major depression scored higher on the Anxiety scale than did those with specific phobia or obsessive-compulsive disorder. Brown et al. (1997) also observed the former of these two differences. In both studies the Anxiety scale failed to discriminate between the social phobia and major depression groups.

In general, exploratory factor analyses of the DASS items have reproduced its three-factor structure in both clinical and non-clinical samples, although the degree of fit in confirmatory factor analyses has not been adequate (Antony et al., 1998; Brown et al., 1997; Clara et al., 2001; Lovibond and Lovibond, 1995b).

The DASS-21 has been studied less. The internal consistency (Cronbach's alpha) of its Depression, Anxiety and Stress scales is .81, .73 and .81, respectively (Lovibond and Lovibond, 1995a) and is even higher in clinical samples (Antony et al., 1998; Daza et al., 2002). The remaining data come from North American, Canadian and Hispanic clinical samples (Antony et al., 1998; Clara et al., 2001; Daza et al., 2002). In terms of convergent and divergent validity, and its ability to discriminate between clinical and non-clinical samples and between patients with different psychological disorders (anxiety and depressive disorders), the results are similar to those found with the DASS. In two of these studies (Antony et al., 1998; Clara et al., 2001) the DASS-21 was not administered separately, but as part of the full DASS.

Furthermore, one exploratory factor analysis (Antony et al., 1998) has shown the DASS-21 to have the same three factors as the DASS. In the confirmatory analysis of Clara et al. (2001) the three-factor model of the DASS-21 passed four of five evaluative criteria. Finally, in the confirmatory factor analysis of Daza et al. (2002) the three-factor first-order model of the DASS-21 and a second-order factor model were significantly better than the one-factor model; however, none of the fit indices reached the more frequently recommended cut-off points.

Therefore, apart from internal consistency, the psychometric properties and factor structure of the DASS-21 have so far only been studied in clinical samples. Thus, one aim of the present study was to assess the internal consistency, the convergent and divergent validity, the discriminant validity and the fit of the factor structure of the DASS-21 in a non-clinical sample. In addition, the psychometric properties of the DASS were studied in order to increase (a) the set of questionnaires validated in Spanish language (e.g., Sandín, Valiente, Chorot y Santed, 2005) and (b) the number of countries in which the instrument has been investigated.¹

Method

Participants

Three hundred and sixty-five students from the School of Psychology of the University of Barcelona (Spain) took part in the study. Of these, 297 were women and 68 men. All were third-year

students between the ages of 20 and 25 years. Of students, 91.5% were single, 8% were married or living with a partner and .5% were divorced or separated; 49.9% were unemployed apart from their studies.

The DASS was also administered to 59 consecutive patients attending throughout a year an external university-based psychology service, the Behavioural Therapy Unit of the University of Barcelona's School of Psychology. Of these 59, 35 were chosen who presented with a main diagnosis of either anxiety disorder (excluding specific phobias) or affective disorder. Of the 23 patients (14 women and 9 men) with anxiety disorder, 10 presented with panic disorder with or without agoraphobia, 9 with social phobia, 3 with generalized anxiety disorder and 1 with obsessive-compulsive disorder; 22% presented a co-morbid affective disorder. Of the 12 patients (10 women and 2 men) with affective disorders, 7 presented with unspecified depressive disorder, 2 with major depression, 2 with unspecified bipolar disorder and 1 with dysthymic disorder; 17% had a co-morbid anxiety disorder.

Diagnoses were established by independent raters with a semistructured interview similar to the Anxiety Disorders Interview Schedule for DSM-IV (Brown, DiNardo & Barlow, 1994). In instances where the patient was deemed as meeting criteria for two or more diagnoses, the principal diagnosis was the one associated with the highest distress and/or interference in functioning. In the few cases with no interrater agreement, raters worked to reach a consensus on the diagnosis.

