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Factor structure and psychometric properties of the Dysfunctional Attitude Scale Revised in Colombian undergraduates[☆]

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Abstract   The Dysfunctional Attitude Scale (DAS) is a classic, 40-item measure of dysfunctional schema – a key construct of the cognitive model of depression. However, some controversy exists regarding the factorial structure of the DAS. Accordingly, a revised version of the DAS (hereafter, the DAS-R) has been recently proposed using confirmatory factor analysis and consisting of 17 items. The DAS-R contains two correlated factors: Perfectionism/Performance evaluation and Dependency. In a previous study with a Spanish sample, a hierarchical factor model with these two first-order factors and a general factor showed the best fit of the data. This study analyses the factorial structure and psychometric properties of the DAS-R in a sample of 762 Colombian undergraduates. The results were very similar to the ones obtained in the Spanish sample. The hierarchical factor structure showed the best fit of the data, and the DAS-R showed good internal consistency and discriminant and convergent validity. In conclusion, the DAS-R seems a good option to measure dysfunctional schema in Colombia. Furthermore, the replication of the hierarchical factor structure indicates that the DAS-R provides general and specific measures of dysfunctional schema that are theoretically meaningful.
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Estructura factorial y propiedades psicométricas de la Escala de Actitudes Disfuncionales Revisada en universitarios colombianos

Resumen   La Escala de Actitudes Disfuncionales (DAS) es una medida clásica de 40 ítems de los esquemas disfuncionales, un constructo central en el modelo cognitivo de la depresión. Sin

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embargo, existe alguna controversia en torno a su estructura factorial. Recientemente se ha propuesto una versión revisada del DAS (de aquí en adelante DAS-R), consistente en 17 ítems, usando un análisis factorial confirmatorio. El DAS-R contiene 2 factores correlacionados: perfeccionismo/evaluación del rendimiento y dependencia. En un estudio previo con una muestra española, una estructura jerárquica con estos 2 factores de primer orden y un factor general mostró el mejor ajuste a los datos. Este estudio analiza la estructura factorial y las propiedades psicométricas del DAS-R en una muestra de 762 estudiantes universitarios colombianos. Los resultados fueron muy similares a los obtenidos en la muestra española. La estructura factorial jerárquica mostró el mejor ajuste a los datos y el DAS-R mostró buena consistencia interna y validez discriminante y convergente. En conclusión, el DAS-R parece una buena opción para medir los esquemas disfuncionales en Colombia. Además, la replicación de la estructura factorial jerárquica indica que el DAS-R provee medidas generales y específicas de los esquemas disfuncionales que son teóricamente significativas.

Dysfunctional schemata are extremely inflexible beliefs that are the main cognitive vulnerability to depression according to the cognitive model advocated by Beck, Rush, Shaw, and Emery (1979). They are thought to be shaped by early negative life experiences, to be relatively stable, and to remain latent until the individual encounters negative events that activate them. In this case, dysfunctional schemata would skew the information processing system, leading to the production of negative automatic thoughts that constitute the cognitive triad (i.e., negative views about oneself, the world, and the future).

The measurement of dysfunctional schemata has been mainly conducted by applying the Dysfunctional Attitude Scale (DAS; Weissman & Beck, 1978). Most of the studies have relied on the total score of the DAS as a general cognitive vulnerability to depression, as exploratory factor analyses (EFA) have yielded mixed results regarding the number of factors extracted, with studies finding between two- to four-factor solutions (e.g., Cane, Olinger, Gotlib, & Kuiper, 1986; Chioqueta & Stiles, 2006; Sanz & Vázquez, 1993). Accordingly, de Graaf, Roelofs, and Huibers (2009) used confirmatory factor analysis (CFA) to compare the fit of the previously proposed factor structures using a Dutch version of the DAS with a very large general population sample (N = 8960). The authors found that the two-factor solution was the most adequate fit of the data and revised the DAS by retaining 17 items of the 40 original ones. This revised version (hereafter the DAS-R) consists of two correlated factors labeled as perfectionism/performance evaluation and dependency.

