

Creative Personality Scale. A new version for college students from Argentina

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Resumen: La creatividad y las prácticas ligadas a fomentarla en el ámbito universitario constituyen en la actualidad un tema de interés. La creatividad en tanto fenómeno multidimensional requiere ser evaluada en sus distintas facetas, siendo la personalidad una de las que mayor relevancia reviste. Se propone así, adaptar localmente la Escala de Personalidad Creativa (EPC) de Gough para ser aplicada en el ámbito universitario. El instrumento se compone de 30 adjetivos a ser respondidos por los evaluados según se identifiquen o no con cada uno de ellos. Se realizó un análisis factorial exploratorio y de consistencia interna ($n = 150$) y otro confirmatorio y de validez convergente ($n = 150$) a partir de dos muestras independientes. El procedimiento exploratorio conservó ocho ítems y una estructura factorial unidimensional con una óptima consistencia interna (Alfa ordinal = .853). Este modelo se verificó empíricamente mediante el análisis confirmatorio que arrojó óptimos índices de ajuste y un apropiado índice de consistencia interna. Adicionalmente se obtuvieron adecuadas evidencias de validez convergente del instrumento en relación con otros constructos teóricamente afines. Los resultados se discuten a la luz de la teoría y las limitaciones del diseño, destacando los alcances del estudio y las futuras líneas de investigación.

Palabras claves: Escala de Personalidad Creativa; Estudiantes Universitarios; Adaptación; Validez de Constructo; Validez Convergente; Consistencia Interna.

Abstract: Creativity and actions aimed at fostering it became a matter of interest in higher education. Since creativity is a complex phenomenon, its multiple dimensions must be assessed. Among them, personality arises as the most relevant one. Therefore, the local adaptation of Gough's Creative Personality Scale to be used in college students is presented. Examinees must indicate, among a list of adjectives/items, whether they feel described by each one of them or not. Two independent samples ($n = 150$ each) were employed to develop an exploratory factor analysis and an internal consistency analysis on the one hand, and a confirmatory factor analysis and a convergent validity study on the other.

The exploratory procedure retained eight items and a 1-dimension structure with a good internal consistency (ordinal Alpha = .853). This model was empirically verified by the confirmatory analysis which showed good fit indices, as well as an adequate internal consistency coefficient. Moreover, adequate convergent validity evidences were obtained. Findings are discussed considering the theoretical model and the study weaknesses along with practical and theoretical outcomes. Further research lines are outlined.

Keywords: Creative Personality Scale; College Students; Adaptation; Construct Validity; Convergent Validity; Internal Consistency.

Introduction

Creativity and actions aimed at fostering it became a matter of interest in several professional fields -organisational, artistic, familial, etc.-. Among them, the educational one arises as central given its influence in the development of individual cognitive skills, which are essential in daily life situations. Traditional education methods usually restrict students' creativity according to social norms and conventions (Csikszentmihalyi, 1996; Gardner, 1984). However, international organisations point out the importance of strengthen this ability along with solving-problem competences. Accordingly, creativity, critical thinking, cooperative teamwork, curiosity and resilience emerge as pillars of knowledge (OEI, 2010; UNESCO, 2017). This is a novel productive paradigm based on knowledge, creation and innovation (CEPAL, 2011). Hence, education focused on creativity becomes crucial, especially in the higher level of the system.

