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## Type D personality negatively associated with self-care in Chinese heart failure patients

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### Abstract

**Background** Little is known about the association between type D personality and self-care behaviors in heart failure (HF) patients. We examined the effect of type D personality on self-care behaviors and self-efficacy among Chinese HF patients. **Methods** A cross-sectional study with a convenience sample was conducted. All participants completed the questionnaires of the self-care of HF index (V6) and type D personality scale. Demographic and clinical variables were obtained from medical records and patient interviews. The methods used for data analysis included descriptive analysis, independent-sample *t*-test,  $\chi^2$  test, and multiple linear regression. **Results** A total of 127 HF patients were included and 61.4% of them were male. The average age for this study sample was  $64.9 \pm 12.34$  years. The majority of the participants were in a New York Heart Association class III or IV (87%), and the average length of living with HF was  $38.24 \pm 41.1$  months. A total of 33.1% of the participants were identified as having type D personality. No significant differences were determined in the demographic and clinical variables between type D and non-type D patients, except for the mean age and the length of living with HF. Type D patients were younger and had a shorter time of living with HF than their non-type D counterparts. Multiple regression demonstrated significant associations between type D personality and self-care maintenance and self-efficacy after adjusting the demographic and clinical factors. However, type D personality was not significantly associated with self-care management behaviors. **Conclusions** Type D personality was negatively related to self-care maintenance and self-efficacy in Chinese HF patients. Future study is warranted to develop a tailored intervention to improve engagement in self-care behaviors in HF patients with type D personality.

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**Keywords:** Heart failure; Self-care; Self-efficacy; Type D personality

### 1 Introduction

Heart failure (HF) is a progressive heart disease and affects an increasing number of people worldwide.<sup>[1]</sup> In the US, over 5 million adults aged 20 years and above live with HF; this number is projected to increase by 46% in 2030.<sup>[2]</sup> By contrast, approximately 4 million people in China aged 35 to 74 years suffered from HF in 2003.<sup>[3]</sup> Type D personality, which is defined by a high level of negative affectivity (NA) and social inhibition (SI), has been identified as a new risk factor for adverse health outcomes in cardiac patients.<sup>[4]</sup> Individuals with type D personality are inclined to experience an extensive range of negative emotions (e.g., anxiety, irritability) and inhibit the expression of these negative emo-

tions during social interactions because of the fear of being rejected or disapproved by others.<sup>[5]</sup> Approximately 13% to 30% HF patients reported having a type D personality.<sup>[6–8]</sup>

Self-care has been recommended by the HF practice guideline as an important non-pharmacological treatment in preventing repeated hospitalization and improving health outcomes for HF patients.<sup>[9,10]</sup> Self-care is a decision-making process with which patients take actions to maintain their physiological stability (self-care maintenance) and response to HF symptoms when they occur (self-care management).<sup>[11]</sup> The literature has reported the positive association between self-care and physical functioning, quality of life, and few hospitalization among patients with HF.<sup>[12,13]</sup> However, self-care is not performed well by HF patients. A recent study examining self-care behaviors in approximately 6000 HF patients across 15 countries concluded that the performance of self-care was sub-optimal in the study population, with over 50% of them reporting a low level of exercise or weighing themselves regularly and only 42.4% adhering to a diet regimen of decreasing sodium intake.<sup>[14]</sup>

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Type D personality may affect patients' engagement in self-care behaviors. Numerous studies report that type D personality is significantly related with maladaptive behaviors, such as smoking, lack of exercise, unhealthy diet, or non-adherence to medication.<sup>[15-17]</sup> However, only a few studies analyze the association of type D personality and self-care behaviors in patients with HF; instead, three prospective studies investigating the relationship between type D personality and a particular HF self-care behavior showed that type D personality was associated with less consultation behavior<sup>[18,19]</sup> and poor medication adherence.<sup>[20]</sup> However, these studies mainly focus on a specific HF self-care behavior (i.e., consultation behavior and medication behavior) rather than a series of behaviors which are critical for the success of self-management of HF. Therefore, exploring the effect of type D personality on other HF self-care behaviors is necessary. Given that type D personality cannot be modified, other modifiable factors underlying type D personality and self-care behaviors, such as self-efficacy, should be explored based on which intervention can be developed.

