EDUCATION & PSYCHOLOGY I+D+i
Research, Innovation and Solutions on-line®
Electronic Journal of Research in Educational Psychology
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Editorial EOS

The relationship between optimism, creativity and psychopathological symptoms in university students

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Abstract

Introduction. This study examines the protective effects of variables of dispositional optimism and creativity with respect to measurements of psychopathology or psychological distress.

Method. A total of 113 university students from different degree programs participated in the research. Measures of creativity (CREA), optimism (LOT-R) and psychopathological symptoms (SCL-90) were administered during their course on public speaking. Correlational and regression analyses were carried out using optimism and creativity as predictors for psychopathological symptoms. In order to round out the analysis, ANOVAS were carried out between three levels of creativity, with groups fomed according to low, medium and high creativity.

Results. Strong negative correlations, statistically significant, were found between dispositional optimism and psychopathological symptoms. The psychopathological symptoms measured by the SCL-90 were explained by the variable of dispositional optimism, primarily in its dimensions of depression and interpersonal difficulties. However, no significant correlational relationship was found between creativity and the measure of psychopathology. Differences in psychopathological symptoms, however, were found according to the three groups of creativity; participants with a medium level of creativity showed the least psychopatological symptoms.

Discussion and Conclusions. In the light of the results of this study, the protective effect of optimism against psychopathology, as found in other studies, was confirmed, and we offer specific proposals to be applied in psychological well-being programs. Various possibilities are suggested to explain the relationship found between creativity and psychopathology.

Keywords: Optimism, creativity, mental health, psychopathology

Received: 05/11/10 *Initial Acceptance:* 05/17/10 *Final Acceptance:* 07/30/10

Resumen

Introducción. En este estudio se analiza el efecto protector de las variables de optimismo disposicional y creatividad respecto a una medida de psicopatología o sufrimiento psicológico.

Método. Un total de 113 estudiantes universitarios de un curso de promoción educativa participaron en la investigación. Durante la realización de este curso se administraron medidas de creatividad (CREA), optimismo (LOT-R) y síntomas psicopatológicos (SCL-90). Se efectuaron análisis correlacionales y de regresión utilizando el optimismo o la creatividad como variables predictoras sobre los síntomas psicopatológicos. Para completar los análisis se efectuaron ANOVAS entre los niveles de creatividad divididos en tres grupos baja, media y alta creatividad.

Resultados. Se encontraron fuertes correlaciones negativas y estadísticamente significativas del optimismo disposicional respecto de los síntomas psicopatológicos. Los síntomas psicopatológicos medidos a través del SCL-90 eran explicados por la variable optimismo disposicional, principalmente con respecto a las dimensiones de depresión y dificultades interpersonales. Sin embargo, no se encontraron correlaciones significativas entre la creatividad y la medida de psicopatología. Se encontraron diferencias en síntomas psicopatológicos en función de los tres grupos de creatividad, siendo los participantes con un nivel intermedio de creatividad los que presentan menores sintomas psicopatológicos.

Discusión y Conclusiones. A la luz de los resultados de este estudio, se confirmó el efecto protector del optimismo frente a la psicopatología encontrado en otros estudios y se proponen propuestas concretas de aplicación en programas de promoción del bienestar psicológico. Se barajan diversas propuestas para explicar la relación hallada entre la creatividad y la psicopatología.

Palabras Clave: Optimismo, creatividad, salud mental, psicopatología

Recibido: 11/05/10 *Aceptación Inicial*: 17/05/10 *Aceptación Definitiva*: 30/07/10

Introduction

In his book entitled *The Farther Reaches of Human Nature*, the famous humanist psychologist, Abraham H. Maslow (1975), states the following: *"*Common sense means living in the world as it is today; but creative people are people who don't want the world as it is today but want to make another world*"* (p. 93). Creativity requires "getting out of the box" in order to find ideas, problems or solutions that are normally not present, they are only real in the mind of the one who is playing or inventing alternative realities for new problems and challenges that arise. Optimism, for its part, is able to see, to consider and to pursue realities that are not necessarily happening at this moment: the person expects that things will improve, or will continue to go well in the future, contributing actively to this alternative, positive reality, by building it progressively with their actions, thoughts and feelings in the present moment. Persistence and tenacity are needed in this effort, helping them to reach the goals they have proposed (Carr, 2007; Carver & Scheier, 1998).

Both optimism and creativity can be factors that facilitate adapting to new contexts characterized by rapid changes. On the other hand, although we know that optimism is a producer of positive emotions (Vera, 2008), even in adverse situations, creativity could be characterized as a certain dissatisfaction produced by the nonconformity with what currently is, triggering a search for alternative realities to the present one.

Promotion of mental health and prevention of psychological disorders have seen increased research in recent years (Horowitz & Garber, 2006). Seligman and Csikszentmihalyi (2000) indicate that the greatest progress in prevention comes out of a perspective that focuses on systematic development of competencies.