Creativity in Higher Education

This matter raises several questions. Why some students are more creative than others? Do certain courses demand more creative profiles than others? Can creativity improve academic achievement? Can creativity be trained? Does it depend on the teaching methods? Various studies analysed this variable related to others, such as cultural (Lee, Therriault, & Linderholm, 2012; Saeki, Fan, & Van Dusen, 2001; Smit, 2013), sociodemographic -gender, age- (Baer & Kaufman, 2008; Roskos-Ewoldsen, Black, & McCown, 2008), academic -type of course, academic achievement- (Atwood & Pretz, 2016; Bolandifar & Noordin, 2013; Daly, Mosyowski, Oprea, Huang-Saad, & Seifert, 2016; Gajda, Karowski, & Beghetto, 2016; Krumm, 2004; Naderi, Abdullah, Aizan, Sharir, & Kumar, 2009; Nami, Marsooli, & Ashouri, 2014), as well as psycho-educational and psychological -learning approaches, emotional intelligence, motivation, personality and locus of control, etc.- (Chen, 2016; Joy, 2008; Lather, Jain, & Shukla, 2014; Mukhopadhyay & Sen, 2012; Rodríguez-Suárez, Llamas-Salguero, & López-Fernández, 2015; Sitar, Černe, Aleksić, & Mihelič, 2016). Findings describe creativity in different individuals, how culture influences its development, how creativity changes through lifespan, how it differs according to the academic field, and which is its linkage to academic achievement.

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Diverse educational organisations have taken up teaching methods based on creativity and problem-solving skills. This implies the gradual withdrawal of traditional teaching methods, making use of new design thinking methods, creative problem-solving, and brainstorming (DeHaan, 2009; Klawe, 2017). To do so universities should analyse creative skills in students. These findings will lead to renovated teaching methods aimed at boosting creativity. The most straightforward and efficient way to gather such data, either in terms of time or money, is the use of valid and reliable tests.

Psychometric Assessment of Creativity

There is widespread consensus on the notion of multiple factors explaining human creativity, which can be grouped into four broader categories. They are person, process, product and environment (Isaksen, Puccio, & Treffinger, 1993; López, Corbalán, & Martínez, 2006; Rhodes, 1961; Simonton, 2003). Even though all of them can be measured by means of psychometric tests, most studies examine only the process and person categories. Consequently, there is a higher number of scales to assess such features.

Regarding the creative process dimension, scales usually employ Guilford's indicators (Guilford, 1950): fluency –in terms of quantity-, flexibility –as variety -, originality –as to innovation-, and elaboration –related to details- (Artola, Barraca, Mosteiro, Ancillo, Poveda, & Sánchez, 2012; Corbalán-Berná, Martínez-Zaragoza, Donolo, Alonso-Monreal, Tejerina-Arreal, & Limiñana-Gras, 2006; de la Torre, 1991; Guilford, 1967; Torrance, 1974). Hence, creative persons can offer a high number of responses –fluency-, more varied –flexibility-, unknown –originality-, and socially desirable –elaboration-. Several tests to measure the creative process have adapted versions useful to be employed in local populations (e.g. Aranguren, 2014; Corbalán-Berná et al., 2006; Krumm, Lemos, & Filippetti, 2014; Martínez-Zaragoza, 2003).

With reference to the person dimension, its analysis can be performed in terms of multiple facets, feasible to be assessed psychometrically. Such facets can be classified into five broader categories: 1) attitudes and interests –defined as openness to problems, motivation, confidence, independence, among others-, 2) perceptual-cognitive tendency –described as perceptive flexibility and preferred way of thinking-, 3) biographic –early experiences, hobbies, meaningful experiences, family history, education, etc.-, 4) specific creative personality factors –*locus* of control, risk tolerance, ambiguity tolerance, self-concept-, and 5) creative personality –defined as openness to experience, sensitivity, audacity, individualism, initiative, curiosity, imagination- (Benlliure, 2006). According to the above, this study was centred in one of the five possible creative person's approaches: the creative personality. The reason behind this is that, on the one hand, creative personality is the trait most frequently assessed in the educational field, enabling results comparison (Meneely & Portillo, 2005; Santamaría & Sánchez, 2012; Wang, Chen,

Zhang, & Deng, 2017). On the other hand, findings on creative personality may be useful to adapt teaching programs to social and job market requirements. Thus, practitioners such as educational psychologists, teachers, counsellors, or tutors would lead these improvements and, simultaneously, would apply them daily (Chen & Chen, 2012).

