

## **SPANISH VALIDATION OF THE TYPE D PERSONALITY SCALE (DS14)**

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### **Abstract**

Type D personality, which encompasses two dimensions, Negative Affectivity (NA) and Social Inhibition (SI), has been identified as a risk factor for cardiovascular disease, and its link to other conditions has become a focus of research in recent years. The main study objectives were to assess the psychometric properties behind the Type D Personality Scale (DS14) in the Spanish population and to evaluate type D personality presence taking into account sociodemographic as well as clinical variables. A total of 1257 subjects (41.1% men and 58.9% women) participated in this study. Ages ranged from 18 to 80 years. The Spanish version of the DS14 and a sociodemographic questionnaire were administered. Cronbach's alpha coefficients for the DS14 subscales were .84 (NA) and .81 (SI). The original scale's factor structure was replicated. Type D personality presence was 29.7% in the total sample and 56.5% in patients presenting both hypertension and heart disease. The Spanish version of the DS14 shows high internal consistency and adequate evidence of internal and external validity when assessing type D personality.

KEY WORDS: *type D personality, DS14, validation, Spanish population.*

### **Resumen**

La personalidad tipo D integrada por dos dimensiones, Afectividad negativa (AN) e Inhibición social (IS) ha sido identificada como un factor de riesgo cardiovascular y, en los últimos años, se está investigando su asociación con otras enfermedades. El objetivo de este estudio es examinar las propiedades psicométricas de la "Escala de personalidad tipo D" (DS14) y su presencia en población española teniendo en cuenta características sociodemográficas y clínicas. La muestra participante fue de 1257 sujetos (41,1% varones), de entre 18 y 80 años de edad. El coeficiente de fiabilidad para las dos subescalas de la DS14 fue de 0,84 (AN) y 0,81 (IS). Se replicó la estructura factorial de la escala en su versión original. La presencia de personalidad tipo D fue de 29,7% en el total de la muestra y de 56,5% en pacientes que presentaban conjuntamente hipertensión y patología cardíaca. La versión española de la DS14 tiene una alta consistencia interna y muestra evidencias adecuadas de validez interna y externa.

PALABRAS CLAVE: *personalidad tipo D, DS14, validación, población española.*

## Introduction

Type D (distressed) personality is defined as the tendency to experience two stable personality traits, Negative Affectivity (NA) and Social Inhibition (SI), simultaneously. NA refers to the propensity to experience negative emotions over time and in different situations, whereas high NA involves symptoms of dysphoria, anxiety and irritability, a negative self-view, and anticipatory anxiety concerning imminent problems. SI refers to the tendency to inhibit the expression of emotions and to avoid confrontation in social settings that can bring about disapproval from others; this involves discomfort in social interactions and a lack of social skills (Denollet, 2005).

The presence of type D personality traits in community samples was found to have a negative impact on mental health, with a higher prevalence of symptoms of depression, anxiety, posttraumatic stress disorder, mental stress, low social support, and passive coping strategies (Denollet, 2005; Kupper & Denollet, 2007, 2014). This personality was also found to negatively affect physical health, reporting more somatic problems and poorer health status (Svansdottir et al., 2013). Type D personality is a vulnerability factor for psychological stress, associated with mechanisms that give rise to illness and work-related problems in healthy people (Mols & Denollet, 2010).

Type D personality is considered an independent risk factor for cardiovascular disease (Suls & Bunde, 2005), and research to date indicates that it is a psychological construct directly involved in both the onset and prognosis of progression for this type of pathology.

