Research paper

Normative data and effects of age and gender on temperament and character dimensions across the lifespan in an Italian population: A cross-sectional validation study

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ARTICLE INFO

ABSTRACT

Background: The short version of the Temperament and Character Inventory (TCI-125) has been employed for the study of personality traits in both clinical and normal populations. However, to the best of our knowledge, no studies explored the psychometric properties of this instrument in healthy individuals across the lifespan. We here provide the Italian normative data and present the personality features according to age and gender in a sample of healthy individuals.
Methods: A cross-sectional study was carried out in a total of 1430 Italian healthy individuals ranging from 13 to 67 years (59.3% females). We evaluated the factorial model of the TCI-125, explored the internal consistency of the scales and carried out univariate analyses of variance for the investigation of age and gender differences in temperament and character dimensions.
Results: Confirmatory factor analysis only partially confirmed the factor structure, with some Reward Dependence, Self-Directedness, and Cooperativeness items showing poor fit. Overall we found acceptable internal consistencies for all the dimensions of the TCI-125 across all age groups, except for Reward Dependence, Persistence, and Novelty Seeking, which showed unsatisfactory internal consistency in younger age groups. Furthermore, we found significant age differences in most temperament and all character dimensions. Finally, in specific age groups we also observed significantly lower scores in males compared to females in Harm Avoidance, Reward Dependence and all character dimensions except for Self-Directedness, on which males scored higher than females.
Conclusions: Although this study only partially confirmed the factor structure of the TCI-125 and suggested limited homogeneity for some temperament scales, overall our results supported the reliability of the TCI-125, which can therefore be considered a useful tool for exploring personality traits in both clinical and normal samples. Moreover, this study suggested the need of using this instrument with caution in adolescents.

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1. Introduction

The *Temperament and Character Inventory* (TCI) operationalizes a psychobiological model of personality developed by C. Robert Cloninger in 1994 (Cloninger et al., 1994). The TCI was originally developed in English and contains 240 statements for which the subject should indicate true or false (Cloninger et al., 1994) and it has been translated and validated in several other languages, including Swedish (Brändström et al., 1998), Dutch (De la Rie et al., 1998), Japanese (Kijima et al., 2000), Turkish (Köse et al., 2004), and Spanish (Gutierrez and Torrens, 2001; Garcia et al., 2013).

Cloninger's model of personality is formed by two second-order dimensions, temperament and character. The temperament refers to automatic responses to emotional stimuli and is postulated to be inherited, innate and relatively stable over time. Within the temperament, Cloninger suggested the existence of four genetically independent dimensions that identify predictable patterns of interaction between environmental stimuli and persons' adaptive responses. These four dimensions are defined as: *Novelty Seeking*, a tendency towards exploratory excitability, impulsivity, and eccentricity; *Harm Avoidance*, a tendency to intensely respond to aversive or potentially aversive stimuli; *Reward Dependence*, a tendency to strongly respond to signs of social gratification; and *Persistence* (P), the propensity to achieve goals despite frustration and fatigue (Cloninger et al., 1994). On the other hand, the character is composed by three dimensions that are moderately influenced by socio-cultural learning and mature gradually throughout life (Cloninger et al., 2008). The three character dimensions are: *Self-Directedness*, which indicates the ability to identify the self as autonomous and the feeling of hope, honor and self-confidence; *Cooperativeness*, which refers to the ability to identify the self as an integral part of society; and *Self-Transcendence*, which reflects the ability to identify the self as an integral part of the universe as a whole (Cloninger et al., 1994).