De Graaf et al. (2009) recommended the use of the DAS-R because it has some advantages over the full version. First, the DAS-R showed a clearer factor structure than the DAS and possesses good psychometric properties in terms of model fit, reliability, and convergent construct validity. Second, the DAS-R can considerably shorten the administration time with respect to the full DAS scale. Lastly, the DAS-R contains two theoretically meaningful subscales that measure specific dysfunctional schemata. This constitutes an advance in the analysis of the cognitive model of depression because, according to Beck (1987), vulnerable individuals might show only specific dysfunctional schemata rather than the whole range of dysfunctional beliefs measured by the DAS.

Following the work by de Graaf, Roelofs, & Huibers (2009), Ruiz et al. (2015) analyzed the factor structure and psychometric properties of the DAS-R in a Spanish sample mostly formed by undergraduates using the DAS version by Sanz and Vázquez (1993). The DAS-R showed excellent internal consistency and discriminant and convergent validity. The same two-factor structure as in de Graaf et al.'s study was found. Further, Ruiz et al. provided evidence of a hierarchical structure with two first-order factors (perfectionism/performance evaluation and dependency) and a second-order factor that reflects dysfunctional schemata in general. This finding is particularly important because it supports the common practice of aggregating DAS items into only one score versus calculating the subscales scores. This way, researchers and clinicians have more flexibility because they can obtain a global score of the DAS-R or separate scores of its two first-order factors depending on their interests.

To our best knowledge, neither the DAS nor the DAS-R have been validated in Colombia. The current study aimed at analyzing the psychometric properties and factor structure of the DAS-R by Ruiz et al. (2015) in a Colombian sample of undergraduates (N = 762).

Method

Participants

The sample included 762 undergraduates (age range 18-63, M = 21.16, SD = 3.76) from four universities of Bogotá. Forty-six percent of the sample were Psychology undergraduate students. The other majors included Law, Engineering, Mathematics, and Physics. Sixty-two percent were women. Of the overall sample, 26% of participants had received psychological or psychiatric treatment at some time, but only 4.3% were currently in treatment. Also, 2.9% of participants were taking some psychotropic medication.

Instruments

Dysfunctional Attitude Scale – Revised
(DAS-R; de Graaf et al., 2009; Weissman & Beck, 1978; Spanish version by Ruiz et al., 2015). The DAS comprises 40 items

that are rated on a 7-point Likert-type scale (7 = *fully agree*; 1 = *fully disagree*). The revised version of the DAS (i.e., the DAS-R; de Graaf et al., 2009) contains 17 items grouped in two factors: perfectionism/performance evaluation (e.g., ''It is difficult to be happy unless one is good-looking, intelligent, rich and creative'') and dependency (e.g., ''My value as a person depends greatly on what others think of me''). The Spanish version of the DAS-R showed excellent internal consistency for the total scale (α = .90), and good internal consistency for the perfectionism/performance evaluation factor (α = .87) and the dependency factor (α = .81). A factor structure with two-correlated factors and a second-order factor was obtained.

Automatic Thoughts Questionnaire – 8

(ATQ-8; Netemeyer et al., 2002; Spanish version by Cano-García & Rodríguez-Franco, 2002). The ATQ is a measure of the frequency of negative automatic thoughts experienced during the past week. It consists of 8 negative automatic thoughts that are rated on a 5-point Likert-type scale (5 = *all the time*; 1 = *not at all*). Examples of items are ''I'm no good,'' ''Nothing feels good anymore,'' ''What's wrong with me?'' and ''I'm worthless.'' The ATQ-8 showed good internal consistency in this study (α = .85). According to the cognitive theory of depression, it was expected that the DAS-R would show medium to strong correlations with the ATQ-8.

Acceptance and Action Questionnaire – II

(AAQ-II; Bond et al., 2011; Spanish version by Ruiz, Langer, Luciano, Cangas, & Beltrán, 2013). The AAQ-II is a general measure of psychological inflexibility. It consists of 7 items that are rated on a 7-point Likert-type scale (7 = *always true*; 1 = *never true*). The items reflect unwillingness to experience unwanted emotions and thoughts (e.g., ''I worry about not being able to control my worries and feelings'') and the inability to be in the present moment and behave according to value-directed actions when experiencing psychological events that could undermine them (e.g., ''My painful experiences and memories make it difficult for me to live a life that I would value''). The alpha found for the AAQ-II in this study was .88. The AAQ-II was administered because psychological inflexibility strongly correlated with the DAS in previous studies (e.g., Ruiz & Odriozola-González, in press).

