



Type D, coping and self-care in chronic heart failure patients

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Abstract

Object: Chronic heart failure (CHF) is a serious condition, associated with worse health outcomes. Type D personality defines a subgroup of CHF patients at risk for adverse health outcomes. Consultation behavior might be one mechanism linking Type D to these outcomes. Until now, no study has examined the association between Type Ds coping and consultation behavior. This study aims at confirming the association between Type D and consultation behavior found in previous studies and at investigating: (1) The association between Type D and coping; and (2) Whether coping mediates the relationship between Type D and consultation behavior in CHF patients.

Methods: 103 patients with systolic CHF completed three questionnaires. DS14 – Type D, CISS – Coping styles, EHFSBS – Self-management and consultation behavior. Information on sociodemographic variables was obtained by questionnaire; information on clinical variables was obtained from medical records. Type D was not significantly associated with consultation behavior ($p = .09$), but there was a significant association with self-management ($p = .04$). Type Ds were more likely to use emotion-oriented coping ($p = .001$); emotion-oriented coping was significantly associated with self-management ($p = .03$), but after statistically adjusting for Type D this last association was no longer significant ($p = .15$). In multivariable analyses, Type D remained a significant associate of self-management ($p = .05$) and of emotion-oriented coping ($p = .001$).

Conclusions: Type D personality was independently associated with impaired self-management behavior and emotion-oriented coping. We could not test the hypothesis of mediating effects of coping styles between Type D personality and self-care (self-management, consultation behavior), because the assumptions underlying the mediation model were not fulfilled.

Key Words

- Chronic heart failure
- Type D personality
- Consultation behavior
- Coping

■ Introduction

Due to improved survival after myocardial infarction and an aging population, the prevalence and incidence of chronic heart failure (CHF) have increased dramatically in the last decade.^{1,2} CHF is a chronic, life threatening condition that has been associated with high mortality and morbidity rates, impaired health status, increased psychological distress and ever rising health costs.^{3–6} It is an important objective in healthcare to search for an approach that decreases the adverse outcomes associated with CHF.⁷

During the last ten years, there has been a growing interest in research on the role of personality, more specific Type D personality, in heart diseases, also in CHF.^{8–10} Type D personality is defined by two normal and stable personality traits, negative affectivity and social inhibition. Type D persons experience a lot of negative emotions (negative affectivity) and are not likely to express these emotions in social interactions, because they fear disapproval or rejection by others (social inhibition).¹¹ Among CHF patients, the prevalence of Type D ranges between 24–45%^{12–14}, whereas the prevalence of Type D in the general population ranges between 17–39%.^{15,16} Type D personality defines a subgroup of cardiovascular disease (CVD) patients that is vulnerable to experience a range of adverse health outcomes, such as worse prognosis, impaired health

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status, and increased psychological distress, such as depression and anxiety.^{17,18}

One of the current foci of personality research in heart disease is the physiological and behavioral mechanisms that may link personality and health outcomes. Knowledge on possible mechanisms that link Type D to adverse health outcomes will enable improvement of interventions aimed at reducing the negative health effects of CHF. Recent research has shown that inadequate consultation behavior could be a behavioral mechanism that links Type D and adverse health outcomes. Schiffer and colleagues¹⁴ showed that CHF Type D patients were less likely to consult medical services as compared to non-Type Ds, despite elevated cardiac symptoms and high levels of health worry. The authors suggested that this failure to consult may be a mechanism explaining the adverse effects of Type D on health outcomes. In a subsequent study¹⁹ was shown that Type D CHF patients with inadequate consultation behavior were at a 6-fold increased risk for impaired health status compared to non-Type Ds with adequate consultation behavior (OR = 6.06, $p < .001$)

Recent research of Roohafza H, et al.²⁰ has indicated that patients with maladaptive coping strategies are at elevated risk of acute coronary syndromes. Xiao-nan Yu et al.²¹ found that in Chinese patients with coronary heart disease (CHD), Type D patients used more maladaptive coping strategies in response to the heart disease compared to non-Type D patients. Coping strategy fully mediated the association between Type D personality and perceived health.

Until now no study examined the association between Type Ds coping styles and consultation behavior. It might be that consultation behavior is influenced by coping style and that the association between Type D and consultation behavior is mediated by coping style.^{14,19} Hence this study aims at confirming the association between Type D personality and consultation behavior found in previous studies^{14,19} and at investigating:

1. The association between Type D personality and coping
2. Whether coping mediates the relationship between Type D personality and consultation behavior in CHF patients.

