ELSEVIER

Psychiatry Research 94 (2000) 67–76

PSYCHIATRY RESEARCH

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Normative data and factor structure of the Temperament and Character Inventory (TCI) in the French version

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Received 26 April 1999; received in revised form 24 August 1999; accepted 15 September 1999

Abstract

We explored the psychometric features of the French Temperament and Character Inventory (TCI) in a 602-subject community sample (263 men and 339 women), representative of the French population. The factor structures of the temperament and character dimensions, explored separately, were in agreement with the hypothesized constructs, except for the scales Novelty Seeking NS1 (exploratory excitability), Persistence, and Self-Directedness SD4 (self-acceptance). The internal consistency of the main dimensions was good (Cronbach alpha coefficients between 0.68 and 0.82), but weak for Persistence (0.49). The mean scores of the temperament dimensions were notably different from those published in other normative data — especially lower for Novelty Seeking (16.4 ± 5.6) and higher for Harm Avoidance (16.1 ± 7.2) when compared with US data — suggesting cross-cultural differences in personality assessment, and the necessity to use specific normative values with each translated instrument.

Keywords: Consistency; Cross-cultural; Personality; Questionnaire; Validity

1. Introduction

The Temperament and Character Inventory (TCI) is a 226-item, self-administered, true–false questionnaire developed by Cloninger to assess seven dimensions of personality (Cloninger et al., 1993, 1994). These dimensions reflect his psychobiological model of temperament and character. The four temperament dimensions are supposed to be highly heritable, stable throughout life, and underlined by specific neurotransmission systems. *Novelty seeking* (NS) is defined as a hereditary tendency to respond actively to novel stimuli, with frequent exploratory activity in response to novelty or impulsive decision-making. *Harm avoidance* (HA) is viewed as a heritable bias in the inhibition of behaviors, such as pes-

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0165-1781/00/$ - see front matter
PII: S0165-1781(00)00127-X

simistic worry, passive dependent behaviors, or rapid fatigability. *Reward dependence* (RD) is defined as a heritable bias in the maintenance or continuation of ongoing behaviors, and is manifest as sentimentality and social attachment or dependence. *Persistence* (P) is defined as a hereditary tendency to perseverance despite frustration and fatigue.

The three character facets, which reflect individual differences in goals, values, and self-conscious emotions, are influenced by social learning and are hypothesized to be less developed in immature personality and in personality disorder. *Self-directedness* (SD) refers to self-determination and 'willpower', to self-esteem, and to the ability of an individual to control, regulate and adapt his behavior in accord with personal goals and values. *Cooperativeness* (C) refers to individual differences in identification with and acceptance of other people (agreeability, compassion, empathy, etc.). *Self-transcendence* (ST) refers to spiritual maturity, transpersonal identification, and self-forgetfulness.

Each of these dimensions, except P, is explored by between 24 and 44 items of the TCI, and involves three to five facets measured by subscales of the main scales. Persistence is explored by only eight items, not subdivided. The TCI is an extension of the former Tridimensional Personality Questionnaire (TPQ), which evaluates only the dimensions of temperament (Cloninger, 1987; Cloninger et al., 1991; Svrakic et al., 1991).

Two studies have established the validity and the reliability of the original American version of the TCI in individuals from the general community (Cloninger et al., 1993) and in psychiatric patients (Svrakic et al., 1993). Numerous other psychometric studies have been carried out on the TPQ (Svrakic et al., 1991; Kleifield et al., 1993; Takeuchi et al., 1993; Lépine et al., 1994), and have supported the validity of the four temperament dimensions, especially from a genetic point of view (Cloninger et al., 1993; Stallings et al., 1996).