The 35 patients were between 20 and 53 years of age ($M = 30.20$; $SD = 8.47$). Of these, 62.9% were single, 25.7% were married or living with a partner and 11.4% were divorced or separated; 42.9% were unemployed.

Measures

Depression, Anxiety and Stress Scales (DASS, Lovibond and Lovibond, 1995a, 1995b). Respondents evaluate from 0 to 3 the severity/frequency with which they have experienced each of the 42 negative emotional symptoms during the previous week. There are three 14-item scales (Depression, Anxiety and Stress). The responses to the 21 items of the DASS-21 were extracted from the responses to the DASS as a whole.

Symptom Checklist-90-R (SCL-90-R; Derogatis, 1983. Spanish version: Derogatis, 2002). This is a 90-item questionnaire scored on a scale of distress from 0 to 4, and which is often used to assess psychopathological characteristics during the last 7 days. Only two of its nine sub-scales, those referring to depression and anxiety, were analyzed.

Beck Depression Inventory (BDI; Beck et al., 1979. Spanish version: Sanz and Vázquez, 1998). This contains 21 items, each of which has four brief statements corresponding to normal responses and to mild, moderate and severe depressive symptoms. Respondents choose the statement, scored from 0 to 3, which best describes their feelings over the previous week.

Beck Anxiety Inventory (BAI, Beck and Steer, 1993. Spanish version: Sanz and Navarro, 2003). It contains 21 items, or symptoms of anxiety, each of which respondents score from 0 to 3 according to the degree of distress which it has produced in them over the previous week.

Positive and Negative Affect Schedule (PANAS; Watson, Clark and Tellegen, 1988. Spanish version: Sandín, Chorot,

Lostao, Joiner, Santet and Valiente, 1999). This contains 20 items, scored from 1 to 5, which assess positive and negative affect during the previous week. Positive affect reflects the extent to which a person feels enthusiastic, active and alert. Negative affect is a state or dimension of subjective distress and unpleasurable engagement that subsumes a variety of aversive mood states, such as anger, contempt, disgust, guilt, fear and nervousness.

Procedure

The DASS was translated into Spanish by a bilingual psychologist and the translation was supervised by four Spanish psychologists with knowledge of English. Our translation of the DASS-21 compares well with that realized by Daza et al. (2002). Of the 21 items, 16 are identical or very similar, 4 are a bit different and 1 is very different. The four somewhat different items are: 1 («Me ha costado mucho descargar la tensión» instead of «Me costó mucho relajarme»), 10 («He sentido que no había nada que me ilusionara» instead of «Sentí que no tenía nada por qué vivir»), 11 («Me he sentido inquieto» instead of «Noté que me agitaba») and 18 («He tendido a sentirme enfadado con facilidad» instead of «Sentí que estaba muy irritable»). The wording of item 8 is very different («He sentido que estaba gastando una gran cantidad de energía» instead of «Sentí que tenía muchos nervios»).

We think that there are some problems with the translation of these five items realized by Daza et al. (2002). Translation of items 1 and 18 coincides respectively almost with that of item 12 of the DASS-21 and with that of item 27 of the DASS. Translation of items 10 and 11 implies a degree of intensity greater than that involved in the original items. Finally, translation of item 8 is similar to that of item 33 of the DASS, and implies a meaning different from the original item. To check the correctness of our translation, a bilingual English professor translated back into English the 42 items of the DASS and the 5 items of Daza et al. (2002) above mentioned. Of the 42 items of the DASS, there was a problem with item 39; the meaning of this item (number 11 of the DASS-21) fit best with Daza's translation. Of the remaining four items of the DASS-21 which differed between Daza and us, two (1 and 18) had a similar meaning in both cases, and in the other two (8 and 10) backtranslation agreed with the translation carried out in this paper.

The 365 university students were asked to respond anonymously to the six questionnaires, which were administered during class time. They were told that it was part of a study regarding feelings, complaints and problems experienced by various groups of people. With respect to the patients, they responded to the DASS in the second or third consultation as part of the assessment procedure.

