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Rosa Aurora Chavez-Eakle [a]; Ma. del Carmen Lara [a]; Carlos Cruz-Fuentes [a]
[a] Instituto Nacional de Psiquiatria Ramon de la Fuente.

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Personality: A Possible Bridge Between Creativity and Psychopathology?

Rosa Aurora Chávez-Eakle, Ma. del Carmen Lara, and Carlos Cruz-Fuentes

Instituto Nacional de Psiquiatría Ramón de la Fuente

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ABSTRACT: Several studies have been devoted to the relation between creativity and psychopathology, proposing conflicting associations between these variables. In addition, the investigation of personality traits present in highly creative people has been an important area of creativity research. Furthermore, the study of the relation between personality and psychopathology has been of relevant interest to psychiatrists and psychologists; nonetheless, creativity often has been ignored. The purpose of this research was to evaluate the relation among creativity, temperament and character, and psychopathological distress. A comparative cross-sectional study was conducted involving three groups: (a) highly creative people with outstanding artistic or scientific achievement, (b) control people without mental disorders, and (c) psychiatric outpatients. Torrance Tests of Creative Thinking, Temperament and Character Inventory, and Symptom Check List–90 were administered to participants. The personality profile associated with a high creativity index included the following traits: high exploratory excitability, low harm avoidance, high persistence, high self-directedness, and high cooperativeness. Highly creative achievers scored low on psychopathology. There were strong negative correlations between creativity and psychopathology on all subscales. Further, psychopathology was more related to personality than to creativity. These findings suggest that the treatment of psychopathology when present could facilitate the development of the creative potential.

For centuries there has been much debate about the relation between creativity and psychopathology. Several possible associations have been proposed: psychopathology enhances creativity, psychopathology diminishes creativity, and creativity predisposes the development of psychopathology. Hundreds of books and articles have been published exploring these topics. In addition, the study of personality traits present in highly creative people has been an important area in creativity research and has received considerable attention in the scientific literature. The study of the relation between personality and psychopathology has been of relevant interest to psychiatrists and clinical psychologists; nonetheless, creativity often has been ignored. The purpose of this research was to study the possible interactions among these three variables (creativity, personality, and psychopathology) and to evaluate the relations among creative potential (assessed with the Torrance Tests of Creative Thinking [TTCT]), creative achievement,

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Correspondence and requests for reprints should be sent to Rosa Aurora Chávez-Eakle, 5141 Driftwood Ct., Columbia, MD 21004. E-mail: drchavezra@yahoo.com

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personality profile (using a psychobiological model), patterns of psychological symptoms, and the levels of psychopathological distress.

Creativity and Psychopathology

Three types of studies principally have been conducted in the field of creativity and psychopathology (Chávez & Lara, 2000). The first category involves biographical studies. For instance, Juda (1949) could not find evidence of a relation between creativity and psychopathology, whereas Jamison (1989, 1997) found a high rate of depression and bipolar disorder in highly creative people (mainly artists, writers, and poets). In addition, Post (1994, 1996) described unusual personalities among world-famous men and a higher rate of affective and addictive disorders among playwrights. Ludwig (1992) researched the biographies of 1,004 famous people reviewed by the New York Times, finding a high incidence of alcohol abuse among famous artists and athletes. In a second category, much recent research has been carried out examining psychopathology in living creative people. For instance, a high rate of affective, anxiety, and eating disorders, as well as substance abuse, has been found among creative writers (Andreasen, 1987; Ludwig, 1994). Third, research on creativity in psychiatric patients has been conducted. A relation between bipolar disorders (especially hypomania) and creativity in patients and their relatives has been reported (Jamison, Gerner, Hammen, & Padesky, 1980).

The Creative Personality

According to Rothenberg (2000, 2001), some of the studies mentioned in the previous section are based on romantic notions that consider suffering as a necessary condition to be creative, a view that has been questioned. To better understand complex behaviors that involve emotion, cognition, and actions such as creativity, we, like many others, believe there is a need to develop an understanding of personality. Personality constitutes the everyday ways of feeling, thinking, and acting of an individual. Since the 1950s, the study of the personalities of highly creative people has been an important area in creativity research. Helson (1996) suggested it is time to return to the question of creative personality and to investigate whether highly creative people have common characteristics across fields and to examine the major differences among highly creative people. Some investigators have been interested in the general features of a creative personality; others have been interested in differences among highly creative or eminent people. Using the adjective checklist (an instrument developed for the study of well-functioning people and useful for the identification of potentially creative persons) in a sample of highly selected architects, MacKinnon (1965) found that the most creative architects described themselves as inventive, determined, independent, individualistic, enthusiastic, and industrious. Using this instrument with photographers, Domino and Giuliani (1997) discovered that experienced photographers emphasized their inventiveness, enthusiasm, independence, and industriousness as well. Adventurous, curious, imaginative, unconventional, and humorous were descriptors also considered by the photographers.