General Health Questionnaire – 12

(GHQ-12; Goldberg & Williams, 1988; Spanish version by Rocha, Pérez, Rodríguez-Sanz, Borrell, & Obiols, 2011). The GHQ-12 is a 12-item, 4-point Likert-type scale that is frequently used as screening for psychological disorders. Respondents are asked to indicate the degree to which they have recently experienced a range of common symptoms of distress, with higher scores reflecting greater levels of psychological distress. The Likert scoring method was used in this study, with scores ranging 0 to 3 assigned to each of the four response options. The alpha value for the GHQ-12 in this study was .88. Medium to strong correlations were expected between the DAS-R and the GHQ-12.

Depression Anxiety and Stress Scales – 21

(DASS-21; Antony, Bieling, Cox, Enns, & Swinson, 1998; Spanish version by Daza, Novy, Stanley, & Averill, 2002). The DASS-21 is a 21-item, 4-point Likert-type scale (3 = *applied to me very much, or most of the time*; 0 = *did not apply to me at all*) consisting of sentences describing negative emotional states experienced during the last week. It contains three subscales (depression, anxiety, and stress) and has shown good internal consistency and convergent and discriminant validity. Alpha values in this study were .86, .80, and .80 for the depression, anxiety, and stress subscales, respectively. Medium to strong correlations were expected between the DAS-R and the total score of the DASS-21 and its subscales.

Satisfaction with Life Survey

(SWLS; Diener, Emmons, Larsen, & Griffin, 1985; Spanish version by Atienza, Pons, Balaguer, & García-Merita, 2000). The SWLS is a 5-item, 7-point Likert-type scale (7 = *strongly agree*; 1 = *strongly disagree*) that measures self-perceived well-being. Example of items are ''I am satisfied with my life'' and ''In most ways, my life is close to my ideal.'' The SWLS has good psychometric properties and convergent validity. The alpha value for the SWLS in this study was .85. Medium correlations were expected between the DAS-R and the SWLS.

Procedure

Following the suggestions by Elosua, Mujika, Almeida, and Hermosilla (2014), a small pilot study was conducted first to explore whether Colombian people experienced difficulties in understanding the items of the Spanish versions of the DAS-R, ATQ-8, AAQ-II, GHQ-12, DASS-21, and SWLS. Ten Colombian undergraduates did not find any difficulties in understanding the DAS-R items; therefore we decided to apply the original scale without changes.

Administration of the questionnaire package was collective and conducted in the participants' classrooms during the beginning of a regular class. Six people administered the questionnaire package following the same instructions. The study was presented, and individuals who signed an informed consent were given a questionnaire packet including the self-report instruments listed above. Upon completion of the study, the participants were debriefed about the aims of the study and thanked for their participation.

Data Analysis

Prior to conducting factor analyses, data were examined searching for missing values. Only three values of the DAS-R were missing (one value for items 3, 6, and 14). These data were inputted using the replacing option of the Factor 9.2© (Lorenzo-Seva & Ferrando, 2006).

The robustness of the two-factor model with a second-order factor found by Ruiz et al. (2015) and the alternative two-correlated-factor and one-factor models was assessed by conducting confirmatory factor analyses (CFA) using LISREL© (version 8.71, Jöreskog & Sörbom, 1999) and adopting an unweighted least square estimation method. Goodness-of-fit was examined computing the following fit indexes: (a) the root mean square error of approximation (RMSEA); (b) the comparative fit index (CFI); (c) the non-normed fit index (NNFI); and (d) the expected cross-validation index (ECVI). According to Kelloway (1998),

RMSEA values of .10 represent a good fit, with values below .05 representing a very good fit to the data. Regarding the CFI and NNFI, values above .90 indicate well-fitting models, and above .95 represent a very good fit to the data. The ECVI was computed to compare the goodness-of-fit of the three factor structure alternatives (lower values indicate better fit to the model). Lastly, the differences between the chi-square-values for the three models were calculated following a likelihood ratio test under the null hypothesis that the one-factor model fits as well as the two-factor models, and that the two-correlated factor model fits as well as the hierarchical factor model. These chi-square differences are also chi-square distributed with degrees of freedom equal to the difference between the degrees of freedom of the two compared models.

