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Type D personality: Application of DS14 French version in general and clinical populations

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Abstract

The aim of this study was to validate the French-language version of the Type D personality scale-14 among general and clinical populations (acute coronary syndrome and breast cancer patients). The two-factor structure of the Type D personality scale-14 was confirmed by factorial and confirmatory analyses. Internal consistency for both subdimensions of Type D personality scale-14 (negative affectivity and social inhibition) was very good with $\alpha = .87$ for each. Contrary to our expectations, the Type D prevalence was much higher in the breast cancer group than in the acute coronary syndrome patients. In conclusion, the French-language Type D personality scale-14 showed good psychometric properties among general and clinical populations.

Keywords

acute coronary syndrome, breast cancer, cross-validation, DS14, Type D personality

Purpose

The distressed personality (Type D) profile is a hierarchically personality construct which refers to the combination of two global traits: negative affectivity (NA) and social inhibition (SI) (Denollet, 2005). The NA subscale comprises three low-level traits: dysphoria, anxiety, and irritability. NA is defined by the tendency to experience negative emotions across time and situations (Watson and Clark, 1984). The SI subscale comprises three low-level traits: social discomfort, reticence, and lack of social poise. SI refers to the tendency to inhibit the expression of emotions and behaviors in social interaction to avoid potential dangers such as disapproval by others (Asendorpf, 1993). High-NA individuals report more physical symptoms and show attention bias toward negative stimuli (Watson et al., 1994) while high-SI individuals tend to experience more discomfort, nervousness, and insecurity when they are in relation with others (Gest, 1997). Type D personality

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has been associated with cardiac prognosis. Recently, a meta-analysis indicated that Type D personality is associated with a more than threefold increased risk of poor long-term prognosis such as cardiac death, myocardial infarction, and failing revascularization (mean odds ratio of 3.7, 95% confidence interval (CI) (2.7–5.1)). This study also highlighted the conceptual difference between depression and Type D personality. Indeed, Type D predicted the onset of depressive symptoms in patients who were free of depression at baseline and also predicted the prevalence and persistence of depressive symptoms (Denollet et al., 2010). Another meta-analysis relative to cardiac patients found an increased risk of poor prognosis (evaluated by fatal and non-fatal myocardial infarction and cardiac death) for people exhibiting a Type D personality profile with a mean odds ratio of 1.54 (95% CI (1.26–1.89)) (Grande et al., 2012). With regard to the estimated risk of the poor health prognosis following cardiac injuries, many studies have investigated the psychometric properties of the Type D personality scale (DS14), a measure that has been developed to assess this personality profile (Denollet, 2005). The DS14 clearly exhibited the two factorial NA and SI dimensions describing the Type D personality with high internal consistency (Denollet, 2005). The factorial structure of the DS14 is widely validated in many countries, and internal consistencies were generally good (e.g. in the United Kingdom and Ireland (αNA=.85; αSI=.82; Ferguson et al., 2009), Denmark (αNA=.83; αSI=.76; Pedersen and Denollet, 2004), or Turkey (αNA=.82; αSI=.81; Alçelik et al., 2012). To date, there is a cross-cultural analysis which examines the psychometric properties of the Type D scale across many countries. This study showed that the French-language Type D scale had good internal consistency with Cronbach's αs of .88 for NA and .88 for SI. Nevertheless, the factorial structure of the French-language DS14, in itself, has not been yet validated (Kupper et al., 2013). Convergent validity has been established with Type D correlating positively with anxiety, depression, and stress (Howard and Hughes, 2012). Furthermore, NA was inversely related to emotional stability and SI negatively related to extraversion (Bunevicius et al., 2013). Regarding discriminant validity, Type D construct shares some common features with alexithymia, in particular difficulties to verbalize feelings to others as well as a strong association with distress in general. However, despite their theoretical overlap, these two constructs appear to be distinct (Williams et al., 2011). So, it seems important to study the incremental value of Type D over alexithymia on disease risk.

Finally, one remaining question concerns the specificity of type D personality to cardiac diseases. Indeed, Type D is supposed to be a personality profile frequent in cardiovascular patients with a prevalence ranging from 28 percent to 32 percent (Pedersen and Denollet, 2006). However, some studies have already examined the Type D prevalence in cancer populations such as melanoma or colorectal cancer. They found a prevalence of about 19–22 percent in these cancer survivors (Mols et al., 2012a, 2012b). These results suggest that Type D personality is not specific to cardiac diseases, but broader to aversive health conditions, and thus a vulnerability factor for health issues in general. Thus, we will also take interest in breast cancer patients undergoing treatment because it seems that no study has yet observed the prevalence of Type D personality in this population.

