Sociodemographic factors associated with personality traits assessed through the TCI

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Abstract

The Temperament and Character Inventory (TCI) assesses four dimensions of temperament –Novelty Seeking (NS), Harm Avoidance (HA), Reward Dependence (RD) and Persistence (P) – and three character dimensions –Self-directedness (SD), Cooperation (C), and Self-transcendence (ST). Previous research has shown that these personality traits may be affected by several factors. This study explored the influence of sociodemographic factors on personality in a healthy Spanish sample. The Spanish version of the TCI was administered to 404 adults aged 20-60 years screened for personal mental disorder using the Mini-International Neuropsychiatric Interview. There were gender differences in HA [t=2.47, p=0.014], RD [t=2.91, p=0.002], and C [t=3.06, p=0.050], with women scoring higher on each measure. Multivariate models showed that NS decreased with increasing age for men, HA increased with age and RD decreased with increasing age for both genders, and SD increased with age for women. C varied significantly according to age in women (younger women scored higher). After adjustment for age, demographic variables (i.e., residence, socioeconomic group, education, employment, civil and parental status) were significantly associated with all dimensions (except ST) in women and with HA, RD, SD, C, and ST in men. The scores obtained appear to reflect macrosocial characteristics of Western culture.

2

1. Introduction

Trait-based or factorialist models of personality are based on the notion that human behaviour has a certain degree of consistency or repetitiveness. It is supposedly possible to identify patterns of covariance with the capacity to predict individuals' behaviour according to their previous behaviours in other circumstances. At the same time, a large proportion of factorialist authors have considered that their personality model would be definitively consolidated if neurophysiological elements could be found that corresponded to the personality structures previously identified by means of statistical techniques. This type of biologicist connection rescues factorialist approaches from one of their principal limitations: their merely descriptive and organizational nature in relation to inter-individual behaviour differences, without leading to an understanding, of how these models could explain such behaviour. Thus, behaviour can now be explained by the trait, given its causal link to the biological structure or process proposed (Errasti, 2002).

An example of this type of psychobiological formulation of personality can be found in the model by Cloninger (Cloninger, Svrakic, & Przybeck, 1993), who, based on the work of Eysenck (1947), formulated the Unified Biosocial Theory of Personality. This postulates that personality is structured around four primary temperament dimensions [novelty seeking (NS), harm avoidance (HA), reward dependence (RD), and persistence (P)] and three character dimensions [self-directedness (SD), cooperativeness (C), and self-transcendence (ST)]. Temperament is constituted by those personality traits which, in theory, are linked to well-defined and heritable neurobiological systems. Temperament remains stable throughout life, and is scarcely influenced by the social environment. On the other hand, character dimensions are learned attributes originating

from developmental experiences within family structures and the social environment (Cloninger et al., 1993).

Empirical support for this model has been mixed. Several genotyping studies have failed to obtain the association between the hypothesized neurotransmitter system and temperament traits (Munafo, Clark, Moor, Payne, Walton, & Flint, 2003). Another body of research has shown the distinction between heritable and less heritable traits to be untenable (Ando et al., 2004). The effects of sociocultural factors appear to be less specific than those of genetic factors, but previous research has shown that these personality traits (referring to both temperament and character) may be affected by several factors, such as anxiety or mood disorders and sociodemographic factors (Smith, Duffy, Stewart, Muir, & Blackwood, 2005; Savitz, Van der Merwe, & Ramesar, 2008). Other studies reveal possible independent effects of sex on some of the temperament and character scales (Cloninger, Przybeck and Svrakic 1991; Brändström, Richter, & Przybeck, 2001). Mendlowicz et al. (2000) suggested that a possible explanation for these discrepant findings concerns the practice of recruiting volunteers without careful screening for mental disorders. Indeed, the majority of studies have been carried out with psychiatric populations (Smith et al., 2005; Savitz et al., 2008) or with student volunteer samples assumed to be "normal" (Rozsá et al., 2008), despite the knowledge that there is a high prevalence of psychopathological disorders in the student population (Bayram & Bilgel, 2008; Vázquez & Blanco, 2008). Each of the seven dimensions has been shown to have a different relationship with personality disorder subtypes. In particular, low SD and low CO are related to the presence and severity of personality disorders (Cloninger, 2008). Other studies have reported significant correlations between HA and depression, and inverse relationships between depression and SD (Loftus, Garno, Jaeger, & Malhotra, 2008).