Further, Helson (1996) found that symbolic interests with a developed power motive and social identity are centrally important to creative personality. In longitudinal studies, Helson and Pals (2000) found that creative potential (which is assessed through measures of creativity) in young adulthood correlated with observer reports of openness, complexity, unconventionality, and undercontrol, whereas real-life creative achievement during midlife correlated with openness, complexity, and unconventionality but not with low self-control. Real-life creative achievement also correlated with indicators of persistence and depth. Both creative potential and creative achievement were related to increases of indicators of intrapsychic maturity, intellectuality, and tolerance of ambiguity between the ages of 21 and 52. However, Helson and Pals found that only creative achievement was related to socially integrated manifestations of openness, autonomy, and complexity, forming an integrated identity involving self-insight and personal coherence. The development of this coherent identity (more than an openness to risk taking) is crucial for the conversion of creative potential into creative achievement. The creative personality is relatively consistent over time (Helson, 1996); however, some changes in the vitality of highly creative people have been observed throughout life (Helson, Jones, & Kwan, 2002).

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The Psychobiological Model of Personality

De la Fuente (1959/1992) considered that personality is integrated by two dimensions: temperament and character. The former is a biological dimension and is heritable, representing a potential for development; the latter is molded by environmental and sociocultural factors. Human personality has been shown to have the same multidimensional structure in the general population as well as in different samples of psychiatric patients (Cloninger, 2002). This suggests that personality is a continuum in which personality disorders are the extreme and individual differences in personality traits are related to differences in the risk of developing psychopathology (Cloninger, 2002).

Cloninger, Svrakic, and Przybeck (1993) developed a psychobiological model of personality by considering dimensions of temperament and character. They defined temperament in terms of individual differences in learning everyday behaviors. Temperament involves heritable neurobiological dispositions to early emotions and their related automatic behavior and responses to specific environmental stimuli. Character refers to self-concepts and individual differences in goals and values and involves higher-order cognitive processes such as logic, formal construction, symbolic interpretation, and creation. Temperament and character dimensions were based on clinical observations and confirmed through factor analyses. The four dimensions of temperament were categorized as follows: (a) novelty seeking (impulsive vs. reflective), (b) harm avoidance (anxious vs. calm), (c) reward dependence (warm vs. aloof), and (d) persistence (steadfast vs. fickle). In addition, three dimensions of character have been described: (a) self-directedness (resourceful vs. helpless), (b) cooperativeness (empathetic vs. hostile), and (c) self-transcendence (self-forgetful vs. acquisitive). The temperament and character inventory (TCI) was developed to assess the personality profile according to this psychobiological model (Cloninger et al., 1993). Studies using the TCI have suggested an association between temperament traits and functional variations in neurotransmitter systems such as the dopaminergic, serotoninergic, noradrenergic, and gamma aminobutyric acid (GABA)–ergic systems (Svrakic, Draganic, Hill, Bayon, Przybeck, & Cloninger, 2002); therefore, the use of this psychobiological model to study the creative personality could provide valuable knowledge related to the neurobiology of highly creative people. It has been proposed that creativity, maturity, and spirituality may be related to a temperament and character profile integrated by high self-directedness, high cooperativeness, and high self-transcendence (Svrakic et al., 2002). However, to our knowledge empirical data have not been published to support these propositions. Thus, this study was designed to investigate the temperament and character traits present in highly creative people following the psychobiological model to explore the relation between creative potential, creative achievement, and the psychopathological distress profile and to test whether personality is differently related to creativity and to psychopathology.

Method

Participants

Three groups of people from Mexico City were evaluated: Group I was composed of 30 people with high creative achievement who were dedicated to full-time scientific or artistic creation, who had won national prizes in art or science, and who were members of the National System of Researchers or the National System of Creators in Mexico. These organizations provide economic support to the most productive scientists and artists of the country. To remain in these organizations, members must demonstrate continuing and successful achievement in their respective fields. Psychopathology was not an exclusion criterion for this group.

Group II, the control group, was composed of 30 people who were administrative staff and graduate students from the National Autonomous University of Mexico, employees of the National Institute of Psychiatry "Ramón de la Fuente," and members of a parents association. A clinical interview was conducted, and it was determined that none of these people displayed signs or symptoms of psychiatric disorders. The interview was based on the *Diagnostic & Statistical Manual for Mental Disorders* (American Psychiatric Association, 2000). Criteria from Axis I (e.g., clinical disorders such as affective disorders, psychotic disorders, anxiety disorders, sleep disorders), Axis II (personality disorders), and Axis III (medical diseases affecting mental health) were checked in each

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individual, corroborating that the control participants did not integrate diagnostic criteria for any of the Axis I, II, and III disorders.