The heritability of these dimensions was examined by several old and more recent twin and genetic studies (Cloninger et al., 1993; Benjamin et al., 1996; Brambilla et al., 2014; Picardi et al., 2015). Specifically, for temperament dimensions, Cloninger's model suggests that these dimensions are genetically determined and therefore are not supposed to change during lifetime. On the other hand, the same model hypothesizes that character dimensions are influenced by environmental factors (Cloninger et al., 1994). However, recently this view has witnessed a change in perspective in relation to studies on the genetic architecture of personality that reported a similar influence of genetic and environmental factors for both temperament and character dimensions (Cloninger and Garcia, 2015; Ando et al., 2002, 2004; Gillespie et al., 2003). Although the heritability of personality traits has been extensively studied in adults, twin studies exploring temperament and character dimensions in children are scarce. The existing literature provides some important evidence regarding the similar and different role of genes and environmental factors in these developmental phases. Specifically, it has been reported that temperament dimensions, including Harm Avoidance and Persistence, had strong genetic and non-shared environmental effects in both adults (Ando et al., 2002) and children/adolescents (Garcia et al., 2013). On the other hand, Novelty Seeking had strong genetic and non-shared environmental effects only in children (Garcia et al., 2013) whereas Reward Dependence displayed strong genetic and shared environmental factors only in adults (Ando et al., 2002). For character dimensions, it has been reported that in both adults and children all three character dimensions can be explained by genetic and unique environmental contributions (Ando et al., 2002; Garcia et al., 2013). However, in children these temperament dimensions seemed to be also influenced by shared environmental factors (Garcia et al., 2013). Finally, a large twin study carried out by Gillespie et al. (2003) in a cohort of 2517 twins aged over 50 further supported the heritability of character dimensions.

Moreover, another important aspect that has been extensively studied by several studies employing different versions of the TCI is the role of socio-demographic variables, including age and gender (Brändström et al., 2001; Miettunen et al., 2007; Gutierrez-Zotes et al., 2015). All together, these studies reported significant negative and positive correlations between age and gender and specific temperament and character dimensions, which suggests the importance of differentiating individuals according to these variables for the correct use of this instrument. However, despite the TCI is one of the most widely used instruments for the study of personality in normal and clinical samples, as the seven-factor model of personality proposed by Cloninger is supported by several independent studies using a factor analysis approach (Brändström et al., 2008; Richter et al., 2000), no evidence has yet been reported with regard to the psychometric properties as well as specific age and gender distributions of the short version of the TCI (TCI-125) across the lifespan. Furthermore, to the best of our knowledge, no studies evaluated the development of those dimensions during adolescence with a self-report form of the instrument.

Therefore, the first aim of this study is to explore the consistency of internal and external scores in the seven dimensions of temperament and character across age groups. As a second aim, we explored the factorial validity of this scale in both adults and adolescents. Finally, as a third aim, we also investigated the association of age and gender withtemperament and character dimensions.

2. Methods

2.1. Participants

A total of 1430 (59.3% of females) Italian-speaking participants ranging from 13 to 67 year old received the questionnaire. This was a convenience sample, not representative of the general population of the country but with socio-demographic characteristics similar to those of the healthy population in Italy. No overlapping was present with the Italian normative sample of the junior version of the questionnaire (adapted for children between 8 and 12 years, Urgesi et al., 2012). Sampling was carried out in different regions of the Northeast and Central Italy. For high-school-age participants, different types of school were included in order to improve the representativeness of the sample (i.e., three-years/vocational and five-years/standard schools). The majority of adult participants were recruited via a postal survey and 9.58% of them were recruited from the control groups of other current studies. Participants with more than 10% of omissions in a single scale or in the whole inventory were excluded (2.7% of the total sample, in particular: 16 participants omitted more than 12 items and 23 of the remaining participants completed less than the 90% of the items of one or more scales). A maximum of four omissions were permitted and they were replaced by the mean item score (0.08% of items). The final sample employed for the analyses consisted of 1391 participants (59.0% of females). Participants were divided in six age groups: 13–14 (145 participants, 53.8% females), 15–17 (126, 53.2% females), 18–29 (221, 68.3% females), 30–39 (311, 62.1% females), 40–49 (326, 60.1% females), and 50–69 (262, 51.5% females). The rationale behind the groups' subdivision is based on literature data exploring personality changes with age. The two youngest groups (13–14 and 15–17) were used to cover the whole adolescence phase and to explore whether the distributions of personality traits differ in younger and older adolescents. The upper age limit of 29 year old in the group of young adults (18–29) is supported by previous considerations that personality changes would occur before this age (McCrae and Costa, 1994). Whereas, the age range of the three groups of adults (30–39, 40–49, 50–69) were employed to explore whether changes in personality traits occur in these developmental phases, especially because it has been demonstrated that inter-individual differences for personality traits increase until 50–70 years old (Roberts and DelVecchio, 2000; Small et al., 2003).

The procedure was approved by the local Ethics Committee. The questionnaires were collected anonymously. For the