To our knowledge, the study by Mendlowicz et al. (2000) was the only one to explore the influence of sociodemographic factors on temperament and character after careful exclusion of individuals with DSM-III-R Axis I and Axis II mental disorders or a family history of these. Partial correlation showed a significant correlation between gender and RD (women scored higher). Occupational status was significantly related to RD, CO, and ST (higher occupational status giving higher scores).

Consistent with these observations, the aim of the present study was to examine the influence of sociodemographic factors on temperament and character in a Spanish sample of healthy adults carefully screened for personal mental disorder. Thus, if we assume that the personality traits Cloninger attributes to temperament are the manifestations of heritable biological structures with scarce possibility of being modified by the environment, then we would not expect these traits to be affected by sociodemographic variables to the same extent as the character traits. Such variables – place of residence (urban or rural), educational level (primary, secondary, vocational, and third-level), socioeconomic group (employed, student, unemployed, retired, unable to work, and homemaker), employment sector (services, public administration, farming/fishing/mining/building, other industry, and other), civil status (single, married, cohabiting, separated/divorced, and widowed), number of siblings (from none to four or more) – cover the principal contexts of people's lives.

2. Method

2.1. Sample procedures

The study sample comprised 404 unrelated healthy subjects seen consecutively by a general practitioner for an acute, non-serious medical event (e.g., cold, otitis, lumbago, etc.). All participants were of Spanish Caucasian origin, residing in Asturias (Northern Spain), and aged 20-60 [mean age (sd) = 40.5 (11.3) years; 50% males]. The Spanish

version of the Mini-International Neuropsychiatric Interview (MINI, DSM-IV criteria) was used as a psychiatric screening interview – Axis I (Sheehan et al., 1997). Only subjects without a history of drug or alcohol abuse or dependence, without data for prior history of psychiatric disorders in their clinical records, and without a personal or first-degree family history of psychiatric disorders were invited to participate and assessed with the MINI. We initially selected 540 patients (by strict order of appearance during the field phase designed for this purpose), of whom 70 (12.9%) declined to participate and 66 (12.2%) were ruled out due to positive results in the MINI.

Each participant completed the Spanish version of the Temperament and Character Inventory (TCI) (Gutierrez-Zotes et al., 2004). The TCI is a self-rating instrument comprising 240 items that uses a true-false scale for assessing Cloninger's psychobiological model of temperament and character. NS is a tendency to respond to novelty and cues for potential reward that leads to exploratory activity in pursuit of rewards, as well as avoidance of monotony and punishment. HA is a tendency to respond intensely to signals of aversive stimuli, thereby inhibiting or stopping behaviour. RD is a tendency to respond intensely to signals of reward, especially social reward, thereby maintaining and continuing particular behaviours. P is a tendency to persevere despite frustration and fatigue. SD refers to the ability to set personal long-term goals and to develop the resources and confidence necessary for achieving them. C refers to the ability to identify empathically with other individuals and establish purposeful relationships. Finally, ST refers to the awareness that all beings, including the self, are integral participants in the evolution of the universe as a whole (Cloninger, Svrakic, Przybeck, & Wetzel, 1994).

Written informed consent was obtained from all participants included in the study. The study was subject to, and in compliance with, Spanish national legislation. It

was conducted according to the provisions of the World Medical Association Declaration of Helsinki (1989), and received institutional approval.

2.2. Statistical analysis

The demographic profile of male and female participants was compared using chi-square (χ^2) tests. Gender differences relating to the TCI measures were assessed using t-tests. For male and female participants separately, multivariate linear regression models were estimated for each TCI measure. A hierarchical approach was taken, whereby age group was first entered into each model.

The other demographic variables constituted the second block of independent variables, and a forward stepwise approach was used to select them into the model if their association with the TCI measure (after adjustment for the other variables in the model) was significant at the 0.05 level. Residual 'other' categories and categories of demographic variables with five participants or fewer were not considered in the linear regression models, and therefore dropped from these analyses. If adjacent categories of a demographic variable had the same strength associations with a TCI measure, they were collapsed into one category in the multivariate models, in order to increase statistical power while providing an accurate presentation of the data. For demographic variables with more than two categories, dummy variables were used to examine their association with the TCI measures. Evidence of linear associations was also examined for ordinal variables such as educational level.

