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Jörg Richter · Martin Eisemann · Gabriele Richter

Temperament and character during the course of unipolar depression among inpatients

Abstract Cloninger has developed a novel approach concerning relationships between psychopathological syndromes and personality by his biosocial theory. Increased levels of harm avoidance (HA) were consistently found in unipolar disorders. The present study was conducted to cross-validate, in part, previous findings that high harm avoidance (HA) persisted in the course of disorder and to explore the distinct role of character dimensions. One hundred and twenty-six inpatients with an unipolar depressive disorder and 126 healthy controls, strictly matched for age and gender have been included in the study. Our findings underline that higher harm avoidance among unipolar depressives compared to healthy controls persisted after treatment even if a significant reduction could be observed. Recurrent disorders and comorbidity with anxiety disorders seem to be related to a relatively immature character in terms of consistently lower scores for the character dimensions (e.g. self-directedness and cooperativeness) of the patients classified into these groups both at admission and at discharge compared with their healthy counterparts.

Key words Temperament · Character · Unipolar depressive disorder · Course of illness · Inpatients

Introduction

The importance of personality in the etiology of unipolar depressive disorders has been frequently discussed and investigated based on various theoretical approaches and as-

sessed by different measures. Psychoanalytical theories focused on dependency and obsessionalism (Chodoff 1972, Rado 1928). The results of Nystrom & Lindegard (1995) pointed to an 'asthenic' disposition which is characterised by introversion and a tendency to give up easily. Hirschfeld and co-workers (Hirschfeld et al. 1983, 1986, 1989) concluded that introversion and lack of social adroitness emerged as distinct attributes among recovered depressives.

Cloninger (Cloninger 1991, 1994, Cloninger and Gilligan 1987, Cloninger et al. 1993) has developed a novel approach concerning relationships between psychopathological syndromes and personality by his biosocial theory. Many studies have been internationally conducted to confirm the theory using the Tridimensional Questionnaire (TPQ) (Brown et al. 1992, Health et al. 1994, Joffe et al. 1993, McCourt et al. 1993) and more recently, the Temperament and Character Inventory (TCI) (Brändström et al. 1998, Cloninger et al. 1994, Svrakic et al. 1993), which is a further development of the TPQ. One consistent finding from various studies is that patients with a unipolar depressive disorder score high on harm avoidance (HA) (Joffe et al. 1993). Although a significant decrease has been found for harm avoidance in patients in remission these still scored higher compared to normal subjects (Brown et al. 1992). According to Cloninger's theory harm avoidance is one of four independent, largely genetically determined temperament dimensions (Cloninger 1994, Cloninger et al. 1993). It reflects a heritable bias in the inhibition or cessation of behaviours. Subjects scoring high in harm avoidance (HA) are pessimistic, worrying, fatigable, shy with strangers and become tense in unfamiliar situations. The temperament dimension novelty seeking (NS) is viewed as a tendency toward exhilaration in response to novel stimuli or cues. Subjects high in novelty seeking show an increased frequency of explanatory behaviour, impulsive decision making, a quick loss of temper and active avoidance of frustration. The third dimension, reward dependence (RD), reflects the tendency to maintain or pursue ongoing behaviours. Subjects with high scores on reward dependence are described as senti-

Priv.-Doz. Dr. J. Richter (✉) · G. Richter
Klinik für Psychiatrie und Psychotherapie, Universität Rostock, Gehlsheimer Str. 20, D-18147 Rostock, Germany
e-mail: joerg.richter@med.uni-rostock.de,
Phone: +49 381 494 9564, Fax: +49 381 494 9502

M. Eisemann
Unit of Medical Psychology, Dept. Psychiatry,
WHO Collaborating Centre, Umeå University, Umeå, Sweden

mental, socially attached and dependent on the approval of others. Persistence, originally thought to be a component of the reward dependence system, is the fourth temperament dimension and reflects the perseverance in behaviour despite frustration and fatigue.