Group III consisted of 30 psychiatric outpatients of the National Institute of Psychiatry Ramón de la Fuente, none of whom were receiving psychopharmacological treatment at the time of the evaluation. Patients with acute psychosis or dementia were excluded. Three different psychiatrists confirmed psychiatric diagnosis. The included diagnoses were mainly major depressive disorder and anxiety disorder (panic attacks, general anxiety), but other diagnoses included social phobia, obsessive–compulsive disorder, and bipolar disorder.

For the three groups, the general inclusion criteria were that the participants needed to be older than 18 years and capable of reading and writing. The exclusion criterion was any communication disability. Everyone who was invited accepted the invitation to participate. All the procedures were performed in compliance with the relevant laws and institutional guidelines and were approved by the National Institute of Psychiatry Ramón de la Fuente Ethics Committee. The sample size was calculated by performing power analysis (Cohen, 1977) using the TTCT scores obtained from a pilot sample ($n = 15$). Thirty people were required per group for a $d = 0.90$, considering $\alpha = 0.05$, $\beta = 0.20$. The total sample ($N = 90$) consisted of 41 male and 49 female participants.

Clinical Ratings and Assessment

The following tests and inventories were administered to all participants:

1. TTCT Figural and Verbal forms (Torrance, 1990). These psychometric tests assess what Guilford (1968) defined as divergent thinking, the production of a variety of responses not determined by explicitly given information, as opposed to convergent thinking, which indicates a single correct answer. The TTCT provide a creativity index (CI), a composite score that gives an indicator of creative potential, and score the following dimensions of the creative process: (a) flexibility (the ability to move from one conceptual field to other), (b) fluency (the number of relevant responses), (c) originality (unusual responses), (d) elaboration (the number of details on each response), (e) resistance to premature closure (the ability to remain open to the uncertain), and (f) abstractness of titles (the degree of abstraction). Extra points are added to the final score by the presence of other creative strengths such as emotional expressiveness, story-telling articulateness, movement or action, expressiveness of titles, synthesis of incomplete figures, unusual visualization, internal visualization, extending or breaking boundaries, humor, richness of imagery, colorfulness of imagery, and fantasy. The TTCT have shown high reliability ($r > 0.90$) as well as high predictive validity ($r > 0.57$) for future career image and for academic and style-living creative achievements in 22- and 30-year follow-up studies (Torrance, 1988, 1990, 1993). The training on the administration and scoring of the TTCT was obtained at the Torrance Center for Creative Studies at the University of Georgia. Interrater reliability ($R > 0.90$) was confirmed. The TTCT Figural and Verbal Form A, Spanish version, was administered to the participants and blind scored by the main investigator. This version has been administered to a sample of 200 people observing high internal consistency for the Figural TTCT ($\alpha = 0.8$) and for the Verbal TTCT ($\alpha = 0.93$; Chávez-Eakle, 2004).

2. Temperament and Character Inventory (TCI), designed by Cloninger et al. (1993), was validated in the Mexican population by Sánchez de Carmona, Páez, López, and Nicolini (1996). This is a self-report scale based on the psychobiological model for the structure and development of personality proposed by Cloninger et al. that considers four temperament and three character dimensions. Temperament dimensions include (a) novelty seeking (formed by exploratory excitability, impulsivity, extravagance, and disorderliness), (b) harm avoidance (consisting of anticipatory preoccupation, fear of uncertainty, shyness, fatigability,) (c) reward dependence (consisting of sentimentalism, attachment, dependence), and (d) persistence involving perseverance in spite of frustration. The three character dimensions are (a) self-directedness (which involves responsibility, goal directedness, plenty of resources, self-acceptation, and congruency), (b) cooperativeness (which consists of social acceptation, empathy, service, compassion, integrated consciousness), and (c) self-transcendence (which involves creative self-forgetting, transpersonal identification, and spiritual acceptance).

3. The Symptom Check List (SCL)–90 was developed and validated by Derogatis in 1973. We used the SCL–90, Spanish version, validated by Bonicatto,

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Dew, Soria, and Seghezzo (1997). The SCL–90 consists of a self-report scale designed to indicate the level of distress and the psychological symptom patterns, differentiation between behavioral symptoms of somatization, obsessive–compulsiveness, interpersonal sensibility, depression, anxiety, hostility, phobic anxiety, paranoid ideation, and psychotic behavior. Construct validity was tested by examining the SCL–90 scores in relation to characteristics known to be strongly associated with high levels of psychopathological distress, such as patient versus nonpatient status (Bonicatto et al., 1997); using the Spanish version of the SCL–90 the Cronbach's alpha coefficients were higher than 0.7 for all the mentioned dimensions except psychoticism (α = 0.62) and paranoid ideation (α = 0.67; Bonicatto et al., 1997).

