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Psychometric properties of the abbreviated Spanish version of TCI-R (TCI-140) and its relationship with the Psychopathological Personality Scales (MMPI-2 PSY-5) in patients

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Introduction. The short version of the Temperament and Character Inventory-Revised (TCI-R), the TCI-140, is presented. This study aimed: *a)* to obtain the psychometric properties of TCI-140; *b)* to analyze the relationship with the normal version of the TCI-R, and *c)* to study its convergent validity with the MMPI-2 PSY-5.

Method. The TCI-R and MMPI-2 PSY-5 scales were administered to a sample of consecutive psychiatric in-patients with differential Axis I and II diagnoses.

Results. It was found that the TCI-140 dimensions showed reliability coefficients ranging from 0.67 (Reward Dependence [RD]) to 0.86 (Self-Transcendence [ST]) and the reability coefficients of PSY-5 ranging from 0.68 (CON) to 0.86 (NE/NEU). Correlations for the dimensions with the TCI-R original 240-item version and TCI-R 140 item version ranged from 0.91 (Self-Directedness [SD]) to 0.97 (ST). The dimensions had a normal distribution. Correlations of TCI-140 scales with PSY-5 scales provided preliminary evidence supporting the convergent validity of the constructs. Then, Novelty Seeking (NS) was associated with low Constraint, Harm Avoidance (HA) was associated with low Aggressiveness and Positive Emotionality/Extraversion, and also with high Negative Emotionality/Neuroticism, Reward Dependence (RD) was associated with high Positive Emotionality/Extraversion. Persistence (PS) was related to high aggressiveness, and Positive Emotionality/Extraversion. On the other hand, SD was correlated with low Psychoticism, and Negative Emotionality/Neuroticism, and also with high Positive Emotionality/Extraversion. Cooperativeness (C) had a relationship to high constraint and low psychoticism. Finally ST was associated with high psychoticism and Positive Emotionality/Extraversion.

Conclusions. The short Spanish version of TCI-R is a useful inventory for the evaluation of the principals dimensions of temperament and character.

Key words:
Dimension. Reliability. Personality. Temperament. Character.

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Propiedades psicométricas de la versión española abreviada del TCI-R (TCI-140) y su relación con las Escalas de la Personalidad Psicopatológica (MMPI-2 PSY-5) en pacientes

Introducción. Se presenta la versión corta del Inventario del Temperamento y Carácter-Revisada (TCI-R), el TCI-140. Este estudio tuvo varias finalidades: *a)* obtener las propiedades psicométricas del TCI-140; *b)* analizar su relación con la versión larga del TCI-R, y *c)* estudiar su validez convergente con el MMPI-2 PSY-5.

Métodos. El TCI-R y las escalas PSY-5 del MMPI-2 fueron administradas a una muestra de pacientes psiquiátricos ingresados con diferentes diagnósticos de los Ejes I y II.

Resultados. Las dimensiones del TCI-140 mostraron coeficientes de fiabilidad entre 0,67 (Dependencia de Recompensa [RD]) y 0,86 (Autotrascendencia [ST]) y las dimensiones del PSY-5 entre 0,68 (CONS) y 0,86 (EN/NE). Las correlaciones para las dimensiones con la versión original del TCI-R y su forma abreviada tuvieron un rango de 0,91 (Autodirección [SD]) a 0,97 (ST). Las dimensiones se distribuyeron de acuerdo a la normalidad. Las correlaciones del TCI-140 con las escalas del PSY-5 proveen evidencia preliminar apoyando la validez convergente de los constructos. Así, Búsqueda de Novedades (NS) estuvo asociado con baja Constricción, HA con baja Emocionalidad Positiva y Agresividad y con alta Emocionalidad Negativa/Neuroticismo y Dependencia de Recompensa (RD) con alta Emocionalidad Positiva. La persistencia (PS) fue relacionado con alta Agresividad y Emocionalidad Positiva. Por otro lado, SD con bajo Psicoticismo y Emocionalidad Negativa/Neuroticismo y con alta Emocionalidad Positiva. Cooperación mostró relaciones con alta Constricción y bajo psicoticismo. Finalmente, ST estuvo asociado con alta Emocionalidad Positiva y Psicoticismo.