Character is defined as the second domain of personality which is predominantly determined by socialisation processes during the life-span (Cloninger et al. 1994). It is described in terms of response biases related to different concepts of the self. Changes in cognition and the self-concept during the development of personality are supposed to be related to personal, social, moral and spiritual development. Self-directedness (SD) is related to the extent to which a person identifies the self as an autonomous individual. An individual who is low in self-directedness could be described as irresponsible, aimless, undisciplined in behaviour and of poor impulse-control in general. Cooperativeness (C) is related to the extent to which a person identifies himself or herself as an integral part of the society as a whole. Low cooperativeness is associated with deficits in empathy. Uncooperative individuals are characterised as hostile, aggressive, hateful and as revengeful opportunists. Self-transcendence (ST) reflects the tendency of identification with unity of all things and is associated with deficits in transpersonal identification or conscience. Individuals low in self-transcendence show conventional and materialistically oriented behaviour with little or no concern for absolute ideas, such as goodness and universal harmony. All temperament and character dimensions have to be viewed as the result of an ever continuous interaction during life. Although there are consistent findings regarding the importance of harm avoidance (HA) in unipolar depressive disorders, only little is known about the character dimensions as part of the relationship between personality and this psychopathological manifestation. Therefore, the present study was conducted to cross-validate, in parts, the findings of Brown et al. (1992) and to explore the distinct role of character dimensions. Especially lower scores for the self-directedness dimension and a tendency for higher cooperativeness scores are excepted in depressive patients compared to healthy individuals according to Cloninger's hypotheses (Cloninger et al. 1998). Comorbidity with other axis I disorders and the presence of recurrent disorders is assumed to be related to influences of character dimensions.

Methods

Subjects

One hundred and twenty-six inpatients who have been diagnosed to have a unipolar depressive disorder (F32 or F33 according to ICD-10, as diagnosed by the Composite International Diagnostic Interview-CIDI) (Wittchen and Semler 1990) have been investigated by means of the Temperament and Character Inventory (TCI) and the Beck Depression Inventory-BDI (1961), both within two days after admission to hospital and within two days before discharge (further details of the patient sample – Table 1). The CIDI assessment was made by specially trained physicians.

For each of the inpatients a subject from a normal population sample has been matched for age and gender. The healthy individuals are derived from the normative sample for the German version of the TCI (n = 509). The inclusion-criteria for this sample was that the probands had never been under psychiatric or psychological treatment. Most of them were investigated during courses at an educational institute for vocational training. These individuals were assessed once by means of the TCI and the BDI.

The healthy subjects as well as the patients signed a written informed consent which was preceded by a comprehensive explanation of the investigation.

The inpatient sample was divided both according to the exclusive presence of a unipolar depressive disorder (D) or that of a comorbid axis I disorder (anxiety disorder – F40 or F41 according to ICD-10 – D+A), and also according to the presence of only a single episode (E) or a recurrent disorder (rD).

The self-rated severity of depression (BDI-score) neither differed between the 'D-group' and the 'A+D-group' nor between the 'E-group' and the 'rD-group' (Table 1) neither at admission nor at discharge. The patients in each group reported themselves at admission as significantly more depressive compared with their healthy counterparts. We found a highly significant decrease of the BDI-scores within each of the groups of depressives between admission and discharge. At discharge, the only substantial difference in depression severity occurred between the 'rD-group' and their healthy controls. Nevertheless, in order to evaluate the differences between the 'E-group' and the 'rD-group' it is remarkable that the mean-score of the BDI for the healthy controls of the 'E-group' was significantly higher than the score of the 'rD-group'.

All patients had undergone a psychiatric treatment combining psychopharmacological (tri-, tetracyclic antidepressants or SSRIs) and psychotherapeutical therapies (cognitive therapy in group sessions and single settings).

Instruments

The Temperament and Character Inventory (TCI) is a 240-item, self-administered, paper-and-pencil test with a bivariate response model (true/false) which takes about 20 to 30 minutes to complete (Cloninger et al. 1994, Richter et al. 1999 b). It represents a further development of the Tridimensional Personality Questionnaire (TPQ) (Cloninger et al. 1991). The TCI measures the four higher-

Table 1 Sample characteristics

[a] p < 0.001 for comparisons patients vs. controls, df between 59 and 65; 1 – p < 0.001 for comparisons between patient groups at admission, df = 124; I – p < 0.001 for comparisons between patient groups at discharge, df = 124; A – p < 0.05 for comparison between control groups, df = 124

	Depressive disorder	Comorbid depression	Single episode	Recurrent depression	Healthy
Male	26	21	16	31	47
Female	40	39	45	34	79
Age (years)	45.2 ± 11.6	43.6 ± 11.7	46.7 ± 11.7	42.4 ± 11.3	44.4 ± 11.6
Days in hospital	57.6 ± 24.3	65.9 ± 48.8	53.3 ± 22.5	69.2 ± 47.3	–
BDI-score admission	17.7 ± 10.7[a]	19.8 ± 12.6[a]	18.6 ± 10.9[a]	19.8 ± 13.0[a]	
BDI-score discharge	5.9 ± 5.6	5.7 ± 7.2	4.9 ± 5.9	6.8 ± 6.0[a]	
BDI-score of corresponding healthy controls	4.7 ± 5.9	4.0 ± 4.1	5.5 ± 6.5	3.0 ± 3.1[A]	