Results

Factor analysis

A confirmatory factor analysis was carried out in order to validate the three-factor structure of the DASS and DASS-21. Two models were considered in analyzing the structure of the DASS: three first-order factors (Depression, Anxiety and Stress), and a single second-order factor underlying the three first-order factors. Correlation between factors was permitted. The three-factor model produced a $\chi^2(816) = 2,250.8$, $p < .0001$, and the single second-order factor model gave a value of $\chi^2(816) = 2,327.5$, $p < .0001$.

Various indices were used to describe the degree of fit of the different models tested by the confirmatory factor analysis. These were: goodness of fit index (GFI), comparative fit index (CFI) and root mean square error of approximation (RMSEA). The following cut-off points have been frequently used for interpreting these indices: $GFI \geq .90$; $CFI \geq .90$; and $RMSEA \leq .05$. Browne and Cudeck (1992) have suggested that RMSEA values less than .05 constitute good fit, and values in the .05 to .08 range acceptable fit.

Table 1 shows that the three-factor model and the second-order factor model did not fit. The same models were then analyzed with respect to the DASS-21. Table 1 shows that the three-factor model had the best fit, and although none of the indices actually reached the recommended cut-off point they were very close to it; the fit can be said to be acceptable but not good enough. The estimated phi coefficients were very similar to those obtained for the DASS, in this case: Depression-Stress: .55; Anxiety-Stress: .71; Anxiety-Depression: .63.

Analysis of reliability

Using Cronbach's α the following α values were obtained for the Depression, Anxiety and Stress scales, respectively: .92, .84 and .91 for the DASS; and .84, .70 and .82 for the DASS-21.

Analysis of Convergent and Divergent Validity

Table 2 shows the intercorrelations between the three scales for both the DASS and the DASS-21. These intercorrelations were moderate, those corresponding to the DASS being higher, although not significantly so. The highest of the three intercorrelations, although again not significantly so, was that between Anxiety and Stress. Table 2 also shows the correlations between the different scales of the DASS and the DASS-21. Each of the DASS-21 scales was strongly correlated ($>.94$) with its corresponding scale in the DASS.

Also presented in Table 2 are the correlations between the DASS and DASS-21 scales and measures provided by other questionnaires. It was predicted, for both the DASS and the DASS-21, that in relation to the other two scales: (a) the Depression scale would correlate more strongly with other measures of depression, whether positively (BDI, depression subscale of the SCL-90-R) or negatively (positive affect sub-scale of the PANAS); (b) the Anxiety scale would correlate more strongly

Table 1
Fit indices for confirmatory factor analysis comparing two models for DASS and DASS-21

Fit index	Models for DASS		Models for DASS-21	
	3 factor	2nd order	3 factor	2nd order
GFI	.747	.744	.895	.874
CFI	.794	.796	.899	.870
RMSEA	.077	.071	.061	.070
χ^2 (df)	2,250.8 (816)	2,327.5 (816)	431.4 (186)	520.3 (186)

Note: GFI= goodness of fit index; CFI= comparative fit index; RMSEA= root mean square error of approximation; df= degrees of freedom; DASS= Depression, Anxiety, Stress Scales; DASS-21= short form of DASS. Data are from university students.

with other measures of anxiety (BAI, anxiety sub-scale of the SCL-90-R); and (c) the Stress scale would correlate more strongly with the negative affect sub-scale of the PANAS.

These pairs of correlations (16 for the DASS and 16 for the DASS-21) were compared by applying the z statistic of Meng, Rosenthal and Rubin (1992). Bonferroni's correction was also applied to the significance tests ($p_{crit} < .00312$). Almost all the predictions were borne out, with one noteworthy exception. The negative affect sub-scale of the PANAS did not correlate more

strongly with the DASS-21 Stress scale than with the DASS-21 Anxiety scale.

