

Original Research

Prevalence of “Distressed” Personality in Patients with Coronary Artery Disease and Its Correlation with Morbidity After Coronary Surgery

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Coronary artery disease, “distressed” personality, coronary artery bypass grafting.

Introduction: The “distressed” (Type-D) personality is an emerging risk factor in cardiovascular diseases and is associated with an increased risk of impaired quality of life, morbidity and mortality. The purpose of this study was to explore the prevalence of Type-D personality among patients with coronary artery disease (CAD) and its association with the development of complications following coronary artery bypass grafting surgery.

Methods: A Greek version of the Type-D Personality Scale-14 (DS14), along with the Hospital Anxiety and Depression Scale (HADS) as well as the Ways of Coping Questionnaire (WCQ), were used. A cohort of 323 patients with CAD was examined.

Results: The prevalence of Type-D personality among Greek patients with CAD was found to be 18.24%. Type-D patients showed a higher rate of anxiety and depression compared to non Type-D patients. Type-D was also associated with passive coping and negatively correlated with active coping. Regarding postoperative morbidity, type-D patients were at an increased risk of developing postoperative atrial fibrillation, while no significant differences were found in the development of any other complication.

Conclusions: The impact of Type-D personality on health outcomes should be studied further, both in clinical samples and in the general population.

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Type-D or “distressed” personality represents the effects of two personality traits: negative affectivity (NA, the tendency to experience negative emotions), and social inhibition (SI, the tendency to inhibit the expression of emotions).¹ It refers to a normal personality disposition rather than to a psychopathology.² Type-D personality has been associated with poor health-related quality of life in patients with peripheral artery disease,³ chronic heart failure,⁴ an implantable cardioverter-defibrillator,⁵ and in patients who have undergone coronary artery bypass grafting (CABG) surgery.⁶

In addition, Type-D personality seems to moderate the effects of medical treatment.⁷ The aim of this study was to evaluate the prevalence of Type-D personality in patients with coronary artery disease (CAD) and to explore its association with the postoperative morbidity after CABG.

Methods

We recruited 323 patients with CAD who were admitted between June 2007 and December 2009 to the Cardiology and Cardiothoracic Departments of AHEPA University Hospital for either percutane-

ous coronary intervention (PCI) or CABG. Patients were considered eligible if they were Greek speaking, were not suffering from life-threatening diseases, and had no history of psychiatric disorder.

Personality Type-D was assessed using the Type-D Personality Scale-14 (DS14), which is a number-item self-report scale that measures NA and SI.⁸ Each item is rated on a 5-point Likert scale ranging from 0 (false) to 4 (true). A standardised cut-off score of ≥ 10 on both subscales indicates the presence of Type-D personality in an individual. The present study used the Greek translation of the DS14 and the same scoring system was maintained.⁹ The internal consistency of the Greek DS14 was very good, with a Cronbach's alpha of 0.86 (NA/SI of 0.81/0.79).

The Hospital Anxiety and Depression Scale (HADS) was employed to assess depression and anxiety.¹⁰ This is a 14-item scale, evenly divided into two subscales, with each item being rated on a 4-point Likert scale (0-3). Each subscale score ranges from 0 (absence of symptoms or presence of positive features) to 21 (maximal presentation of symptoms or absence of positive features). A validated Greek version of the HADS was used to identify and quantify anxiety and depression.¹¹ The Greek version of the HADS had Cronbach's alpha for the anxiety and depression scales of 0.887 and 0.703, respectively. In the present study, since there is no single generally accepted cut-off score, the 75th percentile was used as the cut-off point to define clinically significant symptomatology (anxiety: 8, depression: 4).

The Ways of Coping Questionnaire (WCQ), which was developed by Folkman and Lazarus, was used to assess coping strategies in a variety of general and patient populations.¹² The WCQ contains 38 items that describe actions, thoughts and coping strategies that may be employed during stressful situ-

ations. The WCQ consists of five subscales that are representative of five distinct coping processes. The subscales are wishful thinking, avoidance, thinking it over, seeking support and goal-oriented. On a 4-point Likert scale, the individual has to indicate the extent to which one employed a particular strategy. A validated Greek version of the WCQ was used to measure coping strategies.¹³ Cronbach's alpha for the WCQ (Greek version) ranges from 0.60 to 0.79.