The TCI, as well as the TPQ, has been translated into several languages and used in more and more genetic studies (review in Cloninger, 1998), and in various clinical studies (Bayon et al., 1996; Allgullander et al., 1997; Ampollini et al., 1997; Black and Sheline, 1997; Tome et al., 1997; Bejerot et al., 1998; Bulik et al., 1999; Hansenne et al., 1999 Mulder et al., 1999). Normative data have been recently published from a Swedish epidemiological sample of 1300 adults (Brändström et al., 1998). However, such psychometric investigations in large community samples are rather scarce, especially for translated versions of the TCI (Tanaka et al., 1997; De la Rie et al., 1998).

The TCI was translated into French based upon consensus of five bilingual clinicians. This translated version, approved by Cloninger, has been used in France and in French-speaking countries since 1993. Its factor structure and its reliability have been tested in various clinical and non-clinical samples (Pélissolo and Lépine, 1997), and a validation study on a computerized version of this inventory has been published (Pélissolo et al., 1997). This questionnaire has also been used in French-speaking patients with depression (Hansenne et al., 1999), but no normative data for the French version of the TCI have been available to date. Such normative data are necessary to interpret the figures obtained with the TCI in French-speaking subjects, but are also of interest to address some cross-cultural issues about the assessment of personality in various countries, e.g. the US compared to European countries. Indeed, cross-cultural validation studies have been published for depression scales (Roberts et al., 1990; Takeuchi et al., 1994), for expressed emotion scales (Leeb et al., 1991), or for cognitive functioning assessment instruments (Velligan et al., 1995), but less information is available for temperament scales (Svrakic et al., 1991).

2. Objectives

The primary objective of this study was to obtain French normative data for scores and subscores of the TCI in a representative community sample. Other objectives were to explore the internal consistency of the scores and sub-scores of

the TCI in a translated version, to explore the factor structures of temperament and character dimensions, and to determine cut-off scores for temperament dimensions in order to delineate categorical typology of personality as described by Cloninger et al. (1993).

3. Methods

3.1. Subjects

A group of 750 subjects was first identified by the SOFRES survey institute as representative of

Table 1
Mean scores (and standard deviations) of the TCI, comparison between men and women (taking age into account), and Cronbach's alpha coefficients

		No. of items	Total ($n = 602$)		Men ($n = 263$)	Women ($n = 339$)	Alpha ($n = 602$)
			Mean	S.D.			
Novelty seeking	NS	40	16.4	5.6	16.5	16.3	0.75
Exploratory excitability	NS1	11	5.3	2.4	5.4	5.2	0.60
Impulsiveness	NS2	10	3.6	2.1	3.6	3.6	0.59
Extravagance	NS3	9	4.2	2.0	4.1	4.2	0.66
Disorderliness	NS4	10	3.3	1.8	3.4	3.3	0.35
Harm avoidance	HA	35	16.1	7.2	14.5	17.5**	0.87
Anticipatory worry	HA1	11	4.5	2.7	4.0	5.0**	0.73
Fear of uncertainty	HA2	7	4.4	1.9	4.0	4.7**	0.68
Shyness	HA3	8	3.8	2.4	3.3	4.2**	0.76
Fatigability	HA4	9	3.4	2.3	3.2	3.6*	0.71
Reward dependence	RD	24	14.2	3.9	13.4	14.9**	0.68
Sentimentality	RD1	10	6.9	1.9	6.3	7.3**	0.41
Attachment	RD3	8	4.3	2.1	4.2	4.4	0.70
Dependence	RD4	6	3.0	1.4	2.9	3.1	0.42
Persistence	P	8	4.6	1.9	4.7	4.6	0.49
Self-directedness	SD	44	31.9	6.3	32.7*	31.4	0.82
Responsibility	SD1	8	6.0	1.8	6.1*	5.8	0.65
Purposeful	SD2	8	5.3	1.8	5.5*	5.1	0.53
Resourcefulness	SD3	5	3.5	1.3	3.6*	3.4	0.54
Self-acceptance	SD4	11	8.0	2.4	8.0	8.0	0.71
Congruent second nature	SD5	12	9.2	2.1	9.4*	9.0	0.62
Cooperativeness	C	42	31.7	5.6	31.3	32.0	0.81
Social acceptance	C1	8	6.7	1.5	6.7	6.8	0.63
Empathy	C2	7	4.6	1.5	4.4	4.7*	0.45
Helpfulness	C3	8	5.7	1.4	5.6	5.8	0.46
Compassion	C4	10	7.7	2.4	7.7	7.7	0.80
Pure-hearted	C5	9	6.9	1.4	6.7	7.0	0.36
Self-transcendence	ST	33	13.7	6.1	13.0	14.2*	0.84
Self-forgetful	ST1	11	5.2	2.5	5.1	5.3	0.69
Transpersonal identification	ST2	9	3.8	2.1	3.6	3.9	0.66
Spiritual acceptance	ST3	13	4.7	3.2	4.3	5.0*	0.79