Conclusiones. La versión corta española del TCI-R es un inventario útil para la evaluación de las dimensiones principales del temperamento y carácter.

Palabras clave:
Dimensión. Fiabilidad. Personalidad. Temperamento. Carácter.

INTRODUCTION

Cloninger¹ and Cloninger et al.² developed a unified theory of personality, hypothesizing that the individual differences varied over three large dimensions that are genetically independent, stable and inheritable. These dimensions are: novelty seeking, harm avoidance and reward dependence, the latter being later, with derivations to the Persistence scale¹. This model, initially focused on exclusively biological dimensions of personality, became behaviorally operational in the Tridimensional Personality Questionnaire (TPQ). Later, it was extended based on the deficiencies posed by an exclusively biological basis. Three dimensions that would be formed by Character (self-directedness, cooperativeness and self-transcendence) were added. These new factors were defined based on both information on cognitive and social development and on learning and conceptual memory paradigms². A new questionnaire called TCI³ combined seven dimensions forming personality, this being divided into Temperament and Character. In 1999, the TCI was revised to correct deficiencies of the previous version, basically low reliability, due to the limited number of items on the Persistence scale and low amplitude of the potential score range in which the subject's answers were placed, transforming the format of the V/F items to Likert type, with 5 response options. The Spanish version of the Temperament and Character-Revised (TCI-R), together with the scales in our population, has recently appeared⁴.

The importance of the Cloninger model is found in the wide circulation that the questionnaire has reached in the field of research in personality genetics as well as in that of psychopathology, its greatest exponent being the study of the links, from a dimensional perspective, of the personality disorders. In fact, since decades ago, paradigms that try to provide a parsimonious description of the different individuals have been under development and have been proposed. There have been many attempts to define the factorial structure of personality and its disorders. Most of the factorialist paradigms have proposed between three and five factors^{1,5-10}. However, from the point of view of their content development and basis of construct, only the personality systems of Cloninger¹, Cloninger et al.², Eysenck⁶, Zuckerman¹¹⁻¹³, Livesley et al.¹⁴ would be based on psychobiological personality models. Although the models are based on different number of factors, great overlapping has been seen between the dimensions that all of them propose¹⁵⁻¹⁸.

Given the great repercussion of the model, Cloninger et al. proposed a short version of the TCI-R (Przybeck, personal communication 1-IV-2004), made up of the first 140 items of the 240 version, allowing for the transcultural comparison of the scores obtained with the same items in all the countries. Within the field of personality, one of the most used abbreviated inventories is the NEO-FFI (60 items), that was obtained from the Five Factors model¹⁹. Making abbreviated versions of inventories, such as the NEO FFI or TCI-140, make it possible to obtain accurate and rapid infor-

mation of the construct on which the model is based through the scores in the general dimensions, eliminating the features or subscales.

Another one of the models suggested in recent years in the area of personality and its disorders is that proposed by Harkness et al.²⁰, who developed an inventory called the PSY-5 Personality Psychopathology Five based on a combination of items obtained from the MMPI-2. The PSY-5 constructs were based on studies of topics on personality disorders²¹ and normal personality²². Given its importance, they will be included in the USA as an authorized part of the MMPI-2 supplementary scales. Trull et al.²³ compared the NEO PI-R with the PSY-5, finding that the two models normally predicted comparable levels of variance in structured clinical interviews in the assessment of personality disorders. PSY-5 usefulness to discriminate between psychotic disorder and type I bipolar disorder has recently been demonstrated²⁴. In the same way, other authors have found evidence of the diagnostic importance of this model^{25,26} and its utility in the forensic context²⁷. The maladaptive personality traits and poor psychological functioning are related both with psychiatric diseases and with extreme limits of normal personality traits. In fact, the dimensional constructs of PSY-5 are based on ideas or constructs with a long history within the European psychiatric nosology²⁴. PSY-5 is made up of the Aggressiveness, Psychoticism, Constraint, Negative Emotionality/Neuroticism and Positive Emotionality/Extraversion.