4. A general ad hoc sociodemographic data questionnaire also was administered to explore age, gender, education, current activities, awards obtained, and the level of education among the participants.

The TCI, SCL–90, and the general questionnaire were administered to the participants during the first interview. The TTCT Verbal and Figural tests were administered in two different sessions. Codes were given to each participant by one member of the research team; therefore, the principal researcher did not know the identities of the participants while scoring the tests.

Statistical Analyses

Two types of analyses were carried out. The first consisted of an analysis of variance of the TTCT, the TCI, and the SCL–90 scores for the three groups. An analysis of covariance was used to control the effect of academic achievement when evaluating group differences on the TTCT scores. The second analysis was to determine the correlational pattern among the TTCT, the TCI, and the SCL–90 scores in the entire sample (N = 90) using Pearson correlations. Kolmogorov–Smirnov test was used to examine the normality of the data. Post hoc analysis was displayed using Scheffe test. Descriptive statistics (mean, standard deviation) and power analysis also were carried out. We used t tests for comparisons between genders.

Results

Comparisons Between Groups

There were no significant differences in age or sex by group, although significant differences for education were found, $F(2, 89) = 29.16$, $p = .0001$. Group I ($M = 20$, $SD = 4$) and Group II ($M = 15$, $SD = 5$) had higher levels of education compared with Group III ($M = 12$, $SD = 4$). There were significant differences by group for the CI (a composite score that provides an indicator of creative potential) obtained with the TTCT Figural, $F(2, 89) = 33.10$, $p = .0001$. Significant differences were observed by group for the following creative dimensions: flexibility, originality, elaboration, resistance to premature closure, abstractness of titles, and other creative strengths; fluency did not show significant differences. Significant differences by group for the CI and all the creativity dimensions (fluency, originality, and flexibility) obtained with the TTCT Verbal also were observed, $F(2, 89) = 55.33$, $p = .0001$. The participants in Group I, who were selected for their high creative scientific or artistic achievement, obtained the highest scores on the TTCT, both Figural and Verbal. The control group showed a normal distribution of the CI. Figures 1 and 2 show the CI (Figural and Verbal TTCT) by group. When comparing Group I and Group II, significant differences were observed in the TTCT scores: Figural, $F(1, 59) = 22.88$, $p = .0001$, where Group I presented the highest scores ($M = 143.93$, $SD = 15.33$); and Verbal, $F(1, 59) = 49.08$, $p = .0001$, where Group I presented the highest scores ($M = 128.1$, $SD = 17.4$). As was mentioned before, significant differences in education were found among the groups; when academic achievement was controlled for in the analysis, we still observed high significant differences in the TTCT by group in both TTCT Figural, $F(2, 89) = 8.3$, $p = .007$, and TTCT Verbal, $F(2, 89) = 32.05$, $p = .0001$. Education did not have a significant effect.

Significant differences by group were found for the following temperament and character dimensions: exploratory excitability, harm avoidance, self-directedness, and cooperativeness. The exploratory excitability is a component of novelty seeking (NS); this was the only NS subscale that showed significant differences among the three groups, $F(2, 89) = 9.63$, $p = .0002$. Participants with high creative achievement (Group I) presented the highest NS1 scores ($M = 8.13$, $SD = 1.11$). No observed differences were encountered for the other NS subscales (impulsivity, ex-