Following the recommendations by Gignac (2007), the Schmid-Leiman transformation (Schmid & Leiman, 1957) was conducted as an alternative to the nested factors modeling to explore the factor loadings of the items and the extracted variance accounted for by the general factor. This procedure performs a secondary EFA using the latent factor intercorrelations obtained from a previous EFA and facilitates interpretation of primary factors (items) relative to higher-order factors by computing direct relations between primary variables and second-order factors. Likewise, the proportion the general factor accounting for the extracted variance is indicative of the presence of a general factor (range = 40-50%; Gorsuch, 1983). This analysis was computed using Factor 9.2©. An exploratory unweighted least squares factor analysis with direct oblimin rotation and the Schmid-Leiman transformation (Schmid & Leiman, 1957) was conducted. Additionally, the syntax developed by Wolf and Preising (2005) for SPSS was used to compute the total extracted variance accounted for by the higher order factor.

The remaining statistical analyses were performed on SPSS 19©. Cronbach's alphas providing confidence intervals according to Duhacheck and Iacobucci (2004) were computed to explore the internal consistency of the DAS-R. Corrected item-total correlations were obtained to identify items that should be removed because of low discrimination item index (i.e., values below .20). Descriptive data were also calculated. To examine discriminant construct validity, scores on the DAS-R were compared, computing Student's t, between participants with scores above and below the cutoff on the GHQ-12 (i.e., 12 points). Pearson correlations between the DAS-R and the other scales were calculated to assess convergent and divergent construct validity.

Results

Factor Structure

Table 1 presents the results of the CFA comparing the three alternative models: (a) one-factor model, (b) two-correlated-factor model, (c) two-factor with a second-order factor model. The one-factor model obtained an acceptable fit, but inferior to the one observed for the two-factor model. The chi-square difference between the two-factor model and the two-factor model with a general factor was 173.53 (df = 1, p < .05), thereby indicating that the hierarchical factor model showed a significantly better fit to the data.

Scores on the goodness-of-fit indexes for the hierarchical factor model were good for the RMSEA (RMSEA = .059, 90% CI [.053, .065]), and very good for the CFI and NNFI (.99 and .98, respectively). Both factors were strongly correlated (r = .83). Table 2 shows the original items, their translation into Spanish, and factor loadings for the two-factor model with a general factor.

According to the Schimd-Leiman transformation, all items of the DAS-R seemed to represent the general factor because they showed loadings above .30 (Tabachnick & Fidell, 2007). The range of factor loadings was between .43 (item 6) and .70 (item 12). The loading of the two first-order factors on the second-order factor were .91 and .92 for the perfectionism/performance evaluation and dependence, respectively. The general factor accounted for 72.4% of the extracted variance, a proportion clearly above the range considered as indicative of the presence of a general factor (40%-50%; Gorsuch, 1983), whereas the two first-order factors explained 22.5% (perfectionism/performance evaluation) and 5.1.% (dependence) of the variance.

Internal Consistency, Descriptive Data and Criterion Validity

Table 3 shows that Cronbach's alpha of the overall DAS-R was .91 (95% CI [.90, .92]). With respect to the DAS-R factors, Perfectionism/Performance Evaluation showed an alpha of .87 (95% CI [.86, .89]), whereas the alpha of Dependency was .81 (95% CI [.79, .83]). Corrected item-total correlations of the DAS-R ranged from .46 to .66. With respect to the two factors, perfectionism/performance evaluation showed item-total correlations between .49 and .68, whereas for dependency, they were between .42 and .65.

Table 1 Goodness-of-Fit Indexes of the One-Factor, Two-Correlated Factors, and Two-Correlated Factors with a Second-Order Factor Models of the DAS-R.