In terms of cardiovascular disease, type D personality has been linked to increased morbidity and mortality in ischemic heart disease (Denollet, Tekle, Pedersen, et al., 2013; Pedersen et al., 2010), an inadequate response to treatment in cardiopathy (Denollet, Vaes, & Brutsaert, 2000), greater psychological stress, and gaining less benefit from medical treatment (Pedersen & Denollet, 2003). It has also been associated with early-onset coronary disease (Ketterer et al., 2004), low quality of life (Denollet, 2000, 2005; Habibovic et al., 2011), increased risk of ventricular arrhythmia after defibrillator implantation (van den Broek et al., 2009), low adherence to treatment in patients with myocardial infarction (Williams, O'Connor, Grubb, & O'Carroll 2011), negative cardiac prognosis, and greater emotional instability in patients; furthermore, it is considered an independent predictor of risk for cardiac death (Denollet, Tekle, van der Voort, Alings, & van den Broek, 2013; Pedersen et al., 2010).

Thus, the relationship between type D personality, psychological status, and health habits has been examined by assessing personality, anxiety, and depression (Starrenburg et al., 2013). Starrenburg et al. (2013) found that type D personality, anxiety and depressive symptoms, plus a history of anxiety and depressive disorders, comprise vulnerability factors for experiencing poor health status prior to patients being fitted with an implantable cardioverter defibrillator (ICD). Moreover, a link has been identified between depression and poor health status and between type D personality and poor mental health status (Widdershoven, Kessing, Schiffer, Denollet, & Kupper, 2013), whereby both psychological risk factors appear to be

associated with poor self-care and health behaviors. However, these patients also had a higher prevalence of psychopharmacological medication use (sleep and antidepressant drugs) and poorer health-related behavior practices (e.g., minimal exercise, smoking, bad eating habits) when compared with non-type D patients (Svansdottir, van den Broek, Karlsson, Gudnason, & Denollet, 2012). Moreover, different studies have linked type D personality to patients with heart disease; for example, in Italy, type D personality was present in 39% of patients who participated in a cardiac rehabilitation program (Sogaro et al., 2010).

The Type D Scale (DS14) was a measure specifically designed to assess type D personality. From a clinical point of view, people with type D personality tend to worry excessively; they have a pessimistic outlook on life and generally feel tense, unhappy, and irritable. They are also less likely to display negative emotions for fear of rejection and disapproval, thus limiting their personal ties and feeling uncomfortable around strangers (Pedersen & Denollet, 2003).

The DS14 has been translated into different languages and has shown high reliability and internal consistency (Lim et al., 2011; Pedersen et al., 2009; Pedersen & Denollet, 2003; Sprindler, Kruse, Zwisler, & Pedersen, 2009; Svandottir et al., 2012; Vilchinsky et al., 2012; Weng et al., 2013; Yu, Zhang, & Liu, 2008; Yu, Thompson, Yu, Pedersen, & Denollet, 2010). Moreover, this scale has been adapted for use in other countries in both the general and clinical (heart disease) population (Alcelik et al., 2012; Barnett, Ledoux, Garcini, & Baker, 2009; Bergvik, Sorlie, Wynn, & Sexton, 2010; Christodoulou et al., 2013; Denollet, 2005; Grande et al., 2004; Jucynski & Oginska-Bulik, 2009; Kaur, Zainal, Low, Ramasamy, & Shidu, 2014).

This construct, specifically among Spanish samples, has been approached in a limited number of research studies. However, the relevance of type D personality and vital exhaustion as a syndrome of psychological distress (Appels & Murder, 1989), and their association with poor psychological adjustment in patients with heart disease, has been confirmed (Montero, Rueda, & Bermúdez, 2012).

Given the importance of assessing type D personality in patients with poor health status (i.e., heart disease patients) and the absence of a similar tool available in Spanish, the present study sought to evaluate the psychometric properties of the DS14 in the general Spanish population.

## Method

### *Participants*

An incidental sample of 1257 subjects from the general population was selected (41.1% men), both sexes ranging from 18 to 80 years (mean age of men = 37.09,  $SD = 14.73$ ; and mean age of women = 34.50,  $SD = 14.85$ ). Participants were final-year high school students, university students, university staff, company employees, and subjects who came to a health center.

