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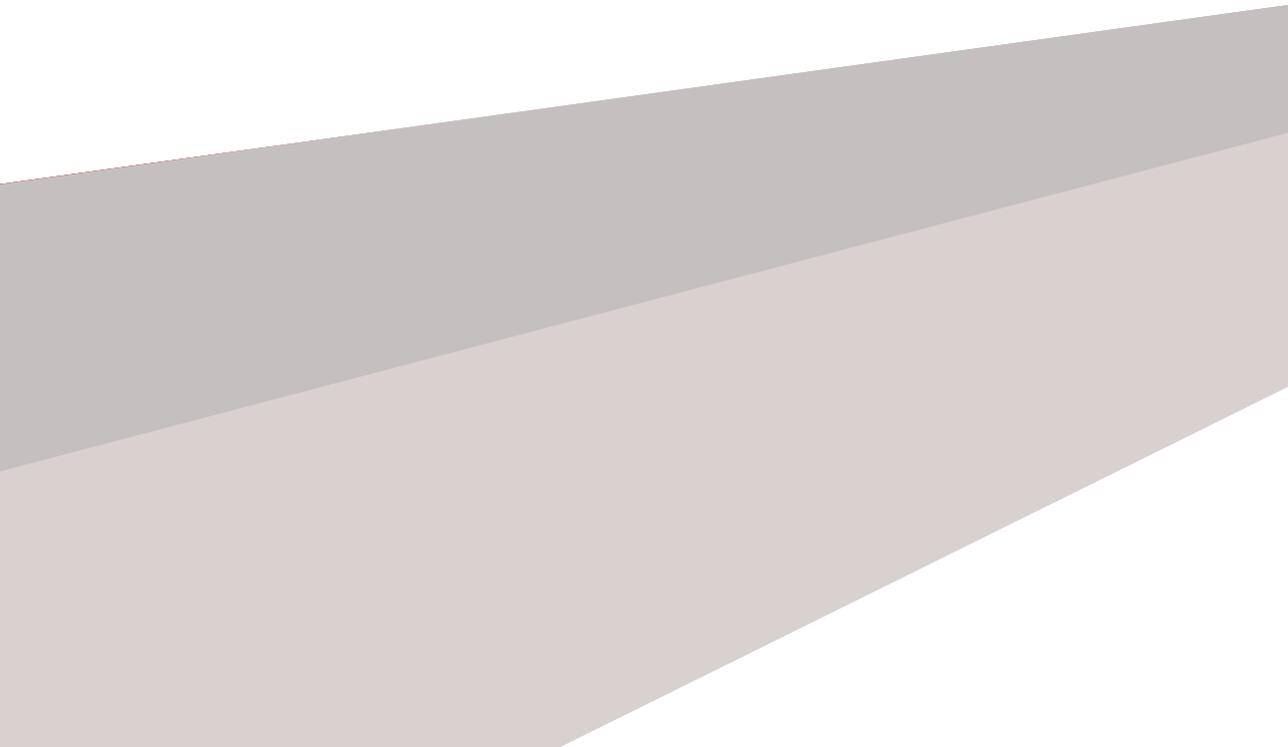
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# Chapter 5

## **The stability of type D personality and the association with depressive and anxiety symptoms in dialysis patients**

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Submitted



## ABSTRACT

**Background** Type D personality has been identified as an independent risk factor for survival in cardiovascular disease (CVD) patients. As CVD is present in about 50% of dialysis patients it is of clinical interest to assess the prevalence of type D personality, the association with depressive and anxiety symptoms and stability of type D personality in dialysis patients.

**Methods** Data was used from two consecutive measurements of the DIVERS study, a prospective cohort study among chronic dialysis patients in the Netherlands. Beck Depression Inventory (BDI), Beck Anxiety Inventory (BAI), and the Type D Scale-14 (DS14) were used to assess depressive and anxiety symptoms, and type D personality, respectively. The association of type D personality was assessed with analysis of variance F test. Stability of type D personality, depressive and anxiety symptoms was determined by calculating Cohen's  $\kappa$ , and by determining the positive agreement.