■ Materials and methods

Study population

194 Outpatients with CHF from the “Ziekenhuisgroep

Twente”, a general hospital in Almelo, the Netherland, were included in the current study.

Inclusion criteria were:

1. Systolic heart failure
2. Left ventricular ejection fraction (LVEF) $\geq 40\%$
3. Pharmacologically stable 1 month preceding inclusion

Excluded were patients:

1. Aged > 80 years
2. With a main diagnosis of diastolic heart failure
3. Incapable of understanding and reading Dutch
4. Diagnosed with cognitive impairment and life threatening co-morbidities
5. Participating in another study on CHF
6. Known psychiatric disease (except depression and anxiety)

Procedure

Patients were selected for inclusion in the study by the researchers on the basis of above mentioned criteria between April 2010 and April 2012. Selected patients were informed about the study and asked to participate by letter. When they agreed to participate, they were asked to complete an informed consent form and a set of psychological questionnaires (73 items) and to return it in a self-addressed and stamped envelope. Patients who did not respond within 3 weeks received a reminder telephone call and were asked whether they were interested in participating in the current study.

All returned questionnaires were checked for completeness and in case patients had left open any items, they were called to obtain the remaining answers. Participation was voluntary. 103 Patients agreed to participate and the response rate was 53%. Ethical approval has been obtained from the medical ethical committee of the hospital.

Type D personality

The DS14 was used to assess Type D personality. This questionnaire consisted of two subscales of seven items each, measuring negative affectivity and social inhibition.²² The 14 items are answered on a 5-point Likert scale ranging from “False” (0) to “True” (4). Seven of these items refer to the subscale “Negative Affectivity”, the tendency to experience negative emotions in general. The remaining 7 items refer to the tendency to inhibit the expression of emotions in social relationships, (“Social Inhibition”). Patients are defined as Type D when scoring 10 on both subscales simultaneously. The DS14 has good

psychometric properties, as both subscales are internally consistent, with Cronbach's alpha = .88 for the negative affectivity subscale and .86 for the social inhibition subscale, and good test-retest reliability with $r = .72$ and $.82$, respectively.^{22,23}

Self-management and consultation behavior

The EHFSBS is a disease-specific measure of the self-management behavior of patients with CHF. The questionnaire consists of 12 items that are answered on a 5-point Likert scale ranging from "I completely agree" (1) to "I don't agree at all" (5). A high total score indicates less self-management behavior – Cronbach's α for the total scale is 0.81.²⁴

Previous research to determine the factor structure of the EHFSBS has found one specific facet of self-management, namely consultation behavior that can be studied in its own right in addition to the total EHFSBS score¹⁸ – Cronbach's α for this factor was 0.86. The mean (SD) score of the consultation behavior subscale was 9.8, and the scores were normally distributed. Inadequate consultation behavior was defined as a score above the median split of this subscale. In the current study, both the total score on the EHFSBS (self-management behavior) and the score on the consultation subscale was used (consultation behavior) as measures of self-care in CHF.

Coping

The Coping Inventory for Stressful Situations (CISS) was used to assess coping styles. This CISS is a 48-items self-report measure of emotion-, task-, and avoidance-oriented coping.²⁵ The avoidance dimension could be further subdivided into a distraction scale and a social diversion scale. The items can be answered on a 5-point Likert scale ranging from "Not at all" (1) to "Very much" (5), with lower scores meaning using less of a specific coping style compared to higher scores.

The CISS has been translated into Dutch and the Dutch version has good psychometric properties, as subscales are internally consistent, with Cronbach's alpha = .87 for the task-oriented coping subscale, .87 for the emotion-oriented subscale, .82 for the avoidance-oriented subscale, .75 for the distraction subscale and .78 for the social diversion subscale. Test-retest reliability is between $r = .60$ (avoidance-oriented) and $r = .92$ (emotion-oriented).²⁶

Demographic and clinical variables

Sociodemographic information included sex, age, marital

status and educational level. Clinical variables LVEF, etiology of CHF and medication. Information on clinical variables was obtained from the patients' medical records and from the treating cardiologist. It was not possible to obtain the New York Heart Association (NYHA) functional class of most of the participants because in more than half of the cases it could not be found in the medical records. In the current study, LVEF is used as a measure of disease severity.

