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Type D personality in Poland: Validity and application of the Polish DS14

Type D personality (increased negative emotions paired with emotional non-expression) is an emerging risk indicator in cardiovascular disease (CVD), associated with poor patient-centered outcomes, mortality and morbidity. Little is known about the cross-cultural utility of the construct, as it has primarily been used in the Western European setting. We applied the Type D Scale to a large sample of healthy and CVD patients to validate the DS14 in Poland. DS14 was used in the sample comprised 1154 persons, healthy and CVD. The internal consistency of the Polish version of the DS14 was good with Cronbach's alpha of 0.86 for negative affectivity (NA) and 0.84 for social inhibition (SI). The 2-factor structure of the DS14 was confirmed both with exploratory and confirmatory factor analysis. Both of the DS14 subscales were internally consistent and stable over time. Using the standardized cut-off ≥10 for both NA and SI to identify those with a Type D personality, the prevalence was 72.1% in CVD patients and 34.8% in healthy. The Type D personality construct, as assessed with the DS14, seems to be applicable to the Polish setting, as the Polish DS14 was shown to be a psychometrically sound instrument.

Introduction

The distressed (Type D) personality, defined by the tendency to experience increased negative emotions (negative affectivity) paired with emotional non-expression (social inhibition), is a recent construct that may help revive the interest in personality factors in somatic diseases, cardiovascular diseases, in particular (Pedersen & Denollet, 2006; Ogińska-Bulik & Juczyński, 2008; Ogińska-Bulik, 2009).

Negative affectivity (NA) refers to tendency to experience of various negative emotions such as anxiety, anger, hostile feelings, irritability, dysphoria. Social inhibition (SI) refers to difficulties in expression emotions and discomfort in social interactions. Type D is regarded as a relative stable personality trait, but also (social inhibition, in particular) as a coping mechanism with stress (Pedersen, Denollet, 2006).

Studies conducted in the Netherlands have reported that patients with established coronary artery disease are at greater risk for a heart attack if they have this personality type. The risk of mortality of those diseases associated with Type D is 4-fold, with this risk being independent of disease severity, traditional biomedical risk factors and mood states (Pedersen & Denollet, 2006).

Type D personality seems not just to be a phenomenon that is relevant to patients with coronary heart disease, where the construct was initially developed, but also in patients with chronic heart failure (Schiffer, Pedersen, Broers, Widdershoven & Denollet, 2008; Schiffer, Pedersen, Widdershoven, Hendriks, Winter & Denollet, 2005), peripheral arterial disease (Aquarius, Denollet, Hamming & De Vries, 2005), and in patients treated with state-of-the-art invasive treatment, including percutaneous coronary intervention with drug-eluting stents (van Gestel, Pedersen, van de Sande, de Jaegere, Serruys, Erdman et al., 2007; Spindler, Pedersen, Serruys, Erdman & van Domburg, 2007; Pedersen, Denollet, Ong, Serruys, Erdman & van Domburg, 2007; Denollet, Pedersen, Ong, Erdman, Serruys & van Domburg, 2006) and device therapy (Pedersen, Van Domburg, Theuns, Jordaens & Erdman, 2004; Pedersen, Theuns, Muskens-Heemskerk, Erdman &

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Jordaens, 2007). NA and SI were not predictive of outcome individually; only the joint presence of high scores on both dimensions was linked to disease morbidity and mortality (Habra, Linden, Anderson, Weinberg, 2003).

Type D has been also associated with a broad range of patient-centered outcomes, including increased anxiety (van Gestel, Pedersen, van de Sande, de Jaegere, Serruys, Erdman et al., 2007; Spindler, Pedersen, Serruys, Erdman & van Domburg, 2007; Pedersen, Van Domburg, Theuns, Jordaens & Erdman, 2004; Schiffer, Pedersen, Broers, Widdershoven & Denollet, 2008), post-traumatic stress (Pedersen & Denollet, 2004), depressive symptoms (Pedersen, Ong, Serruys, Erdman & van Domburg, 2006; Schiffer, Pedersen, Widdershoven, Hendriks, Winter & Denollet, 2005), vital exhaustion (Pedersen & Middel, 2001; Pedersen, Daemen, van de Sande, Sonnenschein, Serruys, Erdman et al., 2007), poor quality of life (Al-Ruzzeh, Athanasiou, Mangoush, Wray, Modine, George, et al., 2005; Pedersen, Denollet, Ong, Serruys, Erdman & van Domburg, 2007; Aquarius, Denollet, Hamming & De Vries, 2005), and adverse clinical events (Denollet, Vaes & Brutsaert, 2000; Denollet, Pedersen, Ong, Erdman, Serruys & van Domburg, 2006; Pedersen, Lemos, van Vooren, Liu, Daemen, Erdman et al., 2004).

