

Openness is not the only defining feature of students with higher creative potential

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Abstract

Introduction. The study of personality traits in creative students in the educational setting involves identifying them and then adopting the right educational response to the different creative profiles observed. Our aim, therefore, was to analyze the relationship between personality traits and creative abilities, and to inquire into which personality traits define students with higher creative potential, in a sample of adolescents, based on the Big Five model of personality (Costa & McCrae, 1992).

Method. The sample was formed of 178 students who were enrolled in compulsory secondary education in the Region of Murcia (Spain). Ages ranged from 12 to 17 ($M = 14.59$; $SD = 1.40$), and 49.3% were male. The instrument used to assess creativity was the TTCT (Torrance, 1974), and the instruments to identify personality traits were the BFQ-C (Big Five Questionnaire for children; Barbaranelli, Caprara & Rabasca, 1998), in its Spanish adaptation (Del Barrio, Carrasco & Holgado, 2006), and the NEO-FFI (Revised NEO Personality Inventory, reduced version; Costa & McCrae, 2008). To assess differences in personality, we made three groups based on their level of creativity (high, medium and low).

Results. The results showed that three personality traits were related to creative dimensions: Extraversion, Conscientiousness and Openness. At the same time, the most creative people presented significantly higher scores in the following personality traits: Extraversion, Conscientiousness and Agreeableness.

Discussion and conclusions. Creative abilities in general were somewhat related to the personality traits. In particular, Extraversion, Conscientiousness and Openness were the dimensions most related to creativity. Of these, Extraversion and Conscientiousness were the most distinctive of a creative profile. Similar results were obtained by Chamorro-Premuzic and Reichenbacher (2008), Furnham (2015), and Szobiová (2006).

Key words: creativity, personality, extraversion, openness.

Resumen

Introducción: La relevancia de estudiar los rasgos de personalidad en los estudiantes creativos dentro del ámbito educativo implica su identificación y posterior respuesta educativa adecuada a los diferentes perfiles creativos que manifiestan. Por tanto, el objetivo fue analizar la relación entre los rasgos de la personalidad y las habilidades creativas, así como profundizar en qué rasgos de personalidad son los que definen a los estudiantes con mayor potencial creativo en una muestra de adolescentes, basándonos en el modelo de los Cinco Grandes Factores de la personalidad (Costa & McCrae, 1992).

Método: Participaron 178 estudiantes de Educación Secundaria Obligatoria (ESO) de la Región de Murcia (España), con edades entre los 12 y los 17 años ($M = 14.59$; $DT = 1.40$). De los cuales un 49.3% eran varones. Los instrumentos utilizados fueron: el TTCT (Torrance, 1974), para valorar la creatividad; el BFQ-NA (Big Five Questionnaire de Personalidad para niños y adolescentes; Barbaranelli, Caprara y Rabasca, 1998), en concreto, la adaptación española (Del Barrio, Carrasco & Holgado, 2006) y el NEO-FFI (Inventario de Personalidad NEO Revisado, versión reducida; Costa & McCrae, 2008), para los rasgos de personalidad. Para valorar las diferencias en personalidad realizamos tres grupos en función de su nivel de creatividad (alta, media y baja).

Resultados: Los datos sugieren que fueron tres los rasgos de la personalidad relacionados con las dimensiones creativas: la Extraversión, la Conciencia y la Apertura. Al mismo tiempo, las personas más creativas presentaron puntuaciones significativamente más elevadas en los siguientes rasgos de personalidad: Extraversión, Conciencia y Amabilidad.

Discusión o conclusión: A nivel general se observa cierta relación entre las habilidades creativas y los rasgos de personalidad. Concretamente son la Extraversión, la Conciencia y la Apertura las dimensiones más relacionadas con la creatividad. De las cuales, la Extraversión y la Conciencia son las que definen en mayor medida un perfil creativo. Resultados en esta línea son los obtenidos por Chamorro-Premuzic y Reichenbacher (2008), Furnham (2015), y Szobiová (2006).

Palabras Clave: creatividad, personalidad, extraversión, apertura.

Introduction

The study of the relationship between personality and creativity has been a constant in scientific literature. The relationship between the two is very complex, and the different conditioning factors are biological as well as personal and contextual (Feist, 2010; 2019). In this study we have analyzed the personality traits that are associated with creativity and creative achievement, and which traits differentiate individuals with higher creative potential from others.