Statistical analyses

Prior to statistical analyses, etiology of CHF, educational level and marital status were dichotomized according ischemic versus non-ischemic etiology, low versus high educational level, working versus not-working and partner versus no partner. The EHFSBS and the consultation behavior subscale were recoded into dichotomous variables using a median split, reflecting good versus poor self-management and adequate versus inadequate consultation behavior, respectively.

For comparison between two groups (participants versus non-participants, Type D versus non-Type D), chi-square test for discrete variables and the t-test for independent samples for continuous variables were used.

Before investigating whether coping mediates the relationship between Type D personality and consultation behavior, we examined whether the assumptions underlying the mediation model were fulfilled:

1. Type D had to be associated with consultation behavior
2. Type D had to be associated with coping styles (the mediator)
3. Coping styles had to be associated with consultation behavior statistically controlling for Type D²⁷

To test these assumptions, linear regression models were used.

Multivariable linear regression analyses were used to examine whether univariable significant associations between Type D personality and coping styles, and between Type D personality and self-management behavior were independent from sociodemographic and clinical variables. In multivariable analyses, we adjusted for significant sociodemographic and clinical in the univariable analyses. A priori LVEF, gender and age were also selected as covariates.

All statistical tests were two-tailed. $p < 0.05$ was used for all tests to indicate statistical significance. All statistical analyses were performed using SPSS 11.5 for Windows.

Table 1: Baseline characteristics stratified by type-D personality

	Total (n = 103)	Type-D (n = 33)	Non Type-D (n = 70)	P
Demographics				
Age, mean (SD)	65 (10)	64 (10)	66 (10)	0.35
Male sex	74 (72)	25 (76)	49 (70)	0.54
Living with a partner	82 (80)	26 (79)	56 (80)	0.89
Lower Education	25 (25)	6 (19)	19 (27)	0.36
Working	10 (10)	4 (13)	6 (9)	0.54
Clinical variables				
LVEF* 30–45%	80 (78)	27 (82)	53 (77)	0.57
Ischemic etiology	48 (47)	12 (36)	36 (52)	0.13
Smoking	18 (18)	6 (18)	12 (17)	0.90
Medication				
ACE-inhibitors	67 (65)	23 (70)	44 (63)	0.50
ARB's	14 (14)	4 (12)	10 (14)	0.77
Diuretics	84 (82)	26 (79)	58 (83)	0.62
K Diuretics [#]	24 (23)	11 (33)	13 (19)	0.98
Digitalis	19 (18)	7 (21)	12 (17)	0.62
Beta-blockers	84 (82)	27 (82)	57 (81)	0.96
Long-acting nitrates	14 (14)	4 (12)	10 (14)	0.77
Aspirin	86 (84)	28 (85)	58 (83)	0.80
Statins	58 (56)	15 (46)	43 (62)	0.13
Psychopharmaca	22 (22)	5 (15)	17 (25)	0.28

Numbers are presented as n (%) unless otherwise stated

* LVEF = Left Ventricular Ejection Fraction

[#] K Diuretics = Potassium-sparing-diuretics

■ Results

Patient characteristics

Participants and non-participants did not differ significantly on baseline characteristics, except for gender. Participants were more often male (72% versus 57%, $p = .03$) as compared to non-participants.

Patient characteristics stratified by Type D personality are presented in Table 1; no significant differences were found between Type Ds and non-Type Ds on any of the sociodemographic and clinical variables (all $ps > .05$). The

prevalence of Type D personality in the current study was 32%.

Test of the mediation model

In univariable linear regression analyses, Type D personality was not significantly associated with consultation behavior ($b = .166$; $t = 1.693$ $p = .09$). However, we found a significant association between Type D personality and self-management behavior ($b = .199$; $t = 2.039$, $p = .04$). Furthermore, Type Ds were more likely to use an emotion-oriented coping style ($b = .457$; $t = 5.159$, $p \leq .001$). There were no significant associations between

Type D personality and task-oriented ($p = .19$), avoidant-oriented ($p = .69$), distraction-oriented ($p = .37$) and social diversion-oriented ($p = .83$) coping styles.

The association between emotion-oriented coping and self-management behavior was significant ($b = .217$; $t = 2.230$, $p = .03$). When statistically adjusted for Type D personality, the association between emotion-oriented coping and self-management behavior lost significance ($b = .159$; $t = 1.458$, $p = .15$).