Regarding assessment, creative personality may be analysed by two types of scales: the personality scales and the scales to measure distinctive features in creative persons. The first one is composed of classic personality tests that assess non-pathological styles/traits or pathologic personality (Cattell, Cattell, & Cattell, 1993; Costa & McCrae, 1992; Eysenck & Eysenck, 1975). They analyse dimensions typical of creative individuals –openness to experience, extraversion, emotional stability, ambiguity tolerance, psychoticism –among other diverse personality traits unconnected with creativity- (e.g. Abraham, Windmann, Daum, & Güntürkün, 2005; Burch, Pavelis, Hemsley, & Corr, 2006; Esfahani, Ghafari, Emami, & Baboli 2012; Joy, 2008; Kaufman, 2009; Martín-Brufau & Corbalán-Berná, 2016; Runco & McGarva, 2013; Sternberg, 2006). There are few locally adapted scales to assess creative personality using this approach, which obtained adequate validity evidences and good reliability indices (e.g. Richaud de Minzi, Lemos, & Oros, 2003; Squillace, Picón-Janeiro, & Schmidt, 2013). Several authors analysed these creative personality traits in college students employing these tests (e.g. Elisondo, Donolo, & Corbalán, 2009; Páramo, Straniero, García, Torrecilla, & Gómez, 2012).

The second type of scales comprises those exclusively developed to assess features hypothesised as distinctive of creative individuals, such as originality, imagination, curiosity, intelligence, self-confidence and sensitivity (e.g. Domino, 1970; Gough, 1979; Holmes, 1976; Khatena, 1971). Those dimensions were analysed in college students from different countries (e.g. An, Song, & Carr, 2016; Mi-Ra & Jim-Hee, 2016; Tsai, 2015). However, such features cannot be assessed in local populations since there are neither local versions available nor new scales developments in process.

The main difference between both groups of scales – personality scales and scales measuring distinctive features of creative persons- relies on the type of assessment: measuring creativity among other personality traits or measuring creativity as a unique object. Nevertheless, this does not imply the superiority of none. Classic personality scales provide useful information to outline an individual profile, without focusing on creativity since it is only one among the whole personality traits. Conversely, scales to measure creative personality as a single dimension are centred on its description in depth (Benlliure, 2006). The use of one or another should be decided according to the goals of the assessment.

As mentioned above, though classic global personality tests to measure traits related with creativity are locally available, the lack of scales assessing creative personality is worthy to be highlighted. Therefore, this study is aimed at analysing psychometric features of the Creative Personality Scale (Gough, 1979), given its international widespread use.

Gough's Creative Personality Scale

The Creative Personality Scale (CPS) (Gough, 1979) specifically assesses this 1-dimension variable. It is based on the *Adjective Check List* (ACL) (Gough & Heilbrun, 1965), which was locally adapted (Leibovich de Figueroa & Schufer de Paikin, 1989). The ACL examines individuals' self-perceptions and outlines a creative personality profile. It is composed of 300 adjectives/items -grouped into 24 scales- with a dichotomous response (+ or -), according to the examinee's feeling about being properly described by those items.

The CPS (Gough, 1979) was developed based on a correlational procedure calculated on the ACL's 300 adjectives. After that, 30 of them were selected due to their high association coefficients. The scale's internal consistency was estimated by analysing different samples: 1) practitioners from diverse fields –architects, mathematicians, scientists, engineers-, 2) male postgraduate Psychology students, 3) female graduates in Mathematics and senior students from different college courses, among other populations, and 4) male and female Psychology postgraduates. Adequate Alpha coefficients were obtained ($>.70$). Convergent validity evidences were analysed as well, correlating the total scale score with other tests scores, used as external criteria. Such procedure was conducted in different samples, split by gender, professional field, course students were attending, etc. Sample sizes varied between 35 and 256 participants. Correlation indices between .14 and .40. were obtained. Therefore, the scale showed appropriate reliability and convergent validity evidences (Gough, 1979).

CPS was adapted to be used in different countries, and the resulting versions maintained the 1-dimension structure (Garcés et al., 2015; Park, 2013, 2014; Zampetakis, 2010). Other studies found that scores correlated in a significant and positive way with dimensions theoretically related, such as openness to experience, extraversion, and other measures of creative personality (Kaduson & Schaefer, 1991; Wolfradt & Pretz, 2001).