According to Selby, Shaw and Houtz (2005), the study of the creative personality has been considered an important line of research in relation to creativity. Some authors seek to identify the personal characteristics that define more creative individuals (Feist & Barron, 2003; Szobiová, 2006). Others, like McCrae and Greenberg (2014), ask whether certain personality traits are what make creative geniuses tackle problems, tasks and situations differently. Some authors attribute to creative geniuses certain gifts that lead them to resolve artistic, intellectual and practical problems in original ways --thus pointing to Openness to experience as the key personality characteristic. According to these authors, a distinctive feature of these geniuses, regardless of the field they are working in, are their exceptional contributions, and the attraction they feel toward combining ideas in new ways.

Simonton (2000) indicated that ambition was a defining feature of these highly creative individuals, and was associated with the dimension of Conscientiousness. Different studies have analyzed the personality of figures who were considered creative in their field (Skinner and Ford), individuals who represented two opposite ends of personality and creativity. The study was carried out by analyzing documents and testimonies of persons who knew them. In the case of Skinner, a great creative figure in the field of behaviorism, his profile characteristics were described as high Conscientiousness and Openness to experience, a certain degree of Neuroticism and Extraversion, and as being neither agreeable nor disagreeable (Overskeid, Grønnerød & Simonton, 2012). By contrast, in the case of Henry Ford, who revolutionized the field of mechanical engineering, his profile reveals a person with high Conscientiousness; however, it seems that he resisted changing his first car model, despite the demands of the context. Ford had high intrinsic motivation only for the things that interested him, so he has been labeled as not being open to new experiences that did not fall within his interests (McCrae & Greenberg, 2014). The results of these studies may indicate that personality traits differ according to the

domain where creative potential is being manifest (Bernal, Esparza, Ruiz, Ferrando & Sainz, 2017).

Personal characteristics have a natural influence on creative manifestation. But what are the qualities that increase the likelihood of creative ideas appearing in certain persons more than others? Is it cognitive styles, attitudes, one's developmental history, motivational styles, personality traits (Feist, 2018)? In this regard, we can assert that creativity is the result of multiple factors, including cognitive processes, affective processes, behavioral and contextual processes (Amabile, Barsade, Mueller, & Staw, 2005; da Costa, Páez, Sánchez, Garaigordobil & Gondim, 2015; Sternberg & Lubart, 1995/1997).

Among the personal factors, the following have been stressed: personality traits, intelligence, knowledge, thinking style, and motivation (Sternberg & Lubart, 1995/1997). Regarding personality traits, although no single one can guarantee creative production, there seems to be some agreement on the existence of particular traits in individuals that have developed their creativity the most (Romo-Santos, Sánchez-Ruiz & Alfonso-Benlliure, 2017).

In the study of the creative personality from Eysenck and Eysenck's model (1985), Psychoticism is the personality trait most clearly associated with creativity (Aguilar-Alonso, 1996; Furnham & Nederstrom, 2010; Woody & Claridge, 1977). This trait is characteristic of creative individuals and also individuals with some mental disorder; in fact, many poets, writers and artists who are considered creative also suffered some kind of mental illness, and creativity is sometimes associated with schizophrenia (Lloyd-Evans, Batey & Furnham, 2006; Prentky, 2001; Sass, 2001). By contrast, creativity has also been related to other personality traits, such as Extraversion (Aguilar-Alonso, 1996).

In our study we have used the Big Five model of personality factors by Costa and McCrae (1992), which proposes five factors that group together the main characteristics of personality, namely: Conscientiousness (the ability to control impulses and to organize and plan tasks and activities to be performed); Openness to experience (imagination, curiosity, divergent thinking, in short, openness both in ideas and in how the challenges of new experiences and situations are faced); Extraversion (sociability, assertiveness and effectiveness in social interactions); Agreeableness (sensitivity to the others' manifest needs); and Emotional Instability (sadness, visible anxiety and irritability). The present study asks which personality traits, as

defined in this model, are most associated with creativity. To do so, we first examined the literature, collecting studies with a similar approach, that assessed personality with the Big Five model, and studied the relationship between personality factors and creativity, as well as personality differences according to the level of creativity that individuals present.