The MMPI²⁸ is the instrument used most to measure pathological personality²⁹. Thus, between 1990 and 2004, 1742 studies appear in the index of Medline biomedical citations. Furthermore, this inventory is referenced in studies that analyze genetic components on normal and pathological personality scales. Thus, estimations of inheritability have been obtained with monozygotic and dizygotic twins on clinical and content scales going from 0.26 to 0.62³⁰. These results indicated that about 44 % of the variance in the MMPI was delimited by genetic variability, corroborating a well-established truth in the scientific literature on personality. Associations, by genetic mechanisms, between normal and pathological personality with the MMPI have also been found³¹.

Given the great tradition of clinical contributions and studies on biological-genetic aspects of the MMPI-2, we decided to relate TCI-R with the Psychopathological Personality dimensions (PSY-5) of that instrument in an attempt to extend the construct of the Cloninger model. Specifically, this study has several objectives: a) provide the first data on reliability, descriptive statistics and study of the normal distribution parameters of the abbreviated Spanish version of the TCI-R, the TCI-140; b) obtain the variance shared between the pairs of dimensions in the two versions of the TCI-R; c) study convergent validity between the Psychopathology Five Factors (PSY-5) obtained in the MMPI-2 and the two versions of the TCI-R, y d) obtain the first descriptive

statistics, reliability coefficients of the PSY-5 in a sample with patients in our country.

METHOD

Subjects

The sample was made up of 107 patients admitted to an Acute Unit with heterogeneous diagnoses of Axis I and II. A total of 58.9% ($n = 63$) were men, with a mean age = 33.52 and $SD = 7.84$, the mean for women being = 32.34 and the $SD = 8.76$. With this total sample, reliability and correlations were obtained between the two TCI-R versions. In the correlations between PSY-5 and TCI-R, 10 patients out of the 107 were eliminated from the validity criteria of the sample proposed by the authors²⁰: number of questions without answer equal or greater than 15, T greater than 100 on the TRIN scale and greater than 80 on the VRIN. For the sample of 97 patients, there were 58.8% ($n = 57$) men, with a mean age of 33.35 and SD of 7.67, the mean and standard deviations for women being 31.78 and 8.87, respectively.

All the patients signed an informed consent.

Instruments

1. Spanish version of the Temperament and Character Inventory Revised (TCI-R) made up of 240 items, whose dimensions and subscales are described in detail in Gutiérrez-Zotes et al.⁴. In a second stage, the first 140 items that correspond to the reduced versions, whose items-dimension distribution appears in table 1, were corrected.

2. Complete MMPI-2³² from which the 139 items that make up the PSY-5 scales were obtained²⁰. The scales are the following: *a*) Aggressiveness (AGR) reflects offensive or predatory aggression and the hostile desire to dominate, conquer and destroy others. The items of this scale stress

contents of superiority and avoidance of control with groups of questions having openly cruel subjects such as a disposition to dominate others and offensive or even abusive aggressive behavior; *b*) Psychoticism (PSYC) mainly scores unusual beliefs or experiences, refusal to make a commitment with the world and other persons in conventional terms, and a lack of harmony in relationships between physical and social reality so that the action is risky and the relationships alienated; *c*) Constraint (CON) supposes traditionalism, high control, cognitive rigidity, low opening of interests, risk avoidance, inhibition of behavior and obtaining of pleasure from routine; *d*) Negative Emotionality/Neuroticism (NE/NEU): this would imply, in high values, a tendency to depression and dysthymia, to seeking of social withdrawal and disposition to have a low daily life performance level. Worry, nervousness, anxiety, tension and stress. In the same way, a second group of items would exist, supposing expression of anger and emotional lack of control, and *e*) Positive Emotionality/Extroversion (PE/EX) shows great sociability, capacity to experience pleasure and tendency to seek activities that involve energy output. High scores mean high self-esteem when social relationships are established.

The Spanish version of PSY-5 (table 2) shows reliability coefficients and descriptive statistics similar to those of the North American version in samples with patients²⁰.