Self-efficacy refers to one's belief of their ability to perform a particular behavior or a set of behaviors in producing the desired outcomes.<sup>[21]</sup> According to the social cognitive theory, self-efficacy is directly correlated with behavioral performance.<sup>[21]</sup> Moreover, studies have reported a positive association between self-efficacy and self-care in HF patients.<sup>[22,23]</sup> Two studies exploring the mediating role of self-efficacy for type D personality and medication adherence reported that HF patients with type D personality had a lower self-efficacy in medication than their non-type D counterpart, thereby leading to medication non-adherence among them.<sup>[24,25]</sup> However, the effect of type D personality on self-efficacy in other HF self-care behaviors is unclear. Widdershoven, *et al.*<sup>[26]</sup> suggested the differences in self-care among HF patients with and without type D personality should be acknowledged and addressed thereafter.

The aim of this study was to explore the association between type D personality and self-care in Chinese HF patients. In particular, the association between type D personality and (1) self-care maintenance behaviors, (2) self-care management behaviors, and (3) self-efficacy in performing self-care was examined.

## 2 Methods

### 2.1 Study population and settings

This was a cross-sectional study. Patients were recruited from medical wards in two university-affiliated hospitals in Changsha, China during the time period from August 2013 to January 2014. Patients who met the following criteria

were invited: (1) with an established diagnosis of HF for at least six months, (2) at a stable stage of HF, and (3)  $\geq 18$  years old. However, patients with cognitive impairment, a known history of psychiatric illnesses, with life-threatening comorbidities, at the end stage of other diseases, or involved in other studies were excluded.

### 2.2 Demographic and clinical variables

A data collection sheet was developed to collect the patients' demographic data (i.e., age, gender, education level, and marital status) and clinical data [i.e., New York Heart Association (NYHA) class, etiology of HF, length of living with HF, and number of hospitalization because of HF].

### 2.3 Self-care behaviors

The self-care of heart failure index [SCHFI (V6)] was used to measure the patients' self-care behaviors.<sup>[27]</sup> SCHFI (V6) comprises three subscales of self-care maintenance, self-care management, and self-care confidence, with self-care maintenance and self-care management being used to determine the self-care performance of HF patients.<sup>[27]</sup> The self-care maintenance subscale contains 10 items and each item is rated on a four-point Likert scale from 1 (never or seldom) to 4 (daily or always). The self-care management subscale consists of six items to evaluate the patients' ability to recognize HF symptoms and implement self-treatments. Both of these two subscales have a standardized score range from 0 to 100, with a higher score indicating better self-care performance. The Cronbach's alpha of each subscale ranged from 0.74 to 0.87 among Chinese HF patients.<sup>[28]</sup>

### 2.4 Self-efficacy

Self-efficacy, which is the belief in one's ability to complete a task, was measured by the self-care confidence subscale of SCHFI (V6). This subscale consists of six items that evaluate a patient's confidence in adhering to treatment advice and performing self-care management behaviors; each item is rated on a four-point Likert scale from 1 (not confident) to 4 (extremely confident).<sup>[27]</sup> Similar to the other two subscales, the score of self-care confidence is also converted into a standard score ranging from 0 to 100, with a higher score indicating a higher level of self-care confidence. The self-care confidence subscale showed good internal consistency in Chinese HF patients (Cronbach's alpha was 0.84).<sup>[28]</sup>