**Results** In total 349 patients were included. The prevalence of type D personality was 21% and type D personality was associated with depressive and anxiety symptoms ( $p < 0.01$ ). Over a 6-month period Cohen's  $\kappa$  was 0.52, 0.56 and 0.61 for type D personality, depressive and anxiety symptoms, respectively. Sixty one, 73 and 73%, had a stable type D personality, depressive and anxiety symptoms, respectively.

**Conclusions** The prevalence of type D personality was 21% and type D personality was associated with more depressive and anxiety symptoms. The presence of type D personality varies over time, and stability of type D personality is comparable to stability of depressive and anxiety symptoms.

## INTRODUCTION

Type D personality has been identified as an independent risk factor for survival in cardiovascular disease (CVD) patients.<sup>1</sup> Patients with type D (distressed) personality have the tendency to experience negative emotions across time (negative affectivity), and inhibit emotional expression because of fear for social rejection (social inhibition).<sup>2</sup> In patients with cardiovascular disease the prevalence of type D personality varies between 13.5 and 35%<sup>1</sup> and type D personality is associated with an impaired health related quality of life (HRQOL), and more depressive and anxiety symptoms.<sup>3-5</sup> Type D personality is also associated with higher morbidity and mortality rates, independent of depressive and anxiety symptoms.<sup>3,6</sup>

In dialysis patients relatively little is known about type D personality despite the high prevalence of both cardiovascular disease, and depressive and anxiety symptoms. Two relatively small studies of 100 and 144 dialysis patients have shown that the prevalence of type D personality in dialysis patients is around 27%.<sup>7,8</sup> Furthermore, it has been demonstrated that patients with type D personality experienced more depressive and anxiety symptoms<sup>8</sup>, have a poorer HRQOL<sup>7</sup>, and that type D personality seems to be stable over a 1-month period.<sup>8</sup>

It remains unclear whether type D personality is a stable trait over a longer than a 1-months period in dialysis patients. In patients with cardiovascular disease it has been demonstrated that stability of type D personality differs over time periods ranging from four weeks until nine years<sup>2,9-12</sup>, and that the stability of type D personality varies after an event such as cardiac surgery.<sup>13</sup> Moreover, a personality trait continuous to develop during the life course<sup>14</sup>, and its expression can be influenced by events such as depressive symptoms or traumatic experiences.<sup>15</sup> Consequently, it seems important to know if one type D measurement will suffice in clinical practice or research.

Therefore, the aim of this study is to determine (1) the prevalence of type D personality, negative affectivity and social inhibition, (2) if there is an association of these personality traits with depressive and anxiety symptoms and quality of life, and (3) if type D personality is a stable personality trait over a six month period in Dutch dialysis patients.

## **SUBJECTS AND METHODS**

### **Patients**

For this study we used data of the “Depression related factors In dialysis patients with Various Ethnicities and Races Study” (DIVERS), an observational prospective cohort study among incident and prevalent dialysis patients in four urban teaching hospitals and one university hospital in the Netherlands. To be included in DIVERS patients had to be (1) at least 18 years of age, (2) on dialysis treatment for at least 90 days, and (3) able to fill out questionnaires in the Dutch, English, Turkish or Moroccan Arabic language. Patients were excluded if they had cognitive disabilities that interfered with filling out questionnaires. Inclusion of DIVERS started in June 2012 and is still ongoing. At the inclusion of the study, and consequently every six months, demographic and clinical data were collected from medical records. Furthermore, patients were asked to complete questionnaires on depressive and anxiety symptoms and HRQOL. From September 2013 onwards a type D personality questionnaire (DS14) was added to each consecutive follow up measurement. For the current analysis we used data from patients who filled out at least one DS14 between September 2013 and March 2015. The study was approved by the local medical ethics committees, and all patients gave written informed consent.

### **Patient characteristics**

The following data were obtained from medical records only at baseline: date of birth, gender, date of starting dialysis treatment, and primary cause of kidney disease. The primary cause of kidney disease was classified according to the codes of the European Renal Association-European Dialysis and Transplantation Association (ERA-EDTA).<sup>16</sup> The following data were obtained from medical records at baseline, and at each consecutive measurement: dialysis modality, body mass index (BMI), laboratory measures, and comorbidity. Laboratory parameters were collected from routine blood laboratory investigations performed in the individual dialysis centers. Comorbid conditions were scored according to the Davies comorbidity index<sup>17</sup>, resulting in a comorbidity index classified into: no, intermediate or severe. Data on smoking status, country of birth, country of birth of both parents, marital status, working status, and education were collected through a self-report questionnaire at baseline.