SPSS version 15.0 (SPSS Inc., Chicago, Illinois, USA) was used for the statistical analyses.

3. Results

Demographic characteristics of the participants are detailed in Table 1, for the total sample and for men and women separately. Male and female participants differed only

in terms of their level of education [χ^2 (df) = 11.40 (4), p = 0.022], socio-economic group [χ^2 (df) = 54.92 (6), p < 0.001], and the employment sector in which they worked [χ^2 (df) = 56.74 (4), p < 0.001]. Half (50.5%) of the men had attained a level of education beyond second-level (13–16 years), while the corresponding figure for women was 61.9%. Almost one in four men was either retired (10.9%) or unable to work – short-term temporary physical disability - (12.9%), compared to just 3% of the women. Homemakers accounted for 12.4% of the women and just 1% of the men. A higher proportion of women worked in public administration (36.6% vs. 21.3%), whereas farming/fishing/mining/building and other industries were predominantly male employment sectors (27.7% vs. 2.0%).

Table 2 details the summary statistics for the seven TCI measures. Forwards stepwise multiple regression revealed that there were gender differences with respect to HA [t (df) = 2.47 (402), p = 0.014], RD [t (df) = 2.91 (402), p = 0.002] and C [t (df) = 3.06 (402), p = 0.050], with women obtaining higher average scores than men on each measure.

NS decreased in a stepped manner with increasing age for men (Table 3), on average by approximately 1.7 per 10 years of age. No demographic variables were significantly associated with NS in men after adjustment for age. Among women, the pattern of decreasing NS with increasing age was less marked, and was not statistically significant (Table 4). Independently of age, NS was higher in women with third-level education and markedly lower in women who were homemakers.

HA generally increased with age for both genders, with particularly high levels in women over 51 years of age (Tables 3, 4). Men with third-level education and unmarried men with a long-term partner had lower levels of HA. Regardless of age, women with three or more children had lower HA.

RD decreased with increasing age, particularly in women (Tables 3, 4). There was evidence that men and women from medium-sized families (i.e., with two or three siblings) had lower RD. Having no children was also associated with lower RD, but only in women. There was a gradated association between education and RD in women, whereby increasing educational level was associated with increasing RD.

Age was not associated with P for either gender (Tables 3, 4). Unmarried women with a long-term partner had lower P. No demographic characteristic was significantly associated with P in men.

There was evidence that SD increased with age in women, but not in men (Tables 3, 4). Independently of age, increased SD was associated with employed men and unmarried men with a long-term partner, and with women who had at least three children.

C varied significantly by age in women (Table 4), but not in men (Table 3). Women aged 31-60 years (spanning 3 levels of the age variable) had lower C than younger women. Also in women, higher educational level was associated with increased C, while women with one sibling had lower C. Men working in the composite employment sector 'farming/fishing/mining/building' had lower levels of C.

Among men, ST was higher in those living in rural areas and in those working in services, and lower in unmarried men with a long-term partner (Table 3). Among women, ST was lower in those who had at least three siblings (Table 4).

4. Discussion

In the present study we found significant associations between these factors and personality dimensions, in spite of which it is difficult to draw firm conclusions, given a design such as that employed here. However, the study contributes data of interest to the discussion of a personality model with such current relevance as that developed by

Cloninger (Cloninger et al., 1993). Typically, these kinds of factorial-biologicist models are accompanied by psychometric instruments which attempt to assess the levels of personality traits proposed by the authors. The existence of significant differences in a large part of the seven TCI factors according to individuals' age and sex is not incompatible with Cloninger's defence of the role played by heredity in the determination of temperament traits. Nevertheless, nor would it be incompatible with the opposite hypothesis, which argues that personality is forged through the individual's interactive relationship with the world, an interaction that goes beyond the mere manifestation of previously established neurophysiological mechanisms. It should be pointed out that, in general, the differential behaviour by sex and age revealed by our scores appears to reflect the characteristics of life itself in relation to growth and ageing; also, this differential behaviour has to do with certain macrosocial characteristics of Western culture with regard to gender role differences.