Analysis of Discriminant Validity

Table 3 shows the means and standard deviations for university students and patients. There were significant differences between the groups on all the scales of the DASS and DASS-21 according to t tests for groups with equal variances not assumed ($p < 0.009$). In addition, there were significant differences between anxious patients and depressed patients on the Depression and Stress scales of both questionnaires according to t tests for groups with equal variances assumed ($p < 0.015$); there were no differences on the Anxiety scale.

Discussion

The confirmatory factor analysis does not support the three-factor model of the DASS. This is in accordance with confirmatory factor analyses carried out by other authors (Brown et al., 1997; Clara et al., 2001; Lovibond and Lovibond, 1995b). In a recent work, published after the completion of this paper, Crawford and Henry (2003) found that the best fitting model of the latent structure of the DASS consisted of three correlated factors (Depression, Anxiety and Stress) in which three items (9, 30 and 33) were permitted to load on more than one factor.

In terms of the DASS-21, the fit indices for the three-factor model almost reached the recommended cut-off points and the fit can be said to be acceptable. This is consistent with the findings of Clara et al. (2001) and provides some support, as does the research by Daza et al. (2002), to the three-factor structure of the Spanish version of the DASS-21. However it is necessary to point out that in all these studies the degree of fit of the three-factor model was not good enough. On the other hand, in contrast to Daza et al. (2002) we found that the second-order factor model did not fit as well as the three-factor model.

In terms of the internal reliability of the DASS and DASS-21, the values found were acceptable. The lower value was for the Anxiety scale of the DASS-21 (.70), but similar to that obtained by Lovibond and Lovibond (1995a) with Australian psychology students (.73).

In line with the findings of other studies (Antony et al., 1998; Brown et al., 1997; Crawford and Henry, 2003; Daza et al., 2002; Lovibond and Lovibond, 1995b), the convergent validity of the DASS and the DASS-21 was satisfactory, since correlations between similar constructs (e.g., DASS Depression and BDI) were high and significant.

The divergent validity of the DASS and the DASS-21 was merely acceptable. In line with the aforementioned studies, correlations between different constructs (e.g., DASS Depression and BAI) were moderately high and significant. However, these correlations were significantly lower than the correlations between similar constructs. Regardless of instruments used, anxiety and depression are two constructs significantly correlated (Clark and Watson, 1991), although the DASS and DASS-21 seem to have a greater divergent validity than many other self-report inventories. The correlation between the Anxiety and Depression scales was .53 for the DASS-21 and .62 for the DASS. This latter value is higher than that found by Lovibond and Lovibond (1995b) with Australian students (.54), although somewhat lower than that

Table 2
Product moment correlations among scales of DASS and DASS-21 and other questionnaires

Measure	DASS: D	DASS: A	DASS: E	DASS-21: D	DASS-21: A	DASS-21: E
DASS: A	.62					
DASS: E	.57	.68				
DASS-21: D	.97	.58	.54			
DASS-21: A	.54	.94	.65	.53		
DASS-21: E	.51	.61	.95	.49	.60	
BDI	.80	.63	.60	.77	.58	.52
BAI	.58	.77	.58	.56	.73	.52
SCL-90-R : D	.84	.64	.65	.81	.58	.61
SCL-90-R : A	.57	.75	.67	.55	.70	.62
PANAS : PA	-.57	-.33	-.36	-.55	-.30	-.30
PANAS : NA	.58	.65	.74	.55	.60	.66

Note: N ranged from 339 to 365 according to the questionnaires considered. Data are from university students. BAI= Beck Anxiety Inventory; BDI= Beck Depression Inventory; DASS= Depression, Anxiety, Stress Scales (D, A and E correspond to Depression Anxiety and Stress respectively); DASS-21= short form of DASS; PANAS= Positive and Negative Affect Schedule (PA and NA are the subscales of positive and negative affect respectively); SCL-90-R= Symptom Checklist-90-R (D and A correspond to the subscales of depression and anxiety respectively).