Patients were classified as native or immigrant based on the country of birth the patient and of their parents.<sup>18;19</sup> Patients of whom both parents were born in the Netherlands were classified as native. All other patients were classified as immigrants.

## Type D personality

Type D personality was assessed using the type D Scale-14 (DS14).<sup>2</sup> The DS14 consists of seven items on negative affectivity, and seven items on social inhibition; each item scored on a 5-points Likert scale from 0 (false) to 4 (true). A cut-off  $\geq 10$  on both NA and SI scales was used to define type D personality. Patients who did not fulfil these criteria were further categorised as having neither the NA nor the SI trait (NA  $< 10$  and SI  $< 10$ ), having only the NA trait (NA  $\geq 10$ , SI  $< 10$ ) or having only the SI trait (NA  $< 10$  and SI  $\geq 10$ ). The Dutch version of the DS14 has an internal consistency measured by Cronbachs alpha of 0.88 and 0.86 for NA and SI, respectively.<sup>2</sup> In our cohort, the DS14 has an internal consistency measured by Cronbachs alpha of 0.84 and 0.81 for NA and SI, respectively.

## Depressive and anxiety symptoms and HRQOL

Depressive and anxiety symptoms were measured, simultaneously with Type D personality, by using the Beck Depression Inventory (BDI)<sup>20</sup>, and the Beck Anxiety Inventory (BAI)<sup>21</sup>, respectively. Both questionnaires consist of 21 questions scored on a 0 – 3 scale. Patients with BDI  $\geq 13$ <sup>22</sup> were considered as having depressive symptoms and those having BAI  $\geq 13$ <sup>23;24</sup> as having anxiety symptoms. To determine patient's physical and mental HRQOL we used the physical component summary score (PCS) and mental component score (MCS) of the Short Form 12 (SF-12). The SF-12 is a HRQOL questionnaire validated among dialysis patients.<sup>25</sup> The PCS and MCS range from 0-100, with a higher score suggesting a better quality of life.

## Statistical analyses

### *Prevalence of type D personality and the association of type D personality with depressive and anxiety symptoms and HRQOL*

To determine the prevalence of type D personality all patients who filled out at least one DS14 were selected. Patient characteristics between type D personality and no type D personality subgroups were compared using the analysis of variance F test or Kruskal-Wallis tests for continuous variables, and a Pearson's chi-square test for categorical variables. Mean with standard deviation or median with interquartile range was used, depending on the underlying distribution. The same patient group and analysis holds true for the association of type D personality with depressive and anxiety symptoms and HRQOL.

### *Stability of type D personality*

Data from patients who filled out two consecutive DS14, BDI and BAI questionnaires within a six month timeframe were used to determine the stability of type D personality. The characteristics of these patients were compared with the characteristics of patients who filled out one DS14, BDI and BAI questionnaire. The stability of type D personality and depressive and anxiety symptoms was determined by using Cohen's  $\kappa$  and positive and negative agreement.<sup>26</sup> Positive agreement refers to the probability that two measurements define a patient as having a type D personality. Negative agreement refers to the probability that two measurements define a patient as having no type D personality. Furthermore, intra-class correlation coefficients were used for NA/SI scores and BDI/BAI scores. To assess the measurement error of NA/SI scores and BDI/BAI scores the Bland-Altman method was used.<sup>27</sup> With this method individual differences of both measurements were plotted against the mean of both measurements. The 95% limits of agreement were calculated as the mean difference plus or minus 1.96 standard deviations of the differences. A p-value < 0.05 was considered statistically significant. For all statistical analyses SPSS for Windows version 21.0 was used.