The sample's sociodemographic characteristics are shown in Table 1. Of the total sample, 47% of men and 43.5% of women were single; 38.1% of men and 30% of women were first-time married; and 5% were widowed or separated. As

for employment situation, 25.9% of men and 38.2% of women were full-time students. Regarding the health variables, 20.2% of the total sample suffered with hypertension (11.8% of men and 8.4% of women) and 7.8% of the total sample presented heart disease (4.4% of men and 3.4% of women).

**Table 1**

Frequency and percentage of participants by sociodemographic and clinical variables

Sociodemographic and clinical variables	Men (n= 517)	Women (n= 740)
Civil status		
Single	225 (43.5%)	350 (47.3%)
Living with a partner	70 (13.5%)	83 (11.2%)
Widowed	4 (0.8%)	29 (3.9%)
Separated/divorced	12 (2.3%)	41 (5.5%)
First-time married	197 (38.1%)	229 (30.9%)
Second-time married	9 (1.7%)	8 (1.1%)
Educational level		
No studies	17 (3.3%)	19 (2.6%)
Reads and writes	47 (9.1%)	67 (9.1%)
Primary studies	19 (3.7%)	19 (2.6%)
Secondary studies	29 (5.6%)	48 (6.5%)
High school/Preuniversity	103 (20%)	137 (18.5%)
Vocational Training 1/2	89 (17.2%)	82 (11.1%)
University studies	178 (34.5%)	305 (41.3%)
Postgraduate studies	32 (6.2%)	58 (7.8%)
Other	2 (.4%)	4 (.5%)
Employment situation		
Employed	302 (58.4%)	303 (41%)
Retired	39 (7.5%)	13 (1.8%)
With a disability	5 (1.0%)	2 (.3%)
Student	134 (25.9%)	282 (38.2%)
Unemployed and/or claiming unemployment benefits	28 (5.4%)	57 (7.7%)
On sick leave	1 (.2%)	0 (0%)
Homemaker	4 (.8%)	78 (10.6%)
Self-employed	4 (.8%)	4 (.5%)
Suffering with hypertension	61 (11.8%)	62 (8.4%)
Suffering with heart disease	23 (4.4%)	25(3.4%)

### *Instruments*

- a) *Ad hoc Sociodemographic Characteristics Questionnaire*. A sociodemographic questionnaire was designed to collect data on age, sex, civil status, number of children, profession, educational level reached, and questions about the work setting (current situation, workday, working hours). Two questions referring to the participants' health status were included, one about hypertension and the other about the possible presence of heart disease.

- b) *Type D Personality Scale* (DS14; Denollet, 2005). The DS14 contains 14 items distributed across two subscales: Negative Affectivity (NA) and Social Inhibition (SI). The NA subscale has 7 items (e.g., "I often feel unhappy" and "I have a pessimistic view of things"). The SI subscale also has 7 items (e.g., "I am a closed person" and "I'm often inhibited in social relations"). Responses are rated on a 5-point Likert scale, ranging from 0 (*false*) to 4 (*true*). Total scores for each subscale range from 0 to 28 points. Denollet (2005) reported an alpha coefficient of .88 for the NA subscale and of .86 for the SI subscale, with a corrected item-total correlation of between .52 and .75. The scores of both subscales correlated moderately ( $r = .37$ ). In addition, the author observed how SI scores correlated negatively with extroversion ( $r = -.59$ ) and NA scores correlated positively with neuroticism ( $r = .68$ ) in the general population.

### *Procedure*

TRANSLATION PROCESS. The Spanish version of the DS14 was the result of a back translation performed by the questionnaire's author and his research team, thus giving us a Spanish version of the DS14. The DS14 Spanish translated version was reviewed by a multidisciplinary expert committee made up of two clinical psychologists with over 20 years experience, a psychometrician with 20 years plus experience in test translations, and a native English speaker highly proficient in Spanish (more than 18 years living in Spain and teaching English). The expert committee revised and compared the two DS14 versions (English and Spanish) to correct any potential mistakes. Thus, in order to ensure understanding and appropriateness of the terms included in the items, the committee revised words and expressions that could be deemed inappropriate or less familiar to the respondents. No changes were made. Furthermore, the DS14 Spanish version was administered to five individuals of different ages and socio-cultural level. These participants responded to the items of the scale and then answered through an interview which addressed the difficulties they faced when responding to the questionnaire items. Subjects had no difficulty in understanding the terms. Thus, the results obtained in this review process showed that no changes were necessary. Guidelines for test translations and adaptations were taken into account throughout the process (Muñiz, Elosua, & Hambleton, 2013).