The study aims to investigate (1) the factorial structure of the French-speaking type D scale, (2) its convergent validity, (3) the prevalence in different populations such as general and health disease population, and (4) the incremental value of Type D over alexithymia.

Methods

Population

The overall sample was 669 participants splitted into a clinical sample (acute coronary syndrome (ACS) and breast cancer patients) and a healthy sample.

Clinical sample. The ACS group was composed of 74 participants, suffering from a first ACS, recruited during their hospitalization at a

Belgian hospital (64 men and 10 women, mean age: 60.12 ± 13.49). The breast cancer patients group was composed of 83 women (mean age: 48.04 ± 9.54) suffering from grade 1 to 3 non-recurrent breast cancer, and all these patients were in treatment (chemotherapy, hormonotherapy, and radiotherapy) at the time of assessment. They were recruited by online messages on dedicated forums.

Healthy sample. We collected data from 512 participants. There were 350 students (142 men and 208 women, mean age: 24.26 ± 8.52) and 162 adults from the general population (mean age: 53.19 ± 8.35). The adult control group was recruited to allow comparisons with clinical populations in terms of gender and age. The cardiac control group was composed of 88 participants (52 men and 36 women, mean age: 54.80 ± 9.71), and the breast cancer control group was composed of 74 women (mean age: 51.28 ± 5.87). The inclusion criteria for the healthy group were not having an acute or chronic somatic disease.

For all groups, exclusion criteria were (1) difficulties understanding French language and (2) psychiatric disease. All participants gave their informed consent, and the ethical board of the Belgian hospital approved the studies involving clinical patients and their respective control group. For student participant, the research was conducted according to the Helsinki recommendations.

Instruments

Type D personality was assessed with DS14 (Denollet, 2005). This scale comprises 14 items scored on a 5-point Likert scale ranging from 0 (false) to 4 (true). There are seven items for both subscales: NA (i.e. "I am often irritated") and SI (i.e. "I often feel inhibited in social interactions"). We used the standard cut-off $\geqslant 10$ on both subscales to differentiate between Type D and non-Type D cases as it seems to be the most optimal cut-off for each subscale (Emons et al., 2007). The French version was translated from the original DS14 by J.D. and back-translated by C.F.-H.

Depression and anxiety symptoms were measured with the Hospital Anxiety and Depression Scale (HADS; Zigmond and Snaith, 1983). This 14-item scale (7 for the anxiety subscale and 7 for the depression subscale) was scored on a 4-point Likert scale ranging from 0 to 3. The two-dimensional structure of the HADS exhibits a good internal consistency ($\alpha = .74$ for anxiety and $\alpha = .75$ for depression).

Positive affectivity and negative affectivity were measured with the Positive Affect and Negative Affect Scale (PANAS; Watson et al., 1988). The PANAS is a 20-adjective scale with two mood subscales of 10 items each which was designed to measure to what extent people experience positive affect (i.e. "enthusiastic" and "determined") and negative affect (i.e. "afraid" and "upset"). In the instructions, the respondents were asked to indicate if they have experienced all the 20 adjectives during the last weeks using a 5-point scale ranging from 1 (not at all or rarely) to 5 (very often), highlighting the frequency of the affect experience. Reliability of the two subscales is good ($\alpha = .87$ for positive affect, $\alpha = .88$ for negative affect).

Alexithymia was assessed with the Toronto Alexithymia Scale-20 (TAS-20) which is a 20-item self-report questionnaire using a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) (Bagby et al., 1999). The TAS-20 identifies three factors: difficulty identifying feelings (i.e. "I am often confused about what emotion I am feeling"; "I have feelings that I can't quite identify"), difficulty describing feelings (i.e. "I am able to describe my feelings easily"; "It is difficult for me to reveal my innermost feelings, even to close friends"), and externally oriented thinking (i.e. "I prefer to analyze problems rather than just describe them"; "Looking for hidden meanings in movies or plays distracts from their enjoyment"). Cronbach's α for the total alexithymia score was .82.