Statistical analysis

Type-D versus non-Type-D characteristics were assessed using the t-test and chi-square tests, depending on whether variables were continuous or categorical. Pearson's correlation coefficient was used to assess linear relationships between measurements on a continuous scale. Normality assumptions were checked through the Kolmogorov-Smirnov test. P-values < 0.05 flagged significant results. Statistical analysis was performed using JMP 8.0 (SAS Institute Inc., Cary, NC).

Results

The baseline demographic, clinical and laboratory characteristics of the study population are shown in Table 1. Patients with Type D personality were younger (Figure 1), mostly female (Figure 2), and more frequently had renal impairment. Regarding the prevalence of Type-D personality, using the recommended cut-off of 10 on both DS14 subscales, 18.27% of the total cohort of patients were classified as Type-D. In univariate analysis, Type-D was more frequent among the female group ($\chi^2_{(1)}=35.925$, $p<0.001$; odds ratio: 5.9, 95% CI: 3.17-11.01). Type-D individuals were significantly younger. Type-D per-

Table 1. Description and comparison of socio-demographic characteristics of subjects in the study (n=323, Type-D=59).

	n(%)	Type D	non Type D	p
Age	65.1 \pm 9	58.7 \pm 9.5	66.5 \pm 8.3	<0.0001
Female	63 (19.5)	28 (47.4)	35 (13.2)	<0.0001
LVEF <30%	23 (7.1)	6 (10.1)	17 (6.4)	0.31
Diabetic	69 (21.3)	11 (18.6)	58 (21.9)	0.57
Creatinine > 2.0 mg/dL	2 (0.6)	2 (3.3)	0	0.003
LOS	13.6 \pm 11.6	12 \pm 4.7	13.9 \pm 12.6	0.058
COPD	13 (4)	3 (5)	10 (3.7)	0.64
CABG	233 (72.1)	44 (74.5)	189 (71.5)	0.64

Mean \pm SD or frequency followed by percentage are shown accordingly. LVEF – left ventricular ejection fraction; LOS – length of stay; COPD – chronic obstructive pulmonary disease; CABG – coronary artery bypass grafting.

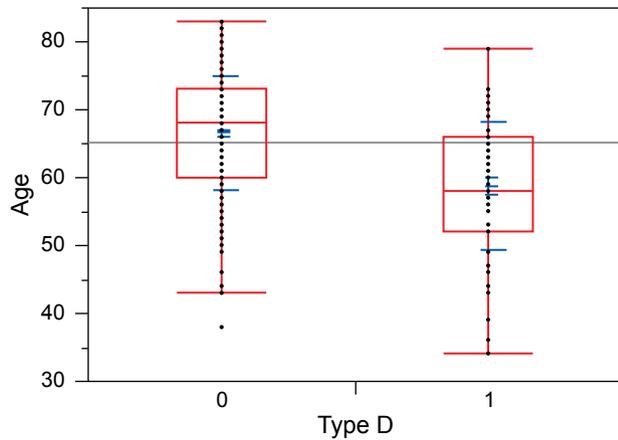


Figure 1. Boxplots for age of Type-D vs. non Type-D subjects. Type-D are significantly younger.