Table 2 Pearson correlation coefficients between TCI- and BDI-scores (Correlations between score differences between admission and discharge are above the diagonal. Autocorrelations for the patients are along the diagonal. Correlations for the patients at admission are in the first line, at discharge in the second line, and for the healthy controls in the third line below the diagonal

	BDI	NS	HA	RD	PS	SD	C	ST
BDI	0.50[c]	–0.07	–0.21[a]	0.07	0.17	0.29[c]	0.14	0.15
NS	–0.13							
	–0.26[b]	0.74[c]	–0.20[a]	–0.28[c]	–0.11	0.05	–0.48[c]	0.15
	–0.18[a]							
HA	0.45[c]	–0.46[c]						
	0.53[c]	–0.45[c]	0.72[c]	0.15	0.28[c]	–0.30[c]	–0.09	–0.11
	0.54[c]	–0.37[c]						
RD	–0.11	–0.29[c]	–0.05					
	–0.00	–0.01	–0.12	0.51[c]	0.11	0.01	0.40[c]	0.14
	–0.20[a]	–0.01	–0.13					
PS	–0.15	0.09	0.12	0.04				
	–0.08	0.11	–0.23[b]	0.22[b]	0.54[c]	0.08	0.05	0.02
	–0.21[a]	–0.13	–0.31[c]	0.24[b]				
SD	–0.42[c]	0.06	–0.54[c]	0.12	–0.06			
	–0.53[c]	0.10	–0.58[c]	0.18[a]	0.33[c]	0.74[c]	0.27[b]	–0.12
	–0.37[c]	–0.10	–0.40[c]	0.01	0.17			
C	0.08	–0.47[c]	–0.10	0.33[c]	–0.02	0.28[c]		
	–0.21[b]	–0.24[b]	0.01	0.46[c]	0.06	0.35[c]	0.50[c]	–0.09
	–0.40[c]	0.02	–0.22[b]	0.47[c]	0.18[a]	0.39[c]		
ST	0.00	–0.14	0.18[a]	0.21[b]	0.30[c]	–0.27[b]	0.03	
	0.04	0.00	–0.09	0.23[b]	0.29[c]	–0.19[a]	–0.08	0.67[c]
	–0.03	0.11	–0.11	0.19[a]	0.08	–0.37[c]	–0.08	

[a] $p \leq 0.05$; [b] $p \leq 0.01$; [c] $p \leq 0.001$

order temperament dimensions based on Cloninger's unified biosocial theory of personality as well as the three higher-order character dimensions. The temperament dimensions consist of 11 subscales (four each for HA and NS, three for RD – Table 2 for details) and one single-subscale dimension (persistence – PS), and the character dimensions consist of 13 lower-order subscales (five each for SD and C, and three for ST). Its psychometric properties could be verified separately for various versions in several languages (Brändström et al. 1998, Richter et al. 1999c), using different personality theories (Heath et al. 1994, Waller et al. 1991) in different patient groups (Mulder et al. 1994, Svrakic et al. 1993, Stallings et al. 1996), and by neurobiological parameters such as cortisol, prolactine, heart rate, skin conductance level (SCL) and EMG activity of the musculus zygomaticus (Cloninger et al. 1994, Joyce et al. 1994a, b, Engel et al. 1998). Cronbach's alpha coefficients range within the preliminary German normative sample from 0.57 for the persistence dimension to 0.84 for harm avoidance, self-directedness and cooperativeness. Direct comparisons of the structures of the TCI among different language versions (American English, Swedish, German) by means of orthogonal Procrustes rotations suggest a high similarity (Richter et al. 1999 a).

By means of the Beck Depression Inventory (BDI), the self-reported severity of depression was assessed (Beck et al. 1961). The inventory consists of 21 items, which are summed up to a total score. It is the internationally most widely used self-evaluation scale for severity of depression.

Data analysis

Pearson correlation coefficients were calculated between BDI-scores and temperament- and character-scores in order to evaluate the possible bias of severity of psychopathology (depressivity) to the changes of the personality scores and to the differences between patients and controls. T-tests were performed to compare correlation coefficients.

Various discriminant analyses were calculated to test for differences between groups at the multivariate level. At the univariate level, t-tests for dependent samples were applied when comparing scores of subgroups of patients with their corresponding controls and when comparing the scores within the patient groups from admission and discharge. When comparing patient subgroups, t-tests for independent samples were used.

Results

Correlational analysis

We found significant correlations between BDI-, HA-, and SD-scores for patients at admission and at discharge as well as for healthy subjects (Table 2). The stability of the NS-, HA-, and the SD-scores of the patients in terms of autocorrelations was significantly higher than that of the BDI-score. The correlations between the differences of the BDI-scores and the differences of the HA- (t = 2.62; p < 0.01) and the SD-scores (t = 1.97; p = 0.05) were nearly half of the magnitude of the correlations between the scores or the autocorrelations (BDI vs. HA: t = 2.64; p < 0.01; BDI vs. SD: t = 3.23; p < 0.01).