ADMINISTRATION. Participants were informed of the research aims and the anonymous and confidential nature of their data. They then gave their informed consent to participate. Participants received no rewards or incentives for taking part in the study. Members of the research team administered the questionnaires. High-school and university students self-completed the DS14 and the multi-section survey during teaching hours. Employees received the questionnaire at work and returned it completed to the interviewer. Finally, the questionnaire was made available to those attending the health center in either self-completion or interview format. Total administration time was approximately 10 minutes.

### *Data analysis*

Data screening was conducted to assess missing data. A percentage of participants (1.33%) were excluded from the study because their answers were incomplete. In order to analyze the DS14's internal structure, a principal component factor analysis with varimax rotation was performed, accepting those factors with an eigenvalue equal to or greater than 1, in addition to inspecting the scree plot to select the factors. An item with a factor loading  $\geq .40$  on a factor was considered to belong to that factor. Moreover, a Confirmatory Factor Analysis (CFA) was used to analyze the internal structure of the DS14 items in the Spanish sample. But before this could be done, multivariate normality of item and test scores was tested. CFA, using the maximum likelihood estimation method, was conducted to evaluate the fit of the bidimensional model proposed by Denollet (2005). Thus, the hypothesis that items 2, 4, 5, 7, 9, 12 and 13 load on one factor and items 1, 3, 6, 8, 10, 11 and 14 load on a second factor was tested. Furthermore, all the measurement error terms associated with each item were uncorrelated and factors were allowed to be correlated. The adequacy of model fit was assessed using the following fit indices (Bentler, 2005; Hu & Bentler, 1999): comparative fit index (CFI), goodness of fit index (GFI), standardized root mean square residual (SRMR), and root mean square error of approximation (RMSEA) with its confidence interval. Conventional guidelines suggest that a good fit is indicated by CFI values between .90 and .95 and SRMR values less than .08. RMSEA values less than .06 indicate a good fit and as high as .08 indicates a reasonable fit. Statistical analyses were carried out using EQS 6.1 (Structural Equation Modeling Software, version 6.1) for CFA. Second, classical item analysis and reliability analysis (internal consistency) were performed. Finally, frequency analysis was conducted for type D personality and its dimensions (NA and SI) relative to the different sociodemographic and clinical variables considered in this study. The SPSS 17.0 statistical software was used for all remaining analyses (SPSS Inc., 2016).

## **Results**

### *Validity evidence based on the DS14's internal structure: exploratory and confirmatory factor analysis*

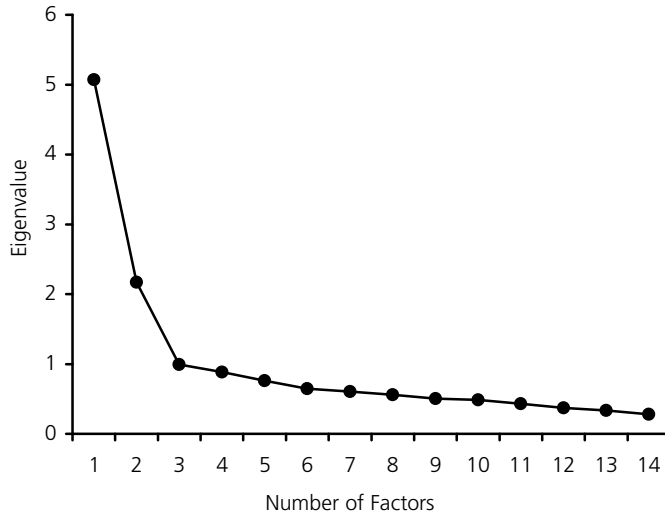
The principal component analysis results revealed two factors consistent with the DS14 personality model. Furthermore, two factors with an eigenvalue greater than 1 were obtained, which explained a greater proportion of variance over the remaining factors (see Figure 1). Thus, these factors accounted for 36.21 and 15.94%, respectively, of the variance.