Analysis of data

We have used means and deviations in direct scores to obtain the descriptive data for the inventory scales. We have also used Cronbach's coefficient for the analysis of reliability of the dimensions of the two versions of TCI-R, Pearson's correlation between the components of the Temperament and Character Inventory when they are analyzed by pairs (for ex., NS of TCI-R-140 with NS of the long version of TCI-R), as well as between these dimensions and those of PSY-5 and Kolmogorov-Smirnov's test to study

Table 1

Number of items in the long and abbreviated version of the TCI-R, descriptive statistics, internal consistence and correlation between versions ($n = 107$)

	TCI-140			TCI-R-240			$r(\text{TCI-R}_{240/140})$
	Items	Mean (SD)	α	Items	Mean (SD)	α	
NS	20	58.56 (12.20)	0.69	35	100.85 (18.08)	0.76	0.93**
HA	20	66.13 (15.15)	0.82	33	107.62 (22.43)	0.86	0.96**
RD	20	68.36 (11.71)	0.67	30	104.73 (16.68)	0.77	0.95**
PS	20	62.88 (13.79)	0.79	35	111.71 (23.22)	0.87	0.95**
SD	20	61.50 (15.18)	0.82	40	131.04 (23.34)	0.84	0.91**
C	20	76.17 (11.17)	0.71	36	136.57 (18.61)	0.82	0.94**
ST	16	45.88 (15.45)	0.86	26	77.49 (20.97)	0.87	0.97**

if the sample comes from a population in which the variables follow a normal distribution.

RESULTS

Analysis of reliability and descriptive statistics of the TCI-140

Table 1 shows the number of items, reliability, descriptive statistics of the two versions of TCI-R together with the correlation between the same dimensions. Reliability of the long version is in a margin of 0.76 to 0.87, this being lower in the abbreviated version with values between 0.67 and 0.86.

The Kolmogorov-Smirnov test applied to the scales of the two versions, that is long and abbreviated one, of the TCI-R show a p value associated to the statistics of major contrast that is always 0.05. These results imply that the distribution of the responses to the dimensions in our sample do not differ from the normal distribution.

Relationship between the two versions of TCI-R

The links between the two versions of TCI-R provide an overlapping of information in the main dimensions that range from 82% for SD to 94% for Self-transcendence (table 1).

Convergent validity with MMPI-2 PSY-5

Table 3 shows Pearson's correlations between the TCI-R dimensions, in its two forms, with the PSY-5 scales, a pattern of associations with similar values in both the long and abbreviated version standing out. The Aggressiveness scale correlates negatively with HA and positively with Persistence, Psychoticism is negatively linked with Self-directedness and Cooperativeness and positively with Self-transcendence. On its part, Constraint is inversely related with Novelty seeking and positively with Cooperativeness. Negative Emo-

Table 2	Number of items, descriptive statistics and internal consistence of the MMPI-2 PSY-5 scales (n = 97)		
	Items	Means (SD)	α
Aggressiveness	18	8.88 (3.40)	0.73
Psychoticism	25	8.21 (4.68)	0.82
Constraint	29	15.40 (4.36)	0.68
Negative emotionality/ neuroticism	33	18.04 (6.66)	0.86
Positive emotionality/ extroversion	34	19.91 (6.18)	0.83