The observed intercorrelations between the TCI scores had been expected and were only of small or medium effect size according to Cohen's classification (1977).

Unipolar depression (D) vs. unipolar depression with comorbid anxiety disorder (D+A)

The set of TCI subscales substantially discriminated between these groups at admission (Wilks' Lambda = 0.38; chi square = 107.54; df = 25; p < 0.001) as well as at dis-

Table 3 Mean scores and standard deviations for patients with simple unipolar depression, with unipolar depression with a comorbid anxiety disorder, and for healthy controls

	D (F32, F33)		D+A (F32, F33 & F40 or F41)		Healthy total
	admission	discharge	admission	discharge	
Harm avoidance (HA)	23.4 ± 4.7[c]	20.3 ± 5.8[c]	24.6 ± 6.1[c]	21.4 ± 6.7[c]	15.7 ± 5.5
Novelty seeking (NS)	14.8 ± 6.3[c]	17.0 ± 7.0	15.9 ± 4.8	17.1 ± 4.5[c]	19.3 ± 4.5
Reward dependence (RD)	16.2 ± 3.5	15.8 ± 3.5	17.0 ± 3.2[b]	16.3 ± 2.3	15.3 ± 3.3
Persistence (P)[3, III]	3.2 ± 1.6[b]	3.7 ± 1.2	3.9 ± 1.6	4.2 ± 1.6[a]	3.7 ± 1.6
Self-directedness (SD)	27.7 ± 7.0[c]	31.7 ± 5.6[b]	29.2 ± 6.8[c]	31.7 ± 7.8[c]	34.0 ± 4.9
Cooperativeness (C)[1, I]	30.0 ± 3.7	31.8 ± 5.0	32.3 ± 2.9[a]	33.6 ± 4.0[a]	32.4 ± 4.6
Self-transcendence (ST)	10.2 ± 6.9	9.2 ± 5.6[b]	11.3 ± 5.9	10.6 ± 5.2	11.5 ± 5.4
Anticipatory worry (HA 1)	6.7 ± 1.7[c]	5.6 ± 2.1[c]	7.0 ± 2.6[c]	6.3 ± 2.5[c]	4.4 ± 2.0
Fear of uncertainty (HA 2)	6.1 ± 1.2[c]	5.4 ± 1.6	6.1 ± 1.1[c]	5.9 ± 1.4[c]	4.8 ± 1.6
Shyness (HA 3)	5.4 ± 1.5[c]	4.6 ± 1.8[c]	5.4 ± 2.2[c]	4.2 ± 2.2[a]	3.4 ± 2.2
Fatigability (HA 4)[1]	5.2 ± 2.2[c]	4.7 ± 2.2[c]	6.1 ± 2.1[c]	5.1 ± 2.1[c]	3.1 ± 1.8
Exploratory excitability (NS 1)[2, III]	4.2 ± 2.0[c]	4.4 ± 2.2[c]	5.4 ± 2.4[a]	6.0 ± 2.3	6.3 ± 2.0
Impulsiveness (NS 2)[I]	4.2 ± 2.5	4.2 ± 2.5	3.5 ± 1.7[c]	3.4 ± 1.4[c]	4.4 ± 2.1
Extravagance (NS 3)	4.0 ± 2.1	4.4 ± 2.0	4.4 ± 2.0[b]	4.4 ± 1.9[b]	4.9 ± 1.8
Disorderliness (NS 4)[I]	2.4 ± 1.7[b]	4.0 ± 2.1[a]	2.6 ± 1.7[c]	3.3 ± 1.6	3.7 ± 1.5
Sentimentality (RD 1)	7.0 ± 2.0[a]	6.5 ± 2.1	7.5 ± 1.7[b]	6.8 ± 1.9	6.4 ± 1.9
Attachment (RD 3)	5.3 ± 1.4	5.8 ± 1.7	5.2 ± 2.0	5.4 ± 1.6	5.6 ± 1.9
Dependence (RD 4)[2, II]	3.9 ± 1.4	3.5 ± 1.2	4.4 ± 1.0[c]	4.1 ± 1.0[c]	3.3 ± 1.2
Responsibility (SD 1)	5.3 ± 1.8[b]	6.3 ± 1.6	5.4 ± 2.0[b]	5.9 ± 1.9	6.2 ± 1.5
Purposefulness (SD 2)	5.5 ± 1.8[c]	6.0 ± 1.7[a]	5.0 ± 2.2[c]	6.3 ± 1.7	6.4 ± 1.2
Resourcefulness (SD 3)	2.1 ± 1.7[c]	3.1 ± 1.3[c]	2.4 ± 1.9[c]	3.0 ± 1.7[c]	4.0 ± 1.3
Self-acceptance (SD 4)	7.6 ± 2.5[a]	7.7 ± 2.4[a]	8.0 ± 2.2	8.0 ± 2.3	8.0 ± 2.3
Congruent second nature (SD5)[3]	7.3 ± 2.5[c]	8.5 ± 1.9[b]	8.3 ± 1.9[c]	8.6 ± 2.5[a]	9.3 ± 1.7
Social acceptance (C 1)[2]	6.5 ± 1.2[a]	6.9 ± 1.1	7.2 ± 1.1[b]	7.0 ± 1.3	6.9 ± 1.1
Empathy (C 2)[2]	4.4 ± 1.1	4.8 ± 1.3	4.9 ± 0.7	5.0 ± 0.9	4.9 ± 1.3
Helpfulness (C 3)	5.7 ± 1.2	5.9 ± 1.3	6.0 ± 0.9	6.5 ± 0.9	5.9 ± 1.3
Compassion (C 4)[1, I]	7.4 ± 2.1[c]	7.4 ± 2.7[c]	8.6 ± 1.8[b]	8.4 ± 2.3	8.1 ± 2.1
Pure-heartedness (C 5)	6.0 ± 1.3[c]	6.9 ± 1.3	5.8 ± 1.1[c]	6.7 ± 1.7	6.6 ± 1.4
Self-forgetfulness (ST 1)	3.9 ± 2.6	4.0 ± 2.3	4.2 ± 2.2	4.0 ± 2.2[a]	4.3 ± 2.0
Transpersonal identification (ST 2)	2.9 ± 2.4[a]	2.4 ± 1.9[c]	3.0 ± 2.0	2.9 ± 1.7	3.5 ± 2.0
Spiritual acceptance (ST 3)	3.5 ± 3.3	2.8 ± 2.8[a]	4.0 ± 3.1	3.8 ± 2.8	3.7 ± 3.2