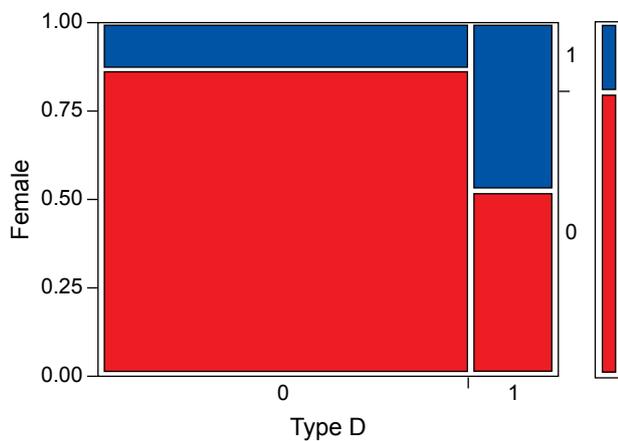


Figure 2. Type-D vs. sex shown as proportions. A value of 0 means No while a value of 1 means Yes. The x-axis demonstrates the distribution of subjects between non Type-D (0) and Type-D (1), with the majority being non Type-D. The y-axis demonstrates the gender distribution between male (0) and female (1). There is a significantly higher proportion of females in Type-D than in non Type-D subjects.

sonality was associated with a higher education level ($\chi^2_{(2)}=10.943$, $p=0.0042$; Figure 3). No differences were found regarding the length of stay, diabetes, low ejection fraction (<30%), chronic obstructive pulmonary disease, concurrent cardiac pathology, type of treatment, number of grafts for CABG, or concurrent cardiac surgery treatment. A creatinine level >2.0 mg/dL was found to be significantly associated with Type-D personality ($\chi^2_{(1)}=9.005$, $p=0.003$).

Regarding the association between Type-D personality, depression and anxiety, the DS14 and HADS were found to be highly correlated (Table 2). The NA subscale of the DS14 was correlated

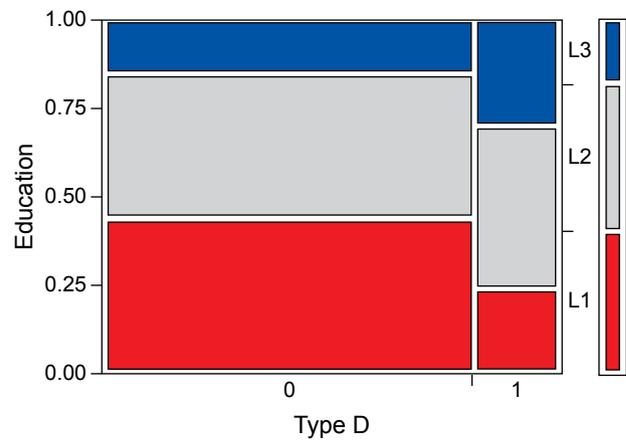


Figure 3. Type-D vs. education shown as proportions. A value of 0 means No while a value of 1 means Yes. The x-axis demonstrates the distribution of subjects between non Type-D (0) and Type-D (1). The y-axis demonstrates the educational level distribution. L1: Primary school, L2: Secondary school, L3: University. Type-D subjects are more educated than non Type-D.

Table 2. Correlation coefficients of Type-D vs. anxiety, depression, and coping.

	DS14-NA	DS14-SI
HADS		
Anxiety	0.81*	0.84*
Depression	0.66*	0.65*
WCQ		
Active coping		
Seeking support	-0.75*	-0.64*
Goal oriented	-0.79*	-0.65*
Passive coping		
Wishful thinking	0.69*	0.61*
Avoidant coping	0.8*	0.72*
Thinking it over	-0.03	-0.01

Significant correlations are marked with an asterisk. DS14 – Type-D Personality Scale-14; NA – negative affectivity; SI – social inhibition; HADS – Hospital Anxiety and Depression Scale; WCQ – Ways of Coping Questionnaire.

with anxiety ($r=0.8183$, $p<0.001$) and depression ($r=0.6664$, $p<0.001$). The SI subscale was also correlated with anxiety ($r=0.8466$, $p<0.001$) and depression ($r=0.6544$, $p<0.001$). Type-D persons scored higher on anxiety ($t=31.937$, $p<0.001$) and depression ($t=12.683$, $p<0.001$) as compared to their non Type-D counterparts.

For the association between Type-D personality and coping, the DS14 and WCQ were found to be correlated (Table 2). For both the NA and SI subscales of the DS14 significant correlations were found with the wishful thinking and the avoidance coping subscales (passive coping). Seeking social

support and goal-oriented subscales (active coping) were negatively correlated with both the NA and SI. Type-D persons scored higher on the wishful thinking ($t=17.663$, $p<0.001$) and avoidance ($t=33.464$, $p<0.001$), and lower on the seeking social support ($t=-26.560$, $p<0.001$) and goal-oriented ($t=-26.467$, $p<0.001$) subscales.