CPS was widely employed in research on higher education (e.g. An & Runco, 2016; Barrantes-Vidal, Caparrós, & Obiols, 1999; Batey & Furnham, 2008; Dollinger, Palaskonis, & Pearson, 2004; Luescher, Barthelmess, Kim, Richter, & Mittag, 2016). Because of that, its psychometric analysis was developed in local population. Thus, a valid and reliable scale will be available for practitioners to be used. For those reasons, this study analysed the 30 items composing the CPS (Gough, 1979), taking into consideration the local version of the *Adjective Check List* (ACL) developed by Leibovich de Figueroa and Schufer de Paikin (1989). So, the main goals were aimed at: 1) analysing the scale's construct validity evidences and its internal consistency, and 2) examining convergent validity evidences by means of external criteria.

Method

Participants

Pilot study: 10 college students attending the Faculty of Psychology.

Exploratory factor analysis and internal consistency study: 150 college students (44% males; 56% females) from Buenos Aires. Ages were between 17 and 50 years old ($M_{age} = 21.96$; $SD = 5.66$; $Mdn = 21$). 53.3% of them attended Psychology whereas 46.7%, Engineering.

Confirmatory factor analysis and convergent validity evidences study: 150 college students (47% males; 53% females) from Buenos Aires, with ages from 17 to 56 years old ($M_{age} = 21.86$; $SD = 6.80$; $Mdn = 20$). 52% attended Psychology and 48% attended Engineering.

Instruments

- *Socio-demographic and academic survey:* It gathered data about gender, age, university, faculty, and course.
- *Creative Personality Scale:* Based on the locally adapted version of the *Adjective Check List* (ACL) (Leibovich de Figueroa & Schufer de Paikin, 1989), resulting from the original 30 items selected by Gough (1979). Such items/adjectives must be responded by means of a dichotomous scale. The options, (+) and (-), express whether each adjective applies to the examinees or not, according to their self-perceptions.

18 items are positive (+), and therefore their scores must be added to obtain the total score –Capable, Clever, Self-confident, Egotistical, Humorous, Individualistic, Informal, Insightful, Intelligent, Wide Interests, Inventive, Original, Reflective, Resourceful, Confident, Sexy, Snobbish, Unconventional-, whereas the remaining 12 are negative and consequently they must be negatively subtracted (-) –Affected, Cautious, Commonplace, Conservative, Conventional, Dissatisfied, Suspicious, Honest, Mannerly, Narrow Interests, Sincere, Submissive-. The total score -varying between -12 and +18, obtained by the addition of positive items and the subtraction of the negative ones, responds to the goal of showing which features are present and absent in creative individuals' self-perceptions.

Tests used in the convergent validity study:

- *CREA* (Corbalán-Berná et al., 2006): It assesses the verbal facet of the creative process. Their items were chosen accordingly to the classic creativity factors –originality, fluency, flexibility, and divergent production- along with other categories hypothesised as associated with creativity, such as problem-finding, lateral thinking, the cognitive mechanisms of overinclusion, motivation, and personality, among others (Corbalán-Berná & Limiñana-Gras, 2010). The respondent must think as many questions as

possible about a visual stimulus -image- which is shown for four minutes. The score expresses a 1-dimension measure of the verbal creative process. It is estimated by the addition of scores for each question, according to the number of cognitive schemata use by the examinee to formulate each question. The test is composed of three stimuli (A, B and C) to be used in individuals of different ages. CREA A can be employed with children from 10 years old onwards. CREA B, from 12 whereas CREA C, from 6 years old onwards. All of them can be used in collective or individual sessions. Responses must always be written by the examinees, except for children between 6 and 9, who only respond orally and individually. The scale obtained adequate validity evidences in American (Clapham & Ryan-King, 2010), Spanish and Argentinian populations (Corbalán-Berná et al., 2006). The adapted version to be used in Argentinian population, which was analysed in this study, showed appropriate predictive, convergent and discriminant validity evidences as well as parallel forms reliability. This study employed only stimulus A.