[a] p ≤ 0.050; [b] p ≤ 0.010; [c] p ≤ 0.001 for comparisons patients vs. controls, df between 59 and 65; [1] p ≤ 0.050; [2] p ≤ 0.010; [3] p ≤ 0.001 for comparisons between D vs. D+A group at admission, df = 124; [I] p ≤ 0.050; [II] p ≤ 0.010; [III] p ≤ 0.001 for comparisons between D vs. D+A group at discharge, df = 124

charge (Wilks' Lambda = 0.47; chi square = 82.50; df = 25; p < 0.001).

Both at admission and at discharge these groups differed in 'persistence' and 'cooperativeness' at the level of higher-order dimensions (Table 3). The patients of the co-morbid group scored higher in both. Additionally, the co-morbid group had a higher mean score for 'exploratory excitability' (NS 1) and 'dependence' (RD 4) as part of the temperament and 'compassion' (C 4) as part of character at both assessments. At admission only, the scores for 'fatigability' (HA 4), 'congruent second nature' (SD 5), 'social acceptance' (C 1) and empathy (C 2) differed between both groups in terms of higher scores for 'A+D', whereas group D had higher scores for 'impulsiveness' (NS 2) and 'disorderliness' (NS 4) at discharge.

Wilks' Lambda = 0.29; chi square = 115.53; df = 25; p < 0.001).

There is one consistent difference between patients suffering from a single episode and the patients with recurrent disorders for the harm avoidance dimension at univariate level of analysis, which is derived specifically from the subscales 'fear of uncertainty' (HA 2) and 'fatigability' (HA 4) (Table 4). Patients with a recurrent disorder scored higher than those with a single episode. Interestingly, both groups differed regarding 'cooperativeness' (E higher than rD for 'empathy' – C 2 – and 'transpersonal identification' – ST 2) at admission, whereas the patients of the rD group scored higher in 'anticipatory worry' (HA 1), 'fear of uncertainty' (HA 2), and lower in 'resourcefulness' (SD 3) as well as in 'congruent second nature' (SD 5) at discharge.