### 2.5 Self-efficacy

The type D personality scale (DS-14) was used to identify individuals with type D personality.<sup>[4]</sup> DS-14 comprises two seven-item subscales of negative affection (NA) and

social inhabitation (SI), with each item being rated on a five-point Likert. The score range for each subscale is 0 to 28, with a cut-off point of  $\geq 10$  on both the NA and SI subscales used to classify a type D personality.<sup>[4]</sup> DS-14 demonstrated good reliability in Chinese cardiac patients (Cronbach's alpha were 0.90 and 0.85 for NA and SI, respectively).<sup>[29]</sup>

## 2.6 Data collection

Ethical approval had been obtained from the ethics committee of the third Xiangya Hospital of Central South University. Patients were referred by a senior nurse in a cardiac ward and then screened by inclusion and exclusion criteria by the researcher for the eligibility. After the written consent forms were obtained, patients were asked to complete SCHFI (V6) and DS-14 independently. Demographic data were collected via patient interview; while clinical data were obtained from both medical records and patient interview. All the data were collected by the same researcher to ensure the consistency of this study. The participants were informed of their right to withdraw from the study or discontinue participation at any time without any penalty to their present or further care. Anonymity and confidentiality were also assured.

## 2.7 Data analysis

IBM SPSS 22.0 (IBM Corp., Armonk, NY, USA) was used for data analyses. Descriptive statistics, including mean (SD) and percentage, was used to present the data. Independent-sample t-test was used to compare the differences in continuous variables between type D and non-type D patients; while  $\chi^2$  test was used to analyze the difference in categorical variables between the two groups. To determine the associations between type D personality and self-care as well as self-efficacy, a two-block multiple linear regression was performed. Type D personality was entered first and then all the considered demographic factors (i.e., age, gender, education level, and marital status) and clinical factors (i.e., NYHA class, etiology of HF, length of living with HF, and number of hospitalization) were entered in the second block using a backward stepwise mode to retain the significant ones in the final regression model obtained. All statistical tests involved were two-sided and the statistical significance level was set at 0.05.

# 3 Results

## 3.1 Patients' characteristics

A total of 133 HF patients were approached and 127 patients consented to participate in this study. The average age

for this study sample was  $64.9 \pm 12.34$  years, with male being the predominant gender (61.4%). The majority of the participants were in a NYHA class III or IV (87%). The average length of living with HF was  $38.24 \pm 41.1$  months. A total of 42 patients (33.1%) were classified as having type D personality. No significant difference was determined in gender, marital status, education background, NYHA class, etiology of HF, and the number of hospitalization between type D and non-type D patients. However, type D patients were found to be younger ( $t = 2.392$ ,  $P = 0.018$ ) and had a shorter time of living with HF ( $t = 2.550$ ,  $P = 0.012$ ) than those without type D personality. Table 1 illustrates the detailed demographic and clinical characteristics stratified by type D personality.

## 3.2 Type D personality and self-care maintenance

Overall, patients with type D personality performed fewer self-care maintenance behaviors than non-type D patients did ( $t = 3.326$ ,  $P = 0.002$ ) (Table 1), and the association between type D personality and self-care maintenance behaviors remained significant after adjusting the demographic and clinical factors ( $\beta = -0.185$ ,  $t = -2.005$ ,  $P = 0.047$ ). Regarding the specific self-care maintenance behaviors, except for taking physical activities ( $t = 2.913$ ,  $P = 0.004$ ) and exercise for 30 min ( $t = 2.927$ ,  $P = 0.04$ ), no significant difference was observed in other behaviors (e.g., medication adherence) between type D and non-type D patients (Table 2).

## 3.3 Type D personality and self-care management

A borderline significant difference in overall self-care management behaviors was observed between the two groups ( $t = 1.942$ ,  $P = 0.054$ ). After adjusting for the demographic and clinical variables, the association between type D personality and self-care management was also insignificant ( $\beta = -0.162$ ,  $t = -1.722$ ,  $P = 0.088$ ). Both type D and non-type D patients had difficulties in recognizing HF symptoms, whereas the difference was not significant ( $t = 1.505$ ,  $P = 0.135$ ). When facing HF symptoms, type D patients were less likely to reduce salt in their diet as a response than non-type D patients ( $t = 2.206$ ,  $P = 0.029$ ). In addition, no significant difference was observed in the behavior of consulting doctors or nurses between type D and non-type D patients ( $t = 0.748$ ,  $P = 0.456$ ). Table 3 showed the difference in each self-care management behavior between the two groups.