In this line, the study by King, Walker and Broyles (1996) set out to study the relationship between personality and creativity, measured by the TTCT (verbal and figural). Study participants were between the ages of 17 and 47. Their results indicated significant correlations between verbal creativity, Extraversion and Openness to experience. In order to more closely examine the influence of Openness to experience on creativity, they divided the sample into three groups (high, medium and low creativity). The results showed that creative ability was positively related to creative achievement at medium and high levels of Openness to experience, and that subjects who scored highly in these two variables made the greatest creative achievements. Those individuals who scored highly in creative ability but had low scores in Openness to experience gave little evidence of creative behaviors. Consequently, Openness to experience was claimed to moderate the relationship between creative ability and creative achievement.

Results from the study by Wolfradt and Pretz (2001) also corroborate that the trait of Openness to experience is positively related to creativity, regardless of the instrument used. Personality traits highly related to creativity would then be prerequisites to becoming an outstanding contributor in one's field of knowledge. For example, assuming all of the more creative participants have the same likelihood of becoming experts in their field of knowledge, they would need to possess traits like Openness to experience, low Conscientiousness and an intuitive thinking style as preconditions to a mature creative personality. In other words, it is likely that meeting these preconditions would lead these individuals to obtain an adequate level of expert knowledge, to stay motivated in pursuing their interests, and if the climate is right for the individual, to eventually have a high impact in their field of knowledge.

Dollinger, Urban and James (2004) found similar results, where Openness to experience was the variable that correlated significantly with most measures of creativity, specifically with self-reported creativity.

In a population of 370 adolescents (196 male and 174 female, mean age 18 years), Szobiová (2006) assessed creativity using the Torrance Test (TTCT; Torrance, 1974), adapted for

a Slovak population (Jurčová, 1984). The sample was divided into three groups (students with low, medium and high creativity), according to the originality scores obtained on the TTCT Incomplete Figures task. Although statistically significant differences in personality traits were not found between the three creative groups, when the differences were considered by gender, differences were significant in the dimension of Openness and Neuroticism, in favor of the girls. According to this author, this reveals that the girls were more interested in new experiences and impressions and were more sensitive to experiencing pleasant and unpleasant emotions.

Considering the creative boys separately, there were significant correlations between personality factors Extraversion and Conscientiousness. In the creative girls, the significant correlations were between Neuroticism and Conscientiousness, although in a negative relationship (Szobiová, 2006). All this indicates that the creative girls have higher Conscientiousness, are persistent, systematic, more physically stable, surer of themselves, and less anxious. The creative boys, however, were more extraverted (more active, sociable and optimistic) and also had higher Conscientiousness. Given these results, the author affirms that Conscientiousness has an important role in the creative personality. This dimension would be linked with Neuroticism in the case of the girls, and with Extraversion in the case of the boys. It is worth noting that the girls with highest creativity obtained higher scores in the trait of Openness to experience than did the high-creativity boys.

Hoseinifar et al. (2011), in a sample of 630 adolescent students, analyzed the relationship between creativity and the five personality factors. Their results included significant, high magnitude, positive correlations between total creativity score and the traits of Openness to experience, Extraversion, Agreeableness and Conscientiousness, while with Neuroticism these correlations were negative. On the predictive side, they found that the personality model predicted 48% of the variance of creativity, with all five personality traits acting as predictors: Openness, Extraversion, Agreeableness and Conscientiousness were positive predictors and Neuroticism was a negative predictor. Elsewhere, Chamorro-Premuzic and Reichenbacher (2008) carried out a study that analyzed the predictive effect of the Big Five personality traits on divergent thinking, in a sample of 82 Psychology students. The two clear predictors were Openness to experience and Extraversion. Similar results were obtained by Sanz de Acedo, Sanz de Acedo and Closas (2014), in a sample of 180 university students, using the CREA

(Corbalán et al., 2003) to assess creativity. These authors found that personality was a significant predictor of ideational creativity.

By contrast, McCrae and Ingraham (1987) indicated that creativity correlated with Openness to experience, but not with the other personality traits (Extraversion, Agreeableness, Conscientiousness and Neuroticism). Similarly, Furnham, Hughes, and Marshall (2013) confirmed their hypothesis that Extraversion and Openness would manifest a positive relationship to creativity in a sample of 207 participants between the ages of 16 and 54. In the same line, Kaufman et al. (2016) also confirmed their hypothesis that Openness and Extraversion predict creative achievement in the arts, and that intelligence predicts it in the sciences, in a total of 1035 participants divided into 4 samples, between the ages of 16 and 61.