Table 2 shows the rotated factor loadings obtained for each factor. In the first factor (NA), items 2, 4, 5, 7, 9, 12 and 13 yielded factor loadings higher than .40, whereas all remaining items loaded on the second factor (SI). In NA, items had a loading value of between .55 (Item 2) and .80 (Item 5). In SI, factor loadings ranged from .47 for Item 11 to .79 for Item 8. Analysis of the items (statements)

corresponding to Factor 1 (NA) indicated that they referred to dysphoria (items 4, 7 and 13), worry (2 and 12), and irritability (items 5 and 9). Analysis of Factor 2 (SI) reported items referring to nonconformity in social relations (items 6, 8 and 14) and social inhibition (items 1 and 3).

**Figure 1**

Scree plot showing the eigenvalues of the factors representing the DS14 items



**Table 2**

Exploratory factor analysis of the Type D Personality Scale (DS14)

Items	Factor 1	Factor 2
1. I make contact easily when I meet people*	-.024	<b>.697</b>
2. I often make a fuss about unimportant things	<b>.554</b>	.006
3. I often talk to strangers*	-.199	<b>.501</b>
4. I often feel unhappy	<b>.612</b>	.059
5. I am often irritated	<b>.803</b>	.022
6. I often feel inhibited in social interactions	.298	<b>.697</b>
7. I take a gloomy view of things	<b>.703</b>	.247
8. I find it hard to start a conversation	.191	<b>.786</b>
9. I am often in a bad mood	<b>.775</b>	.181
10. I am a closed kind of person	.273	<b>.737</b>
11. I would rather keep other people at a distance	.368	<b>.470</b>
12. I often find myself worrying about something	<b>.691</b>	.147
13. I am often down in the dumps	<b>.767</b>	.217
14. When socializing, I don't find the right things to talk about	.222	<b>.744</b>
% Explained variance for each factor	27.94	23.76

Notes: \*Reverse keyed. Extraction method: Analysis of principal components; Rotation method: Varimax normalization.

Univariate skewness and univariate kurtosis values indicated univariate normality. Values for univariate skewness ranged from  $-.15$  (item 3) to  $.97$  (item 13), and values for univariate kurtosis ranged from  $-1.81$  (item 12) to  $.26$  (item 13). However, the value of Mardia's normalized multivariate kurtosis was  $44.55$ , supporting the presence of severe multivariate non-normality in the distribution of data in this study. Therefore, following recommendations made by Finney and DiStefano (2006), CFA would be conducted using robust ML estimation.

CFA supported the correlated two-factor model (NA and SI) of the DS14 identified through Exploratory Factor Analysis. Thus, the overall fit was reasonable, and the fit index values were adequate:  $S-B\chi^2 = 563.05$ ,  $df = 76$ ,  $p < .01$ ;  $R-CFI = .91$ ,  $GFI = .92$ ,  $R-RMSEA = .071$  (90% CI  $.066-.077$ ); and  $SRMR = .065$ . All parameter estimates were moderate to high and statistically significant (see Table 3). Thus, for the 7 SI factor items, the factor loadings ranged from  $.27$  to  $.79$  ( $M = .62$ ). For the 7 items corresponding to NA, the factor loadings ranged from  $.46$  to  $.77$  ( $M = .66$ ). The correlation between both DS14 dimensions ( $.51$ ) yielded a large effect size ( $> .50$ ; Cohen, 1988).