Statistical methods

Principal component analysis (PCA) and Pearson's correlations for convergent validity

were run with PASW Statistics 22 (SPSS Inc., Chicago, IL). Parallel analysis was processed with TANAGRA (Rakotomalala, 2005) whereas confirmatory factor analyses (CFAs) were conducted with AMOS 21 (IBM Inc., Chicago, IL). We randomly split the overall sample in two groups. The first sample ($n=339$) was used to identify one or more latent variables underlying the observed variables. We first conducted a PCA with a varimax rotation and determined the number of factors to extract through parallel analysis (Horn, 1965). Here, the number of factors selected is equal to the number of eigenvalues obtained that have values greater than those produced by random uncorrelated data based on the same number of observations and variables as the original data set. Parallel analysis is one of the most accurate methods for determining the number of factors to retain (Velicer et al., 2000).

The second sample ($n=321$) was used to confirm the factorial structure obtained from the PCA. We used maximum likelihood estimation in all CFAs. The following indices were used to evaluate the model fit according to the main rule of thumb (Bentler and Chou, 1987; Bollen, 1989; Browne and Cudeck, 1993; Hu and Bentler, 1999; Steiger, 2007; Tabachnick and Fidell, 2013): a goodness-of-fit index (GFI) $\geqslant .90$, a comparative fit index (CFI) $\geqslant .95$, the standardized root mean square residuals (SRMR) $\leqslant .08$, and if a root mean square of error approximation (RMSEA) $\leqslant .08$ was considered indicative of acceptable fit, a value $\leqslant .06$ was considered indicative of a good fit. Additionally, we provided the ratios of the chi-square to its degrees of freedom (χ^2/df). A χ^2/df close to or less than 2.0 was considered to represent a good model fit and close to or less than 5.0 indicative of an acceptable fit. We then provided the cross-validation between the two samples to assess the replicability and the structure invariance of the DS14.

To confirm the factorial structure of the DS14, we have taken into account the theoretical foundation of the Type D construct: two main dimensions (NA and SI) with three facets each (NA: dysphoria, anxiety, and irritability; SI: social discomfort, reticence, and lack of social poise). To consider these facets in our model, we have added error covariances between items that represent each facet.

Convergent validity of the DS14 was estimated by exploring Pearson's correlation between the NA and the SI subscales, and similar constructs (i.e. alexithymia, positive and negative affect, depression, and anxiety).

Results

Internal validity

Consistent with the conceptualization of Type D personality, the parallel analysis evidenced to retain a two-factor solution. This two-factor solution accounted for 52.47 percent of the variance with eigenvalue ranging from 5.89 for SI to 2.51 for NA. The fit indices for the estimated model yielded a satisfactory fit criteria with $\chi^2(66)=187.62$, $\chi^2/df=2.84$, GFI=.93, CFI=.95, RMSEA=.07, and SRMR=.07. Multisample analysis was performed to determine whether or not the structure of the DS14 was invariant across our two samples. First, configural invariance was achieved with $\Delta\ \chi^2(132)=391.94$, $\chi^2/df=2.97$, GFI=.92, CFI=.94, RMSEA=.05, and SRMR=.07. We assumed the configural invariance was correct between the two samples. Then, the measurement weight did not show any statistical differences $\Delta\chi^2(12)=6.44$, $p=.89$, nor the structural covariance $\Delta\chi^2(3)=6.19$, $p=.10$ or measurement residual with $\Delta\chi^2(24)=25.87$, $p=.36$. Internal consistency for NA and SI was very good with $\alpha=.87$ and $\alpha=.87$, respectively. All item loadings and Cronbach's αs are reported in Table 1.

Construct validity

As expected, results showed strong significant positive correlations of NA with depression ($r=.67$), anxiety ($r=.57$), negative affect ($r=.69$), and alexithymia ($r=.46$) and a negative correlation, with a lowest magnitude, for positive affect ($r=-.33$). Significant positive

Table 1. Factor loadings from EFA and CFA for the two samples.

	EFA (overall sample, $n=660$)	CFA sample 1 ($n=339$)	CFA sample 2 ($n=321$)
Social inhibition			
DS1R	−.87	.79	.75
DS3R	−.64	.42	.35
DS6	.78	.74	.64
DS8	.83	.79	.74
DS10	.79	.81	.81
DS11	.75	.64	.63
DS14	.76	.72	.67
Cronbach's α	.87	.88	.86
Negative affectivity			
DS2	.51	.30	.39
DS4	.77	.74	.83
DS5	.78	.56	.64
DS9	.75	.63	.69
DS12	.70	.56	.63
DS7	.60	.75	.79
DS13	.82	.80	.82
Cronbach's α	.87	.83	.87

EFA: exploratory factor analysis; CFA: confirmatory factor analysis.

