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# Six year stability of Type-D personality in a German cohort of cardiac patients

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ABSTRACT

*Objective:* The aim of the study was to systematically analyze the stability of Type-D personality over a time span of several years in a clinical sample.
*Methods:* In a prospective cohort study, cardiac patients from different medical settings in Germany were assessed using the DS14 questionnaire at baseline (n = 1240) and at a mean follow-up time of six years (n = 679). Different types of stability were examined and compared with the stability of the Hospital Anxiety and Depression Scale (HADS).
*Results:* Rank-order stability was moderate (r = .61 for Negative Affectivity [NA] and r = .60 for Social Inhibition [SI]) and didn't differ from the rank-order stability of the HADS. Whereas the mean level of SI didn't change over time, the mean level of NA increased (d = 0.08). On an individual level, approximately one quarter of the participants showed a significant increase or decrease. The factorial structure of the DS14 was stable over time. Finally, the agreement of Type-D classification between the two measurement points was moderate (κ = .42) with 22% of the participants changing their Type-D classification over time.
*Conclusion:* The stability of NA and SI didn't differ from the stability of measures of emotional distress that are generally considered to be less stable. In particular, the only moderate stability of the dichotomous Type-D classification raises some questions.



## Introduction

In recent years, Type-D personality, characterized by the coincidence of a high level of negative affectivity (NA) and a high level of social inhibition (SI) [1,2], has been established as a predictor of poor prognosis and adverse clinical events in patients with cardiovascular diseases. A recent meta-analysis concluded that patients with Type D have more than a 3-fold increased risk for mortality and recurrent myocardial infarction as well as for psychological distress, even after controlling for sociodemographic variables, medical risk factors, and different indicators of psychological distress, especially depression [3].

In considering potential causal mechanisms of the Type-D personality and the strength of the effects compared to other concepts of negative affectivity, the stability of the Type-D construct as well as its constituents - negative affectivity and social inhibition - has been pointed out as a salient aspect. In contrast to episodic or transient states of depressive mood and anxiety, the pathogenetic mechanisms of the Type-D personality are seen as affecting a person continuously across time [2,3].

However, until now, only limited empirical evidence has existed for the stability of the Type D personality measures. Most previous studies used the 14-item Type-D scale (DS14) and computed the test-retest reliabilities of the NA and SI subdimensions as measures of stability. Within an interval of 4 weeks to 3 months, moderate to high test-retest reliabilities were reported for samples of cardiac patients and students (NA: Pearson product–moment correlation coefficients between time points, $r_{tt}$ = .72-.85; Intraclass correlation coefficients, ICC = .76-.92; SI: $r_{tt}$ = .63-.83; ICC = .74-.91) [2,4–8]. A study with a longer interval of 6 months found only moderate test-retest correlations of $r_{tt}$ = .61 and $r_{tt}$ = .59 for NA and SI, respectively [9]. For a population sample of healthy twins, intraclass correlations between 0.72 and 0.83 were reported over a time interval of 9 years [10]. With regard to the absolute scores of NA and SI, only one study showed significant changes [4–6,8,9]. Also, the Type-D classification remained relatively stable in samples of coronary artery disease (CAD) patients across 6 and 18 months, respectively [5,11], but changed in 28% of the Type-D patients between pre-surgery and 6 months post-surgery (bypass or valve surgery) [9].

In comparison, the retest reliability of the Hospital Anxiety and Depression Scale (HADS), a measure of emotional distress generally considered to be less stable, has been reported to be $r_{tt}$ > .80 up to

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2 weeks and to be lower for time intervals longer than 6 weeks ($r_{tt}$ = .70) [12].

The stability of the Type-D construct over a longer time period in a clinical sample has not been examined so far. Some of the different types of stability that are distinguished in personality research [13] - structural stability and individual-level stability - have not been analyzed at all for Type D and its constituents. Thus, a systematic approach for examining different aspects of stability in the same sample is warranted. In addition, a systematic examination of potential differences in the stability of Type D across different subgroups is missing. Age and gender are important characteristics for which differences in stability have been studied with regard to other established personality traits [14–16]. Apart from this, changes in the life situation, especially the occurrence of critical life events, could influence the level of a trait [9]. Most cardiac inpatients and patients in cardiac rehabilitation have recently experienced an acute cardiac event (e.g., myocardial infarction, surgery), whereas most outpatients have not. Thus, it is possible that the stability may be indirectly influenced by the setting in which the assessment occurs.