- *Revised Two Factor Study Process Questionnaire (R-SPQ-2F)* (Biggs, Kember, & Leung, 2001): The locally adapted version for college students from Buenos Aires was used (Freiberg-Hoffmann & Fernández-Liporace, 2016). It assesses two learning approaches, the deep one and the surface one, by means of 20 items responded by a 5-option likert scale. The first approach correlates positively with creativity (e.g. Mukhopadhyay & Sen, 2012; Rogaten, Moneta, & Spada, 2012), and it is associated with curiosity, broad interests, skills linked to asking questions and a good abstractive ability. The surface approach is related to cognitive simplicity, a poor conceptual comprehension, problem-solving without clear understanding, learning by heart and repeating ideas as well as the lack of interest in relating notions. Since there is no evidence about the relationship between the surface approach and individual creativity, this dimension was excluded from the convergent validity analysis. The local version of R-SPQ-2F (Freiberg-Hoffmann & Fernández-Liporace, 2016) obtained adequate results on content, *facies* and construct validity evidences –exploratory and confirmatory factor analyses-. Additionally, each one of its dimensions showed appropriate internal consistency and temporal stability indices.

Procedure

Data were gathered during classes in both faculties, by a trained psychologist. Participants signed an agreement where they were informed about the research goals. They also received the assurance on the data confidentiality and anonymity. No retribution was payed. Faculties authorities and teachers allowed the procedure.

Design and data analysis

A cross-sectional, psychometric study was conducted.

FACTOR v. 10 software was used to develop the exploratory factor analysis and LISREL v. 8.8 was chosen for the confirmatory one. The dichotomous nature of the variables led to employ a statistically robust methodology. Therefore, to perform exploratory and confirmatory factor analyses a tetrachoric correlation matrix was estimated (Lloret, Ferreres, Hernández, & Tomás, 2017; Price, 2017), also used to calculate internal consistency by the ordinal Alpha index, which is appropriate for categorical variables. This procedure avoids possible coefficient underestimations (Gadermann, Guhn, & Zumbo, 2012). SPSS v. 21 package was employed to conduct the convergent validity evidences analysis.

Results

Pilot study

Ten students attending the Faculty of Psychology participated. They examined the Creative Personality Scale (Gough, 1979), based on items from the local version of the *Adjective Check List* (Leibovich de Figueroa & Schufer de Paikin, 1989). Participants were told to point out ambiguous or confusing contents. Since only two suggestions were made, and most students found items and instructions easy to understand, the scale was not modified.

Exploratory factor and internal consistency analyses

A parallel analysis based on tetrachoric correlations and the generation of 500 random matrices to be compared to real data obtained in the matrices was developed. Results were explained considering percentile 95 of random variances in order to analyse the hypothesised 1-dimension nature of the model (Ledesma & Valero-Mora, 2007; Merino-Soto & Domínguez-Lara, 2015). Such procedure verified the pertinence of extracting a unique factor (Table 1).

Table 1. Parallel analysis.

Variable	Real-data % of variance	Mean of random % of variance	95 percentile of random % of variance
1	45	26	31

Subsequently, an exploratory factor analysis was calculated from a tetrachoric correlation matrix. Given the previous result, the extraction was forced to one factor. Moderate ba-

lance and fit between the number of indicators and the number of participants was found (KMO= .683; Bartlett's Sphericity Test: $X^2= 209.1$; $df = 28$; $p < .01$). After that, all

the items not reaching a minimum load of .40 were removed (Lloret-Segura, Ferreres-Traver, Hernández-Baeza, & Tomás-Marco, 2014).

The 1-dimension factor solution extracted maintained 8 of the original 30 items, achieving a proportion of common variance of 54% (Table 2).

Table 2. Factor structure of Creative Personality Scale.

Items	Creative Personality
Intelligent	.787
Wide Interests	.838
Inventive	.687
Original	.591
Resourceful	.511
Sexy	.535
Commonplace	.463
Narrow Interests	.844

The factor's internal consistency obtained an ordinal Alpha index of .853.