Single episode (E) vs. recurrent disorder (rD)

At the multivariate level the subscales significantly differed between both groups (admission: Wilks' Lambda = 0.48; chi square = 68.71; df = 25; p < 0.001; discharge:

Admission vs. discharge

Independent of the subsampling there were significant changes for temperament as well as for character dimen-

Table 4 Mean scores and standard deviations for patients with a single episode and for patients with a recurrent disorder

	Single episode		Recurrent disorder	
	admission	discharge	admission	discharge
Harm avoidance (HA)[1, I]	23.0 ± 5.6^c	19.8 ± 5.8^b	24.9 ± 5.1^c	21.9 ± 6.4^c
Novelty seeking (NS)	15.9 ± 6.0^c	17.5 ± 6.0	14.8 ± 5.3^c	16.7 ± 5.8^c
Reward dependence (RD)	16.8 ± 3.1^c	15.8 ± 3.5	16.3 ± 3.7	16.2 ± 2.5
Persistence (P)[1]	3.9 ± 1.5^a	4.1 ± 1.4	3.2 ± 1.6^c	3.8 ± 1.4
Self-directedness (SD)	28.3 ± 6.9	32.6 ± 6.0	28.5 ± 7.0^c	30.8 ± 7.1^c
Cooperativeness (C)[2]	31.2 ± 3.7	33.0 ± 5.0	30.9 ± 3.4^c	32.2 ± 4.3^c
Self-transcendence (ST)[2]	12.2 ± 6.6	10.5 ± 5.7	9.3 ± 6.0^b	9.2 ± 5.1^b
Anticipatory worry (HA 1)[I]	6.5 ± 2.1^c	5.4 ± 2.1^a	7.2 ± 2.2^c	6.4 ± 2.4^c
Fear of uncertainty (HA 2)[I]	6.1 ± 1.2^c	5.7 ± 1.6	6.2 ± 1.1^c	5.6 ± 1.5^c
Shyness (HA 3)	5.3 ± 1.8^c	4.2 ± 2.0^b	5.5 ± 1.8^c	4.7 ± 2.0^c
Fatigability (HA 4)[1, I]	5.5 ± 2.5^c	4.5 ± 2.1^c	6.0 ± 1.7^c	5.2 ± 2.2^c
Exploratory excitability (NS 1)	4.8 ± 2.1^b	5.2 ± 2.1^a	4.7 ± 2.4^c	5.2 ± 2.6^c
Impulsiveness (NS 2)	4.3 ± 2.5	4.2 ± 2.4	3.5 ± 1.8^a	3.5 ± 1.7^a
Extravagance (NS 3)	4.4 ± 1.7^a	4.5 ± 1.8	4.0 ± 2.3^b	4.3 ± 2.1^a
Disorderliness (NS 4)	2.4 ± 1.7^c	3.7 ± 2.1	2.6 ± 1.6^c	3.7 ± 1.7
Sentimentality (RD 1)	7.2 ± 1.6^a	6.5 ± 1.9	7.2 ± 2.1^a	6.7 ± 2.1
Attachment (RD 3)[2]	5.7 ± 1.5^c	5.7 ± 1.9	4.8 ± 1.8^c	5.6 ± 1.5
Dependence (RD 4)	4.0 ± 1.4	3.6 ± 1.2^b	4.3 ± 1.1^c	3.9 ± 1.0
Responsibility (SD 1)	5.0 ± 1.7^b	6.2 ± 1.8	5.7 ± 2.0^b	6.0 ± 1.8^b
Purposefulness (SD 2)	5.6 ± 1.9^b	6.1 ± 1.7	5.0 ± 2.0^c	6.1 ± 1.7
Resourcefulness (SD 3)[II]	2.5 ± 1.8^c	3.4 ± 1.5	2.0 ± 1.8^c	2.7 ± 1.4^c
Self-acceptance (SD 4)	7.4 ± 2.3	7.9 ± 2.1	8.2 ± 2.3	7.9 ± 2.5
Congruent second nature (SD5)[I]	7.8 ± 2.3^c	9.0 ± 2.1	7.8 ± 2.3^c	8.2 ± 2.2^b
Social acceptance (C 1)	6.9 ± 1.2	7.0 ± 1.0^a	6.6 ± 1.1^b	6.8 ± 1.3
Empathy (C 2)[2]	4.9 ± 0.9	5.0 ± 1.0	4.4 ± 0.9^c	4.7 ± 1.2
Helpfulness (C 3)	5.7 ± 1.2	6.1 ± 1.3	6.0 ± 1.0	6.2 ± 1.1
Compassion (C 4)	8.1 ± 1.9	8.1 ± 2.2	7.8 ± 2.2^a	7.6 ± 2.8^a
Pure-heartedness (C 5)	5.7 ± 1.2^b	6.8 ± 1.4	6.0 ± 1.2^c	6.8 ± 1.5
Self-forgetfulness (ST 1)[1]	4.6 ± 2.3	4.0 ± 2.2	3.5 ± 2.4^a	4.0 ± 2.4^b
Transpersonal identification (ST 2)[2]	3.4 ± 2.4	2.9 ± 2.1	2.5 ± 2.0^c	2.3 ± 1.5^c
Spiritual acceptance (ST 3)	4.3 ± 3.4	3.6 ± 2.9	3.2 ± 2.9	2.9 ± 2.7^a