*Gender difference: $P < 0.05$.
**Gender difference: $P < 0.005$.

the French general population in terms of sex, age, socio-professional categories, household location and type. The TCI was sent by mail to these subjects, with the usual instructions and explanations of the purposes of the study presented as an investigation into the 'vision of the life' of the French people. A total of 602 subjects (80.3%) completed and returned the questionnaire, with fewer than 10 non-completed items. To preserve the representativeness of the sample, weighting coefficients were computed, but the differences between weighted and unweighted values for TCI scores were not statistically significant; thus, we present here only unweighted values which are more in accordance with the usual analysis of the instrument.

3.2. Analysis

Mean scores and sub-scores and standard deviations of the TCI were calculated in the whole 602-subject sample, and a comparison of mean scores of men and women was performed, taking into account the age as an associated variable in a general linear model. Correlations between TCI scores and age were also calculated, using the Pearson correlation coefficient. Quartiles of the distributions of temperament and character scores were computed, and cut-off scores for temperament types (Cloninger et al., 1994; Cloninger and Svrakic, 1997) were defined as the median split scores of each temperament dimension (NS, HA and RD), in accordance with recent clinical studies (Tome et al., 1997; Wang et al., 1997).

Internal consistency of scores and sub-scores was assessed by Cronbach's alpha coefficient calculated on responses to items. The structure of the TCI was explored by two principal component analyses with Varimax transformation, one for the temperament dimensions and one for the character dimensions, in accordance with the method used in similar previous studies (Cloninger et al., 1993; Brändström et al., 1998).

All analyses were conducted with SPSS, version 7.5.2 for Windows.

4. Results

4.1. Sample

Among the 602 respondents, 263 were men (43.7%) and 339 women (56.3%) with a mean age of 46.5 ± 17.7 years, i.e. 46.3 ± 17.7 years in men and 46.7 ± 17.7 years in women. Educational level was under 6 years for 20.6% of subjects, and above 15 years for 14.3%. Almost half of the sample (45.2%) had a level of education equal to or higher than the French *baccalaureat*. The majority of subjects were married (56.5%), 9.3% were cohabiting, 19.8% were single, 6.1% divorced, and 8.3% widowed. The subjects lived in all areas of France, with 20.3% in the Paris area.

Table 2
Mean TCI scores (and standard deviations) in three age groups, and correlation of TCI scores with age (Pearson coefficient)

	Age groups (years)			Correlation with age		
	15–25 ($n = 71$)	26–49 ($n = 275$)	50–88 ($n = 256$)	Men ($n = 263$)	Women ($n = 339$)	Total ($n = 602$)
Novelty seeking	20.1 (5.8)	17.1 (5.7)	14.5 (4.6)	−0.38*	−0.28*	−0.32*
Harm avoidance	16.1 (8.0)	15.7 (7.4)	16.6 (6.8)	0.10	0.002	0.05
Reward dependence	15.3 (3.8)	14.1 (3.9)	14.0 (4.0)	0.06	−0.17	−0.06
Persistence	4.4 (1.9)	4.8 (1.9)	4.6 (1.9)	−0.02	0.03	0.02
Self-directedness	27.4 (7.3)	32.4 (6.5)	32.7 (5.3)	0.09	0.16	0.13
Cooperativeness	30.9 (5.9)	31.4 (6.0)	32.3 (5.1)	0.05	0.09	0.07
Self-transcendence	14.6 (6.0)	12.6 (6.0)	14.6 (6.0)	0.15	0.14	0.15

*$P < 0.001$.