The decrease in NS with the passage of time – both with our mean of 1.7 points per decade and with that of 1.0 points per decade found by Mendlowicz et al. (2000) – is perfectly coherent with what would be expected to occur as individuals mature, establish themselves and generate a whole series of behavioural self-perpetuation mechanisms that restrict the range of situations and stimulations to which they expose themselves. The very dynamic of accumulative learning processes (Staats, 1996) may explain this statistical result. The increase in HA, especially in women over 50, also fits in with the life processes that affect people as they get older. Thus, high scores in HA indicate caution, worry, inhibition, less energy and fear of uncertainty. It seems reasonable to think that these personality traits tend to be characteristic of older adults, while those on the opposite side – uninhibited behaviours, underestimation of danger, optimism and attitude of extraversion – correspond to younger people (and to lower

scores in HA). And the fact that RD falls with age is a phenomenon that has caught the attention of authors as varied as Ferster and Skinner (1957), and was explained in each case without recourse to internal personality traits –and still less to genetically-determined traits–, but simply to the dynamic inherent in the temporal dimension of human learning processes. This dynamic means that behaviour, once acquired, is less and less in need of the constant presence of reward, and is maintained by virtue of very low rates of reinforcement or by intrinsic motivation (Staats, 1996).

Mendlowicz et al. (2000) found that occupational status was a significant predictor of RD, C, and ST (people with higher occupational status showing more elevated scores). However, our results have only shown that men working in the employment sector characterized by outdoor manual work had lower levels of C and those working in services scored higher in ST.

As regards the differences found in relation to gender in the dimensions HA, RD, and C (the women score higher), some relevant points can be made. The data contributed by Mendlowicz et al. (2000) showed only a significant correlation between gender and RD (women scoring higher), and this coincides with the findings reported from other studies carried out in North America, Europe, and Japan (Young, Bagby, Cooke, Parker, Levitt, & Joffe, 1995; De la Rie, Duijsens, & Cloninger, 1998; Tanaka, Sakamoto, Kijima, & Kitamura, 1998). According to Cloninger (1993), this association appeared to reflect specific differences between men and women related to the noradrenergic systems. However, we believe that it is only possible to speculate about the ultimate explanation of these types of result, since they are also compatible with a social structure (not just in Spain, but throughout the world) in which there persists a very strong assignment of gender roles to its individuals, and in which masculinity is associated with concepts such as "strength" or "individualism", whilst femininity is

11

deemed closer to concepts of "sensitivity" or "dependence". Indeed, the fact of having several children or none at all, or coming from a larger or smaller family, modulates personality traits much more in women than in men –a finding that could be explained by the primordial role of the woman in childrearing and the acquisition of new behaviours that such responsibility brings with it. On the other hand, our data, unlike those of Cloninger et al., (1991), showed no associations between gender and NS, though NS was indeed positively influenced by educational level in the women's sample, leading us once more to the hypothesis that it is equally compatible with the absence and the presence of genetic determination.

It is also important to highlight that our multivariate models explained no more than 11.1% and 15.1% of the temperament and character dimensions for men and women, respectively. It is curious to note that sociodemographic factors do not explain a greater percentage of variance of scores in character traits than of those in temperament traits. It should not be overlooked that the percentage distribution of the factors –heredity, environment, and so on– that explain the variance of a phenomenon in a population is not of necessity related to the percentual distribution of the factors that explain the same phenomenon in an individual (Yela, 1996).

The changes over the lifespan that appear in the TCI dimensions are compatible with the temporal dynamic of the personality factors involved in work based on other models. After an initial view implying the stability of scores obtained in the Big Five over time (Costa & McCrae, 1997), recent studies have highlighted how the Five Factor Model traits are also subject to changes at all ages. Roberts and Mroczek (2008) affirm that mean-level change in personality traits occurs in middle and old age, showing that personality traits can change at any age. In terms of individual differences in personality change, people demonstrate unique patterns of development at all stages of the life

course, and these patterns appear to be the result of specific life experiences that pertain to a person's stage of life. The variety in patterns of change suggests that the Big Five traits are complex phenomena subject to a variety of developmental influences (Srivastava, John, Gosling, & Potter, 2003).