Confirmatory factor analysis

A confirmatory factor analysis was conducted to test the model extracted from the exploratory study (Figure 1). Regarding the dichotomous nature of the observed variables, a robust procedure based on a tetrachoric correlation matrix and the diagonally weighted least squares estimation method (DWLS) was developed (Míndriř, 2010).

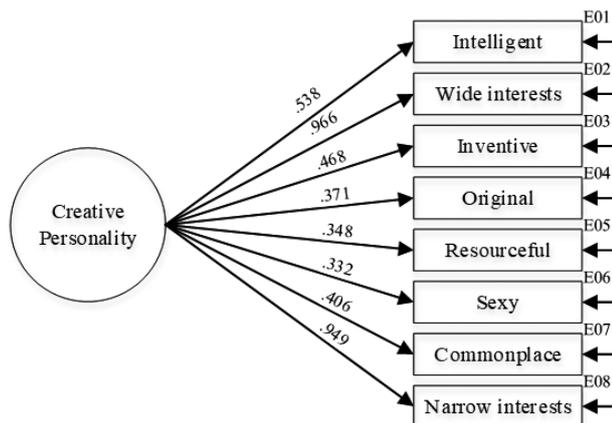


Figure 1. Creative Personality Scale (local version).

The model fit was analysed by different indices: NFI (Normed Fit Index), NNFI (Non-Normed Fit Index), CFI (Comparative Fit Index), IFI (Incremental Fit Index), y RMSEA (Root Mean Square Error of Approximation) (Jöreskog, Olsson, & Wallentin, 2016). As Table 3 shows, they reached optimal values, higher than .90 in the cases of NFI, NNFI, CFI e IFI, and inferior to .05 for RMSEA (Byrne, 2008; Cheung, 2015).

Table 3. Creative Personality Scale. Fit Indices (local version).

	Fit Indices				
	NFI	NNFI	CFI	IFI	RMSEA [IC]
Creative Personality	.943	.980	.986	.986	.04 [.00-.08]

The exam of the estimated parameters shows that all of them were significant ($p < .05$). This means that the observed variables significantly explained the latent variable. However, despite the values of these parameters were acceptable ($>.30$) (Comrey & Lee, 2009; Whitley & Kite, 2013), only 2 of 8 achieved optimal estimations ($>.70$), equivalent to a coefficient of determination (R^2) higher than .50 (50%) (Kline, 2011). Afterwards, the internal consistency of the model was estimated, obtaining an ordinal Alpha of .771.

Convergent validity evidences analysis

Aiming at the analysis of convergent validity evidences, the total score of the Creative Personality Scale -calculated with the 8 items isolated in the previous procedures- was correlated with two different measures: on the one hand, the CREA test score and, on the other, the deep learning approach dimension of R-SPQ-2F. Since the normality hypothesis of the variables was verified, the Pearson's r coefficient was calculated. Statistically significant and positive though low correlations were obtained: CPS-CREA ($r = .204$; $p < .05$), and CPS- R-SPQ-2F's deep learning approach dimension ($r = .188$; $p < .05$).

Discussion

As stated previously, creativity plays a capital role in both the educational and professional fields. Thus, the revision of the educational system is mandatory. Universities must stimulate students' creativity considering their training and their future job performance (CEPAL, 2011; OEI, 2010; UNESCO, 2017). In order to achieve this goal, the first step is the assessment of creativity baseline of undergraduates (Robinson, 2015). So, this study was aimed at analysing psychometric features of the Creative Personality Scale (Gough, 1979), since that version was developed 40 years ago and the last local ACL version (Leibovich de Figueroa & Schufer de Paikin, 1989), 30 years ago. Hence, new studies in local college students' population were required.

In consideration of this, a pilot study was conducted first. College students from Buenos Aires examined the clarity of instructions and items as well as its appropriateness in terms of the current use of language. Since only two suggestions arose, no changes were made.

The second phase consisted in an exploratory factor analysis, which isolated a 1-dimension solution maintaining 8 of the 30 analysed items, with an adequate proportion of explained common variance -54%-, taking into consideration the final number of items and their dichotomous nature (Morales-Vallejo, 2006).