Because results of the linear regression analyses indicated that the assumptions of the mediation model were not fulfilled, the mediation model could not be tested (Figure 1).

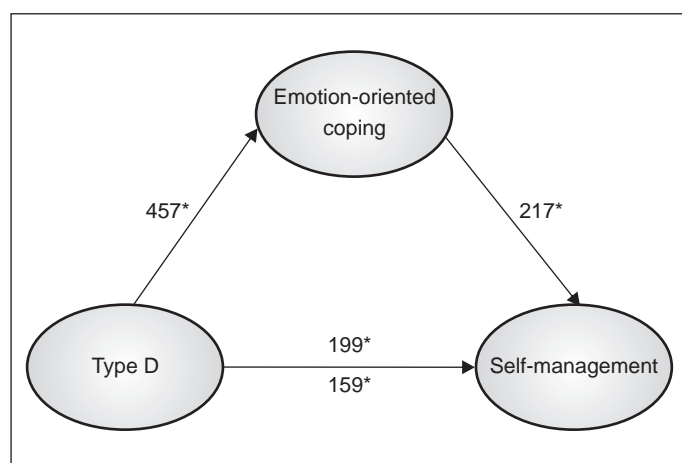


Figure 1 Mediation models for Type D, emotion-oriented coping and self-management. Note: b coefficients are direct effects above the path and mediated effects below the path. *= $p < .05$, ***= $p < .05$

Type D and self-management behavior

In univariable analysis, we found a significant association between Type D personality and self-management behavior ($b = .199$; $t = 2.039$; $p = .04$). Univariable analyses pointed out that none of the sociodemographic and clinical variables were significantly associated with self-management (all p 's $> .08$) except for gender ($p = .03$). In multivariable analyses, adjusted for age, gender and LVEF, Type D personality remained significantly associated with self-management behavior ($b = .189$; $t = 1.953$; $p = .05$, Table 2).

Type D personality and coping style

There was a significant univariable association between Type D and emotion-oriented coping style ($b = .457$; $t = 5.159$, $p \leq .001$). Univariable analyses showed that demographic and clinical variables were not significantly

Table 2: Multivariable analyses of self-management and emotion-oriented coping

	Self-management			Emotion-oriented coping		
	b	t	P	b	t	P
Type D	.189	1.953	0.05	.296	3.412	.00
Age	-.088	-.910	.37	.090	1.040	.30
Gender	-.158	-1.613	.11	.013	.148	.88
LVEF	.174	11.783	0.08	-.044	-.510	.61
K-diuretics	-	-	-	.197	2.254	.03
Psychopharmaca	-	-	-	.296	3.412	.00

associated with emotion-oriented coping (all p s $> .32$) except for potassium-sparing-diuretics ($p = .02$) and psychopharmaca ($p = .01$). The association between Type D patients and emotion-oriented coping remained significant after controlling for k-diuretica, psychopharmaca, age, gender and LVEF in multivariate analyses ($p \leq .001$).

Discussion

To the best of our knowledge, the present study is the first to examine whether the association between Type D personality and consultation behavior that has been found in two previous studies^{14,19} is mediated by coping styles.

In the current study, we found no significant association between Type D and consultation behavior, although we did find a trend ($p = .09$). Therefore, logically, we could not test the hypothesis on the mediating effects of coping in the association between Type D and consultation behavior.

The two previous studies on Type D and consultation behavior pointed out that CHF patients with a Type D personality were less likely to consult medical services in case of elevated symptoms in contrast to non-Type Ds, and that Type D personality independently predicted inadequate consultation behavior in CHF.^{14,19} Our sample size was relatively small compared to the two previous studies ($n = 178$ and $n = 313$) and this could account for not finding a significant result. Also our sample consisted of patients that were not stable during the past two years and were scheduled by the hospital for regular visits. The sample of Schiffer et al. and Pelle et al.^{14,19} consisted of consecutive CHF patients, who were pharmacologically stable. It may be that for unstable CHF patients representing more severe heart failure often with co-

morbidities who are frequently seen by a cardiologists or heart failure nurse it is easier to show adequate consultation behavior. When patients have a stable condition and are not frequently in contact with a cardiologist the barrier to consult when confronted with medical problems may be higher.