## **RESULTS**

### **Prevalence of type D personality**

Table 1 shows the baseline characteristics of 349 dialysis patients based on negative affectivity (NA) and social inhibition (SI) traits. Seventy four patients (21%) were classified with a type D personality (NA  $\geq$  10, SI  $\geq$  10), 36 patients (10%) with only the NA trait (NA  $\geq$  10, SI < 10), 73 patients (21%) with only the SI trait (NA < 10, SI  $\geq$  10), and 166 patients (48%) had neither the NA and SI trait (NA < 10 and SI < 10). The groups differed statistically in immigrant status ( $p = 0.01$ ) and use of anti-depressants ( $p = 0.02$ ). Patients did not differ in the history of cardiovascular disease ( $p = 0.30$ ) or other patient characteristics.

### **Association of type D personality with depressive and anxiety symptoms and HRQOL**

Table 2 shows differences in depressive and anxiety symptoms and quality of life scores between patients with and without type D personality. Patients with type D personality had more depressive and anxiety symptoms ( $p < 0.01$ ), and the lowest quality of life scores ( $p < 0.01$ ). Furthermore, patients with only the NA trait also showed higher depressive and anxiety symptoms and lower quality of life compared to patients with the SI trait or those without the NA or SI trait ( $p < 0.01$ ).

**Table 1.** Clinical characteristics of 349 dialysis patients divided by type D personality, negative affectivity and social inhibition traits

	<b>Type D Both NA and SI* N = 74</b>	<b>No type D Only NA* N = 36</b>	<b>Only SI* N = 73</b>	<b>No NA or SI* N = 166</b>	<b>P-value</b>
<b>Socio demographic</b>					
Age, year	64.6 (14.6)	67.4 (17.4)	70.4 (13.0)	65.8 (15.9)	P = 0.10
Sex,% men	54	67	67	57	P = 0.26
Education, % low	50	46	46	33	P = 0.07
Married/living together, % yes	43	47	60	47	P = 0.84
Having children, % yes	73	83	82	76	P = 0.50
Employed, % yes	7	0	10	10	P = 0.28
Use of anti-depressants, % yes	19	11	11	5	P = 0.02
Immigrant, % yes	59	49	31	47	P = 0.01
<b>Clinical</b>					
Modality, % haemodialysis	93	89	93	92	P = 0.85
Time on dialysis, months	25 (7 – 66)	15 (6 – 45)	21 (5 – 44)	19 (6 – 55)	P = 0.27
BMI, kg/m <sup>2</sup>	26.3 (5.6)	25.8 (5.0)	26.3 (4.9)	26.8 (5.2)	P = 0.77
Current smoking, % yes	30	14	19	19	P = 0.16
Drinking alcohol, % yes	26	31	40	23	P = 0.06
Causes of ESRD, %					P = 0.65
Diabetes Mellitus	24	20	17	24	
Glomerulonephritis	10	14	10	12	
Renal vascular disease	21	31	39	28	
Other	44	34	34	37	
<b>Comorbidity</b>					
Davies comorbidity, %					P = 0.20
No	16	22	22	25	
Intermediate	61	64	51	60	
Severe	23	14	27	15	
Diabetes Mellitus, % yes	45	36	38	42	P = 0.81
Cardiovascular disease, % yes	60	56	56	48	P = 0.30
<b>Laboratory</b>					
Albumin, g/l	37.9 (5.5)	37.6 (4.6)	37.7 (5.3)	37.9 (5.0)	P = 0.98
Haemoglobin, g/l	7.3 (0.7)	7.2 (0.8)	7.1 (0.8)	7.2 (0.7)	P = 0.38
PTH, pmol/l	24 (16 – 40)	26 (12 – 50)	27 (14 – 50)	33 (15 – 53)	P = 0.54
Ca, mmol/l	2.28 (0.14)	2.34 (0.18)	2.31 (0.15)	2.27 (0.15)	P = 0.04
Phosphorus, mmol/l	1.50 (0.46)	1.50 (0.53)	1.61 (0.46)	1.56 (0.46)	P = 0.51
Ferritin, ug/l	427 (220 – 666)	440 (236 – 691)	349 (248 – 530)	386 (259 – 619)	P = 0.34
Cholesterol, mmol/l	4.0 (0.9)	4.3 (1.3)	4.3 (1.3)	4.1 (1.2)	P = 0.31

Comparison was done using the analysis of variance F test or Kruskal-Wallis tests for continuous variables, and a Pearson's chi-square test for categorical variables. NA: negative affectivity, SI: social inhibition, BMI: Body Mass Index, PTH: parathyroid hormone

\*based on cut-off  $\geq 10$  for NA and/or SI

**Table 2.** Depressive and anxiety symptoms and quality of life stratified by negative affectivity and social inhibition groups.