## Objectives

The aim of our study was to systematically analyze different aspects of the stability of Type D as measured with the DS14 over a time span of several years and to test for differences in stability between groups differing in gender, age, and recruitment setting. Additionally, we aimed to compare the stability of Type D with the stability of the Hospital Anxiety and Depression Scale. A sample of 679 cardiac patients from different settings within the German health care system was assessed in a cohort study design with an average follow-up time of 6 years.

## Methods

### *Participants*

Participants were 1,240 consecutive cardiac patients recruited from three different health care settings in Germany between November, 2001 and February, 2003. The sample consisted of patients participating in inpatient cardiac rehabilitation programs (setting 1) in one of two cardiac rehabilitation centers, patients admitted to the department of cardiology of a university hospital for diagnostics and treatment of heart disease (setting 2), and patients consulting the outpatient clinic of the same department (setting 3). Between May, 2008 and August, 2009, all patients with valid postal addresses (n = 1,101) were sent a follow-up questionnaire via mail. Non-respondents were contacted a second and, if necessary, a third time per mail. If a last contact approach via phone was unsuccessful, we asked regional registration offices for address and vital status information. Fifty-three patients had to be excluded because the cardiac diagnosis at baseline could not be verified. Another 8 patients had to be excluded due to inconsistencies in data related to personal identity. At follow-up, 172 (16.5%) of the remaining 1,040 patients had died [17]; for n = 63 (6.1%), the vital status could not be assured. Of the known survivors (n = 805), n = 126 (15.7%) declined further participation, leaving a sample of n = 679 patients. Whereas 92% of the eligible outpatients participated in the follow-up, the response rates were 83.6% and 80.4% for the inpatients and rehabilitation patients, respectively ($\chi^2$ = 13.94; p < .001). In addition, non-responders showed higher baseline scores on the negative affectivity subscale of the DS14 (M = 11.1 ± 5.6 vs. M = 9.9 ± 5.6; t = −2.08; p = .038). The study was carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki). The ethics committee at the University of Göttingen approved the study protocol, and all patients provided their written informed consent.

### *Measures*

#### *Demographic and clinical variables at baseline*

Age and gender were documented at baseline. Cardiac diagnoses were taken from the hospital records and were classified as CAD, other structural heart diseases, such as valvular heart diseases and cardiomyopathies, and arrhythmias.

#### *Type-D personality*

Today the DS14 [18] is the standard instrument for measuring Type-D personality and its constituents: NA and SI. The English version of the questionnaire was independently translated by two native German speakers. The two translations were consolidated in a consensus process and finally authorized by the author of the original scale [18]. Sound psychometric properties of the German version and its equivalence with the original version have been shown in validation studies using both patient [18] and population samples [19]. In this study, the internal consistencies were α = .83 (SI) and α = .85 (NA). In addition, the dichotomous classification of Type D versus non Type D was based on the cutoff points (≥10 on both scales) proposed by Denollet [2], which have been used in most studies.

#### *Anxiety and depressive mood*

The Hospital Anxiety and Depression Scale (HADS) is a widely used self-rating scale for the assessment of anxiety and depressive mood. Originally developed to screen for anxiety and depression in physically ill patients, the HADS has been used extensively with cardiac and other medical patient populations [20–22]. Cutoff points of ≥11 for the anxiety subscale and ≥9 for the depression subscale, as suggested by a validation study reported in the manual for the German version [23], were used to select patients at increased risk for clinically relevant anxiety and depression.

## Types of stability

Different aspects of stability have been distinguished in (developmental) personality research [13]. *Relative stability* (differential continuity or rank-order continuity) indicates the extent to which the relative differences among individuals remain the same over time [16]. *Absolute stability* refers to the extent to which personality scores change over time either on a population level (mean-level stability) [15] or on an individual level [24]. *Structural stability* describes the stability of correlation patterns or covariance structures among items or different traits over time [25]. Finally, *ipsative stability* refers to the continuity of a trait pattern within an individual [26].

## Statistical analysis

The rate of missing values for the different variables was between 0% (for age and gender) and 5% (for NA and SI at baseline). Missing values were imputed using multiple imputation [27]. We created 5 imputation data sets and report results pooled from these 5 data sets.

Pearson correlation coefficients between baseline and follow-up scale scores were calculated as indicators of relative stability. Standardized mean differences between baseline and follow-up scores (Cohen's *d*) were used as indicators of mean-level change on a population level (absolute stability). Both relative and absolute stability were calculated for the entire sample and for subgroups defined by gender, age (dichotomized at the median), and health care setting.

Individual-level stability was assessed by calculating the reliable change index (RCI) [28] and classifying individuals as having decreased, increased, or stayed the same on the scales based on a comparison of their change scores with the RCI. Observed frequencies were compared to frequencies that would be expected under the assumption of no change.