Finally, there are limitations to this study, as there were limited numbers of participants in some demographic subgroups. However, the study did include a sample size of more than 400 adults, an even distribution by sex and age group and a wide range of demographic characteristics. In summary, our study does highlight significant differences between sociodemographic subgroups. In particular, it details differences in temperament and character with regard to sex and age that appear to be in line with cultural aspects of Western civilization.

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Table 1. Demographic characteristics of the study sample

		Men (n=202)		Women (n=202)		All (n=404)	
		n	(%)[a]	n	(%)[a]	n	(%)[a]
Age	21-30 years	49	(24.3%)	53	(26.2%)	102	(25.2%)
	31-40 years	52	(25.7%)	50	(24.8%)	102	(25.2%)
	41-50 years	50	(24.8%)	50	(24.8%)	100	(24.8%)
	51-60 years	51	(25.2%)	49	(24.3%)	100	(24.8%)
Residence	Urban	133	(65.8%)	145	(72.5%)	278	(69.2%)
	Rural	69	(34.2%)	55	(27.5%)	124	(30.8%)
Education	Primary level	58	(28.7%)	46	(22.8%)	104	(25.7%)
	Second level	42	(20.8%)	31	(15.3%)	73	(18.1%)
	Second level + vocational	25	(12.4%)	27	(13.4%)	52	(12.9%)
	Third level	77	(38.1%)	98	(48.5%)	82	(43.3%)
Socio-economic group	Employed	138	(68.3%)	151	(74.8%)	289	(71.5%)
	Student	6	(3.0%)	9	(4.5%)	15	(3.7%)
	Unemployed	6	(3.0%)	7	(3.5%)	13	(3.2%)
	Retired	22	(10.9%)	1	(0.5%)	23	(5.7%)
	Unable to work	26	(12.9%)	5	(2.5%)	31	(7.7%)
	Homemaker	2	(1.0%)	25	(12.4%)	27	(6.7%)
	Other	2	(1.0%)	4	(2.0%)	6	(1.5%)
Employment sector	Services	65	(32.2%)	70	(34.7%)	135	(33.4%)
	Public administration	43	(21.3%)	74	(36.6%)	117	(29.0%)
	Farming/fishing /mining/building	37	(18.3%)	4	(2.0%)	41	(10.1%)
	Other industry	19	(9.4%)	0	(0%)	19	(4.7%)
	Other/Not applicable	38	(18.8%)	54	(26.7%)	92	(22.8%)
Civil status	Single	66	(32.7%)	63	(31.2%)	129	(31.9%)
	Married	112	(55.4%)	106	(52.5%)	218	(54.0%)
	Cohabiting [b]	14	(6.9%)	13	(6.4%)	27	(6.7%)
	Separated/divorced	8	(4.0%)	16	(7.9%)	24	(5.9%)
	Widowed	2	(1.0%)	4	(2.0%)	6	(1.5%)
Living…	Alone	17	(8.4%)	15	(7.4%)	32	(7.9%)

	With partner only	30	(14.9%)	31	(15.3%)	61	(15.1%)
	With partner + children	84	(41.6%)	76	(37.6%)	160	(39.6%)
	With parent(s) +/- others	46	(22.8%)	47	(23.3%)	93	(23.0%)
	Other	25	(12.4%)	33	(16.3%)	58	(14.4%)
Parental status	No children	92	(45.5%)	90	(44.6%)	182	(45.0%)
	1 child	35	(17.3%)	35	(17.3%)	70	(17.3%)
	2 children	61	(30.2%)	57	(28.2%)	118	(29.2%)
	3 or more children	14	(6.9%)	20	(9.9%)	34	(8.4%)
Siblings	None	24	(11.9%)	33	(16.3%)	57	(14.1%)
	One	75	(37.1%)	69	(34.2%)	144	(35.6%)
	Two	52	(25.7%)	38	(18.8%)	90	(22.3%)
	Three	22	(10.9%)	33	(16.3%)	55	(13.6%)
	Four or more	29	(14.4%)	29	(14.4%)	58	(14.4%)