**Table 3**  
Confirmatory factorial analysis results of the Type D Personality Scale (DS14)

Factors/Items	Un-standardized factor loadings	Robust Standard Errors	Standardized factor loadings
Negative Affectivity Subscale			
2. I often make a fuss about unimportant things	1.000		.464
4. I often feel unhappy	1.218	.096	.537
5. I am often irritated	1.497	.095	.735
7. I take a gloomy view of things	1.529	.104	.698
9. I am often in a bad mood	1.452	.099	.774
12. I often find myself worrying about something	1.427	.096	.651
13. I am often down in the dumps	1.482	.103	.772
Social Inhibition Subscale			
1. I make contact easily when I meet people*	1.000		.526
3. I often talk to strangers*	.606	.066	.270
6. I often feel inhibited in social interactions	1.507	.098	.724
8. I find it hard to start a conversation	1.692	.112	.785
10. I am a closed kind of person	1.506	.100	.752
11. I would rather keep other people at a distance	.971	.083	.513
14. When socializing, I don't find the right things to talk about	1.487	.100	.745

Notes: \*Reverse keyed. All loadings were significant at  $p < .05$ .

#### *Item analysis and reliability*

Table 4 shows the classical item analysis of the NA and SI subscales, including item descriptive statistics (means and standard deviations) and corrected item-total



correlations. Corrected item-total correlation indicates the extent to which an item measures the same attribute as the whole test (in this case the subscale), allowing us to detect problems in the items, which in this case may be due to poor item adaptation. Regarding the NA subscale, the mean of the items was moderate, below or close to the scale's central value (2= "Intermediate"), with Item 2 obtaining the highest rating and Item 13 the lowest. Corrected item-total correlation values ranged from .44 for Item 2 to .69 for Item 13.

**Table 4**

Distribution of percentages, means (M), standard deviations (SD), and corrected item-total correlations of the DS14 items

Subscales	Response categories						M	SD	Corrected item-total correlation
	False 0	Fairly false 1	Interme diate 2	Fairly true 3	True 4				
NA									
Item 2	31.3%	32.7%	29.3%	4.3%	2.4%	1.95	1.15	.44	
Item 4	25.8%	30.7%	22.1	14.9%	6.5%	1.46	1.21	.49	
Item 5	21.5%	32%	29.4%	13.4%	3.7%	1.46	1.08	.67	
Item 7	29.4%	29.9%	23.5%	12.3%	5%	1.34	1.17	.64	
Item 9	31.9%	37.4%	21.2%	7.7%	1.8%	1.10	1.00	.67	
Item 12	14.2%	22.6%	32.1%	22.4%	8.8%	1.89	1.16	.59	
Item 13	41.8%	33.4%	15.4%	7.5%	1.9%	.94	1.02	.69	
SI									
Item 1	31.3%	32.7%	29.3%	4.3%	2.4%	1.14	.99	.53	
Item 3	9.6%	18.2%	32.5%	25.5%	14.2%	2.16	1.17	.28	
Item 6	22.4%	31.5%	29.8%	12.7%	3.6%	1.44	1.08	.62	
Item 8	27.2%	30.9%	26.4%	11.2%	4.3%	1.35	1.12	.68	
Item 10	40.6%	32.7%	16.9%	7.5%	2.3%	.98	1.04	.67	
Item 11	43.3%	30.9%	18.8%	5.6%	1.4%	.91	.98	.43	
Item 14	30.5%	33.4%	15.4%	7.5%	1.9%	1.16	1.04	.65	

Note: NA= Negative Affectivity; SI= Social Inhibition.

The SI subscale items presented low to moderate mean values (approaching 1= "Fairly false"), with Item 3 obtaining the highest value (2.16) and Item 11 the lowest (.91). The corrected item-total correlation values ranged from .28 for Item 3 to .68 for Item 8.

Scale reliability (internal consistency) was calculated using Cronbach's alpha coefficient. The NA subscale items obtained a value of .84 (95% CI: .83-.85), and those of the SI subscale .81 (95% CI: .79-.83).