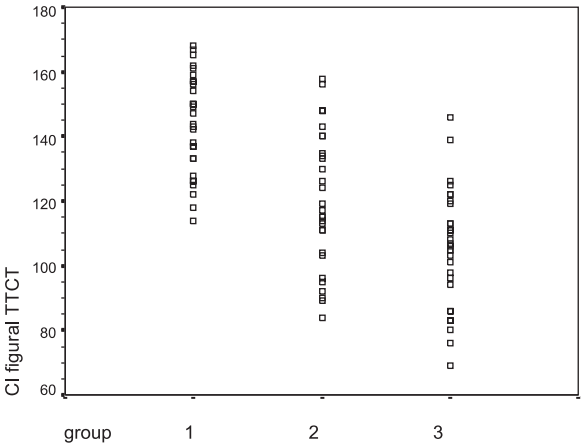

Figure 1. *Figural TTCT creativity index (CI) by group.*

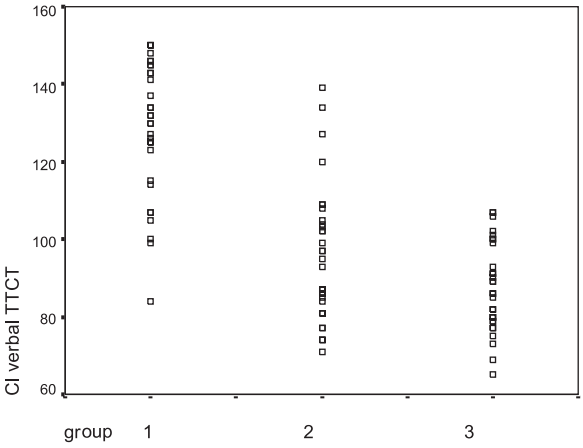

Figure 2. *Verbal TTCT creativity index (CI) by group.*

travagance, or disorderliness) or for the total NS trait score. Harm avoidance (HA) was significantly lower in Group I (M = 11.37, SD = 5.74), whereas Group III, composed of psychiatric patients, exhibited the highest scores (M = 20.83, SD = 6.02), $F(2, 89)$ = 16.80, p = .0001. Conversely, self-directedness (SDi) was significantly higher in Group I (M = 34.83, SD = 6.24), whereas Group III scored the lowest (M = 23.33, SD = 7.89), $F(2, 89) = 22.76$, p = .0001. Cooperativeness (C) was significantly higher in Group I as well (M = 33.77, SD = 6.03), $F(2, 89) = 5.70$, p = .0047. Group I had the highest scores in persistence, but differences were not significant. In addition, high scores on self-transcendence were observed in both highly creative people and psychiatric patients, and the lowest scores in self-transcendence were found in the control group (Group II). Nonetheless, again no significant differences were found for this dimension. Figure 3 shows the temperament and character scores by group.

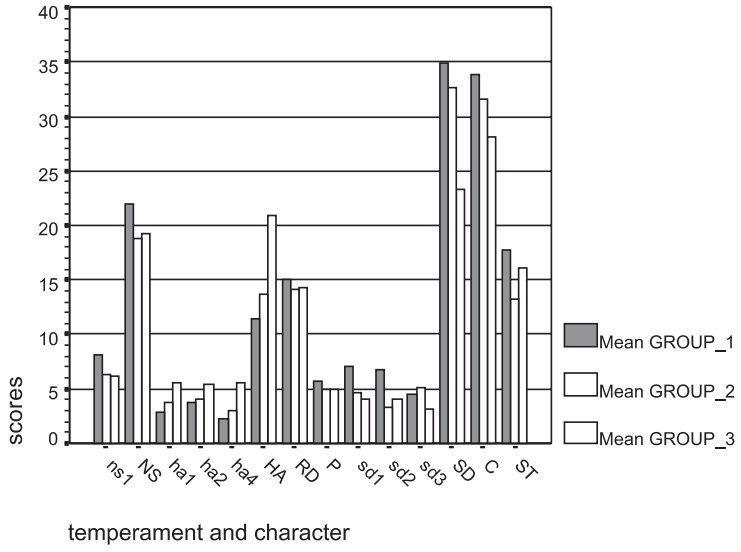

Figure 3. *Temperament and character by group. NS = novelty seeking trait; NS1 = exploratory excitability; HA = harm avoidance trait, HA1 = anticipatory worry, HA2 = fear to uncertainty; HA4 = fatigability; RD = reward dependence trait; P = persistence trait; SDi = self-directedness trait; C = cooperativeness trait; ST = self-transcendence trait. Group I = people with high creative achievement; Group II = healthy control people; Group III = psychiatric out patients.*

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There were significant differences by group for all the psychopathology subscales: somatization, $F(2, 89) = 19.37$, $p = .0001$; obsessive–compulsiveness, $F(2, 89) = 24.36$, $p = .0001$; interpersonal sensibility, $F(2, 89) = 13.98$, $p = .0001$; depression, $F(2, 89) = 36.60$, $p = .0001$; anxiety, $F(2, 89) = 23.99$, $p = .0001$; hostility, $F(2, 89) = 15.74$, $p = .0001$; phobic anxiety, $F(2, 89) = 15.66$, $p = .0001$; paranoid ideation, $F(2, 89) = 8.49$, $p = .0004$; and psychoticism, $F(2, 89) = 20.04$, $p = .0001$. As expected, the highest scores were found in Group III. Interestingly, when comparing Group I (people with high present creative achievement) and Group II (healthy control people), the lowest scores on all the psychopathology dimensions were observed in Group I (except for anxiety, were Group I showed higher scores); however, there were not significant differences among these two groups ($p \geq 0.36$).