The mechanism linking Type D personality to CVD has not yet been established. However as Pedersen and Denollet (2006) suggest that type of personality might be linked to disease outcome either directly through psychophysiological mechanism, such as silent myocardial ischemia or platelet release potentiated by mental stress or it might be related indirectly through poor health behaviors (smoking, alcohol overusing, overeating) or psychological factors, such as lack of social support. The association between unhealthy behaviors, related to smoking, excessive drinking, using drugs was yielded in a study of Ogińska-Bulik (2009). Stress may also influence the immune system increasing the individual's vulnerability to infections and disease. Social inhibition, which may be treated as a non-effective coping mechanism with stress, seems to play essential role (Pedersen, Denollet, 2006).

Another plausible mediating mechanism linking type D personality to CVD may be physiological hyperreactivity (Habra, Linden, Anderson, Weinberg, 2003, Pedersen, Denollet, 2003). In the study of healthy undergraduates the inhibition component of type D was associated with heightened blood pressure reactivity, and both social inhibition and negative affectivity were related to greater cortisol reactivity to stress. Moreover the Type D individuals with health's problem may refrain from seeing the physician and if they seeing, social inhibition may impede communication between patient and physician, what increases poor prognosis.

Type D personality distinguishes itself from other psychological measures, being studied in the context of CVD, such as depression. Whereas depression reflects psychopathology, Type D represents a normal personality construct (Denollet, 2005, Pedersen & Denollet, 2006;). Type D also represents a chronic risk factor compared to depression, which is considered episodic (Kop, 1999). In addition, Type D is unconfounded by indicators of somatic disease (Martens, Kupper, Pedersen, Aquarius & Denollet, 2007), which is not the case for depression (De Jonge, Denollet, van Melle, Kuyper, Honig, Schene et al., 2007). The most prominent difference between Type D and depression is that the Type D construct also includes how people cope with their wide range of negative emotions, due to the inclusion of the social inhibition component (Pedersen & Denollet, 2006; Denollet, 2005). A recent study in percutaneous coronary intervention patients (PCI) confirmed that it is the combination of a high score of the two Type D subcomponents that incurs an increased risk of adverse clinical events and not the single traits, with social inhibition moderating the effect of negative affectivity on clinical outcome (Denollet, Pedersen, Ong, Erdman, Serruys & van Domburg, 2006). Other studies have confirmed that Type D differs from existing personality traits, such as the Big-Five, with Type D predicting outcome above and beyond single traits (Pedersen & Denollet, 2004; Chapman, Duberstein & Lyness, 2007).

The utility of the Type D construct has been examined primarily in the Western European context, with studies confirming the cross-cultural validity of the construct in Belgian, Dutch (Denollet, 2005), Danish (Pedersen & Denollet, 2004), German (Grande, Jordan, Kummel, Struwe, Schubmann, Schulze et al., 2004), and Italian (Gremigni & Sommaruga, 2005) samples. Only recently was the construct also examined in the Ukraine (Pedersen, Yagensky, Smith, Yagenska, Shpak & Denollet, 2009). However, the latter study was based on a healthy sample and not on patients with somatic disease. The DS14 was also included in the Euro Cardio-Qol Project with the aim to develop a core questionnaire for assessing quality of life in heart patients (Pedersen, Denollet, 2006).

Hence, the objective of the current study was to examine the validity of the Polish version of the Type D Scale (DS14), examining the psychometric properties of the scale and its ability to distinguish between CVD patients and healthy.[1]

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[1]   Description and psychometric properties of the DS14 (in Polish) are available in manual: Methods to measure stress and coping with stress, Juczyński, Oginska-Bulik, 2009, Warszawa: Pracownia Testów Psychologicznych.