Table 3
Median and quartile segmentation of TCI dimensions

	Median	Quartile			
		1st	2nd	3rd	4th
Novelty seeking	16	0–12	12–16	16–20	20–40
Harm avoidance	16	0–11	11–16	16–21	21–35
Reward dependence	15	0–11	11–15	15–17	17–24
Persistence	5	0–3	3–5	5–6	6–8
Self-directedness	33	0–28	28–33	33–37	37–44
Cooperativeness	33	0–29	29–33	33–36	36–42
Self-transcendence	13	0–9	9–13	13–18	18–33

4.2. TCI scores

Mean scores of the TCI in the whole sample and by sex are presented in Table 1. When age was taken into account, significantly higher scores were found in women for HA, RD and ST, and lower for SD.

The distribution of TCI scores according to age groups is shown in Table 2. A significant (negative) correlation with age was found only for NS, in men and women.

Median and quartile segmentations for each dimension of the TCI are shown in Table 3. According to Cloninger's theory of temperament (Cloninger et al., 1993; Cloninger and Svrakic, 1997), high and low scores for NS, HA and RD were set using the median as the cut-off scores, i.e. 16, 16 and 15, respectively.

In addition to temperament types, subjects are considered to have a high risk of immaturity, and therefore of personality disorder, if their SD and C scores are significantly low (Cloninger et al., 1993; Cloninger and Svrakic, 1997). Thus, for each category of the temperament typology, those subjects who were considered as 'immature' had SD + C in the lowest quarter of the SD + C distribution of the whole sample, i.e. below 58. The categorization of the subjects according to the temperamental typology, with or without this immaturity criterion, is presented in Table 4.

4.3. Internal consistency and principal component analyses

The Cronbach alpha coefficients for each score and sub-score of the TCI are listed in the last

Table 4
Distribution of temperament typology according to Cloninger's classification

	Temperament types					Temperament type plus immature character**	
	Definition*						
				n	%	*n*	%
Antisocial	NS	ha	rd	89	14.8	23	3.8
Histrionic	NS	ha	RD	93	15.4	11	1.8
Passive–aggressive	NS	HA	RD	54	9.0	22	3.7
Explosive	NS	HA	rd	38	6.3	22	3.7
Obsessional	ns	HA	rd	77	12.8	27	4.5
Schizoid	ns	ha	rd	85	14.1	10	1.7
Cyclothymic	ns	ha	RD	57	9.5	2	0.3
Passive–dependent	ns	HA	RD	109	18.1	26	4.3

*ns ≤ 16 < NS; ha ≤ 16 < HA; rd ≤ 15 < RD.
**SD + C < 58.

Table 5
Correlations between temperament and character scores of the TCI[a]

	NS	HA	RD	P	SD	C
HA	**−0.32**					
RD	0.05	**0.13**				
P	**−0.14**	**−0.15**	0.06			
SD	**−0.12**	**−0.44**	−0.05	**0.19**		
C	−0.06	**−0.13**	**0.45**	0.09	**0.26**	
ST	0.09	0.02	**0.17**	**0.22**	**−0.19**	0.09

[a] Correlations with P-values ≤ 0.01 are shown in bold.

column of Table 1. All alpha coefficients for main scores were higher than 0.68, except for Persistence (0.49) which includes only eight items. Six sub-scores had alpha coefficients lower than 0.50: NS4, RD1, RD4, C2, C3, C5.