	<b>Type D Both NA and SI* N = 74</b>	<b>No type D Only NA* N = 36</b>	<b>Only SI* N = 73</b>	<b>No NA or SI* N = 166</b>	<b>P-value</b>
NA sum score	16.0 (5.2)	13.3 (4.1)	3.5 (3.0)	2.5 (2.6)	P < 0.01
SI sum score	16.4 (4.0)	4.0 (2.5)	14.7 (4.7)	3.3 (3.0)	P < 0.01
BDI ≥ 13 (%)	75	75	31	21	P < 0.01
BDI mean (SD)	19.9 (10.3)	19.3 (9.7)	9.9 (5.9)	7.6 (5.5)	P < 0.01
BAI ≥ 13 (%)	63	61	21	15	P < 0.01
BAI mean (SD)	17.4 (11.4)	14.1 (8.2)	7.3 (6.2)	6.1 (6.2)	P < 0.01
PCS, mean (SD)	33.6 (8.6)	34.3 (9.8)	35.1 (10.4)	39.1 (10.3)	P < 0.01
MCS, mean (SD)	40.0 (10.9)	43.4 (7.4)	49.7 (8.8)	52.0 (9.1)	P < 0.01

Comparison was done using the analysis of variance F test or Kruskal-Wallis tests for continuous variables, and a Pearson's chi-square test for categorical variables. NA: Negative Affectivity, SI: Social Inhibition, BDI: Beck Depression Inventory, BAI: Beck Anxiety Inventory

\*based on cut-off  $\geq 10$  for NA and/or SI

### Stability of type D personality

Six months after the first questionnaires 223 patients filled out a second DS14, BDI, and BAI. Patients who did not fill out a second DS14 questionnaire reached an end point of the study (i.e. death or transplantation), were lost to follow up or refused to fill out further questionnaires. Patients who completed one questionnaire were, compared to patients who completed two questionnaires, shorter on dialysis ( $p = 0.01$ ), and were more often unemployed ( $p = 0.04$ ). There were no further differences in patient and psychological characteristics between these two groups. (data not shown).

Table 3 shows the prevalence of type D personality and the presence of depressive and anxiety symptoms at two measurements. Cohen's  $\kappa$  was 0.52 for type D personality, 0.56 for depressive symptoms, and 0.61 for anxiety symptoms. The positive agreement for type D personality, depressive and anxiety symptoms was 61%, 73% and 73%, respectively. The negative agreement for type D personality, depressive and anxiety symptoms was 91%, 84% and 88%, respectively. These numbers indicate the probability that two measurements define a patient as having (positive agreement) or not having (negative agreement) a type D personality.

**Table 3a.** The prevalence of type D personality at two measurements of 223 dialysis patients.

		Second measurement		
		No type D	Type D	Total
First measurement	No Type D	162 73%	16 7%	178 80%
	Type D	18 8%	27 12%	45 20%
Total		180 81%	43 19%	223 100%