The indices obtained through the confirmatory factor analysis, which was developed to test the results of the second step, suggest an adequate fit of the 1-dimension-8-items model. The RMSEA index $.04$ showed an appropriate parsimony (lower than $.05$), according to international consensus (Ferrando & Anguiano-Carrasco, 2010).

The analysis of the estimated parameters showed that all of them made a significant contribution to the explanation of the latent variable. However, only two of the 8 items – Narrow Interests, Wide Interests – contributed with a high percentage of their variability $> 50%$ to the explanation of the model. It is important to notice that both items are opposite. This leads to hypothesise that interests are the core of creative personality. Some authors support such notion (Csikszentmihalyi, 1996; Fernández-Fernández & Peralta-López, 1998; González-Romo, et al., 2007).

The other items/adjectives, which contributed in a lower degree to the explanation of the model, are Intelligent and Inventive on the one hand, and Commonplace on the other. Several studies emphasised the importance of these three attributes to assess the individuals' creativity (e.g. Csikszentmihalyi, 1996; Ivcevic & Mayer, 2007; Jauk, Benedek, Dunst, & Neubauer, 2013). Items such as Original and Resourceful contributed in an even lower degree. Such features seem to play a secondary role in creativity, at least in this sample despite recent reports about their importance (Acar, Burnett, & Cabra, 2017; Sanz de Acedo Lizarraga, Sanz de Acedo Baquedano, & Closas, 2014). Such difference in findings must be tested in further studies with wider and more heterogeneous samples. In addition, the item Sexy showed the lowest contribution to the explanation of the model. This item was not analysed in previous studies as the rest of the adjectives. That was due to this attribute is a physical dimension of Self-concept, notion related to creative personality, as reported by some studies (e.g. Benlliure, 2006; Garaigordobil-Landazabal & Pérez-Fernández, 2005).

Since the attribute Sexy is a secondary facet of a more general dimension like Self-concept, its lowest explicative power was predictable.

This difference among the parameters in their contribution to explain the model expresses the difference among the items as indicators of the concept of creativity. Such difference must be considered in actual educational situations when analysing assessments in order to get more precise conclusions related to creative personality. Further confirmatory factor analyses should be carried out in new samples as well as factor invariance studies. They will test the stability of the findings here presented –model fit and estimated parameters–, adding new evidences to support the generalisation of the model.

As for the items eliminated from the structure, -Capable, Clever, Self-confident, Egotistical, Humorous, Individualistic, Informal, Insightful, Reflective, Confident, Snobbish, Unconventional, Affected, Cautious, Conservative, Conventional, Dissatisfied, Suspicious, Honest, Mannerly, Sincere, Submissive–, the study developed by Luescher, Barthelmess,

Kim, Richter and Mittag (2016) examining the factorial structure of the Creative Personality Scale in populations from different regions, concluded its variation from one culture to another. These authors emphasise, on the one hand, the differential effect of social desirability according to the culture. For instance, the present study reported that 6 of the 18 positive items (33%) remained in CPS whereas only 2 of the 12 negative items were maintained (18%). Such an imbalance should not only be due to cultural differences but to the original scale features, which included 18 positive items and 12 negative (Gough, 1979). On the other hand, the study by Luescher et al. (2016) mentioned above identified the attributes/traits Inventive, Original and Wide Interests as common features in creative individuals in diverse cultures. They were isolated in the present study as well. Conversely, the adjectives showing higher differences were Individualistic, Insightful, Self-confident, Reflective, Unconventional, Honest, Dissatisfied and Informal. These were precisely the items eliminated from the factor solution here analysed. Luescher et al. (2016) stated that such items behaviour is due to the cultural dependence of creativity and how it is valued. Thus, for instance, Western culture praises abstraction, logical reasoning, and independent thinking whereas Eastern culture appreciates wisdom, humaneness and virtue as creative features in persons. The previous paragraphs show how the Western culture approves qualities associated with success, considering them as central in creative people whereas the Eastern one recognises collective welfare. That leads to hypothesise that the adjectives which were eliminated from the factor solution because of their non-significant correlations with the remaining items, at least in the sample analysed in this study, do not play a key role in the explanation of creative personality.