Correlations between the four temperament and the three character dimensions are shown in Table 5. Notable correlations (higher than 0.30) were found between HA and NS (negative), HA and SD (negative), and RD and C (positive).

Two principal component analyses were performed for temperament and character sub-scores separately, with Varimax orthogonal transformation taking into account factors with eigenvalues of 1 or more. Three factors were identified for temperament sub-scales, accounting for 53% of the variance (Table 6). This solution corresponds to the rationally defined dimensions, except for Persistence, which loaded negatively on the NS factor.

Three factors were also identified for character sub-scales, accounting for 53% of the variance (Table 7), and corresponding closely to the three dimensions, except for SD4, which loads moderately on the three factors.

4.4. Cross-cultural comparison

In order to analyze the main cross-cultural differences in TCI figures, we present in Table 8 the scores found in our sample as well as those obtained in three general population studies carried out in US (Cloninger et al., 1993), in Sweden (Brändström et al., 1998), and in the Netherlands (De la Rie et al., 1998).

Table 6
Principal component analysis of temperament sub-scales (three-factor solution with eigenvalues of 1 or more, after Varimax transformation)[a]

	Factor 1	Factor 2	Factor 3
NS1	**−0.6**	0.30	0.37
NS2	−0.05	**0.71**	−0.14
NS3	−0.28	**0.59**	0.19
NS4	−0.07	**0.69**	0.02
HA1	**0.77**	−0.03	0.18
HA2	**0.78**	−0.14	0.09
HA3	**0.71**	−0.09	0.03
HA4	**0.72**	0.17	0.07
RD1	0.18	−0.17	**0.59**
RD3	−0.11	0.12	**0.77**
RD4	0.12	−0.05	**0.70**
P	−0.32	**−0.57**	0.16
Variance explained (%)	25	14	14

[a] Loadings with absolute values of 0.40 or more are shown in bold.

5. Discussion

Two types of results about the TCI are available in this study, conducted in a French repre-

Table 7
Principal component analysis of character sub-scales (three-factor solution with eigenvalues of 1 or more, after Varimax transformation)[a]

	Factor 1	Factor 2	Factor 3
SD1	−0.36	0.19	**0.61**
SD2	0.12	0.06	**0.77**
SD3	0.01	−0.01	**0.80**
SD4	−0.35	0.39	0.26
SD5	−0.08	0.09	**0.76**
C1	−0.10	**0.68**	0.13
C2	0.08	**0.65**	0.11
C3	−0.01	**0.67**	0.08
C4	0.03	**0.72**	−0.01
C5	0.16	**0.60**	−0.03
ST1	**0.74**	0.08	−0.1
ST2	**0.80**	−0.09	−0.05
ST3	**0.71**	0.22	0.11
Variance explained (%)	23	17	13

[a] Loadings with absolute values of 0.40 or more are shown in bold.

sentative sample, and can be discussed: normative data, and psychometric features about the structure and the reliability of the instrument.

Mean scores of this French version of the TCI can first be compared to those published by Cloninger et al. (1993) in a community sample of 300 subjects in US with the original version (Pélissolo et al., 1998). French scores are lower for all dimensions except for HA (16.1 vs. 12.6) and for SD (31.9 vs. 30.7). Important differences were found for NS (16.4 vs. 19.2) and for ST (13.7 vs. 19.2). These differences can be explained by language and translation issues, and/or by differences in personality characteristics among the two samples, since the US group was not selected as being representative of the general population. The difference in HA (more anxious and depressed traits in the French population) may be only partially explained by the fact that we have a higher proportion of women (56.3%) in our sample than in the US sample (50%), because the mean score for HA in French men (14.5) was higher than the mean score for HA in American men and women together (12.6). The lower score found for NS in the French sample can be partially or totally explained by the fact that the mean age of our sample was higher than in the US sample (46.5 vs. 34.1), since NS is negatively correlated with age ($r = -0.32$). Concerning HA and NS, differences between French and US data were found in the same direction for all subscores, except for NS2 (impulsiveness), for which similar values were obtained in both samples.