**Table 3b.** The prevalence of depressive symptoms at two measurements of 223 dialysis patients.

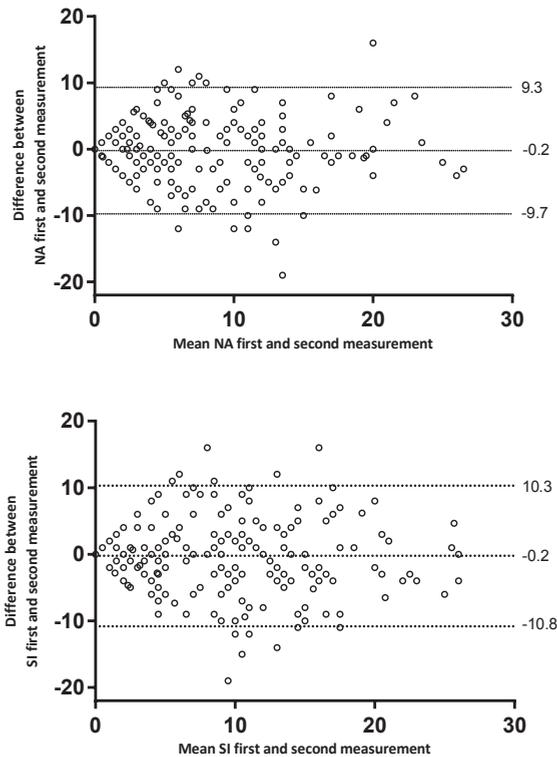
		Second measurement		
		BDI < 13	BDI ≥ 13	Total
First measurement	BDI < 13	115 52%	28 12%	143 64%
	BDI ≥ 13	18 8%	62 28%	80 36%
Total		133 60%	90 40%	223 100%

**Table 3c.** The prevalence of anxiety symptoms at two measurements of 223 dialysis patients.

		Second measurement		
		BAI < 13	BAI ≥ 13	Total
First measurement	BAI < 13	136 61%	21 10%	157 71%
	BAI ≥ 13	16 7%	50 22%	66 29%
Total		152 68%	71 32%	223 100%

BAI: Beck Anxiety Inventory, BDI: Beck Depression Inventory

Mean NA scores were 6.6 (6.5) and 6.8 (6.7) for the first and second measurement, respectively. Mean SI scores were 8.6 (6.8) and 8.7 (7.3) for the first and second measurement, respectively. Intra-class correlation coefficients were 0.73 for NA and 0.71 for SI scores. Individual differences between both NA and SI measurements are shown in the Bland-Altman plots (Figure 1). Limits of agreement ranged from -9.7 to 9.3 for NA scores, and



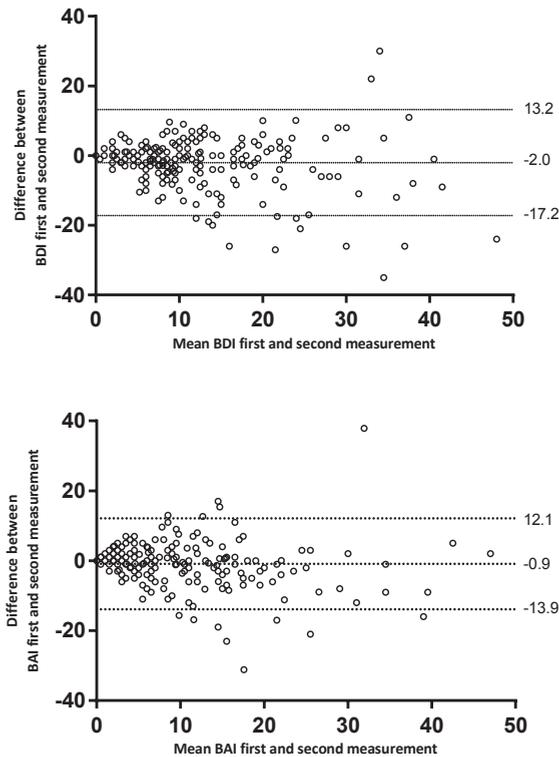
**Figure 1.** Bland Altman plot negative affectivity and social inhibition (first and second measurement)

from -10.8 to 10.3 for SI scores. Indicating that between two measurements the differences can vary up to 10 points.

Mean BDI scores were 11.4 (9.2) and 13.5 (10.6) for the first and second measurement, respectively ( $p < 0.01$ ). Mean BAI scores were 9.2 (9.1) and 10.2 (9.9) for the first and second measurement, respectively ( $p = 0.03$ ). Intra-class correlations were 0.69 for BDI and 0.76 for BAI scores. Individual differences between both BDI and BAI measurements are shown in the Bland-Altman plots (Figure 2). Limits of agreement ranged from -17.2 to 13.2 for BDI scores and from -13.9 to 12.1 for BAI scores.