Methods

Participants and design

1200 persons, who were assured of anonymity of the study, were asked to fill out the DS14. 8 of them refused, results of 40 were incomplete, and were rejected from the analysis, so finally the sample comprised 1154 participants. Their age ranged from 20-70 years, mean age = 30.5 ±15.4, with 37.3% being men (education and marital status were not checked). 226 of the participants (mean age: men = 53.4±12.4 and women = 54.6±13.6) suffered from CVD (coronary artery disease (CAD): n = 133; hypertension: n = 93). Patients with CAD were recruited from the cardiology unit of two cities in central Poland and those with hypertension from general practice. 928 persons (mean age: men=29.5±11,4 and women 28.0±12.6), treated as healthy controls (they reported of not having CVD and other serious somatic diseases), being recruited from the general population. This group included persons representing various professions (i.e., teachers, clerks, nurses, etc.) recruited at their workplace. Data were collected in the period between 2006 to 2007.

Measures
Type D Scale

The Type D Scale (DS-14) was originally developed in Belgian cardiac patients and validated in a Dutch-Belgian population (Denollet, 2005). The DS14 comprises 14 items, contributing to two 7-item subcales, that is negative affectivity (NA; e.g., "I often feel unhappy") and social inhibition (SI; e.g., "I find to hard to start a conversation") (Denollet, 2005). Type D caseness is determined by means of a standardized cut-off ≥10, with a recent study using item-response theory showing that this is the most optimal cut-off on both subscales (Emons, Meijer & Denollet, 2007). The DS14 is a valid and reliable scale, with high internal consistency as assessed by Cronbach's alpha (NA = 0.88; SI = 0.86) and good 3-month test-retest reliability (NA: r = 0.72; SI: r = 0.82). Factor analyses of the DS14 yielded two dominant traits, all of the NA and SI items loaded between 0.62 to 0.82 on their corresponding factor. Type D was more prevalent in coronary patients (28%) and hypertension patients (53%) as compared with subjects from the general population (19%) (Denollet, 2005).

Measures with which to examine the construct validity of the Polish DS14

In order to examine the construct validity of the Polish version of the DS14, 116 healthy individuals completed the neuroticism and extraversion subscales of the Polish version of the NEO-FFI (Zawadzki, Strelau, Szczepaniak & Sliwinska, 1998), the Positive and Negative Affect Schedule (PANAS) measuring positive and negative affect (Watson, Clark & Tellegen, 1988), the Perceived Stress
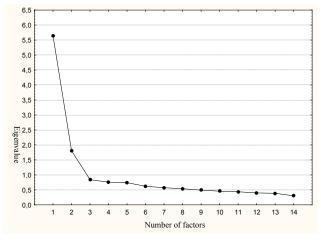

Figure 1. Scree plot of the factors representing items of the Polish DS14.

Scale (PSS-10) assessing the level of perceived stress (Juczynski & Oginska-Bulik, 2009), the Temperament Questionnaire (FCZ-KT) developed by Zawadzki and Strelau (1997), whereas 80 CVD patients completed the NEO-FFI, PANAS and PSS-10. Those variables were chosen because of – at least partly – similarities to type D personality (neuroticism, extraversion, experienced emotions, perceived stress, in particular).

Statistical analysis

Principal component analysis (PCA), with varimax rotation, was used to examine the factor structure of the Polish version of the DS14. The scree plot was used to determine the number of factors to extract. Subsequently, we ran a confirmatory factor analysis as an extension of the PCA, which tests specific hypotheses about the structure of the factor loadings and intercorrelations. Reliability analysis was performed to examine the internal consistency. Pearson's correlations were used to determine the 3-month test-retest reliability of the Type D subcomponents and the construct validity of Type D compared with similar constructs. Student´s t-test for independent samples was used to evaluate differences in means between two groups. All data were analysed using STATISTICA, version 6.0.

Results

Factor structure of the Polish version of the DS14

Consistent with the conceptualization of Type D personality, the scree plot and eigenvalue criteria indicated two dominant personality domains, that is NA and SI (Figure 1). Succeeding factors were much smaller (eigenvalue < 1.0) and explained a minor proportion of the variance. Both dimensions explained 53.2% of the variance (Factor 1: 40.3%; Factor 2: 12.9%). All of the 7 NA and 7 for SI items had a loading ranging between 0.55 and 0.80 (Table 1). We also conducted a confirmatory factor analysis

Table 1
Factor loadings and internal consistency of the DS14 subcomponents.