## 3.4 Type D personality and self-efficacy

The results of multiple linear regression suggested that type D personality was associated with low self-care confi-

**Table 1. Difference in demographic and clinical variables and self-care between type D and non-type D patients.**

Variables	Total	Type D	Non-type D	$\chi^2/t$	<i>P</i>
Sex					
Male	78 (61.4%)	25 (59.5%)	53 (62.4%)	0.095	0.758
Female	49 (38.6%)	17 (40.5%)	32 (37.6%)		
Marital status					
Married	101 (79.5%)	33 (78.6%)	68 (80.0%)	0.035	0.851
Single/widowed/divorced	26 (20.5%)	9 (21.4%)	17 (20.0%)		
Education background					
Less than high school	98 (77.2%)	34 (81%)	64 (75.3%)	0.952	0.621
High school and above	29 (22.8%)	8 (19%)	21 (24.7%)		
NYHA class					
II	16 (12.6%)	4 (9.5%)	12 (14.1%)	3.048	0.218
III	75 (59.1%)	22 (52.4%)	53 (62.4%)		
IV	36 (28.3%)	16 (38.1%)	20 (23.5%)		
Etiology					
Coronary heart disease	56 (44.1%)	21 (50.0%)	35 (41.2%)	2.644	0.45
Valve heart disease	24 (18.9%)	6 (14.3%)	18 (21.2%)		
Hypertention	15 (11.8%)	3 (7.1%)	12 (14.1%)		
Cardiomyopathy	32 (25.2%)	12 (28.6%)	18 (23.5%)		
Age, yrs	64.92 ± 12.34	61.26 ± 14.67	66.73 ± 10.65	2.392	0.018
Length of living with HF, month	38.24 ± 41.10	27.21 ± 26.79	43.68 ± 45.74	2.55	0.012
Numbers of hospitalization	6.78 ± 8.50	5.19 ± 4.88	7.56 ± 9.73	1.489	0.139
Self-care maintenance	39.71 ± 13.17	34.52 ± 12.68	42.27 ± 12.71	3.326	0.002
Self-care management	35.98 ± 15.35	32.26 ± 15.15	37.82 ± 15.21	1.942	0.054
Self-care confidence	49.69 ± 18.42	42.32 ± 18.92	53.33 ± 17.13	3.328	0.001

Data are presented as mean ± SD or *n* (%) unless other indicated. HF: heart failure; NYHA: New York Heart Association.

**Table 2. Differences in each self-care maintenance behavior between type D and non-type D patients.**

Items	Type D	Non-type D	<i>t</i>	<i>P</i>
Weigh yourself	1.31 ± 0.64	1.52 ± 0.89	1.499	0.137
Check your ankles for swelling?	1.98 ± 0.78	2.01 ± 0.88	0.232	0.817
Try to avoid getting sick (e.g., flu shot, avoid ill people)	1.98 ± 1.05	2.34 ± 1.06	1.828	0.07
Do some physical activity	2.17 ± 0.85	2.61 ± 0.79	2.913	0.004
Keep your doctor or nurse appointments	1.55 ± 0.74	1.74 ± 0.83	1.277	0.204
Eat a low salt diet	2.24 ± 1.10	2.40 ± 0.99	0.835	0.405
Exercise for 30 min	1.74 ± 0.73	2.24 ± 0.97	3.213	0.002
Forget to take one of your medicines	3.64 ± 0.69	3.67 ± 0.69	0.211	0.833
Ask for low salt items when eating out or visiting others	1.93 ± 0.92	2.16 ± 0.96	1.32	0.189
Use a system (pill box reminders) to help you remember your medicines	1.86 ± 1.05	2.00 ± 1.02	0.734	0.464

Data are presented as mean ± SD unless other indicated.