Regarding the internal consistency analysis, both exploratory and confirmatory studies found similar indices than Gough (1979), and even higher indices compared to the ones reported in other studies (e.g. Luescher, Barthelmess, Kim, Richter, & Mittag, 2016; Park, 2013, 2014).

With reference to the analysis of convergent validity evidences, the Creative Personality Scale score was correlated with other tests scores assessing variables linked to creativity –verbal creativity measured by CREA and deep learning approach measured by the R-SPQ-2F–. Associations were significant and positive ($.204$ for CREA, and $.188$ for the R-SPQ-2F's deep learning approach dimension). Despite the weakness of both indices they can be accepted as convergent validity evidences based on two reasons (Rubin, 2012). First, because low coefficients close to $.30$ are likely to be found in Psychology (Hemphill, 2003). Second, low coefficients could be due to differentiations between the correlated variables, which are related though not identical (Alfonso, Cantero, & Melero, 2009; Aranguren & Irrazabal, 2012; Clapham, 2004; Garaigordobil-Landazabal & Pérez-Fernández, 2004; Hargreaves & Bolton, 1972). Previous studies correlating Creative Personality Scale scores with theoretically associated variables –divergent thinking, openness to experience, flexi-

bility, originality, etc. – obtained similar results (e.g. Carson, Peterson, & Higgins, 2005; McCrae, 1987). Even Gough (1979) found coefficients between .12 and .40 in his studies on CPS's convergent validity evidences. He analysed such evidences using diverse scales and different samples, concluding that sample features would influence the indices obtained.

In respect of the weaknesses of this study, the lack of a content validity evidences procedure as a first step in the process of adaptation and analysis is worthy to be mentioned. In order to sort out such insufficiency the version here introduced will be re-analysed whereas new items will be added. They will be similar to the remaining 8 items in terms of content, so they will be examined by a content validity procedure before conducting a new factor analysis on them, along with the remaining 8. Apropos factor analysis, it is important to bear in mind that the samples analysed were composed only of Psychology and Engineering undergraduate students. Such sample composition should highly have affected results of the exploratory and the confirmatory factor analyses, which are always tied to the sample variability (Byrne, 2001). For this reason, results here reported are only restricted to such courses. Hence, the utility of this pool of items for undergraduates attending other courses is a possibility which must be taken into consideration. New developments should analyse in depth the model here introduced in new samples composed of undergraduates from different courses or fields.

Additionally, the samples sizes used for the exploratory and the confirmatory factor procedures can be admitted as methodologically acceptable since, on the one hand, analyses were dealing with a 1-dimension model and, on the other, the minimum proportion between the number of items and the number of participants is 5:1 and 10:1, (Kyriazos, 2018;

Osborne, 2008). Nevertheless, it is worthwhile to state that the samples sizes related to the total population of undergraduates are certainly small and they lack heterogeneity in terms of courses. Therefore, even when the findings here reported are valid regarding samples sizes, they are limited to be generalised to a wider undergraduate population. Further studies should broaden these sizes as well as the diversity of courses or academic fields to improve the likelihood of generalising conclusions. Increasing the number of participants is also desirable in order to replicate the convergent validity evidences analysis in a sample split by different criteria - course, gender, age, etc.-. That would aim at testing Gough's hypothesis (Gough, 1979) referred to the likely variation of correlational coefficients in split samples.

Finally, this study analysed the psychometric features of the Creative Personality Scale (Gough, 1979), in order to adapt it to be used with local college undergraduates. The analyses conducted led to a shorter version with good technical features, which assesses creative personality in brief sessions, suitable for educational organisations. This preliminary version would be tested in further studies to analyse creative personality related to academic and labour variables. That would enable identifying behavioural variables linked to higher and lower scores in the scales. In addition, norms will be calculated. The goal is providing researchers and practitioners of universities with this scale to describe creative personality traits in college undergraduates. Measuring the baseline of creative traits is essential for planning major changes in study plans and teaching methods –traditional versus creative, which is based on problem-solving – as well as to trace professional profiles according to the field.

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