[a] $p \le 0.050$; [b] $p \le 0.010$; [c] $p \le 0.001$ for comparisons patients vs. controls, df between 59 and 65; [1] $p \le 0.050$; [2] $p \le 0.010$; [3] $p \le 0.001$ for comparisons between E vs. rD group at admission, df = 124; [I] $p \le 0.050$; [II] $p \le 0.010$; [III] $p \le 0.001$ for comparisons between E vs. rD group at discharge, df = 124

sions and subscales. The scores on harm avoidance (HA) for both the patient group with a simple unipolar depressive disorder and the group with unipolar depression with a comorbid anxiety disorder were decreased (D: t = 5.57; df = 65; p < 0.001; D+A: t = 5.65; df = 59; p < 0.001) due to differences in each of the subscales. 'Disorderliness' (NS 4) was increased within both groups (t = 7.30 resp. 3.06; p < 0.001 resp. 0.003), whereas 'exploratory excitability' (NS 1) was only increased for the D+A group (t = 3.40; df = 59; p = 0.001). For the D+A group the scores for 'reward dependence' (RD - t = 1.98; df = 59; p = 0.050) were decreased during the hospitalisation due to a decrease in 'sentimentality' (RD 1 - t = 2.97; df = 59; p = 0.007) and 'dependence' (RD 4 - t = 2.33; df = 59; p = 0.023). For the D group 'sentimentality' (RD 1 – t = 2.42; df = 65; p = 0.018) was also decreased, whereas the score for 'attachment' (RD 3 - t = 2.29; df = 65; p = 0.025) as well as for 'persistence' (P - t = 2.53; df = 65; p = 0.014) was increased.

For both groups an increase in maturity of the character traits in terms of a higher 'selfdirectedness' (SD – t = 5.83 resp. 4.66; p < 0.001) and higher scores on several 'cooperativeness' subscales could be found.

When scrutinising the patients with a single episode (E) and those with a recurrent disorder (rD), similar findings could be established for the HA and SD dimensions and subscales as well as for NS and C subscales similarly to the grouping for D and D+A. Interestingly, an increase of the 'persistence' (P - T = 3.17; df = 64; p = 0.002) and of the 'attachment' (RD 3 - t = 4.17; df = 64; p < 0.001) scores was established for rD group, and not for E.

Inpatients vs. matched healthy subjects

The set of TCI subscales could discriminate patients of the 'D-group' (admission: Wilks' Lambda = 0.57; chi square = 66.60; df = 25; p < 0.001; discharge: Wilks' Lambda = 0.33; chi square = 133.38; df = 25; p < 0.001) as well as those of the 'D+A-group' from their corresponding healthy counterparts at both assessments (admission: Wilks' Lambda = 0.45; chi square = 81.34; df =

25; p < 0.001; discharge: Wilks' Lambda = 0.33, chi square = 111.32; df = 25; p < 0.001).

Both the D and A+D group scored consistently higher in 'harm avoidance' and lower in 'selfdirectedness' in the higher-order dimensions at both assessments compared to the matched controls (Table 3). These results represent significant differences in each of the four HA subscales, except 'fear of uncertainty' (HA 2) for the D group, whereas the patients of the D+A group have reported consistently lower scores for 'resourcefulness' (SD 3) and for 'congruent second nature' (SD 5). In addition, for the patients with a unipolar depressive disorder only, the scores for 'purposefulness' (SD 2) and 'self-acceptance' (SD 4) remained lower. The scores for 'exploratory excitability' (NS 1) and for 'disorderliness' (NS 4) of 'novelty seeking' were lower for the latter patients than for the controls at both assessments. For the D+A group the scores for the subscales 'impulsiveness' (NS 2) and 'extravagance' (NS 3) were found as lower, whereas the score for 'dependence' (RD 4) was higher. The patients of the comorbid sample scored higher on 'persistence' and 'helpfulness' (C 3) than the controls at discharge only. On the other hand, patients with a simple unipolar depression scored higher on 'helpfulness' at both measurements. When subdividing the patient sample according to single episode (admission: Wilks' Lambda = 0.68; chi square = 39.45; p = 0.033; discharge: Wilks' Lambda = 0.39; chi square = 96.91; df = 25; p < 0.001) or recurrent disorder (admission: Wilks' Lambda = 0.39; chi square = 88.37; df = 25; p < 0.001; discharge: Wilks' Lambda = 0.21; chi square = 149.01; df = 25; p < 0.001), the subscales of the TCI differentiated between these patient groups and the respective healthy controls.