Evaluation of the morbidity after CABG in the two groups of patients revealed that Type-D personality was associated with the development of postoperative atrial fibrillation ($\chi^2_{(1)}=6.558$, $p=0.0104$; odds ratio: 2.35, 95% CI: 1.2-4.58) (Figure 4). No differences were found in the development of transient ischaemic attack or cerebrovascular accident, myocardial infarction, sternal wound infection, leg wound infection,

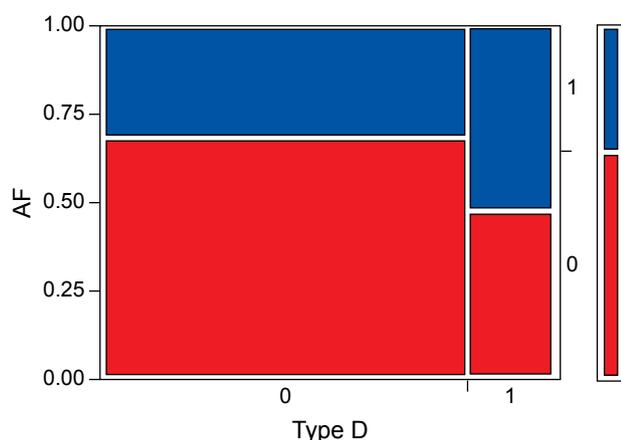


Figure 4. Type-D vs. postoperative occurrence of atrial fibrillation (AF). A value of 0 means No while a value of 1 means Yes. The x-axis demonstrates the distribution of subjects between non Type-D (0) and Type-D (1). The y-axis demonstrates the distribution of AF occurrence between No (0) and Yes (1). AF is more frequent in Type-D subjects.

chest infection, renal replacement therapy, intra-aortic balloon pump insertion, or death (Table 3).

Discussion

This study assessed the distribution of Type-D personality in patients with CAD undergoing either PCI or CABG. A similar study investigated the association between Type-D personality and the metabolic syndrome (MetS) in Greek patients with MetS, excluding individuals with CAD among other comorbidities.⁹ The prevalence of Type-D personality in Greek patients with CAD was found to be 18.27%. Tziallas et al showed a prevalence of Type-D of 44% versus 15% in cases with MetS and controls, respectively. The majority of the international studies on Type-D have shown that the prevalence of Type-D among cardiovascular patients is between 15% and 29%,¹⁴⁻¹⁶ compared to 13% and 24% for the normal population.^{3,8}

Socio-demographic factors such as educational level and social integration are known to be risk factors for the incidence and prognosis of CAD.¹⁷ Although Mommersteeg et al reported an association between Type-D personality and a lower education level,¹⁸ in the present study Type-D personality was associated with a higher education level. Whereas depression signifies the presence of pathology, the same does not apply to Type-D personality as a personality trait. Conversely, Type-D personality implies temporal stability, which is not always true of depression.¹⁹ Distinct differences have been reported between Type-D and depression among cardiac patients.²⁰ Martens et al found stability of Type-D personality in post-myocardial infarction patients over an 18-month period.²¹ Even though the Greek version of

Table 3. Complications following CABG for Type-D vs. non Type-D subjects (n=233, Type-D=44).

	n(%)	Type D	non Type D	p
AF	83 (35.6)	23 (52.2)	60 (31.7)	0.01
MI	10 (4.2)	3 (6.8)	7 (3.7)	0.35
TIA/CVA	5 (2.1)	1 (2.2)	4 (2.1)	0.94
Inf(st)	5 (2.1)	1 (2.2)	4 (2.1)	0.94
Inf (l)	10 (4.2)	1 (2.2)	9 (4.7)	0.46
ChI	15 (6.4)	3 (6.8)	12 (6.3)	0.9
RRT	22 (9.4)	7 (15.9)	15 (7.9)	0.1
IABP	31 (13.3)	9 (20.4)	22 (11.6)	0.12
Death	13 (5.5)	2 (4.5)	11 (5.8)	0.74

Frequencies are followed by percentages. AF – atrial fibrillation; MI – myocardial ischaemia; TIA/CVA – transient ischaemic attack / cerebrovascular accident; Inf(st) – sternal wound infection; Inf(l) – leg wound infection; RTI – respiratory tract infection; RRT – renal replacement therapy; IABP – intra-aortic balloon pump.