Items	Factor 1 NA	Factor 2 SI	Corrected item-total correlation coefficients
2	.66	.02	.50
4	.77	.16	.68
5	.72	.12	.61
7	.57	.42	.58
9	.69	.31	.65
12	.72	.14	.62
13	.80	.26	.76
Eigenvalue	5.64		Cronbach's a=.86
% of variance	40.3		
1	.09	.67	.45
3	.19	.55	.46
6	.29	.67	.61
8	.21	.72	.63
10	.29	.73	.68
11	.26	.63	.56
14	.22	.71	.63
Eigenvalue		1.81	Cronbach's a=.84
% of variance		12.9	

Figure 2. Confirmatory factor analysis of the Polish version of the DS14.

(Generalized Least Squares – GLS), with the results presented in Figure 2. All paths show a probability level below 0.05 and are highlighted to indicate that they are significant. Obtained goodness of fit indices (RMSEA=0.05; FI=0.95; AGFI=0.93) confirm the prevalence of the two factors, that is NA and SI.

Internal consistency and test-retest reliability

The internal consistency of the Polish version of the DS14 was good, with Cronbach's alpha of 0.86 for NA and 0.84 for SI, and item-total correlations being >0.40 (i.e., between 0.45-0.76). The 3-month test-retest stability for healthy individuals (N=60; NA/SI: r = 0.76/0.73) and CVD patients (N=40; NA/SI: r = 0.74/0.70) was also acceptable.

Mean scores on the NA and SI Type D dimensions, stratified by gender, age and disease status

Table 2 presents means and standard deviations of the NA and SI dimensions of the Type D construct, stratified by gender, age and disease status (i.e., healthy vs. CVD). The mean NA score for the total group was 11.84 ±6.34 and for SI 8.80 ±6.07. Women generally scored higher on NA compared to men, but men were more prone not to express their emotions, scoring high on SI. Similarly, older individuals and CVD patients reported higher scores on both NA and SI, respectively, than younger individuals and healthy controls.
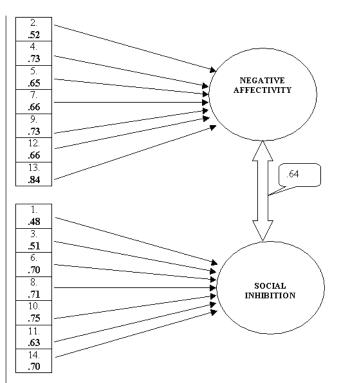
Prevalence of Type D

Using a standardized cut-off ≥10 on both subscales to determine Type D caseness, the prevalence of Type in healthy subjects was 34.8% compared to 72.1% in CVD patients (CAD: 69.9%; hypertension: 75.3%). In a study conducted by Denollet (2005), the prevalence rate in hypertensive was also unusually high, with 53%.

Validity of the Type D construct in health subjects and CVD patients

The construct validity of the Polish version of the DS14 was assessed against instruments measuring similar constructs, both in CVD patients and in healthy. Pearson correlation coefficients are presented in Table 3. NA positively correlated with neuroticism and negatively with extraversion, both in healthy and CVD patients. SI was related positively with neuroticism and negatively with extraversion, but the strength of the association was smaller. Both dimensions of Type D personality, and NA in particular, strongly correlated with perceived stress.

In both groups, NA and SI were positively related to negative affect and negatively to positive affect, with this relation being stronger in CVD patients. In a group of healthy, both dimensions of Type D, but especially NA, was related to general health status and to a smaller degree to emotional reactivity, which represents one of the temperament dimensions. Generally, the shared variance between the Type D dimensions and the examined constructs ranged from 3-55%.

Table 2
The Type D components, negative affectivity and social inhibition, stratified by sex, age and patient status.

	Men (N=430)		Women (N=724)			
	M	SD	M	SD	t	p
Negative affectivity	11.36	6.78	12.13	6.05	2.01	.05
Social inhibition	9.33	5.95	8.49	6.12	2.26	.02
	Younger (< 31 years) (N=790)		Older (>30 years) (N=364)			
Negative affectivity	10.99	6.02	13.69	6.29	-6.85	.000
Social inhibition	7.24	5.37	12.18	6.13	-13.99	.000
	Healthy subjects (N=928)		CVD patients (N=226)			
Negative affectivity	10.96	6.01	15.49	6.38	10.04	.000
Social inhibition	7.47	5.53	14.27	5.02	16.87	.000

Table 3
Construct validity of the Type D subcomponents in healthy sample and cardiac patients.