Table 3	Correlations between PSY-5 and TCI-R-240/140 scales (n = 97)				
	AGR	PSYC	CON	NE/NEU	PE/EX
TCI-140					
NS Novelty seeking			-0.39**		
HA Harm avoidance	-0.45**			0.35**	-0.62**
RD Reward dependence					0.45**
PS Persistence	0.48**				0.59**
SD Self-directedness		-0.45**		-0.51**	0.47**
C Cooperativeness		-0.32**	0.42**		
ST Self-transcendence		0.39**			0.38**
TCI-R-240					
NS Novelty seeking			-0.36**		
HA Harm avoidance	-0.48**			0.37**	-0.66**
RD Reward dependence					0.51**
PS Persistence	0.30**				0.59**
SD Self-directedness		-0.43**		-0.52**	0.44**
C Cooperativeness		-0.33**	0.40**	-0.32**	
ST Self-transcendence	0.32**	0.39**			0.44**
TCI-R-240 FACETS					
NS1 Exploratory excitability	0.34**				0.43**
NS2 Impulsiveness					
NS3 Extravagance			-0.33**		
NS4 Disorderliness			-0.38**		
HA1 Anticipated worry and pessimism				0.50**	-0.62**
HA2 Fear of uncertainty	-0.37**		0.41**		
HA3 Shyness	-0.41**				-0.55**
HA4 Fatigability	-0.49**			0.34**	-0.59**
RD1 Sentimentality		0.30**		0.30**	
RD2 Openess to warm communication	0.41**				0.60**
RD3 Attachment/opening					0.60**
RD4 Dependence					
PS1 Eagerness of effort	0.46**				0.55**
PS2 Hardened worker	0.34**				0.48**
PS3 Ambitious	0.47**				0.41**
PS4 Perfectionist	0.37**				0.41**
SD1 Responsibility		-0.56**		-0.46**	0.35**
SD2 Orientation				-0.37**	0.50**
SD3 Resourcefulness	0.47**				0.56**
SD4 Self-acceptance			0.31**		
SD5 Enlightened second nature				-0.46**	0.39**
C1 Social acceptance				0.35**	
C2 Empathy		-0.30**			0.35**
C3 Helpfulness					0.36**
C4 Compassion	-0.30**		0.34**		
C5 Pure hearted consciousness				-0.30**	
ST1 Self-forgetful	0.36**	0.46**			0.34**
ST2 Transpersonal identification	0.34**				0.45**
ST3 Spiritual acceptance					0.32**

Correlations < 0.30 were eliminated; ** p < 0.01.

tionality/Neuroticism is associated, as was to be expected, with HA and negatively with SD and C, the Positive Emotionality/Extroversion scale being positively associated with RD, PS, SD and ST and negatively with HA.

DISCUSSION

The 140 item version of the Temperament and Character Inventory-Revised has reliability coefficient that should be considered between acceptable and good. Given that the short version, in its main dimensions, is made up of fewer items than the long one, its reliability is less, although within an adequate margin of internal consistence. These indexes are similar to those obtained with the original version of NEO-FFI¹⁹ and similar to those obtained with the short version of the Zuckerman-Kuhlman Personality Questionnaire in our setting³³. In the study, two dimensions, NS and RD, show a reliability index below 0.70. All the scores obtained from the questionnaires indicate that the distribution of frequencies is normally distributed, which facilitates the assumption of a dimensionalistic premise of personality in the dimensions of TCI-R in the two versions.

Similarly, the correlations between the TCI-R dimensions in its two forms provide values superior to 0.91, exceeding the indexes with the short version of NEO PI-R where the lower variance explained for two pairs of dimensions was 0.77. It can be stated that the dimensions of TCI-R, with 140 and 240 items, share much information in its main constructs in spite of excluding the model facets from the evaluation with the abbreviated version.

Given the high overlapping of information between the two versions, it is logical that a similar pattern of correlations with the PSY-5 is repeated when linked with both forms. One of the objectives of this study was to extend the construct of the TCI-R dimensions by the construct contained in the MMPI-2 PSY-5 scales. In the TCI-R dimension, Novelty seeking and Constraint imply a potent indicator of low behavior control, with an active exploratory disposition in new stimuli response, impulsiveness in decision making and active avoidance of frustration. Decrease in Constraint supposes a personality style with minimum modulation of impulses, tendency to spontaneity, with wide interests, cognitive and moral flexibility and independence of the family guidelines³⁴. Harm Avoidance was associated with low Aggressiveness and Positive Emotion/Extroversion and high Negative Emotion/Neuroticism. In HA, this correlation pattern supposes an inhibition of aggressiveness and relationships based on equality more than attempt to dominate. This also occurs with indecision, instability, dependence on others, fear of abandonment and hypersensitivity to criticisms. The person may be doubtful in decision-making, showing absence of energy, lack of satisfaction and impoverishment in emotional life. There is active avoidance of the social relationships, fear of uncertainty and low self-esteem. On its part, RD is positively linked with Positive Emotionality/Extroversion and, to a lesser degree,