**Table 3. Differences in each self-care management behavior between type D and non-type D patients.**

Items	Type D	Non-type D	<i>t</i>	<i>P</i>
If you had trouble breathing or ankle swelling in the past month, how quickly did you recognize it as a symptom of heart failure?	1.57 ± 0.97	1.84 ± 0.91	1.505	0.135
If you have trouble breathing or ankle swelling, how likely are you to try one of these remedies?				
Reduce the salt in your diet	1.19 ± 0.55	1.48 ± 0.93	2.206	0.029
Reduce your fluid intake	1.36 ± 0.73	1.41 ± 0.75	0.392	0.696
Take an extra water pill	1.62 ± 0.96	1.87 ± 1.07	1.291	0.199
Call your doctor or nurse for guidance	2.05 ± 0.85	2.18 ± 0.94	0.748	0.456
Think of a remedy you tried the last time you had trouble breathing or ankle swelling	2.67 ± 0.72	2.82 ± 0.71	1.165	0.246

Data are presented as mean ± SD unless other indicated.

**Table 4. Differences in self-care confidence between type D and non-type D patients.**

Items	Type D	Non-type D	<i>t</i>	<i>P</i>
Keep yourself free of heart failure symptoms	1.83 ± 0.91	2.28 ± 0.93	2.572	0.011
Follow the treatment advice you have been given	2.79 ± 0.65	3.02 ± 0.53	2.065	0.043
Evaluate the importance of your symptoms	2.21 ± 0.72	2.59 ± 0.70	2.823	0.006
Recognize changes in your health if they occur	2.36 ± 0.62	2.74 ± 0.58	3.434	0.001
Do something that will relieve your symptoms	2.14 ± 0.75	2.35 ± 0.75	1.483	0.141
Evaluate how well a remedy works	2.29 ± 0.71	2.61 ± 0.60	2.713	0.008

Data are presented as mean ± SD unless other indicated.

dence even after adjusting for the demographic and clinical variables ( $\beta = -0.247$ ,  $t = -2.703$ ,  $P = 0.008$ ). Except for the behavior of taking measures to relieve HF symptoms, type D patients reported significant lower confidence than non-type D patients did in performing other self-care behaviors, such as following treatment advice (all  $P < 0.05$ ) (Table 4).

## 4 Discussions

A total of 33.1% of the study population was classified as having type D personality; patients with such personality profile were characterized as younger and having a shorter time of living with HF compared with those without type D personality. This study aimed to examine the associations between type D personality and self-care behaviors as well as self-efficacy among Chinese patients with HF. The results showed that type D personality was negatively associated with both self-care maintenance and self-efficacy, whereas no significant association was determined between type D personality and self-care management.

### 4.1 Type D personality and self-care maintenance

The practice of self-care maintenance involves a series of health-promoting behaviors that patients take to maintain their health. This study determined that patients with type D personality performed less self-care maintenance behaviors than non-type D patients, which was consistent with the findings in previous studies of the association between type D personality and maladaptive behaviors in coronary heart disease (CHD) patients,<sup>[7,16,30]</sup> or patients with other medical conditions (e.g., chronic pain, asthma, tinnitus).<sup>[31]</sup> For patients with HF, Widdershoven, *et al.*<sup>[26]</sup> reviewed the available studies to summarize the evidence for the association of depression and type D personality with health outcomes and self-care in HF patients, and concluded that patients with type D personality exhibited limited HF self-care behaviors. These findings suggest the needs of interventions for type D patients to assist them engage in health-promoting behaviors.