Krumm, Lemos, and Richaud (2018) also analyzed relationships between creativity and personality in a sample of 359 schoolchildren ages 9 to 13. Creativity was assessed using the following instruments: the figural test of the Torrance Test of Creative Thinking, Form B (TTCT) and the Creative Personality Scale (CPS). The results showed only Neuroticism to be related to creativity, in a negative direction.

Elisondo, Donolo and Corbalán (2009) analyzed relationships between creativity and personality in a sample of 132 students. They hypothesized the following: a) high, significant correlations between personality traits (Openness to experience and Extraversion) and creativity, and b) the more potentially creative students would attain higher scores than the others in Openness to experience and Extraversion. The results indicated a single significant correlation, in a negative direction, between creativity and personality measured on the Big Five Questionnaire (Caprara, Barbaranelli & Borgogni, 1993), namely, between impulse control and Sheet A from the CREA (Corbalán et al., 2003). When they analyzed correlations with the CEP (personality questionnaire by Pinillos, 1957), positive, statistically significant correlations were observed between Extraversion and Sheet A from the CREA. There were also significant differences between the most potentially creative students and those with medium creativity on the Scrupulousness subscale (under Conscientiousness) and on the Conscientiousness scale of the BFQ. Students with high creativity (according to Sheet A) obtained significantly lower scores on these scales. At the same time, the potentially more creative students scored higher in Extraversion than their peers. This constituted partial fulfillment of one of the initial hypotheses (significant, positive correlations between creativity and Extraversion).

More recently, also using the CREA instrument for creativity (Corbalán et al., 2003), Limiñana, Corbalán and Sánchez-López (2010) analyzed creative behavior and its relationship to personality styles in a sample of 80 university students. They used the MIPS (Millon, 2001) to assess personality, dividing the sample into three groups by creativity level in order to analyze differences. Students with higher creativity were found to present statistically significant differences from their peers in the dimension of Extraversion, as well as in other motivational and sociability dimensions.

Finally, Ma (2009) conducted a meta-analysis and observed that creativity was most associated with Openness to experience, but there were also associations with lower effect sizes with high Extraversion, Emotional stability, Conscientiousness and Agreeableness. Other studies, such as Feist (1998), claimed that the variables of Conscientiousness and Agreeableness were negatively related to creativity. For example, da Costa et al. (2015) indicated that low scores in Neuroticism, Agreeableness and Conscientiousness were globally more associated with creativity. Likewise, Extraversion was moderately associated with creativity, suggesting that more energetic individuals may be more likely to look for new ways to solve problems and tasks, thus leading them to greater creative achievement. Finally, the trait most associated with creativity was Openness to experience, probably due to a preference for adopting new perspectives and being more flexible.

Thus, the studies analyzed indicate that more creative individuals are most characterized by Openness to experience; in other words, individuals who are open to new experiences and have more independent judgment are those with greater creative achievement (Chamorro-Premuzic, 2006; Dollinger et al., 2004; George & Zhou, 2001; Hoseinifar et al., 2011; King et al., 1996; McCrae & Inghram, 1987; Wolfradt & Pretz, 2001). To a lesser degree, Extraversion, that is, people who are more sociable, energetic and optimistic are also more creative (Elisondo et al., 2009; Furnham & Niderstrom, 2010; King et al., 1996; Martindale & Dailey, 1996; Sen & Hagtvet, 1993; Stavridou & Furnham, 1996; Wolfradt & Pretz, 2001). This fact seems surprising, since it is commonly believed that more creative individuals usually isolate themselves, especially when they are working on a specific idea. This conception is not evenly represented in all vocational areas; for example, scientists are perceived as more introverted, while artists are perceived as more sociable (Feist, 1998).

Given that these results appear repeatedly in the scientific literature, Feist (2010; 2019) proposed that the relationship between personality and creativity be analyzed using a model with two large personality factors --Plasticity and Stability-- which would group together the Big Five. Plasticity contains Openness and Extraversion, while Stability is composed of Conscientiousness, Agreeableness and Neuroticism. Plasticity is then the factor most related to creativity, and has predictive capacity for different measures of creativity.