with Aggressiveness, which means social dependence, sentimentalism, dependence on others, openness to warm communication and sensitivity in RD. The person experiences pleasure on interaction with others, seeking to be loved and accepted by others by assertive social contact. Persistence is associated in greater proportion with Positive Emotionality/Extroversion and Aggressiveness, thus indicating high search for activities that require effort, collaboration and in which great ambition is put at stake, probably with dominance and social adaptation traits. They persist in the behavior in spite of frustration, fatigue and impatience. In fact, the Extroversion scale has been linked with low depression according to the Depression scale (D) of the MMPI-2 and AGR with elevation in Hypomania (MMPI-2 Ma)²⁰, which corroborates those dimensions of the TCI-R as a tendency to increase energy and increase of physical rhythm, increase of perceptive acuity and social rapprochement. In fact, scoring very high on PS could translate into problems for the subject, given the loss of limits when obtaining objectives in relationship with others, it being possible for hostile or aggressive reactions to precipitate due to the great exaltation. Self-directedness negatively correlated with Psychoticism and Negative Emotionality/Neuroticism and positively with Positive Emotionality/Extroversion. Self-directedness is defined³⁵ as the ability of an individual to control, regulate and adapt his/her behavior, adapting it to a situation according to individually chosen goals and values. In this sense, it was to be expected that it would be related with those dimensions of the PSY-5 that involve great cognitive and emotional lack of control. Thus, Psychoticism has been related in other studies²⁰ with paranoia (Pa), Hypomania (Ma) and psychasthenia (Pt) while NE/NEU did so with Pt in the MMPI-2. These dimensions include very well the construct of control deficit or self-directedness expressed as a great emotional instability, with an affective life lived as aversive and intra-punitive, with cognitive disorganization and absence of goals that orderly guide behavior. Links with Positive Emotionality are reflected with the contents of responsibility, orientation, and one's own resources of the SD dimension.

Cooperativeness appeared as negatively related with Psychoticism and Neuroticism and positively with Constraint. Cooperativeness as the unconditional acceptance of the other, social tolerance and altruism is related with Constraint by the high responsibility and adherence with dependence on traditional rules. On its part, low psychoticism makes Cooperativeness a scale that reflects from Character a tendency to harmony with which the subject feels or perceives physical and social world in his/her relationship. Scoring high in cooperativeness in relationship to Neuroticism implies the assumption of a commitment with the world and with other persons in conventional terms, with high security in oneself, empathizing with the other.

On its part, Self-transcendence is linked, on the one hand, with psychoticism, and on the other, with Positive Emotionality. This corroborates the contradictory character in the construct of the dimension already obtained in other

studies^{36,37}. The problems of the self-transcendence dimension have been especially defined by MacDonald and Holland³⁸. Thus, in spite of the attempts by the authors of the TCI to define a construct, according to humanistic and transpersonal ideas that measure a spiritual state of health and well being, the scale appears to be more linked to several aspects of pathological functioning³⁶. In fact, some authors³⁸ show that ST may be effective in the prediction of psychotic disorders or mood premorbidly or even that ST represents a subclinical form of those disorders. This dimension has been involved with beliefs closer to the schizotypal or psychotic disorder spectrum than to normality^{38,39}. ST, however, is positively linked with Positive Emotionality, which could be indicating that persons (probably patients) with a high ST in the TCI actively seek spirituality experiences because they are assumed as egosintonic and pleasant, providing harmony and psychological well-being.

CONCLUSIONS

The abbreviated form of TCI-R, TCI-140, shows adequate reliability indexes and good internal consistence between the items. The scores, based on the scales, tend to normal distribution. The two versions supply a large part of the variance of the content in their dimensions. In the same way, with the abbreviated version, a pattern of convergent links is obtained with the psychopathological personality (PSY-5) that tends to repeat with the long version.

Thus, the TCI-140 may be considered a reliable and valid instrument for the evaluation of the seven main personality dimensions according to the Cloninger model.

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