	Healthy subjects (N=116)		CVD patients (N=80)	
	NA	SI	NA	SI
NEO-FFI				
Neuroticism	.71	.46	.70	.36
Extraversion	-.39	-.67	-.56	-.46
PANAS				
Positive affect	-.33	-.28	-.63	-.24
Negative affect	.58	.42	.69	.56
PSS-10				
Perceived stress	.74	.34	.58	.44
FCZ-KT				
Emotional reactivity	.28	.19	-	-
GHQ-28				
General health status	.59	.32	-	-
Somatic complaints	.36	.17	-	-
Anxiety/insomnia	.57	.28	-	-
Functional disorders	.30	.29	-	-
Depressive symptoms	.57	.29	-	-

all correlation coefficients (Pearson) are statistically significant
NEO-FFI= NEO Five-Factor Inventory
PANAS = Positive and Negative Affect Schedule
PSS= Perceived Stress Scale
FCZ-KT= Formal Characteristcs of Behaviour Temperament Inventory
GHQ = General Health Questionnaire

Characteristics of Type D individuals

Mean scores on perceived stress and negative/positive affect, stratified by Type D personality in a group of healthy are presented in Table 4. Individuals with a Type D personality reported significantly higher levels of perceived stress (p = 0.000), less positive affect (p = 0.001), and more negative affect (p = 0.000) compared to non-Type D individuals.

Discussion

The current study confirmed the two-factor structure of the Polish version of the DS14, using both exploratory and confirmatory factor analysis. The internal consistency of the DS14 subscales and their test-retest reliability over a 3-month period were confirmed, as was the scale's construct validity against similar constructs. Using the standardized cut-off ≥10 for both DS14 subcomponents to identify those with a Type D personality, the prevalence was 72.1% in CVD patients and 34.8% in a group of healthy.

The results of the current study add to our knowledge of the cross-cultural validity of the Type D construct, as the validity, internal consistency, and test-retest reliability of the Polish version of the DS14 were confirmed. Previously, the utility of the construct has been examined primarily in the Western European context, including in Belgian, Dutch (Denollet, 1998), Danish (Pedersen & Denollet, 2004, German (Grande, Jordan, Kummel, Struwe, Schubmann, Schulze et al., 2004), and Italian (Gremigni & Sommaruga, 2005) samples and a mixed sample from the UK and Ireland

Table 4
Perceived stress and negative/positive affect, stratified by Type D personality in healthy sample (*n*=116).

	Type D (N=37)		Non Type D (N=79)			
	M	SD	M	SD	t	p
Perceived Stress (PSS)	21.62	5.64	13.04	4.81	6.93	.000
Positive affect (PANAS)	32.64	5.31	36.44	4.37	-3.98	.001
Negative affect (PANAS)	25.68	5.26	16.97	4.63	8.86	.000

(Williams, O'Connor, Howard, Hughes, Johnston, Hay, et al., 2008). Only recently was the construct also examined in the Ukraine (Pedersen, Yagensky, Smith, Yagenska, Shpak & Denollet, 2009), but only in a healthy sample. The prevalence of Type D in Polish healthy subjects was comparable to that found in Danish, German, UK/Irish, and Ukrainian healthy samples, although a lower prevalence (i.e., 13.3%) was found in one study of Dutch healthy controls (Aquarius, Denollet, Hamming, Breek & De Vries, 2005). By contrast, the prevalence of Type D of 72.1% in CVD patients found in the current study was considerably higher than in previous CVD studies conducted in Western Europe (Pedersen, Van Domburg, Theuns, Jordaens & Erdman, 2004; Schiffer, Pedersen, Broers, Widdershoven & Denollet, 2004; Pedersen & Denollet, 2004; Al-Ruzzeh, Athanasiou, Mangoush, Wray, Modine, George, et al., 2005; Denollet, Vaes & Brutsaert, 2000; Grande, Jordan, Kummel, Struwe, Schubmann, Schulze et al., 2004; Whitehead, Perkins-Porras, Strike, Magid & Steptoe, 2007), although a previous study of hypertensives also found an unusually high prevalence, with 53% (Denollet, 2005).