Objectives and hypotheses

The aim of this study was to identify what personality traits differentiate adolescents with high creativity from their peers with low and medium creativity, as well as to study the relationship between these two constructs.

Method

Participants

Participating in this study were 217 students in compulsory secondary education in the Region of Murcia (Spain); a final sample of 178 students remained after eliminating cases with missing data on any of the instruments used, reducing the original group by 18%. The sample was taken from three schools, such that 46% of participants attended public schools and 54% attended charter schools. Students ranged in age from 12 to 17 years ($M = 14.52$; $SD = 1.42$), and 49.3% were male. The socioeconomic and cultural level of the participants was medium, and an incidental sampling procedure was used. The distribution of these students by their year in school is shown in Table 1.

Table 1. *Distribution of students by year in school*

	7th grade	8th grade	9th grade	10th grade
Frequency	24	11	76	67
Percentage	13.5%	6.2%	42.7%	37.6%

Instruments

1. Personality was assessed using two measures, given the spread of the participants' chronological age. The BFQ-C (Barbaranelli et al., 1998) was applied to students between the

ages of 12 and 15, and the NEO-FFI (Costa & McCrae, 2008) was administered to the 16- and 17-year-olds. Both instruments were selected because they were based on the Big Five model.

a) Big Five Questionnaire on personality, for children (BFQ-C; Barbaranelli et al., 1998); in particular, its adaptation to Spanish (Del Barrio et al., 2006). This assessment is designed to measure personality in childhood and adolescence (8-15 years). It contains 65 items on a Likert-type scale with five choices ranging from *almost always* to *almost never*. These items are classified along the five dimensions described in the Big Five model: Conscientiousness, Agreeableness, Extraversion, Emotional Instability and Openness to experience. Del Barrio et al. (2006) obtained adequate reliability with scores between .78 and .88.

b) NEO Personality Inventory- Revised, reduced version (NEO-FFI; Costa & McCrae, 2008), containing 60 items with five answer choices, from *totally disagree* to *totally agree*. Age of application is 16 years and older. This instrument evaluates five personality factors: Conscientiousness or Tenacity, Agreeableness or Friendliness, Extraversion, Neuroticism vs. Emotional Stability, and Openness to Experience. The authors obtained reliability coefficients between .63 and .79.

2. The Torrance Test of Creative Thinking (TTCT; Torrance, 1974) was used to evaluate creativity.

This test assesses students' level of creativity through two sub-tests, one verbal and one figural. For this study we have used the figural sub-test. Both forms evaluate fluency (number of answers given), flexibility (variety of responses), originality (novel answers), and elaboration (details provided to enhance the creative product). Of the three games included in the figural creativity test, for the present study we used Game 3: "Parallel Lines". This Game was selected because it is the option that best evaluates the four creativity skills (Ferrando, Ferrándiz, Bermejo, Sánchez, Parra & Prieto, 2007; Oliveira, Almeida, Ferrándiz, Ferrando, Sainz & Prieto, 2009). Test reliability obtained for this study was a Cronbach alpha coefficient of .782 and Guttman split-half coefficient of .787.

Procedure

First, we selected the schools and the school grades which would be evaluated. Second, the schools were contacted; we prepared a calendar of test administration, according to their

availability, and a written authorization request for parents of the students who would be participating, to inform them about the study objective and to obtain their authorization. Third, the different tests were applied during school hours by experienced assessors in the areas of Psychology and Pedagogy. Fourth, the tests were corrected and the answers computerized; finally, the statistical analyses were performed and study conclusions were drawn.

Data analyses

A quantitative, nonexperimental study design was used. The following statistical analyses were conducted in order to address the objectives of the present study: reliability analysis of the test instrument for creativity (TTCT Game 3); descriptive analyses; Pearson's correlation coefficient analysis, to study the relationship between the study dimensions; and comparison of means analysis (one-way ANOVA), between the different creative groups--all of these calculated using SPSS version 24 for Windows.

Results

First, we analyzed the descriptive statistics of the study variables, including the minimum and maximum scores, and asymmetry and kurtosis values (see Table 2).