Table 3
Means (with standard deviations in parenthesis) of University Students and Patients on DASS and DASS-21

Participants	DASS: D	DASS: A	DASS: E	DASS-21: D	DASS-21: A	DASS-21: E
University ^a	6.22 (6.38) $N= 361$	6.28 (5.35) $N= 360$	13.57 (7.68) $N= 359$	6.29 (6.76) $N= 363$	6.02 (5.61) $N= 364$	13.92 (7.65) $N= 362$
Patients	17.03 (11.02) $N= 33$	14.09 (7.99) $N= 34$	21.15 (9.24) $N= 33$	17.60 (11.19) $N= 35$	14.57 (8.64) $N= 35$	22.24 (9.74) $N= 33$
Anxious ^b	13.36 (9.45) $n= 22$	13.26 (7.65) $n= 23$	18.68 (9.14) $n= 22$	13.74 (9.39) $n= 23$	13.57 (8.65) $n= 23$	19.36 (9.29) $n= 22$
Depressed	24.36 (10.59) $n= 11$	15.82 (8.77) $n= 11$	26.09 (7.61) $n= 11$	25.00 (10.94) $n= 12$	16.50 (8.66) $n= 12$	28.00 (8.25) $n= 11$

Note: DASS= Depression, Anxiety, Stress Scales (D, A and E correspond to Depression Anxiety and Stress respectively); DASS-21= short form of DASS.

^a University students and patients differ significantly on all the scales according to t tests with equal variances not assumed ($p < 0.009$). ^b Anxious and depressed patients differ significantly on the scales of Depression and Stress according to t tests with equal variances assumed ($p < 0.015$).

found in the present study between the depression and anxiety subscales of the SCL-90-R (.71), and between the BDI and the BAI (.70).

The correlations between the PANAS and the DASS and DASS-21 were consistent with what would be predicted by Clark and Watson's (1991) tripartite model of depression and anxiety. We observed, like Brown et al. (1997), that the negative affect subscale of the PANAS correlated more strongly with the Stress scale, rather than the Anxiety and Depression scales of the DASS.

The discriminant validity of the DASS and the DASS-21 was satisfactory when the different scales were used to differentiate between university students and patients. However, although anxious and depressed patients differed on the Depression and Stress scales—a finding consistent with the studies of Antony et al. (1998) and Brown et al. (1997)—there was no difference on the Anxiety scale. With respect to the latter, Antony et al. (1998) and Brown et al. (1997) found that patients with panic disorder, with or without agoraphobia, scored significantly higher on the Anxiety scale than did depressed patients, but that this latter group was not differentiated from patients with other anxiety disorders and even scored higher than did patients with specific phobias. Nevertheless, when *a posteriori* we split our sample into three subgroups (panic disorder with/without agoraphobia, other anxiety disorders, affective disorders), there were no differences among these subgroups on the Anxiety scale of the DASS and the DASS-21.

The limitations of the present study should be pointed out. Firstly, all the data regarding the psychometric properties of the DASS-21 were obtained from responses to the DASS, from which the corresponding items were extracted. Therefore, a further study which directly uses the DASS-21 should be carried out in order to check the degree to which the current findings are replicable. Secondly, all the university subjects were psychology students and therefore it is not clear to what extent the results are generalizable to students as a whole. Finally, the clinical sample size was small.

In summary, our findings indicate that the factorial structure of the DASS has not been supported. On the other hand, the DASS-21 might be a useful instrument for assessing depression, anxiety and stress, although some changes may be necessary to achieve a better fit of the three-factor model. The DASS 21 has good reliability, satisfactory convergent validity and acceptable divergent validity, although it is necessary to improve the discriminant validity of the Anxiety scale.

Footnotes

- ¹ The study by Daza et al. (2002), who translated the DASS-21 into Spanish and validated it with Hispanic adults with anxiety disorders living in the United States, was published as we were completing our research. In our study, both the DASS and the DASS-21 were translated into Spanish and validated with a sample of university students from a European country (Spain).

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