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## Type D personality, self-efficacy, and medication adherence in patients with heart failure—A mediation analysis



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### ABSTRACT

**Background:** Type D personality is associated with medication non-adherence. Both Type D personality and non-adherence are predictors of poor outcomes. Self-efficacy, which is modifiable, is also associated with medication adherence.

**Objectives:** To determine the relationships among Type D personality, self-efficacy, and medication adherence in 84 heart failure patients.

**Methods:** Self-efficacy, Type D personality, medication adherence, demographic and clinical data were collected. Hierarchical linear regression was used.

**Results:** Type D patients were more likely to have lower self-efficacy ( $p = .023$ ) and medication non-adherence ( $p = .027$ ) than non-Type D patients. Low self-efficacy was associated with medication non-adherence ( $p < .001$ ). Type D personality didn't predict medication adherence after entering self-efficacy in the model ( $p = .422$ ), demonstrating mediation.

**Conclusions:** Self-efficacy mediates the relationship between Type D personality and medication adherence. Developing and applying interventions to enhance self-efficacy may help to sever the link between Type D personality and poor outcomes.

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### Introduction

Type D (distressed) personality is a concept used in the field of medical psychology that includes negative affectivity (NA) and social inhibition (SI) personality traits.<sup>1,2</sup> Type D personality was developed by Dr. Denollet based on clinical and research experience in patients with cardiac disease. Individuals with Type D personality are more likely to have negative emotions (worry, touchiness, sadness) and not to interact or share their thoughts and emotions with others (fear of disapproval).

Patients with Type D personality are more likely to have worse health outcomes.<sup>1</sup> Previous research has shown that Type D personality is associated with poor quality of life,<sup>3–5</sup> and higher morbidity,<sup>6–9</sup> and mortality<sup>2,8,10–12</sup> among patients with<sup>1,2,6,8,10,11,13</sup> and without<sup>14</sup> cardiovascular disease. Patients with heart failure

(HF) and Type D personality were more likely to report worse health-related quality of life,<sup>3–5</sup> more depressive symptoms,<sup>5</sup> and have a higher cardiac mortality<sup>12</sup> compared with HF patients without Type D personality.

Many investigators have studied the mechanism(s) linking Type D personality with poor health outcomes. One of the mechanisms potentially linking Type D personality with adverse outcomes is poor self-management skills, including adherence to the recommended medical regimen. For example, patients with obstructive sleep apnea syndrome and Type D personality were more likely to be nonadherent to prescribed respiratory treatment than patients without Type D personality.<sup>15,16</sup>

Medication adherence is a crucial self-care behavior for patients with HF because optimal pharmacological therapy will not benefit patients if they do not take their medications regularly as prescribed. Yet, rates of medication adherence remain suboptimal.<sup>17</sup> Poor medication adherence is associated with poor health outcomes and leads to high health care costs.<sup>18–20</sup> To our knowledge, only four investigative groups have examined the relationship between Type D personality and medication adherence.<sup>21–24</sup> In these studies, Type D personality was associated with poor medication

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adherence in patients with myocardial infarction (MI),<sup>22</sup> acute coronary syndrome (ACS),<sup>21</sup> asthma,<sup>23</sup> and HF.<sup>24</sup>

It is not known, however, why patients with Type D personality are more likely to be non-adherent to their prescribed medication. Self-efficacy is frequently found to be associated with health-related behaviors.<sup>25</sup> Self-efficacy refers to an individual's perception of their ability to perform a specified behavior or set of behaviors in order to produce desired outcomes.<sup>26</sup> For example, high self-efficacy is associated with better medication adherence.<sup>27–33</sup> According to Social Cognitive Theory, there is a direct correlation between performance of a behavior and a person's perceived self-efficacy.<sup>26</sup> Adults with chronic illnesses who have high levels of self-efficacy are more likely to perform self-management behaviors appropriately.<sup>33</sup> Moreover, there is evidence of a mediating role of self-efficacy. Investigators have demonstrated that self-efficacy mediated the relationship between depressive symptoms and medication adherence in 167 African Americans with hypertension,<sup>27</sup> and between depressive symptoms and adherence to the recommended self-care regimen in 56 patients with Type 2 diabetes.<sup>34</sup> Thus, it is plausible that patients with Type D personality may be less likely to adhere to their prescribed medication than their non-Type D counterparts because they have lower medication self-efficacy.

However, it is unknown if medication self-efficacy, a modifiable predictor of medication adherence, mediates the relationship between Type D personality and medication adherence in patients with HF. Based on empirical findings from the current literature and theoretical support from the Social Cognitive Theory, the purpose of our study was to examine the relationships among Type D personality (and its components [NA and SI]), medication self-efficacy, and medication adherence in patients with HF in order to determine whether medication self-efficacy is a mediator between Type D personality (and its components [NA and SI]) and medication adherence in this patient population.