[a] Due to rounding, percentages may not sum exactly 100%

[b] Cohabiting denotes unmarried persons living with a long-term partner

Table 2. Summary statistics of the TCI measures

	Men (n=202)	Women (n=202)	All (n=404)
	Mean (sd)		
Novelty seeking (NS)	17.7 (5.7)	17.7 (5.8)	17.7 (5.7)
Harm avoidance (HA)	15.5 (6.1)	17.0 (6.4)	16.2 (6.3)
Reward dependence (DR)	15.9 (4.0)	17.1 (3.6)	16.5 (3.8)
Persistence (P)	4.5 (2.0)	4.7 (2.0)	4.6 (2.0)
Self-directedness (SD)	31.0 (7.0)	30.2 (7.1)	30.6 (7.0)
Cooperation (C)	32.1 (5.5)	33.1 (5.0)	32.6 (5.3)
Self-transcendence (ST)	12.9 (5.5)	13.3 (6.0)	13.1 (5.7)

sd = standard deviation

Table 3. Age and statistically significant demographic associations (unstandardized regression cofficients) with temperament and personality dimensions in men

Independent variable and category	TCI measure	NS	HA	RD	P	SD	C	ST
	Adjusted R-squared	9.1%	8.9%	5.2%	0.7%	5.4%	3.5%	7.4%
Age [a]	31-40 years	-2.0	+2.6*	-0.8	0.0	-0.3	+0.8	-1.5
	41-50 years	-3.4**	+2.1	-0.4	-0.2	+2.2	+1.0	-0.4
	51-60 years	-5.0***	+3.2**	-1.6*	-0.7	+2.2	+0.3	+1.2
Residence	Rural	-	-	-	-	-	-	+1.9*
Education	Third level	-	-2.3**	-	-	-	-	-
Socio-economic grp.	Employed	-	-	-	-	+3.2**	-	-
Employment sector	Services	-	-	-	-	-	-	+1.7*
	Farm / fishing / mining / building	-	-	-	-	-	-2.8**	-
Civil status	Cohabiting [b]	-	-3.5*	-	-	+4.4*	-	-3.9*
Siblings	Two or three	-	-	-1.9**	-	-	-	-

[a] 21-30 years was the reference age group; [b] Cohabiting represents unmarried persons living with a long-term partner
* $p < 0.05$; ** $p < 0.01$, *** $p < 0.001$
C = Cooperation; HA = Harm Avoidance; NS = Novelty Seeking; P = Persistence; RD = Reward Dependence; SD = Self-directedness; ST = Self-transcendence; TCI = Temperament and Character Inventory

Table 4. Age and statistically significant demographic associations (unstandardized regression cofficients) with temperament and personality dimensions in women

Independent variable and category	TCI measure	NS	HA	RD	P	SD	C	ST
	Adjusted R-squared	12.1%	5.7%	14.6%	0.4%	3.3%	12.9%	1.3%
Age [a]	31-40 years	-1.1	+1.4	-1.4*	-0.1	-2.9*	-3.3***	+0.8
	41-50 years	-0.9	+1.3	-3.0***	-0.5	-1.8	-3.4***	+1.4
	51-60 years	-1.8	+4.8***	-2.0*	-0.4	-4.1**	-2.9**	+1.7
Education	Third level	+1.8*	-	-	-	-	-	-
	Primary -> 2nd -> 3rd level [b]	-	-	+1.3***	-	-	-	-
	2nd level+vocational/3rd level	-	-	-	-	-	+2.5**	-
Socio-economic grp.	Homemaker	-4.1**	-	-	-	-	-	-
Civil status	Cohabiting [c]	-	-	-	-1.2*	-	-	-
Parental status	No children	-	-	-1.7**	-	-	-	-
	3 or more children	-	-3.9*	-	-	+3.6*	-	-
Siblings	One	-	-	-	-	-	-1.5*	-
	Three	-	-	-1.8**	-	-	-	-
	Three or more	-	-	-	-	-	-	-2.0*

ᶜ Cohabiting represents unmarried persons living with a long-term partner

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

C = Cooperation; HA = Harm Avoidance; NS = Novelty Seeking; P = Persistence; RD = Reward Dependence; SD = Self-directedness; ST = Self-transcendence; TCI = Temperament and Character Inventory