Table 2. *Descriptive statistics of the study variables.*

	Minimum	Maximum	Mean	SD	Asymmetry	Kurtosis
Conscientiousness	6.00	92.00	52.75	21.61	-.203	-1.285
Openness	11.00	39.00	26.20	5.10	-.213	.033
Extraversion	18.00	50.00	37.63	6.70	-.540	-.077
Agreeableness	14.00	50.00	34.84	7.14	-.297	-.326
Emotional Instability/Neuroticism	6.00	47.00	25.16	8.33	.283	-.208
TTCT Fluency	1.0	30.0	16.35	7.21	.247	-.764
TTCT Flexibility	3.0	23.0	11.79	4.38	.039	-.651
TTCT Originality	3.0	66.0	29.54	14.68	.288	-.631
TTCT Elaboration	1.0	67.0	23.94	12.63	.706	.690

After analyzing the mean scores obtained by the students, we note that the mean for Conscientiousness is the highest, while scores in the other four personality traits have very similar, lower means. Looking at the creativity scores, the highest means are in originality and elaboration. As for minimum and maximum scores and score distribution, a normal distribution was observed. Scores of asymmetry and kurtosis fall within adequate limits, as established by the scientific literature, except for the kurtosis score in Conscientiousness, which indicates the presence of outliers in this variable.

To further examine the relationship between the constructs of our study, we carried out a Pearson correlation analysis, reported in Table 3.

Table 3. *Correlations between study variables*

	TTCT Fluency	TTCT Flexibility	TTCT Originality	TTCT Elaboration
Conscientiousness	.163*	.077	.142	-.091
Openness	.106	.059	.096	.161*
Extraversion	.210**	.160*	.180*	.033
Agreeableness	.097	.042	.086	-.047
Emotional Instability/Neuroticism	.037	.019	.002	-.064

** The correlation is significant at level .01 (bilateral).

* The correlation is significant at level .05 (bilateral).

After examining the results, it is notable that the statistically significant relationships that do exist between personality traits and creativity variables are of low or moderate magnitude. The personality trait most closely related to creative variables is Extraversion; it presents positive, statistically significant relations with three of the four dimensions considered in the study of creativity, namely, Fluency, Flexibility and Originality. Other personality traits are also related to certain creativity dimensions, such as Conscientiousness and Fluency of ideas, and Openness to experience and Elaboration. The single most significant, highest magnitude relationship, as observed in Table 3, is between the trait of Extraversion and the dimension of

Fluency of ideas.

Such relationships indicate that these two types of personal characteristics (personality and creativity) have certain associations between them. Consequently, we ask whether individuals who present greater creative potential also have a different personality profile from others who present a lower level of creativity.

Table 4 shows the descriptive statistics (means and standard deviations) of participants' scores according to level of creativity. For this purpose, the sample was divided into three groups according to creativity scores (high, medium and low creativity) as obtained in Game 3 "Parallel lines" of the TTCT (Torrance, 1974). Levene's test was carried out in order to verify homogeneity of variances of the variables used, and Extraversion was the only variable that did not fulfill this assumption.

Table 4. *Descriptive statistics of personality according to level of creativity*

	1 (N=45)	2 (N=91)	3 (N=42)		
	<i>Mean</i> (<i>SD</i>)	<i>Mean</i> (<i>SD</i>)	<i>Mean</i> (<i>SD</i>)	<i>ANOVA</i>	<i>Post Hoc</i>
Conscientiousness	52.33 (19.88)	50.42 (21.05)	61.86 (21.77)	F(2, 175)= 4.400; <i>p</i> = .014	3 > 2
Openness	26.07 (5.05)	25.65 (5.48)	27.48 (4.31)	F(2, 175)= 1.848; <i>p</i> = .161	
Extraversion*	36.22 (7.21)	37.34 (6.86)	40.19 (4.92)	F(2, 175)=4.309; <i>p</i> = .015	3 > 1; 3 > 2
Agreeableness	35.73 (6.65)	33.35 (6.90)	37.86 (7.25)	F(2, 175)= 6.404; <i>p</i> = .002	3 > 2
Emotional Instability/ Neuroticism	24.31 (8.11)	26.19 (8.81)	24.62 (8.12)	F(2, 175)= .937; <i>p</i> = .394	

Note: 1: Low creativity group; 2: Medium creativity group; 3: High creativity group

*Equality of variances not assumed

From the descriptive standpoint, we can observe that students with the highest creativity also obtain the highest scores in four of the five personality traits assessed (Conscientiousness, Openness, Extraversion and Agreeableness). By contrast, in the Emotional Instability trait, students with medium creativity are the group that obtains the highest mean scores.