In terms of the specific self-care maintenance behaviors,

the present study also determined that patients with type D personality were less likely to adhere to physical exercise than patients without type D personality. Similar results were also reported in a large Dutch community sample in which type D individuals less frequently followed the norm for physical activity,<sup>[32]</sup> in a cross-cultural sample in which ischemia heart disease patients with type D personality preferred a sedentary lifestyle,<sup>[7]</sup> or in an Eastern CHD population in which those with type D personality seldom engaged in physical exercise.<sup>[30]</sup> Williams, *et al.*<sup>[33]</sup> had shown that type D patients were inclined to perceive their illness as more serious and less controllable by treatment, thereby possibly explaining why type D patients engage in behaviors that are less health-promoting. Therefore, psychoeducational interventions may be advantageous in facilitating engagement in self-care behaviors, such as physical exercise, in HF patients with type D personality.

In addition, no significant difference was observed in medication adherence between type D and non-type D patients in the present study. The results were consistent with the findings from an Eastern CHD study that explored the associations between type D personality and a range of health behaviors.<sup>[30]</sup> However, inconsistent findings could be observed in an American HF population in which type D personality was found to be associated with medication adherence regardless of the measurements of medication adherence (self-reported or objective measure of the medication event monitoring system).<sup>[20]</sup> Therefore, the association between type D personality and medication adherence should be further confirmed in various cultures to develop a culturally tailored intervention to improve medication adherence in this subpopulation.

### 4.2 Type D personality and self-care management

Consistent with the study of Schiffer, *et al.*<sup>[19]</sup> the present study did not determine a significant association between type D personality and overall self-care management behaviors. However, this study found that type D patients were less likely to reduce salt intake in response to the exhibited HF symptoms. An increasing number of studies

demonstrate that type D individuals are likely to eat insensitively,<sup>[7,15,16]</sup> however, few studies analyze the effect of type D personality on the specific behavior of salt restriction,<sup>[30,32]</sup> particularly when salt intake restriction is regarded as one of the self-care management behaviors in HF patients. Self-care management requires considerable critical thinking regarding symptoms recognition and judgment about the importance of symptoms before treatment implementation,<sup>[11]</sup> failure in these processes may lead to failure in addressing problems related to the HF symptoms. Therefore, specific education on salt restriction as a major strategy may be beneficial and effective to improve type D patients' engagement in self-care management behavior.

### 4.3 Type D personality and self-efficacy

The two recent prospective studies that explored the relationships among type D personality, self-efficacy, and medication adherence in American HF patients concluded that type D patients were intended to have a significantly low self-efficacy.<sup>[24,25]</sup> The present study further confirmed the negative association between type D personality and self-efficacy. In particular, patients with type D personality demonstrated lower self-efficacy in adhering to treatment advice than non-type D patients. Moreover, type D patients lacked confidence in managing their HF symptoms, including recognizing the symptoms themselves, judging the importance of the symptoms, and evaluating the effect of a remedy, thereby partially explaining the poor performance of self-care management in this subpopulation. Seto, *et al.*<sup>[34]</sup> indicated that low self-efficacy was one of the barriers for performing self-care; thus, effort should be exerted to improve self-efficacy in type D patients to promote their engagement in self-care.

### 4.4 Limitations

To our knowledge, this study is the first to analyze the association between type D personality and self-care behaviors in Chinese HF patients. This study's findings suggested that type D personality was adversely associated with self-care maintenance behaviors and self-care efficacy. However, several limitations should be acknowledged in this study. First, the self-report measures of self-care behaviors may introduce recall bias to the results. Second, this study is a cross-sectional study; thus, no causal relationship can be guaranteed for the associations that had been found. Third, despite the very good response rate (95%), the findings from this convenience sample may not be generalized to other populations of HF patients.

### 4.5 Conclusions

This study determined the adverse associations between

type D personality and self-care maintenance as well as self-care confidence in Chinese HF patients, whereas the association between type D personality and self-care management was not established. Future studies are necessary to explore effective strategies in facilitating the engagement in self-care behaviors in HF patients with type D personality.

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