## DISCUSSION

This study examined the prevalence of type D personality, NA, and SI traits in dialysis patients in the Netherlands. In addition, this study examined the association of these traits with psychosocial factors, and stability over a six months period in these patients. The



**Figure 2.** Bland Altman plot BDI and BAI (first and second measurement)

prevalence of type D personality, NA and SI traits were 21, 10, and 21%, respectively. These traits were associated with more depressive and anxiety symptoms and lower quality of life. Stability of prevalence of type D personality, NA, and SI traits was moderate, and was comparable to the stability of the prevalence of depressive and anxiety symptoms.

### Prevalence of type D personality

The prevalence of 21% of type D personality found in our study is marginally lower compared to a Korean<sup>7</sup> (26%) and a Turkish<sup>8</sup> (28%) cohort among dialysis patients. The prevalence is comparable to the cardiac population (13.5-35%)<sup>1</sup> and the Dutch general population (18-25.5%).<sup>28</sup> The prevalence of only the NA and SI trait was 10 and 21%, respectively. As far as we know this study is the first to report these traits separately in dialysis patients. These results are, however, comparable to the cardiac population.<sup>29</sup> The higher prevalence of type D personality among immigrant patients is in line with a recent Swedish study which showed that type D cardiac patients were more often Non-Swedish born.<sup>9</sup> However, studies among cardiovascular patients and healthy individuals, showed

no ethnic differences between type D and no type D patients.<sup>30-32</sup> This could indicate that in type D personality research immigrant status is important to assess besides ethnic origin.

### **Association of type D personality with depressive and anxiety symptoms and HRQOL**

Our finding that type D personality is associated with higher levels of depressive and anxiety symptoms and a lower quality of life is consistent with other studies among dialysis patients.<sup>7,8</sup> In patients with cardiovascular disease it has been found that type D personality (especially NA) is also associated with depressive and anxiety symptoms<sup>4;5;8;32-34</sup>, and is associated with depression in the future<sup>35</sup> which support the hypothesis that type D personality could predispose to depression and stress.<sup>36</sup>

### **Stability of type D personality**

Our results indicate that stability of type D personality over a six month period was moderate, and as stable as depressive and anxiety symptoms as was shown by a similar Cohen  $\kappa$  and intra-class correlation coefficient. Our results are in line with another study among dialysis patients which showed 1-month correlation coefficients of 0.84 and 0.78 for NA and SI, respectively.<sup>8</sup> Moreover, our results showed a positive agreement of 61% and a negative agreement of 91%. This indicates that when a patient does have type D personality at the first measurement the chance of having type D personality on the second measurement is 61%. When a patient does not have type D at the first measurement the chance of not having type D personality on the second measurement is 91%. As far as we know this is the first study among dialysis patients which reports on positive and negative agreement. In studies among patient with cardiovascular disease positive agreement was 53%<sup>10</sup> and 44%<sup>13</sup>, these studies also reported moderate Cohen  $\kappa$ . In addition, Bland Altman plots showed that differences between NA and SI measurements can vary over a six month period up to 10 points. This indicates that on a range between 0-28, differences between two NA or SI scores can vary up to 10 points.

In sum, our results and previous research indicates that the presence of type D personality varies over time, and that the stability of type D personality is comparable to the stability of the presence of depressive or anxiety symptoms. These results suggest that type D personality is possibly more a state instead of a trait phenomenon. Future research should address the association of type D personality with morbidity and mortality in dialysis patients, and whether type D personality is an independent predictor of morbidity and mortality.<sup>3,6</sup> In this respect it could also be useful to include multiple measurements of type D personality.

A limitation of our study is that we did not have data of a second DS14 questionnaire for all patients which could result in a selection of patients. However, we do not expect that the differences between patients with one or two questionnaires influences the results as was shown by comparable baseline characteristics. Furthermore, we had only two measurement points. By assessing multiple measurement points a more detailed prescription of the course of type D personality could be given.

In conclusion, in dialysis patients the prevalence of type D personality, NA, and SI traits were respectively 21, 10, and 21% and these traits were associated with higher depressive and anxiety symptoms and quality of life. The presence of type D personality can vary over time, and therefore type D personality is possibly more a state instead of a trait phenomenon. Future research should focus on the effect type D personality on morbidity and mortality in dialysis patients.

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