Goodness-of-fit indicators	Two-factor model with a general factor	Two-factor model	One-factor model
RMSEA [90% CI]	.059 [.053, .065]	.073 [.067, .079]	.091 [.085, .096]
CFI	.99	.98	.97
NNFI	.98	.98	.96
ECVI [90% CI]	.65 [.58, .74]	.88 [.78, .98]	1.23 [1.11, 1.35]
χ^2 (df) Satorra-Bentler	425.64 (117)	599.17 (118)	864.68 (119)

Table 2   Item Description and Their Factor Loadings in a Completely Standardized Solution.

Item number and description	Factor loading
Perfectionism/performance evaluation	
1. Es difícil ser feliz si no se es atractivo, inteligente, rico y creativo [It is difficult to be happy, unless one is good-looking, intelligent, rich, and creative].	.58
2. Si no hago siempre las cosas bien, la gente no me respetará [If I do not do well all the time, people will not respect me].	.67
3. Si una persona pide ayuda, es señal de debilidad [If a person asks for help, it is a sign of weakness].	.66
4. Si no hago las cosas tan bien como los demás, eso significa que soy una persona inferior [If I do not do as well as other people, it means I am an inferior human being]	.77
5. Si fracaso en mi trabajo seré un fracaso como persona [If I fail at my work, then I am a failure as a person].	.79
6. Si no puedo hacer bien una cosa, es mejor no hacerla. [If you cannot do something well, there is little point in doing it at all].	.57
7. Si alguien no está de acuerdo conmigo, eso probablemente indica que no le agrado [If someone disagrees with me, it probably indicates that he does not like me].	.66
8. Si fracaso en parte, eso lo considero tan malo como ser un completo fracaso [If I fail partly, it is as bad as a complete failure].	.78
9. Si los demás saben cómo eres realmente, te considerarán menos [If other people know what you're really like, they will think less of you].	.78
10. Para ser una persona valiosa debo destacar de verdad por lo menos en un aspecto importante [If I am to be a worthwhile person, I must be truly outstanding in at least one major respect].	.64
11. Hacer una pregunta me hace parecer inferior [If I ask a question, it makes me look inferior].	.75
Dependency	
12. Mi valor como persona depende en gran medida de lo que los demás opinen de mí [My value as a person depends greatly on what others think of me].	.82
13. Es horrible recibir la censura de personas importantes para uno [It is awful to be disapproved of by people important to you].	.53
14. Si uno no tiene otras personas en las que confiar, está destinado a estar triste [If you don't have other people to lean on, you are bound to be sad].	.76
15. Si desagradas a los demás no puedes ser feliz [If others dislike you, you cannot be happy].	.77
16. Mi felicidad depende más de los demás que de mí [My happiness depends more on other people than it does on me].	.81
17. Es muy importante lo que otras personas piensan sobre mí [What other people think about me is very important].	.66

Table 4 shows that participants with scores above the cutoff on the GHQ-12 scored statistically significantly higher on the DAS-R and its subscales than those with scores below this cutoff.

Table 3   Cronbach's Alphas and Descriptive Data of the Dysfunctional Attitude Scale - Revised.

Dysfunctional Attitude Scale – Revised (DAS-R)	Sample N = 762
Total	
Cronbach's alpha	.91 [.90, .92]
M (SD)	38.27 (16.55)
Perfectionism/Performance evaluation	
Cronbach's alpha	.87 [.86, .89]
M (SD)	24.53 (11.15)
Dependency	
Cronbach's alpha	.81 [.79, .83]
M (SD)	13.73 (6.69)

Table 4   Mean DAS-R Scores of Participants who Scored above and below the Cutoff of the GHQ-12.

	Mean	SD	N
DAS-R total score			
Participants GHQ > 12	43.99	18.48	298
Participants GHQ < 12	34.52	13.99	461
Student's T	7.55[*]		
DAS-R Perfectionism			
Participants GHQ > 12	28.21	12.22	298
Participants GHQ < 12	22.11	9.68	461
Student's T	7.28[*]		
DAS-R Dependency			
Participants GHQ > 12	15.77	12.40	298
Participants GHQ < 12	12.40	5.70	461
Student's T	6.57[*]		

[*] $p < .001$.