We have no explanation as to why almost 3 out of 4 Polish patients with CVD would have a Type D personality compared to 1 out of 4 or 1 out of 3 in Western Europe. Given that this is the first study to find such a high prevalence in CVD patients in Type D research to date, this finding should be replicated in other Eastern European studies. Nevertheless, if such a high prevalence is confirmed in future research, with the prevalence in CVD patients being almost twice as high as in the general population, this might have serious implications for Polish CVD patients and their clinical and psychosocial management, as Type D has been related to increased mortality and morbidity in Western European studies (Pedersen & Denollet, 2006; Schiffer, Pedersen, Widdershoven, Hendriks, Winter & Denollet, 2005; Al-Ruzzeh, Athanasiou, Mangoush, Wray, Modine, George, et al., 2005; Pedersen, Denollet, Ong, Serruys, Erdman & van Domburg, 2007; Denollet, Vaes & Brutsaert, 2000; Denollet, Pedersen, Ong, Erdman, Serruys & van Domburg, 2006; Pedersen, Lemos, van Vooren, Liu, Daemen, Erdman et al., 2004).

Given that the Polish version of the DS14 seems to be a valid and psychometrically sound measure that comprises little burden to patients (it generally takes 5-7 minutes to complete), the DS14 could easily be adopted as a screening tool in clinical research and practice in order to identify patients with a potential cardio-toxic psychosocial risk profile. Others have also recommended the use of the DS14 as one of the measures to use in clinical cardiology practice to identify high-risk patients (Albus, Jordan & Herrmann-Lingen, 2004), as Type D has been associated with adverse health outcomes, including increased risk of mortality and morbidity (Pedersen & Denollet, 2006; Schiffer, Pedersen, Widdershoven, Hendriks, Winter & Denollet, 2005; Al-

Ruzzeh, Athanasiou, Mangoush, Wray, Modine, George, et al., 2005; Pedersen, Denollet, Ong, Serruys, Erdman & van Domburg, 2007; Denollet, Vaes & Brutsaert, 2000; Denollet, Pedersen, Ong, Erdman, Serruys & van Domburg, 2006; Pedersen, Lemos, van Vooren, Liu, Daemen, Erdman et al., 2004). The use of the DS14 could also be extended to other diseases, as Type D has been shown to predict the onset of cancer in patients with CVD (Denollet, 1998), although further cross-cultural research into the predictive validity of the Type D construct in relation to clinical outcomes in other somatic diseases is warranted. Data presented by Ogińska-Bulik (2009) confirm the relationship between this type of personality (measured with DS14) and cancer diseases, diabetes, psoriasis and asthma. The research conducted by the author also revealed the association between type D and unhealthy behaviours such as smoking, excessive drinking and drug using. It also seems timely to examine whether the impact of Type D on health outcomes can be modified by means of psychosocial intervention.

In conclusion, the results of the current study show that the Polish version of the DS14 is valid and reliable, and that the Type D personality construct also seems to be applicable to the Polish setting. Future research is warranted to examine whether Type D is also associated with increased mortality and morbidity in Polish CVD patients, as has been shown in several Western European studies.

References

Albus, C., Jordan, J. & Herrmann-Lingen, C. (2004). Screening for psychosocial risk factors in patients with coronary heart disease – recommendations for clinical practice. European Journal of Cardiovascular Prevention and Rehabilitation, 11, 75-79.

Al-Ruzzeh, S., Athanasiou, T., Mangoush, O., Wray, J., Modine, T., George, S. & Amrani, M. (2005). Predictors of poor mid-term health related quality of life after primary isolated coronary artery bypass grafting surgery. Heart, 91, 1557-1562.

Aquarius, A., Denollet, J., Hamming, J., & De Vries, J. (2005). Role of disease status and Type D personality in outcomes in patients with peripheral arterial disease. American Journal of Cardiology, 96, 996-1001.

Aquarius, A., Denollet, J., Hamming, J., Breek, J., & De Vries, J. (2005). Impaired health status and invasive treatment in peripheral arterial disease: a prospective 1-year follow-up study. Journal of Vascular Surgery, 41, 436-442.