HADS has only been validated in cancer¹¹ and general hospital patients,²² Herrmann et al suggested that the HADS may be considered the standard instrument for assessing anxiety and depression in cardiac patients.²³

Anxiety and depression impact the outcome of CABG surgery.²⁴ Previously published studies have shown that Type-D individuals have higher levels of cortisol²⁵ and pro-inflammatory cytokines,²⁶ which are associated with anxiety and depression. In the current study, Type-D patients scored higher on anxiety and depression scales compared to the non-Type-D patients.

Type-D personality patients have a limited ability to cope adequately with stressful life events.²⁷ They tend to evaluate situations negatively and avoid potential dangers involved in social interactions, leading to chronic psychological distress.²⁸ Though personality may not be easily changed, this does not imply that coping strategies cannot be modified.²⁹ Early detection and introduction of preventative measures may prove to be beneficial in the future for this group of people.

Morbidity following CABG surgery comprises mostly atrial fibrillation, chest infection, stroke, myocardial infarction, renal failure, and wound infection. These complications may be due to the preoperative patient status as a result of the body's response to the surgical trauma, or they may be the result of technical issues intraoperatively. In the present study, Type-D patients had a 2.35-fold increased risk of developing postoperative AF compared to non Type-D patients. No significant differences were found in the development of chest infection, stroke, myocardial ischaemia, renal failure, sternal wound infection, leg wound infection, intra-aortic balloon pump insertion, or death.

In summary, the distressed personality disclosure is valuable for identifying patients at increased risk of CAD and at increased risk of complications following treatment of the CAD.

References

- Denollet J, Sys SU, Brutsaert DL. Personality and mortality after myocardial infarction. *Psychosom Med.* 1995; 57: 582-591.
- Denollet J, Sys SU, Stroobant N, Rombouts H, Gillebert TC, Brutsaert DL. Personality as independent predictor of long-term mortality in patients with coronary heart disease. *Lancet.* 1996; 347: 417-421.
- Aquarius AE, Denollet J, Hamming JF, De Vries J. Role of disease status and type D personality in outcomes in patients with peripheral arterial disease. *Am J Cardiol.* 2005; 96: 996-1001.
- Schiffer AA, Pedersen SS, Widdershoven JW, Denollet J. Type D personality and depressive symptoms are independent predictors of impaired health status in chronic heart failure. *Eur J Heart Fail.* 2008; 10: 802-810.
- Pedersen SS, Theuns DA, Muskens-Heemskerk A, Erdman RA, Jordaens L. Type-D personality but not implantable cardioverter-defibrillator indication is associated with impaired health-related quality of life 3 months post-implantation. *Europace.* 2007; 9: 675-680.
- Al-Ruzzeh S, Athanasiou T, Mangoush O, et al. Predictors of poor mid-term health related quality of life after primary isolated coronary artery bypass grafting surgery. *Heart.* 2005; 91: 1557-1562.
- Denollet J, Vaes J, Brutsaert DL. 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.* 2000; 102: 630-635.
- Denollet J. DS14: standard assessment of negative affectivity, social inhibition, and Type D personality. *Psychosom Med.* 2005; 67: 89-97.
- Tziallas DM, Kostapanos MS, Skapinakis P, et al. The association between Type D personality and the metabolic syndrome: a cross-sectional study in a University-based outpatient lipid clinic. *BMC Res Notes.* 2011; 4: 105.
- Zigmond AS, Snaith RP. The hospital anxiety and depression scale. *Acta Psychiatr Scand.* 1983; 67: 361-370.
- Mystakidou K, Tsilika E, Parpa E, Katsouda E, Galanos A, Vlahos L. The Hospital Anxiety and Depression Scale in Greek cancer patients: psychometric analyses and applicability. *Support Care Cancer.* 2004; 12: 821-825.
- Folkman S, Lazarus RS. *Ways of Coping Questionnaire: Research Edition.* Palo Alto, CA: Consulting Psychologists, 1988.
- Karademas EC. The adaptation of the Ways of Coping questionnaire in the Greek language. *Psychology.* 1998; 5: 260-273.
- Pedersen SS, Lemos PA, van Vooren PR, et al. 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 substudy. *J Am Coll Cardiol.* 2004; 44: 997-1001.
- Spindler H, Kruse C, Zwisler AD, Pedersen SS. Increased anxiety and depression in Danish cardiac patients with a type D personality: cross-validation of the Type D Scale (DS14). *Int J Behav Med.* 2009; 16: 98-107.
- Denollet J, Pedersen SS, Ong AT, Erdman RA, Serruys PW, van Domburg RT. Social inhibition modulates the effect of negative emotions on cardiac prognosis following percutaneous coronary intervention in the drug-eluting stent era. *Eur Heart J.* 2006; 27: 171-177.
- Rozanski A, Blumenthal JA, Davidson KW, Saab PG, Kubzansky L. The epidemiology, pathophysiology, and management of psychosocial risk factors in cardiac practice: the emerging field of behavioral cardiology. *J Am Coll Cardiol.* 2005; 45: 637-651.
- Mommersteeg PM, Kupper N, Denollet J. Type D personality is associated with increased metabolic syndrome prevalence and an unhealthy lifestyle in a cross-sectional Dutch community sample. *BMC Public Health.* 2010; 10: 714.
- O'Dell KR, Masters KS, Spielmanns GI, Maisto SA. Does