In another normative sample with the Swedish TCI, Brändström et al. (1998) obtained intermediate scores between our results and those published by Cloninger et al. (1993) for temperament dimensions, except for Persistence (3.7 ± 1.9), higher scores than those of both samples for SD (32.5 ± 6.2) and C (33.6 ± 4.6), and lower scores for ST (12.5 ± 5.9).

Hansenne et al. (1999) published TCI figures obtained with the French version in two Belgian samples of 40 depressed subjects and 40 control subjects. Compared to our results, the mean scores were higher for NS both in depressed subjects (20.2 ± 6.8) and in controls (18.0 ± 6.2), markedly higher for HA in depressed subjects (25.6 ± 5.6), and lower for SD (22.4 ± 8.6) and C (28.3 ± 5.8) in depressed subjects. It is worth noting that the mean ages were lower in both samples than in our study.

Hansenne et al. (1999) and other authors (Lépine et al., 1994; Black and Sheline, 1997) have reported that the HA score is related to depression, as well as SD (negatively). Therefore,

Table 8
Comparison of four normative studies of the TCI in France (our study), the US (Cloninger et al., 1993), Sweden (Brändström et al., 1998), and the Netherlands (De la Rie et al., 1998)[a]

		France		US		Sweden		Netherlands	
		Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Novelty seeking	NS	16.4	5.6	19.2	6.0	18.8	5.9	20.7	5.9
Harm avoidance	HA	16.1	7.2	12.6	6.8	14.1	6.3	12.9	6.6
Reward dependence	RD	14.2	3.9	15.5	4.4	14.9	3.5	15.9	3.8
Persistence	P	4.6	1.9	5.6	1.9	3.7	1.9	4.3	1.8
Self-directedness	SD	31.9	6.3	30.7	7.5	32.5	6.2	33.6	6.1
Cooperativeness	C	31.7	5.6	32.3	7.2	33.6	4.6	33.1	5.3
Self-transcendence	ST	13.7	6.1	19.2	6.3	12.5	5.9	10.0	6.3
Total									
N		602		300		1300		154	
% of men		43.7		50		50		50.3	
Mean age (S.D.)		46.5 (17.7)		34.1 (12.9)		50.1 (18.6)		33.4 (13.4)	

[a] *N*, number of subjects; S.D., standard deviation.

a methodological shortcoming of our study is that we do not have a depressive assessment of our subjects. However, such assessment was not available for other normative samples, and there is no procedure to investigate whether psychopathologic differences can explain the differences found in TCI scores between samples. Moreover, our objective was to obtain normative data in the general population, and not TCI figures in healthy subjects.

Higher HA and RD scores in women as compared to men have been found in other populations using either the TPQ or the TCI (Cloninger et al., 1991; Svrakic et al., 1991; Lépine et al., 1994; Hansenne et al., 1999). We also found a slight elevation of SD in women, whereas such a difference was observed only for C by Cloninger et al. (1993) in a US population. Lower SD scores were found by Hansenne et al. (1999) in men compared to women, but with an interaction between sex and psychiatric status (depressed vs. controls).

A significant negative correlation of NS with age appeared in our sample, as in other studies with the TPQ (Lépine et al., 1994) or with the TCI (Cloninger et al., 1994). However, we did not find any significant difference in the other dimensions according to age, whereas Cloninger et al. (1994) noted in a US community sample that SD and C showed a strong positive correlation.