Correlations Between Scales

Normality of the scores was tested using Kolmogorov analysis ($D < 1.96$). A high, significant correlation between Verbal and Figural TTCT was found ($r = .79$, $p = .0001$). The following temperament and character dimensions showed a positive, significant correlation with a high CI: exploratory excitability (NS1), persistence (P), self-directedness (SDi), and cooperativeness (C). Harm avoidance and all its subscales showed a highly negative significant correlation with the CI. There was a low, significant correlation between Verbal TTCT scores and reward dependence and cooperativeness. Persistence showed a positive significant correlation with the CI (both Figural and Verbal); a high, significant, positive correlation was observed between the CI (Figural and Verbal) and self-directedness (trait and all subscales). Table 1 displays the Pearson product–moment correlations between the CI and temperament and character traits.

A high, positive, significant correlation between harm avoidance and all psychopathology subscales was observed, whereas a high negative significant correlation between self-directedness and all psychopathology subscales was documented. When correlating the scores on temperament and character with the scores on psychopathological distress, a significant, positive correlation between disorderliness (NS4) and the hostility subscale of psychopathology was observed. A significant, negative correlation between cooperativeness and all the psychopathology subscales, except somatization, was found. Table 2 shows Pearson correlations between the psychopathology subscales and the temperament and character traits.

Table 1. *Pearson Correlation Between Creativity Index (TTCT) and Temperament and Character Traits (TCI)*

Variable	Creativity Index Figural TTCT	Creativity Index Verbal TTCT
Novelty Seeking (NS1)	0.29*	0.39**
Harm Avoidance (HA1)	–0.30*	–0.39**
Harm Avoidance (HA2)	–0.34*	–0.31*
Harm Avoidance (HA4)	–0.38**	–0.42**
Reward Dependence (RD3)	No sig	0.28*
Persistence	0.31*	0.30*
Self-Directedness (SDi1)	0.51**	0.50**
Self-Directedness (SDi2)	0.44**	0.49**
Self-Directedness (SDi3)	0.46**	0.48**
Self-Directedness (SDi4)	0.39**	0.36**
Cooperativeness (C3)	0.30*	No sig
Cooperativeness (C5)	No sig	0.30*
Harm Avoidance Trait	–0.38**	–0.43**
Reward Dependence Trait	No sig	0.30*
Persistence Trait	0.31*	0.30*
Self-Directedness Trait	0.51**	0.53**
Cooperativeness Trait	No sig	0.34*

Note. No sig = nonsignificant.
*$p < .005$. **$p < .0001$.

A high, negative, significant correlation between all the psychopathology subscales and the CI (including all creativity dimensions) was observed in both Figural and Verbal TTCT. Table 3 shows Pearson correlations between psychopathology subscales and CI.

Differences Between Genders

There were significant differences for the following temperament subscales by gender: Women showed higher anticipatory preoccupation (HA1; $M = 4.76$, $SD = 2.95$), $t(88) = 2.72$, $p = .008$ (two tailed), $d = .50$ and higher fear of uncertainty (HA2; $M = 4.86$, $SD = 1.72$), $t(88) = 2.70$, $p = .009$ (two tailed), $d = .50$ than did men. For the remainder of the temperament and character dimensions and subscales, no significant differences were observed. For instance, when comparing men and women only from Group 1, no significant differences between men and women were observed for any of the temperament and character dimensions or subscales.

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Table 2. *Pearson Correlation Between Temperament and Character Traits (TCI) and Psychopathological Distress Profile (SLC-90)*

Variable	NS4	HA Trait	SDi Trait	C Trait
Somatization (SOM)	No sig	0.60**	–0.68**	No sig
Obsessive–Compulsiveness (O-C)	No sig	0.59**	–0.70**	–0.33*
Interpersonal Sensibility (INT)	No sig	0.64**	–0.72**	–0.45**
Depression (DEP)	No sig	0.66**	–0.76**	–0.33*
Anxiety (ANX)	No sig	0.64**	–0.73**	–0.36*
Hostility (HOST)	0.35*	0.46**	–0.60**	–0.31*
Phobic Anxiety (PHOB)	No sig	0.58*	–0.64**	–0.46**
Paranoid Ideation (PAR)	No sig	0.58*	–0.64**	–0.46**
Psychoticism (PSY)	No sig	0.39**	–0.70**	–0.36*

Note. NS4 = Disorderliness; HA = Harm avoidance; SDi = Self-directedness; No sig = nonsignificant.
*$p < .005$. **$p < .0001$

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Table 3. *Pearson Correlation Between Creativity Index (Figural and Verbal TTCT) and Psychopathological Distress Profile (SCL-90)*