Table 2. Construct validity.

Variables	1. DS14 negative affectivity	2. DS14 social inhibition	3. HADS depression	4. HADS anxiety	5. PANAS negative affect	6. PANAS positive affect	7. TAS-20 alexithymia
1	–	.38*	.67*	.57*	.69*	−.33*	.46*
2	–	–	.25*	.30*	.27*	−.28*	.35*
3	–	–	–	.66*	.71*	−.32*	.45*
4	–	–	–	–	.51*	−.50*	.46*
5	–	–	–	–	–	−.25*	.41*
6	–	–	–	–	–	–	−.30*

DS14: Type D personality scale-14; HADS: Hospital Anxiety and Depression Scale; PANAS: Positive Affect and Negative Affect Scale; TAS-20: Toronto Alexithymia Scale-20.
*$p \leqslant .01$.

correlations were also found between SI and depression ($r=.25$), anxiety ($r=.30$), negative affect ($r=.27$), and alexithymia ($r=.35$) but a negative one with positive affect ($r=-.28$). All statistical significances reached the .001 level. As expected, the DS14 exhibited a convergent reliability, estimated by strong correlations between NA and similar constructs (depression, anxiety, and negative affect) and seems to demonstrate a discriminant reliability as correlations between SI and depression, anxiety, and negative affect are lower in amplitude ($\leqslant .30$) than those of NA ($\geqslant .57$). Furthermore, both NA and SI correlate only moderately with alexithymia. All correlations are reported in Table 2.

Table 3. Association of Type D with ACS and breast cancer beyond depression, anxiety, and alexithymia.

	ACS		OR (95% CI)	*p*
	No (*n* = 88)	Yes (*n* = 74)		
Age	54.80 ± 9.71	60.19 ± 13.49	1.04 (1.00–1.07)	.02
Negative affect (mean ± SD)	19.67 ± 5.81	22.26 ± 6.66	1.04 (0.91–1.13)	.27
Depression (mean ± SD)	6.4 ± 3.43	8.11 ± 3.82	1.04 (0.90–1.21)	.58
Anxiety (mean ± SD)	4.56 ± 2.83	6.12 ± 3.31	1.13 (0.96–1.32)	.15
Alexithymia (mean ± SD)	48.74 ± 11.74	51.35 ± 12.00	1.00 (0.96–1.03)	.81
Type D, % (*n*)	26.14 (26)	30.10 (22)	.76 (0.31–1.89)	.56
	Breast cancer		OR (95% CI)	*p*
	No (*n* = 74)	Yes (*n* = 83)		
Age (mean ± SD)	51.28 ± 5.89	48.04 ± 9.54	0.93 (0.88–0.98)	.003
Negative affect (mean ± SD)	20.18 ± 6.56	23.55 ±	0.97 (0.90–1.05)	.48
Depression (mean ± SD)	7.22 ± 3.32	9.01 ± 4.08	1.04 (0.88–1.22)	.68
Anxiety (mean ± SD)	4.79 ±v2.75	6.46 ± 3.33	1.13 (0.97–1.32)	.13
Alexithymia (mean ± SD)	41.92 ± 9.93	48.85 ± 12.24	1.04 (1.00–1.08)	.03
Type D, % (*n*)	17.56 (13)	43.37 (36)	4.13 (1.75–9.72)	.001

ACS: acute coronary syndrome; OR: odds ratio; 95% CI: 95% confidence interval.

Type D personality prevalences

In the overall healthy group, the Type D prevalence was 27.3 percent (22.2% for the adult control group and 32.5% for the student group). There was 30.1 percent of Type D in the ACS patients group, and we observed 26.1 percent of Type D in the cardiac control group. There was no significant difference between these two prevalences ($\chi^2(1) = .32$, ns). There was 43.4 percent of Type D in the breast cancer patients group versus 17.6 percent in the breast cancer control group. There was a significant difference of Type D prevalence between these two groups ($\chi^2(1) = 12.135$, $p \leqslant .000$). χ^2 test failed to show a significant difference of Type D prevalence between ACS patients and breast cancer patients ($\chi^2(1) = 2.914$, $p = .09$).