#### *Presence of type D personality*

Of all 1257 participants, 29.7% ( $n= 373$ , 142 men and 231 women) (95% CI: 27%-32%) were classified as having type D personality according to the interpretation put forward in the Type D Personality Scale, as they obtained scores

equal to or higher than 10 on both NA and SI subscales (Denollet, 2005; Emons, Meijer, & Denollet, 2007).

### *Demographic variables and type D personality*

As shown in Table 5, statistically significant differences were found for civil status with regard to type D personality,  $\chi^2(4)= 29.35$ ,  $p < .01$ , (Cramer's  $V= .15$ ), with 6.1% being widowed.

The frequency distribution of employment situation and type D personality was not homogeneous,  $\chi^2(4)= 32.98$ ,  $p < .01$  (Cramer's  $V= .16$ ), and we observed how the statuses retired/with a disability and homemaker presented the highest percentages of participants with type D personality, 7 and 10.8%, respectively.

**Table 5**  
Type D personality by sociodemographic and clinical variables

Variables	Total (n=1257)	Type D (n= 373)	Non-type D (n= 884)
<b>Sociodemographic data</b>			
Age (in years) <sup>a</sup>	35.6 (14.9)	37 (16.8)	35 (13.9)
Sex % (n)			
Women	58.9% (740)	61.9% (231)	57.6% (509)
Men	41.1% (517)	38.1 % (142)	42.4% (375)
Statistical significance		$p= .15$ ; Cramer's $V= .04$	
<b>Civil status % (n)</b>			
Single	45.7% (575)	46.9% (175)	45.2% (400)
Living with a partner	12.2 % (153)	10.2% (38)	13% (115)
Widowed	2.6 % (33)	6.2% (23)	1.1% (10)
Separated/divorced	4.2% (53)	4.8% (18)	4% (35)
Married	35.2% (443)	31.9% (119)	36.7% (324)
Statistical significance		$p < .01$ ; Cramer's $V= .15$	
<b>Employment situation % (n)</b>			
Employed	48.9% (614)	39% (145)	53.1% (469)
Retired	4.7% (59)	7% (26)	3.7% (33)
Student	33.1% (416)	35.2% (131)	32.2% (285)
Unemployed and/or claiming unemployment benefits	6.8% (85)	10.8% (40)	4.8% (42)
Homemaker	6.5% (82)	10.8% (40)	4.8% (42)
Statistical significance		$p < .01$ ; Cramer's $V= .16$	
<b>Clinical data % (n)</b>			
<b>Hypertension</b>			
Yes	9.8% (123)	12.4% (46)	8.7% (77)
No	90.2% (1132)	87.6% (325)	91.3% (807)
Statistical significance		$p < .05$ ; Cramer's $V= .06$	
<b>Heart disease</b>			
Yes	3.8% (48)	5.9% (22)	2.9% (26)
No	96.2% (1206)	94.1% (349)	97.1% (857)
Statistical significance		$p < .05$ ; Cramer's $V= .07$	

### *Clinical variables and type D personality*

Two clinical variables directly related to type D personality were defined: hypertension and the presence of heart disease. Of the total sample, 123 patients reported hypertension; 37.40% scored equal to or higher than 10 on the Type D Personality Scale (95% CI: 38.73%-46.07%) compared with the 28% who did not report hypertension. Of the total sample, 48 individuals reported some form of heart disease; of these people, 45.83% (22) had type D personality (95% CI: 31.21%- 60.45%) compared with the 28.9% that did not report heart disease.

### *Negative affectivity and Social inhibition and clinical variables*

We also analyzed the relationship between hypertension and heart disease with regard to the NA and SI dimensions that define type D personality. Thus, of the total sample who reported suffering from hypertension ( $n= 123$ ), 56.1% (95% CI: 47.20%-64.99%) scored 10 or higher on the NA subscale. Furthermore, 54.5% (95% CI: 45.55%-63.40%) were also found to score 10 or higher on the SI subscale.