## Methods

### Study design

This was a secondary analysis of baseline data of a randomized controlled trial (RCT) in patients with HF. The original RCT was to determine whether an educational counseling intervention improved medication adherence and cardiac event-free survival.<sup>35</sup> Demographic, clinical, and psychological data were collected before randomization by interview, questionnaires, and medical record review.

### Sample and setting

Detailed eligibility criteria and recruitment methods have been published previously.<sup>24,35</sup> Briefly, we recruited patients from the outpatient cardiology clinic and inpatient hospitals from the Southern region of the United States. Patients with a confirmed diagnosis of chronic HF who did not change dosage or types of HF medications prescribed by their physician as verified in their medical record were enrolled in the study. We excluded patients with obvious cognitive impairment (as defined by inability to understand the informed consent process or participate in an interview) and any co-existing terminal illness (e.g., end stage renal disease or advanced cancer).

### Measurement of variables

#### Independent variable: type D personality

Type D personality was assessed using the Type D Scale (DS-14),<sup>36</sup> a 14-item questionnaire that includes items such as

whether patients would describe themselves with phrases such as, "I am a closed person" and "I often feel unhappy." The items were answered on a 5-point Likert scale. Seven items reflect negative affectivity (NA), and seven items reflect social inhibition (SI). Total scores for the NA and SI subscales can range from 0 to 28 to assess these personality traits. People who scored 10 points or more on both the NA and SI subscales were classified as Type D personality. The DS-14 is a reliable and valid instrument that has been used to measure Type D personality in patients with hypertension,<sup>36</sup> MI,<sup>22</sup> and HF.<sup>4,12,37</sup> In this study, Cronbach's alpha was .86 and .82 for the NA and SI subscales, respectively.

#### Outcome variable: medication adherence

Medication adherence was defined as the extent to which the patient's medication-taking behavior corresponded with the medication regimen prescribed by their health care provider.<sup>38–40</sup> The Morisky Medication Adherence Scale [MMAS-4] was used to assess medication adherence.<sup>41</sup> Patients were asked to answer four items (yes [score = 1], no [score = 0]) assessing whether or not they missed taking any of their medications under four situations over the last month. The scores range from 0 to 4; higher scores indicate poorer medication adherence. The MMAS-4 demonstrated relative low, but acceptable internal consistency (Cronbach's  $\alpha = .61$ ). It is important to note that our Cronbach's  $\alpha$  is the same as demonstrated when the scale was initially used in patients with hypertension.<sup>41</sup> The MMAS-4 has been used previously to measure medication adherence in patients with HF.<sup>42</sup>

#### Mediator: medication self-efficacy

In this study, self-efficacy was defined as medication self-efficacy, which was assessed using the Self-Efficacy for Appropriate Medication Use Scale (SEAMS).<sup>28</sup> Proponents of Social Cognitive Theory suggest use of a measure that specifically targets self-efficacy in relation to a specific behavior that will better represent the self-efficacy belief.<sup>26</sup> Patients were asked to answer the stem of "how confident are you that you can take your medicines correctly" for 13 situations (e.g., when you are away from home, when your normal routine gets messed up). Each situation is scored using 1 of the following 3 options: not confident (score = 1), somewhat confident (score = 2), or very confident (score = 3). The scores of the 13 items are summed for a total score of 13–39; higher scores indicate higher medication self-efficacy. The SEAMS is a reliable (Cronbach's  $\alpha = .89$ ) and valid scale that has been used across different literacy levels in patients with chronic diseases.<sup>28</sup>

#### Other variables of interest

Age,<sup>43</sup> gender,<sup>43,44</sup> left ventricular ejection fraction (a measure of ventricular function),<sup>45,46</sup> and comorbidity (using the Charlson Comorbidity Index),<sup>47,48</sup> were collected as covariates from medical records or patient interview. These covariates were chosen as they might influence medication adherence. We also collected patients' marital status, length of time with HF diagnosis, body weight and height to calculate body mass index (BMI), New York Heart Association functional classification (NYHA), prescribed medications including angiotensin-converting enzyme inhibitor, and beta-antagonist from patient interview and medication records to characterize patients. BMI was calculated as weight (kg)/height (m<sup>2</sup>).

#### Procedure

Approval to conduct the original RCT was obtained from the Institutional Review Board. The review board at the primary author's current institution approved the secondary data analyses as an exempt protocol. Patient eligibility was confirmed by a trained nurse who then explained study requirements to patients and

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