Variable	Creativity Index Figural TTCT	Creativity Index Verbal TTCT
Somatization (SOM)	–0.51**	–0.48**
Obsessive–Compulsiveness (O-C)	–0.44**	–0.47**
Interpersonal Sensibility (INT)	–0.41**	–0.42**
Depression (DEP)	–0.52**	–0.52**
Anxiety (ANX)	–0.44**	–0.41**
Hostility (HOST)	–0.39**	–0.36**
Phobic Anxiety (PHOB)	–0.41**	–0.41**
Paranoid Ideation (PAR)	–0.39**	–0.37**
Psychoticism (PSY)	–0.45**	–0.42**

**$p < .0001$.

There were no significant differences in CI by sex in both the Figural and Verbal forms of the TTCT. Although no significant differences in any of the Verbal TTCT creativity dimensions were found, there were significant differences by gender for elaboration, when obtained with the Figural TTCT: for this dimension, men exhibited higher scores ($M = 153$, $SD = 11.25$), $t(88) = 3.109$, $p = .003$ (two tailed), $d = .50$. However, when comparing men and women only from Group I, no significant differences between men and women were observed in the CI or in any verbal or figural creativity dimension.

Discussion

In this study, we explored the relations among the creative achievement, the CI obtained with the TTCT Verbal and Figural, temperament and character traits from a psychobiological perspective, and the psychiatric distress profile. People showing high creative achievement in art or science (Group I) exhibited the highest scores on both Figural and Verbal TTCT tests. These people were chosen on the basis of a high productivity and their awarded novel contributions to their fields at the time of the interview, in other words, their

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real-life creative achievement at midlife. As previously mentioned, these people obtained the highest scores on the TTCT, which supports the validity of these creative potential tests. Through our analysis, we could verify that the difference between groups was not an effect of fluency (the number of responses). In fact, we did not find significant differences in fluency on the Figural TTCT. Nevertheless, we indeed found significant differences on the rest of the creativity dimensions. Few people belonging to Group II (control) and Group III (psychiatric patients) presented high CIs as well (although this did not have significant effect in the group statistics), it will be important in further studies to follow-up their creative achievement and to explore how they are using and exploring their creative potential; perhaps in other, less socially recognized, but equally important ways, and, in the case of the psychiatric patients, to evaluate the relation between creative potential and psychiatric recovery.

The differences we found in education by group could be related to the inclusion criteria that we set. People belonging to either the researchers or creators systems in Mexico have doctoral degrees in most cases, because this is an admission requirement to these systems; another explanation could be that highly creative people tend to seek knowledge and academic experiences to nurture their creative potential. Nonetheless, several people belonging to Group II, and few from Group III had graduate education as well. However, as it was described, the effect of group was high and significant after the effect of academic achievement was controlled for in the analysis, which provides evidence of the power of the TTCT.

Temperament and Character Profile Associated With a High CI

As mentioned earlier, we observed a temperament and character profile associated with both a high CI and a high creative achievement. This profile is different than what has been reported in control subjects or in psychiatric populations and is integrated by high exploratory excitability, low harm avoidance, high persistence, high self-directedness, and high cooperativeness (see Figure 3). At the beginning of this research, we expected to find high novelty-seeking scores among highly creative people. However, the only related novelty-seeking subscale we found associated with creativity was exploratory excitability (NS1); the rest of the subscales (impulsivity, extravagance, and disorderliness) were not related to creativity. Exploratory excitability implies exploration as a frequent response toward novelty. Furthermore, highly creative people presented low scores on the harm avoidance trait and all its subscales except shyness, meaning that they tend to be optimistic, unafraid when faced with uncertainty, and not easily tired.

Persistence was another temperament trait that had a positive, significant correlation with the CI; self-directedness was the character trait that showed the strongest association with highly creative achievers and had the highest positive correlation with the CI. Highly self-directed people tend to show responsibility, goal direction, resourcefulness, self-acceptance, and congruency. They pursue their goals with intensity and persist and survive against adversity. This could be related to the strong ego displaying autonomy described in highly creative people by Camacho, Vives-Rocabert, and Solís (1983) and may be related to the characteristics observed by Torrance in what he described as "the beyonders" (those who make creative leaps, Torrance, 1999). Furthermore, high persistence is needed for the elaboration phase after an idea is conceived.

High cooperativeness implies that these people tend to show empathy, tolerance, and integrated consciousness. A low correlation with reward dependence supports the notion of creativity being more related to intrinsic motivation; furthermore, according to this theory, autonomy, self-determination, and competence are considered to be intrinsic motivators (Amabile, 2001), characteristics related to the self-directedness character dimension. Further, it is interesting to point out that both highly creative people and psychiatric patients had the highest scores on self-transcendence (the first transcending through creation, the second through pain—a cultural notion that should be explored in further research) when compared with healthy control subjects. Other authors have found that high scores on self-transcendence were related either to mature character or to schizotypal traits (Svrakic et al., 2002).