As for the group of participants who reported some form of heart disease, 64.6% (95% CI: 50.55%- 78.62%) scored 10 or higher on the NA subscale, and 60.4% (95% CI: 46.07%- 74.77%) obtained a SI subscale total score of 10 or higher.

## **Discussion**

The main purpose of this study was to examine the validity and reliability of the DS14 in the general Spanish population. The link between type D personality and some health status variables (hypertension and heart disease) was also assessed.

The Spanish version of the DS14 showed adequate psychometric properties. In terms of reliability analysis (viewed as internal consistency), both scales (NA and SI) obtained Cronbach alpha coefficient values higher than .80. These results are similar to those reported in previous studies in other countries (Alcelik et al., 2012; Barnett, Ledoux, Garcini, & Baker, 2009; Bergvik, Sorlie, Wynn, & Sexton, 2010; Christodoulou et al., 2013; Denollet, 2005; Grande et al., 2004; Juczynski & Oginska-Bulik, 2009; Kaur, Zainal, Low, Ramasamy, & Shidu, 2014; Lim et al., 2011; Pedersen et al., 2009; Pedersen & Denollet, 2004; Sprindler, Kruse, Zwisler, & Pedersen, 2009; Svandottir et al., 2012; Vilchinsky et al., 2012; Weng et al., 2013; Yu, Zhang, & Liu, 2008; Yu, Thompson, Yu, Pedersen, & Denollet, 2010). Factor analysis supports a bidimensional structure of the DS14 items, with both factors (NA and SI) explaining more than 50% of the variance. These results replicated those obtained in the original version of the instrument among the Dutch population (Denollet, 2005). Moreover, the two-dimensional structure showed adequate fit indexes, and the factor loadings were in the expected range value.

In Denollet's (2005) study, 28% of the general population that participated (1027 out of 3678) were classified as having type D personality (25% men and 31% women). Furthermore, 28% of patients with coronary heart disease and 53% of patients with hypertension were classified as having type D personality. The results found in the present study are similar to those reported by Denollet (2005). Thus, this study's results show that there is a higher presence of type D personality in people with hypertension (37.4%) and heart disease (45.83%) compared with subjects from the general population (29.7%). Moreover, several studies have linked type D personality to patients with heart disease; for example, in Italy, type D personality was present in 39% of patients who participated in a cardiac rehabilitation program (Sogaro et al., 2010), and in Christodoulou et al.'s (2013) study on the Greek population, the presence of type D personality was higher in this group of patients.

To summarize, the results obtained in the present study are similar to those observed in other countries' adaptations of the instrument, including European nations such as Germany (Grande et al., 2004), Italy (Gremigni & Sommaruga, 2004), Denmark (Pedersen & Denollet, 2003) and Poland (Juczynski & Oginska-Bulik, 2009), and Asian countries like China (Yu et al., 2008), South Korea (Lim et al., 2011), Malaysia (Kaur et al., 2014) and Taiwan (Weng et al., 2013). Furthermore, Barnett et al. (2009) showed adequate psychometric properties for this scale and its validity in chronic North American patients. Finally, Kupper et al.'s (2013) cross-cultural study across 22 European countries revealed the type D personality construct to be a general, stable and universal personality construct.

However, the present study does have some limitations. First, the sample of participants was incidental, although different age groups, educational levels, and employment situations were represented. Second, hypertension and heart disease were determined by means of survey questions included in the sociodemographic questionnaire rather than via medical diagnosis. Nevertheless, the national health survey uses a similar method to obtain information about health status from the citizen's perspective. Finally, data on anxiety and depressive symptoms were not included; future studies would benefit from evaluating the link between psychological and psychosomatic symptoms in type D personality. Another point of interest would be to investigate the relationships between personality traits and anxiety variables (Caballo, Salazar, Irurtia, Arias & Guillén, 2010).

Finally, it should be noted that the Spanish version of the DS14 shows adequate psychometric properties, providing us with an easy and quick instrument to assess type D personality, currently considered an independent risk factor for cardiovascular disease. Results show promising evidence for the usefulness of the adapted Spanish version of the DS14.

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