Consultation behavior is part of more general self-management behavior in CHF. Current results showed significant associations between Type D and self-management behavior (total score on the EHFSCBS), between Type D and emotion-oriented coping style and between emotion-oriented coping and self-management behavior. When statistically adjusting for Type D, the association between emotion-oriented coping and self-management behavior was no longer significant. Therefore, also when using the total score on the EHFSCBS (self-management behavior), the assumptions underlying the mediation model were not fulfilled²⁷ and the hypothesis that the association between Type D personality and self-management behavior was mediated by coping could, therefore, not be tested in the current study.

However, in multivariable regression analyses, we found that CHF patients with a Type D personality reported more impaired self-management behavior, also when adjusting for age, sex and LVEF, than non-Type Ds. The association between Type D and emotion-oriented coping style also remained significant in multivariable analyses.

In general, coping style is an important factor in understanding how people react when confronted with complex problematic situations, for instance a chronic disease. Research has indicated that there are three major coping styles:

1. Namely problem-oriented coping
2. Emotion-oriented coping
3. Avoidant-oriented coping²⁸

Problem-oriented coping aims at attempts to solve the problem itself, whereas emotion-oriented coping is directed towards reducing the stress and negative emotions that arise when confronted with the problem. Avoidant-oriented coping can be defined as pretending as if the problem is not there by looking for dispersion. The CISS was used to measure coping style and in this questionnaire emotion-oriented coping is defined as emotional reactions aimed at reducing stress.²⁶ These reactions consist of emotions such as getting upset, getting angry and getting tense.

Persons with a Type D personality experience a high level

of different negative emotions and because of their social inhibition tendency—they do not express these emotions to others. Thus when confronted with cardiac symptoms, Type D patients may feel anxious and distressed, and may react with trying to calm their selves (emotion-oriented coping) instead of consulting a healthcare professional. In the definition of Type D these negative emotions are not expressed to others. This tendency may facilitate an internal process (instead of taking action) as is seen in emotion-oriented coping.

We found three other studies that investigates the association between Type D and coping styles.^{21,29,30} Xiaonan Yu et al.²¹ found that in a sample of patients with acute coronary syndromes, Type Ds used more maladaptive coping (defined as avoidant and acceptance-resignation) and that this coping fully mediated the association between Type D and perceived health. Emotion-oriented coping was not included in this questionnaire. Williams and Winegate²⁹ found a mediating effect of avoidant coping in the relation between Type D on one hand and physical symptoms and perceived stress on the other hand in a non-cardiac population. Polman et al.³⁰ found a mediating effect of resignation and withdrawal in the association between Type D and perceived stress by students. Emotion-oriented coping was not included in this study.

CHF is a serious, chronic condition and self-care is an important aspect in the management of this disease.³¹ Insufficient self-care is associated with adverse clinical outcomes³² and impaired health status.⁸ This study underlines the importance of clinical awareness for the vulnerability of Type D patients concerning self-care in CHF, as Type Ds were more likely to display impaired self-management behavior.³¹ Research has pointed out that a cognitive behavioral stress management intervention can change cognitive coping skills.³³ An intervention aimed at altering one's coping style may be useful for Type D patients and healthcare professionals should pay extra attention to encourage them to tell what is on their minds and share their emotions. Type D patients are not likely to express themselves freely because they fear disapproval.

Limitations of the present study should be noted. First, due to a relatively low response rate (53%), the sample size was smaller than we had expected and the generalizability is for this reason limited. One explanation for the low response rate could be that we approached patients by post. Also our sample consisted of a subgroup of patients that needed hospital care and the medical condition of these patients had not been stable over the past two years. These patients may be less likely to respond due to their unstable health condition. We could not include the stable CHF patients

because they were already included in another study. Importantly, we found no significant differences between participants and non-participants on important variables, such as LVEF. Another limitation concerns the cross-sectional design of this study. It is not possible to draw any conclusions about cause and effect. A third limitation is the use of self-report questionnaires which patients received and completed at home. Self-report is more vulnerable for unreliable results due to exaggerating or underreporting of problems. Another vulnerability is that the patient is going to debate with others concerning which answer to give.

■ Conclusion

In the current study in CHF patients, we found Type D that personality was independently associated with impaired self-management behavior and emotion-oriented coping style. We could not test the hypothesis of mediating effects of coping styles between Type D personality and self-care (self-management, consultation behavior), because the assumptions underlying the mediation model were not fulfilled. Studies with a larger sample sizes and a prospective design are needed to replicate the finding on the relationship between Type D and consultation behavior that has been found in earlier studies and to test the hypothesis that this association is mediated by coping style.

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