High exploratory excitability, low harm avoidance, high persistence, high self-directedness, and high cooperativeness—the personality traits found in our sample of highly creative people—correspond very well with the indicators of intrapsychic maturity, persistence, and tolerance of ambiguity—a coherent identity that Helson found in her research with highly

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creative people (Helson, 1996; Helson & Pals, 2000). However, using a psychobiological model (Cloningeret al., 1993) opened the door for a new research direction involving whether this temperament and character variability is related to variations in some of neurotransmitters systems' functioning.

Some significant differences were observed for the temperament and character traits by gender. Women had the highest scores on two harm avoidance subscales: anticipatory preoccupation and fear of uncertainty. This finding could be related with the higher incidence of anxiety disorders in women, considering that harm avoidance is a temperament trait that has been associated with anxiety behaviors (Svrakic et al., 2002). Among highly creative people, there were no differences in temperament and character traits between genders.

Temperament and Character Profile Associated With High Scores in Psychopathology

We found that the temperament and character profile associated with high scores in psychopathology was integrated by high harm avoidance, low self-directedness, and low cooperativeness. High harm avoidance implies fear, apprehension, nervousness, doubt, insecurity, passivity, inhibition, and uncertainty as temperament traits (not as temporal symptoms). High harm avoidance has been described in several psychiatric samples (Cloninger et al., 1993; Svrakic et al., 2002). Conversely, low scores in self-directedness reveal a tendency to blame others, a lack of direction to goals, inertia, and self-rejection. We consider it to be relevant to conduct further research to elucidate if harm avoidance and self-directedness could be prognosis predictor factors in the outcome of mental disorders.

Creativity and Psychopathology

When comparing groups, we found that people from Group I had low scores in psychopathology and no significant differences were observed between them and Group II (healthy control subjects). It is important to recall that psychopathology was not an exclusion criterion for Group I; the participants were recruited only by their present outstanding creative achievement and productivity at the time the study was conducted. This finding diverges from previous studies that reported high rates of psychopathology among creative people (review in Chávez & Lara, 2000). One explanation often given is that in some of the studies mentioned earlier, the recruited subjects were experiencing shifts or setbacks in their careers or the researchers did not recruit a control group, did not use valid instruments to assess creativity or psychopathology, or did not perform blind evaluations, and in some cases only relied on biographical data (Rothenberg, 2000, 2001). As described in this study, the participants were at the pinnacle of their careers and their real-life creative achievement; this suggests that a peak in actual creative achievement could have an inverse relation with psychopathology but that does not mean that along their lives highly creative subjects cannot experience psychopathological distress. However, some scholars could argue that there is still a good amount of valid research supporting an association between creativity and psychopathology; therefore, another explanation could be that other variables come into play in the creativity–psychopathology association. Even if the creative and the psychopathological processes could be inverse, there might be other characteristics such as temperament and character (and perhaps others) that predispose these creative people to suffer, not a mental disorder. In this study, psychopathology showed higher significant associations and correlations with temperament and character traits than to creativity. It might be, as Helson (1996) proposed, time to return to the question of creative personality.

When correlating the scores on the tests in the total sample, we found a highly negative correlation between creativity and psychopathology in all dimensions and subscales. This is a relevant finding considering how entrenched the idea is, even among creators, of madness as a necessary condition to be creative. Some creators have even refused psychiatric or psychotherapeutic treatment because they fear their creativity might be affected; that was the case of Rilke who expressed that if he lost his demons he would loose his angels as well (Dör Zegers, 2000). Flexibility, abstraction, premature closure resistance, and other creativity dimensions such as emotional expressiveness, vivid imagination, colorful imagination, unusual visualization, humor, and fantasy were the creativity dimensions that performed the lowest when psychopathology was high, and a significant negative correlation was documented between creative perfor-

mance and psychological distress. According to these findings, creative performance would indicate a movement toward mental health. This supports E. Paul Torrance's notion about a link between creativity, constructive behavior, and mental health (Torrance, 1965); it also supports what was proposed by Kubie (1958), who considered flexibility (an important creativity dimension) as the measurement of mental health and postulated that psychopathology (particularly guilt, fear, and anxiety) blocks the creative act, making it rigid and stereotyped. Therefore, when encountering highly creative patients, the treatment of their psychopathology could help them in the process of developing their creative potential and converting it into creative achievement.

It would be relevant to follow this research direction with longitudinal studies to test the effect of psychiatric and psychotherapeutic treatments on creative performance and to evaluate whether personality change occurs in relation to aging and other life events. As has been explored by Helson et al. (2002), the correlation of personality change with the course of life and creative achievement is a relevant issue. We, like others, believe that creativity is important for both individual and social development. To place temperament and character "in the middle," that is, between creativity and psychopathology, adds a new and important dimension to the geniality and madness controversy.

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