Chapman, B., Duberstein, P., & Lyness, J. (2007). The distressed personality type: replicability and general health associations. European Journal of Personality, 21, 911-929.

De Jonge, P., Denollet, J., van Melle, J., Kuyper, A., Honig, A., Schene, A., & Ormel, J. (2007). Associations of type-D personality and depression with somatic health in myocardial infarction patients. Journal of Psychosomatic Research, 63, 477-482.

Denollet, J. (1998). Personality and risk of cancer in men with coronary heart disease. Psychological Medicine, 28, 991-995.

Denollet, J. (2005). DS14: Standard assessment of negative affectivity, social inhibition, and Type D personality. Psychosomatic Medicine, 67, 89-97.

Denollet, J., Vaes, J., & Brutsaert, D. (2000). Inadequate response to treatment in coronary heart disease. Adverse effects of Type D personality and younger age on 5-year prognosis and quality of life. Circulation, 102, 630-635.

Denollet, J., Pedersen, S., Ong, A., Erdman, R., Serruys, P., & van Domburg, R. (2006). Social inhibition modulates the effect of negative emotions on cardiac prognosis following percutaneous coronary intervention in the drug-eluting stent era. European Heart Journal, 27, 171-177.

Emons, W., Meijer, R., & Denollet, J. (2007). Negative affectivity and social inhibition in cardiovascular disease: evaluating Type D personality and its assessment using item response theory. Journal of Psychosomatic Research, 63, 27-39.

Grande, G., Jordan, J., Kummel, M., Struwe, C., Schubmann, R., Schulze, F., Unterberg, C., von Kanel, R., Kudielka, B., Fischer, J., & Herrmann-Lingen, C. (2004). Evaluation of the German Type D Scale (DS14) and prevalence of the Type D personality pattern in cardiological and psychosomatic patients and healthy subjects. Psychotherapie, Psychosomatik, Medizinische Psychologie, 54: 413-422.

Gremigni, P. & Sommaruga, M. (2005). Pesonalità di Tipo D, un costrutto rilevante in cardiologia. Studio preliminare di validazione del questionario italiano. Psicoterapia Cognitiva e Comportamentale, 11, 7-18.

Habra, M., Linden, W., Anderson, J., Weinberg, J. (2003). Type D personality is related to cardiovscular and neuroendocrine reactivity to acute stress. Journal of Psychosomatic Research, 55, 235-245.

Juczynski, Z. & Ogińska-Bulik, N. (2009). Narzędzia pomiaru stresu i radzenia sobie ze stresem (Methods to measure stress and coping). Warszawa: Pracownia Testów Psychologicznych.

Kop, W.J. (1999). Chronic and acute psychological risk factors for clinical manifestations of coronary artery disease. Psychosomatic Medicine, 61, 476-487.

Martens, E., Kupper, N., Pedersen, S., Aquarius, A., & Denollet, J. (2007). Type-D personality is a stable taxonomy in post-MI patients over an 18-month period. Journal of Psychosomatic Research, 63, 545-550.

Ogińska-Bulik, N. (2009). Osobowość typu D: teoria i badania. (Type D personality: theory and research). Łódź: WSHE.

Ogińska-Bulik, N. & Juczyński, Z. (2008). Osobowość, stres a zdrowie (Personality, stress and health). Warszawa: Difin.

Pedersen S. & Denollet J. (2003). Type D personality, cardiac events and impaired quality of life: a review. European Journal of Cardiovascular Prevention and Rehabilitation, 10, 241-248.

Pedersen, S. & Denollet, J. (2004). Validity of the Type D personality construct in Danish post-MI patients and healthy controls. Journal of Psychosomatic Research. 57, 265-272.

Pedersen, S., & Denollet, J. (2006). Is type D personality here to stay? Emerging evidence across cardiovascular disease patient groups. Current Cardiological Review, 2, 205-213.

Pedersen, S. & Middel, B. (2001). Increased vital exhaustion among Type D patients with ischemic heart disease. Journal of Psychosomatic Research, 51, 443-449.

Pedersen, S., Daemen, J., van de Sande, M., Sonnenschein, K., Serruys, P., Erdman, R., & van Domburg, R. (2007). Type-D personality exerts a stable, adverse effect on vital exhaustion in PCI patients treated with paclitaxel-eluting stents. Journal of Psychosomatic Research, 62, 447-453.