Table 5   Pearson Correlations between the DAS-R Scores and Other Self-report Measures.

Measure	DAS-R – Total	DAS-R – Performance evaluation	DAS-R – Dependency
General Health Questionnaire – 12	.31[*]	.29[*]	.29[*]
DASS-21 – Depression	.42[*]	.41[*]	.36[*]
DASS-21 – Anxiety	.34[*]	.33[*]	.29[*]
DASS-21 – Stress	.31[*]	.29[*]	.28[*]
Automatic Thoughts Questionnaire-8 (ATQ-8)	.43[*]	.41[*]	.39[*]
Acceptance and Action Questionnaire – II	.42[*]	.41[*]	.37[*]
Satisfaction with Life Survey	-.26[*]	-.25[*]	-.24[*]

Note. DAS-R: Dysfunctional Attitude Scale – Revised; DASS-21: Depression, Anxiety and Stress Scales-21.
 [*] $p < .001$.

Pearson Correlations with other related Constructs

Table 5 shows that the DAS-R showed correlations with all other assessed constructs in theoretically coherent ways. Specifically, the DAS-R showed positive correlations with psychological distress, depression and anxiety symptoms, negative automatic thoughts, and psychological inflexibility; and negative correlations with life satisfaction.

Discussion

The data obtained in this study provide promising evidence that the DAS-R is a valid and reliable measure of dysfunctional schemata in Colombian samples. Overall, the current data are very similar to those obtained by Ruiz et al. (2015). Specifically, the DAS-R showed excellent internal consistency ($\alpha = .91$), with good Cronbach's alphas for its factors (perfectionism/performance evaluation: $\alpha = .87$; dependency: $\alpha = .81$). The construct convergent validity of the DAS-R was examined by analyzing its correlations with related constructs such as negative automatic thoughts and psychological inflexibility, whereas construct divergent validity was assessed by analyzing DAS-R correlations with life satisfaction. All correlations found were in the expected direction. Although correlations were relatively small, they were similar to those obtained in Ruiz et al. (2015). The DAS-R also presented discriminant validity to the extent that participants who scored above the cutoff on the GHQ-12 scored significantly higher on the DAS-R and its subscales than those who scored below the cutoff.

Importantly, the CFA conducted replicated the hierarchical factor model found by Ruiz et al. (2015) with two-correlated first-order factors (perfectionism/performance evaluation and dependency) and a second-order factor reflecting general dysfunctional schemata. This hierarchical factor structure obtained better fit to the data than the alternative two-correlated factor structure and one-factor structure. As commented in Ruiz et al., this finding has several relevant implications. On the one hand, the presence of a general factor provides a theoretical justification of using the total score of the DAS-R. This score provides a general measure of dysfunctional schemata and not the mere aggregation of the two types of dysfunctional schemata identified. On the other hand, in some contexts, it may be more advisable to analyze the scores on first-order factors.

As previously discussed, the possibility of analyzing the presence of specific dysfunctional schemata can be seen as an advance in the study of depression according to cognitive therapy (Beck, 1987).

Some limitations of this study are worth mentioning. Firstly, the functioning of the DAS-R was tested only in a nonclinical sample; therefore, further research is necessary in clinical samples to confirm the results obtained in this study. Secondly, no information was obtained concerning the diagnosis and the course of therapy in participants who reported being in psychological/psychiatric treatment. Thirdly, the sample used in this study consisted of undergraduate individuals and with a narrow age range. Accordingly, further study should analyze the psychometric properties and factor structure of the DAS-R with older people with less education. Fourthly, because all data were obtained using self-report measures, relationships among variables might be artificially inflated. Lastly, the instruments used to explore the convergent validity of the DAS-R lacked of a formal validation in a Colombian sample; however, their internal consistencies were adequate and similar to the ones obtained in the validation studies.

In conclusion, the DAS-R seems to be a reliable and valid measure of dysfunctional schemata in Colombian samples, consisting of a hierarchical factor structure with a general factor and two first-order factors. The DAS-R provides researchers and clinicians the option to investigate specific types of dysfunctional schemata reliably and provides a theoretically meaningful reason for the use of the total score as a general measure of dysfunctional thinking.

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