Cronbach's alpha coefficients are similar, or slightly inferior, to those published by Cloninger et al. (1993) in a community sample and by Svrakic et al. (1993) in a sample of psychiatric inpatients. They are high for main scores (≥ 0.75), except for RD (0.68) and P (0.49), and are moderate or low for sub-scores, particularly for NS4 and C5. P is actually a sub-score — corresponding to RD2 in the first versions of the TPQ (Cloninger, 1987) — with a limited number of items. The alpha coefficient obtained by Cloninger et al. (1993) was 0.65, and by Svrakic et al. (1993) 0.48, suggesting that the internal consistency of this scale is, in general terms, weak and that translation issues are not entirely responsible for the low coefficient obtained in our population. Similar conclusions can be drawn for RD and certain sub-scores. As a whole, these Cronbach's alpha coefficients are higher than those obtained with the Swedish version in a normative sample (Brändström et al., 1998).

Concerning the principal component analysis, the hypothesized factor structures of temperament and character dimensions are relatively well confirmed, as has already been shown in other normative samples (Cloninger et al., 1994; Brändström et al., 1998; De la Rie et al., 1998). However, the portion of the variance explained by these factor solutions — 53% for temperament and character dimensions — is relatively low. In a similar analysis, Brändström et al. (1998) found 58.9% of the variance of temperament dimensions explained by a four-factor solution, and 48% for character dimensions.

For temperament dimensions, NS1 (exploratory excitability) seemed to load more on the HA factor (negatively) than on the NS factor. Similar results were obtained with the French version of TPQ in a clinical sample (Lépine et al., 1994), and with the English TPQ in a group of patients with eating disorders (Kleifield et al., 1993). These results may suggest that exploratory tendencies are notably influenced by inhibition traits, and that NS1 is a heterogeneous sub-factor. Another unanticipated result of our study is that Persistence is not an isolated dimension, but loads negatively on the NS factor. Several studies have suggested that RD and P are less robust than the other dimensions of the TPQ (Lépine et al., 1994; Brändström et al., 1998), and the construct validity of these factors can be questioned. For character dimensions, the three hypothesized factors are validated, even if SD4 (self-acceptance) appeared to be poorly specific. The same figure was found by Svrakic et al. (1993) in a US sample when character dimensions were analyzed separately.

The negative correlation observed between NS and HA does not fit with the model of independent temperament factors described by Cloninger et al. (1993). However, such a correlation (-0.21) was also found by Brändström et al. (1998) in a community sample and by Hansenne et al. (1999) in French-speaking control subjects. It may be related to an overlap of some items within the two dimensions, in particular because of the interaction found between NS1 and HA in the

factor analysis. Other high correlation coefficients were found between HA and SD (negatively), which may illustrate the fact that anxious subjects frequently have difficulties in choosing their own goals and values, and between RD and C, both dimensions being related to interpersonal relationships. Both correlations were also found in the US community sample (Cloninger et al., 1994), and in a Swedish sample (Brändström et al., 1998).

The cut-off scores and the distribution of temperamental typology according to Cloninger's classification were not given in other normative reports on the TCI. It is noteworthy that the temperament types are relatively equally distributed, with prevalence being between 9.0 and 18.1% in a first approach, and between 0.3 and 4.5% for immature personalities.

6. Conclusion

Our results have shown that the psychometric properties of the TCI are preserved in the French version, in particular the factor structure and the internal consistency of scales and sub-scales, the latter being notably less reliable than the higher order dimensions. On the other hand, the mean scores obtained in a French normative community sample were slightly different from those obtained with the original version of the TCI. These results suggest that specific cross-cultural normative data should be taken into account for the interpretation of clinical or non-clinical figures derived from translated versions of this questionnaire.

Acknowledgements

This work was partly supported by SmithKline Beecham (France). We thank Françoise Duveau, MD (SmithKline Beecham, France) and Frédéric Los (TN-Sofres Healthcare, France) for their help. The authors of the TCI translation into French are: A. Pélissolo, M. Téhérani, R.M. Bourgault, C. Musa, and J.P. Lépine.

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