Pedersen, S., Denollet, J., Ong, A., Serruys, P., Erdman, R., & van Domburg, R. (2007). Impaired health status in Type D patients following PCI in the drug-eluting stent era. International Journal of Cardiology, 114, 358-365.

Pedersen, S., Lemos, P., van Vooren, P., Liu, T., Daemen, J., Erdman, R., Serruys, P., & van Domburg, R. (2004). Type D personality predicts death or myocardial infarction after bare metal stent or sirolimus-eluting stent implantation: A Rapamycin-Eluting Stent Evaluated At Rotterdam Cardiology Hospital (RESEARCH) registry sub-study. Journal of the American College of Cardiology, 44, 997-1001.

Pedersen, S., Ong, A., Serruys, P., Erdman, R., & van Domburg, R. (2006). Type D Personality and diabetes predict the onset of depressive symptoms in patients following percutaneous coronary intervention. American Heart Journal, 151, 367.e1-367.e6.

Pedersen, S., Theuns, D., Muskens-Heemskerk, A., Erdman, R., & Jordaens, L. (2007). Type-D personality but not ICD indication is associated with impaired health-related quality of life 3 months post implantation. Europace, 9, 675-680.

Pedersen, S., Van Domburg, R,, Theuns, D., Jordaens, L., & Erdman, R. (2004). Type D personality is associated with increased anxiety and depressive symptoms in patients with an implantable cardioverter defibrillator and their partners. Psychosomatic Medicine, 66, 714-719.

Pedersen, S., Yagensky, A., Smith, O., Yagenska, O., Shpak, V., & Denollet, J. (2009). Preliminary evidence for the cross-cultural utility of the Type D personality construct in the Ukraine. International Journal of Behavioral Medicine, 16(2), 108-115.

Schiffer, A., Pedersen, S., Broers, H., Widdershoven, J., & Denollet, J. (2008). Type-D personality but not depression predicts severity of anxiety in heart failure patients at 1-year follow-up. Journal of Affective Disorders, 106, 73-81.

Schiffer, A., Pedersen, S., Widdershoven, J., Hendriks, E., Winter, J., & Denollet, J. (2005). Type D personality is independently associated with impaired health status and increased depressive symptoms in chronic heart failure. European Journal of Cardiovascular Prevention and Rehabilitation, 12, 341-346.

Spindler, H., Pedersen, S., Serruys, P., Erdman, R., & van Domburg, R. (2007). Type D personality predicts chronic anxiety following percutaneous coronary intervention in the drug-eluting stent era. Journal of Affective Disorders, 99, 173-179.

van Gestel, Y., Pedersen, S., van de Sande, M., de Jaegere, P., Serruys, P., Erdman, R., & van Domburg, R. (2007). Type D personality and depressive symptoms predict anxiety 12 months post-percutaneous coronary intervention. Journal of Affective Disorders, 103, 197-203.

Watson, D., Clark, L., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: the PANAS scales. Journal of Personality and Social Psychology, 54(6), 1063-70.

Whitehead, D., Perkins-Porras, L, Strike, P., Magid, K., & Steptoe A. (2007). Cortisol awakening response is elevated in acute coronary syndrome patients with type-D personality. Journal of Psychosomatic Research, 62, 419-425.

Williams, L., O'Connor, R.C., Howard, S., Hughes, B., Johnston, D.W., Hay, J.L., O'Connor, D.B., Lewis, C.A., Ferguson, E., Sheehy, N., Grealy, M.A., & O'Carroll, R.E. (2008). Type-D personality mechanisms of effect: the role of health-related behavior and social support. Journalof Psychosomatic Research, 64, 63-69.

Zawadzki, B., Strelau, B. (1997). Formalna Charakterystyka Zachowania - Kwestionariusz Temperamentu (FCZ-KT), (Formal Characteristics of Behaviour - Temperament Inventory (FCZ-KT). Manual. Warszawa: PTP.

Zawadzki, B., Strelau, J., Szczepaniak, P., & Śliwińska, M. Inwentarz osobowości NEO-FFI Costy i McCrae (Personality Inventory NEO-FFI by Costa and McCrae). Warszawa: Pracownia Testów Psychologicznych PTP 1998.