Incremental value of Type D

Two logistic regressions (Table 3) were used to test a model of cardiovascular and breast cancer morbidity with age, negative affect, depression, anxiety, alexithymia, and Type D as predictors. The logistic regression model for breast cancer was statistically significant ($\chi^2(6) = 36.70$, $p \leqslant .000$). The model explained 27.8 percent (Nagelkerke R^2) of the variance in breast cancer disease and correctly classified 68.8 percent of cases. Sensitivity (true positives) was 66.3 percent and specificity (true negatives) was 71.6 percent. Of the six predictor variables only three were statistically significant: age, alexithymia, and type D. The logistic regression model for ACS was statistically significant ($\chi^2(6) = 22.78$, $p \leqslant .001$). The model explained 18.4 percent (Nagelkerke R^2) of the variance in ACS and correctly classified 63 percent of cases. Sensitivity (true positives) was 50.7 percent and specificity (true negatives) was 73.5 percent. Of the six predictor variables only one was statistically significant: Increasing age was associated with ACS (OR, 1.04, $p \leqslant .05$).

Discussion

The purpose of this study was to examine the factor structure, the internal consistency, and the construct validity of the French-speaking

DS14 in general and clinical populations as well as the incremental value of Type D in clinical population.

Our study confirmed the two-factor structure of the French-speaking DS14. Furthermore, both subscales (NA and SI) exhibited excellent internal consistency. The DS14 also demonstrated good construct validity as the subscales NA and SI correlated positively with alexithymia, negative affect, depression, and anxiety and negatively with positive affect. Previous research is in line with these correlations (Weng et al., 2013; Williams et al., 2011).

Both Type D prevalence rates in ACS patients and controls are in the average of previous findings (Aquarius et al., 2009; Denollet, 2005; Grande et al., 2012; Pedersen and Denollet, 2004). However, there were no prevalence differences between ACS patients group and healthy adults group. Although this result discords with previous work (i.e. Ogińska-Bulik and Juczyński, 2009), high Type D prevalence was also observed on healthy participants (Ferguson et al., 2009, Williams et al., 2008) and significant differences between cardiac and healthy participants have not always been found (Hausteiner et al., 2010; Pedersen and Denollet, 2004).

Previous works suggested that Type D captures a general emotional distress factor (Pedersen and Denollet, 2004), and this is particularly important because some recent studies showed a strong relationship between Type D personality and poor health-related behaviors not only in cardiac patients but also in general population (Ginting et al., 2014; Williams et al., 2015). Thus, it seems important to use an appropriate assessment of this construct in clinical cardiology practice. Indeed, our study suggests that measuring type D could also be useful in breast cancer populations as we exhibited a high prevalence of Type D individuals in this sample (43.3%). Recently, some researchers have taken interest in examining the Type D personality in cancer populations. This prevalence is much higher than those of previous works (Mols et al., 2012a, 2012b) but could be related to the cancer stage where these studies took place. Indeed, the previous research has been conducted with remitted cancer patients while we focused on cancer patients undergoing treatment. This also suggests that DS14 should be sensible to acute stress reaction. Despite the absence of prevalence difference between ACS patients and breast cancer patients, the high frequency of Type D in the breast cancer group is also questionable. This seems to indicate that Type D personality could not be considered as a specific personality profile of cardiovascular patients, but rather than a general one related to health adversity. Furthermore, while type D was not associated with cardiac morbidity, it was associated with fourfold increased risk of breast cancer morbidity. The non-association with cardiac morbidity is not contradictory with the literature as Type D is generally considered as a prognosis marker for cardiac severe events, treatment non-compliance, or relapse rather than a personality profile predisposing to first cardiac injuries (Denollet, 2000). Furthermore, there were no substantial differences between ACS and ACS control group regarding the prevalence of Type D, explaining the non-association observed between Type D and cardiac morbidity. Thus, the effect of Type D on cancer prognosis needs to be further investigated.

Finally, an important question was the incremental value of Type D over alexithymia. Our results evidenced an incremental value of the construct over alexithymia, when controlling for age, NA, depression, and anxiety on cancer morbidity. Indeed, Type D personality showed stronger relationships with breast cancer morbidity than alexithymia (OR of 4 for type D vs 1.04 for alexithymia). This is a supplementary argument for the discriminant validity of the Type D measure.

However, our results need to be interpreted with some caution because the main limitation of our study is that we did not have any measure of Type D personality on each clinical population before they developed an ACD or a breast cancer. Therefore, it is possible that Type D assessment could be influenced by general distress due to the medical condition.

In conclusion, the results of this study show that the French version of the DS14 is psychometrically valid and reliable. Our study also suggests the interest to use Type D personality assessment in breast cancer populations, highlighting the possibility that Type D personality is not a useful construct only restrained to cardiac disease.

Declaration of conflicting interests

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