- type-D personality predict outcomes among patients with cardiovascular disease? A meta-analytic review. *J Psychosom Res.* 2011; 71: 199-206.
20. Denollet J, de Jonge P, Kuyper A, et al. Depression and Type D personality represent different forms of distress in the Myocardial Infarction and Depression - Intervention Trial (MIND-IT). *Psychol Med.* 2009; 39: 749-756.
 21. Martens EJ, Kupper N, Pedersen SS, Aquarius AE, Denollet J. Type-D personality is a stable taxonomy in post-MI patients over an 18-month period. *J Psychosom Res.* 2007; 63: 545-550.
 22. Michopoulos I, Douzenis A, Kalkavoura C, et al. Hospital Anxiety and Depression Scale (HADS): validation in a Greek general hospital sample. *Ann Gen Psychiatry.* 2008; 7: 4.
 23. Herrmann C, von zur Mühen F, Schaumann A, et al. Standardized assessment of psychological well-being and quality-of-life in patients with implanted defibrillators. *Pacing Clin Electrophysiol.* 1997; 20: 95-103.
 24. Pignay-Demaria V, Lespérance F, Demaria RG, Frasure-Smith N, Perrault LP. Depression and anxiety and outcomes of coronary artery bypass surgery. *Ann Thorac Surg.* 2003; 75: 314-321.
 25. Whitehead DL, Perkins-Porras L, Strike PC, Magid K, Step-toe A. Cortisol awakening response is elevated in acute coronary syndrome patients with type-D personality. *J Psychosom Res.* 2007; 62: 419-425.
 26. Denollet J, Vrints CJ, Conraads VM. Comparing Type D personality and older age as correlates of tumor necrosis factor-alpha dysregulation in chronic heart failure. *Brain Behav Immun.* 2008; 22: 736-743.
 27. Doering LV, Dracup K, Caldwell MA, et al. Is coping style linked to emotional states in heart failure patients? *J Card Fail.* 2004; 10: 344-349.
 28. Denollet J. Type D personality. A potential risk factor re-fined. *J Psychosom Res.* 2000; 49: 255-266.
 29. Linden W. Psychological treatments in cardiac rehabilitation: review of rationales and outcomes. *J Psychosom Res.* 2000; 48: 443-454.