In order to learn whether the observed differences were statistically significant or not, we carried out a one-way ANOVA. In Table 4, we can also observe statistically significant differences in personality according to level of creativity, in Conscientiousness, Extraversion and Agreeableness. In order to learn which pairings of creative groups (high, mean and low creativity) show these differences, we carried out post hoc analyses (DMS in variables where equal variances are assumed, and Dunnett's T3 where not assumed). Results indicate that these differences exist in the case of Conscientiousness and Agreeableness, between the most creative students and their medium creativity peers, in favor of the former. In the case of Extraversion, differences favor the most creative students, in comparison to their peers with medium and low creativity.

Discussion and Conclusions

The results from this study indicate, on one hand, that the trait most closely related to creativity is Extraversion, followed by Conscientiousness and Openness. On the other hand, traits of Conscientiousness, Agreeableness and Extraversion are what most differentiate students in the highest creativity group from their peers with medium and low creativity. These results differ from those of King et al. (1996), who found differences between the creativity groups only in Openness, and from results in Szobiová (2006), who found no differences between the creativity groups in any personality trait.

As we have noted in the literature review, other studies discuss very different results from those found here, finding relationships mainly between creativity and the personality variable Openness to experience (Chamorro-Premuzic, 2006; da Costa et al., 2015; Dollinger et al., 2004; George & Zhou, 2001; King et al., 1996; Wolfradt & Pretz, 2001). Still other studies showed that no single trait was most closely related to creativity, rather, a combination of traits best defined creative behavior or achievement, such as Extraversion and Openness, in the study by Chamorro-Premuzic and Reichenbacher (2008). Following this line, Feist (2019) proposed that Plasticity, understood as a combination of Openness to experience and Extraversion, was related to and a better predictor of creative thinking and behavior.

We may conclude that, according to our results, the variables of Extraversion and Conscientiousness are fundamental traits for identifying the creative profile. In the case of our

students, having a high score in Conscientiousness did not hinder their creative realization, on the contrary, it facilitated creative achievement. These results concur with those of authors like Furnham (2015), Ma (2009) and Szobiová (2006), who found that the traits of Extraversion and Conscientiousness were positively related to creativity.

Positive, significant relations between Extraversion and Creativity were also found, in studies from Dollinger et al. (2004), King et al. (1996), and Martindale and Dailey (1996). Moreover, Furnham and Bachtiar (2008), using four measures of creativity, found a significant correlation between Extraversion and Creativity. These results point in the same direction as those obtained in the present study, using the TTCT (Torrance, 1974) to assess creativity.

In the case of Conscientiousness, numerous studies have found correlations with creativity, but in a negative sense. Examples of this include studies by Feist (1998), da Costa et al. (2015), and George and Zhou (2001), differing from the present study where we found a positive correlation.

One noteworthy result from our study pertains to the Agreeableness trait. This is a variable that does not appear to be related to the creative profile in most studies, with the exception of the study by Ma (2009), where relations were reported between creativity and all personality traits. Agreeableness is a personality trait having to do with tolerance and a predisposition to establish good social interactions.

Study limitations include the small sample size, and the use of a single instrument to measure students' creative potential. Nonetheless, the TTCT is a widely used instrument, having adequate psychometric properties (Ferrando et al., 2007; Kim, Cramond & Bandalos, 2006; Oliveira et al., 2009); results from Prieto, López, Ferrándiz and Bermejo (2003) also indicate that the TTCT is an adequate measure for assessing creativity in early years of schooling (early childhood and first grade of primary education).

In the future, it would be interesting to analyze the predictive capacity of personality on creativity through longitudinal studies. This is especially true given that the context influences the development and manifestation of creativity, as several authors indicate (Sternberg & Lubart, 1995; Csikszentmihalyi, 1990; Amabile, 1983). In order to attain creative achievement in different fields of knowledge or in different activities of daily life (Ivcevic, 2007), other

factors are needed, such as training (encouraged by the context), intrinsic motivation and high creative potential (Feist, 2013).

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