The HA scores were constantly significantly higher for both groups compared to controls at the univariate level of analysis (Table 4). This is the only difference for the E group compared to the healthy subjects at both assessments in addition to a lower score for 'exploratory excitability' (NS 1). However, the patients of the rD group differed significantly from the healthy control group in some more dimensions. At the dimensional level the former scored higher for 'persistence' and lower for 'novelty seeking', 'self-directedness', 'cooperativeness' and 'self-transcendence'.

Discussion

The study was conducted to cross-validate, in parts, findings of Brown et al. (1992) that higher harm avoidance among unipolar depressives compared to healthy controls persisted after treatment even if a significant reduction was observed. This result is biased because the control subjects were investigated only at one assessment. Another aim of the present investigation was to explore the distinct role of character dimensions. The study was performed with unipolar depressive inpatients who were strictly matched for age and gender with healthy controls.

The results of Brown et al. (1992) could be verified. The inpatients scored higher in harm avoidance than their healthy counterparts both at admission and discharge, even if there was an essential decrease during inpatient treatment. The latter finding is consistent with that of Chien and Dunner (1996). The persistence of the differences between depressives and controls is independent of subsampling of the inpatient group according to the distinction between simple unipolar depression vs. depression with comorbid anxiety disorder or single episode vs. recurrent disorder. Unipolar depressives still tend to be more cautious, more careful, fearful, tense, pessimistic, discouraged and more easily fatigued after treatment than healthy subjects. Furthermore, our findings are in line with those of other studies which have underlined the importance of harm avoidance in depressive disorders (Joyce et al. 1994 a, b, Young et al. 1995). The relatively stable differences of the TCI scores between the depressives and the controls at both assessments seem to be independent of the severity of depression which is reflected by significantly higher autocorrelations for harm avoidance and self-directedness compared with the autocorrelation of the BDI score and by the ratio of correlations between TCI scores and the BDI score and intercorrelations of the related differences between admission and discharge.

The concept of harm avoidance has the advantage that this temperament trait seems to be more homogenous than introversion. The dimension of extraversion vs. introversion was found related with measures of anxiety including harm avoidance as well as with neuroticism, impulsivity and aspects of reward dependence (Cloninger et al. 1994).

Some significant differences at the higher-order and lower-order dimension level, which occurred at admission only, seem to reflect the acute symptom state.

Changes in personality during inpatient treatment could be found in various temperament and character dimensions. Except for harm avoidance, there were major differences between admission and discharge in reward dependence, persistence, novelty seeking, self-directedness as well as in cooperativeness. In fact, it remains still unclear whether the findings are due to postmorbid changes caused by the disorders or whether they reflect premorbid differences.

Nevertheless, further differences between the patients and the controls persisted during the inpatient period or appeared at discharge.

Whereas the patients with a simple unipolar depression still were less goal-oriented and purposeful (SD 2), less resourceful, less helpless with a lack of skills and confidence in problem solving (SD 3) as well as tending to have a low self-esteem (SD 4) compared to the healthy subjects, patients with a comorbid anxiety disorder were slower in decision making (NS 2) and tended to be more reserved, controlled or restrained (NS 3). The subjects of the latter group were more likely to intensify their efforts in response to anticipated reward (P). In addition, they showed a stronger tendency to react sensitively to rejection and slights (RD 4). Interestingly, these patients were, according to their own view, more helpful with others (C 3) at discharge.

The higher persistence and dependency is clearly related to obsessionalism as described by Hirschfeld et al. (1986, 1989).

Differences between the patient group with a single episode and patients with recurrent disorders compared to the healthy subjects are more pronounced in the latter clinical group and strongly support the distinct role of character traits in recurrent depression. These patients were less selfdirected (SD), less cooperative (CO) and less self-transcendent (ST) than their healthy counterparts. Immaturity of character seems to be related to recurrent disorders and partly to comorbidity. This partly confirms the findings of Svrakic et al. (1993) concerning the relationships between temperament and character and personality disorders. The findings of Black and Sheline (1997) that the probability for personality disorder decreases by medical treatment of depressives as well could have been expected. Firstly, it is reasonable from the known interrelationships between depressivity, self-directedness, harm avoidance and reward dependence. Secondly, the medication activates the patients which in turn results in more social interactions. Possibly, this mechanism could explain the correlation between changes of reward dependence and of cooperativeness during the inpatient period (Table 2).

Summing up, the present results support parts of Cloninger's biosocial theory of personality, especially concerning the role of harm avoidance, of reward dependence and of self-directedness in unipolar depressive disorders (Cloninger 1994, Cloninger and Gilligan 1987, Cloninger et al. 1993). Furthermore, they demonstrate once again the diagnostic usefulness of the TCI both for mood and anxiety disorders.

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