Optimism and psychopathology

Avia and Vázquez (1998) indicate that optimism, besides being a requirement for survival, is an indispensable condition for a fully human life, one of the best weapons for adapting to one's medium and for transforming it, a mechanism that allows people to overcome misfortune, to build and to dream of the future. According to Vera (2008), there are two different, but not opposing, theoretical perspectives when it comes to understanding optimism:

1. Explanatory style (Abramson, Seligman & Teasdale, 1978). The reformulated model of learned helplessness is based on attributional theory, and sustains that expectations about future events are closely related with how past events are explained. Explanatory style is the way that a person typically interprets his or her experiences. It involves three dimensions: a) *personalization*, distinguishing whether the cause of the event lies in the person or in an external factor (internal or external attribution); b) *permanence*, referring to the degree to which the cause is stable in time and tends to repeat itself (permanent or temporary attribution); *pervasiveness*, examining whether the cause affects other areas of life (global or specific attribution). The optimistic person tends to explain negative events through external, temporary and specific attributions, while the pessimist produces internal, permanent, global attributions. Conversely, positive events are explained in the opposite fashion.

The benefits of an optimistic explanatory style are numerous. It is associated with lower rates of illness, depression and suicide, and with higher levels of academic and athletic performance, professional adjustment and quality of family life (Gillham, 2000; Sánchez & Méndez, 2009b; Seligman, 1998; Seligman, Reivich, Jaycox, & Gillham, 2005). Research carried out in an educational context over a five-year period, with more than 500 children participating in the Longitudinal Study of Childhood Depression, shows that optimistic explanation cushions the harmful impact of adversity and protects against depression, while the pessimistic style increases the risk (Nolen-Hoeksema, Girgus & Seligman, 1992; Seligman *et al.*, 1984).

Optimism is related to the ability to delay gratification and to renounce short-term benefits in exchange for more valuable long-term objectives, probably because the person considers these objectives to be reachable (Carr, 2007). Sánchez, Méndez and Garber (2009) performed a study on the motivation of 87 adolescents to participate in a program to promote psychological well-being within an educational context, and found that curiosity about positive change is related positively to an optimistic explanatory style and negatively with anxious symptomatology in the participants, meaning that a more optimistic view facilitates curiosity and motivation to introduce positive changes in life (learning healthy behaviors that increase students' physical and psychology well-being, setting and following a plan of action in order to achieve personal goals, etc). It is also considered to be a protective factor against substance use in stressful situations (Torres Jiménez, Robert, Tejero, Boget & Pérez de los Cobos, 2006).

Within this conception of optimism as an explanatory style, we must highlight that the authors do not limit ourselves to working with an explanatory model, via questionnaires for measuring this construct, but we propose the *Penn Resiliency Program* (PRP), from the University of Pennsylvania (Gillham, Jaycox, Reivich, Seligman & Silver, 1990), for the purpose of encouraging optimism in the participants, with the benefits that it entails. There are at least 14 related studies, using randomly assigned participant and control groups, carried out by the creators of the PRP and by other research teams, and including the participation of over 2000 children and adolescents between the ages of 8 and 15 (Abela & Hankin, 2007). As a whole, the results reveal that the program produces a lasting reduction in anxiety and depression symptoms. Gillham, Hamilton, Freres, Patton and Gallop (2006) found that the PRP is preventive against mood disorders, anxiety disorders and adaptation disorders (combined), in a two-year follow-up of children with high levels of symptomatology. It was also found that its preventive effect against disruptive behavior was maintained 2-3 years after finishing the program (Cutuli, 2004; Cutuli, Chaplin, Gillham, Reivich & Seligman, 2006).

López, Kasanzew and López (2007) worked with a sample of 60 patients with low and medium psychopathology, assigning them randomly to a control group (classic cognitive psychotherapy) and an experimental group (classic cognitive psychotherapy plus techniques to encourage optimism). The achieved an optimization and strengthening of the effects of classic cognitive psychotherapy in the first five sessions, increasing an optimistic perspective by using Seligman's techniques for fostering optimism (Seligman, 2005) and decreasing the intensity of patients' psychopathological symptoms as measured by the SCL-90-R psychopathology scale (Casullo, 2004). Results showed a significant decrease in variables such as somatizations, phobic anxiety and hostility in favor of the experimental group as compared to the control group. Therefore, this method to increase optimism seems to optimize cognitive psychotherapy as it diminishes the intensity of patients' symptoms.

Sánchez and Méndez (2009a) performed a pilot study on a cognitive-behavioral program inspired by the PRP, whose objective was to foster optimism in 25 primary education students. They found that the experimental group significantly reduced depressive symptomatology on the post-test, thus obtaining a medium-small effect, in line with research results in this field.

Within the educational context, we would emphasize the decisive role of parents, teachers, coaches, and any other educational agent in general, in the formation of the child's or adolescent's explanatory style. This influence comes through two channels: how these agents explain what happens to them in their own lives, and more importantly, how they explain, through their comments, what is happening to their pupils. Thus they contribute decisively to the development of optimism or pessimism in their students, with its subsequent consequences for their physical and psychological health in all areas of their lives (Seligman, 2005).

2. Dispositional characteristic (Scheier & Carver, 1985). These authors define dispositional optimism as a stable, generalized expectation or belief that positive things occur in life (Scheier & Carver, 1985, 1987), making optimism the tendency to expect that the future will bring favorable results, while pessimism would correspond to an expectation that the future will bring negative events (Avia & Vásquez, 1998; Otero *et al.*, 1998). The theoretical forerunner to this concept is the behavior self-regulation model by Carver and Scheier (1981). According to this model, when difficulties arise, favorable expectations increase people's efforts to reach their objectives, and unfavorable expectations reduce these efforts, sometimes to the point of entirely abandoning the task (Carver & Scheier, 1998).

The great interest sparked by dispositional optimism is due to its large predictive power, for both psychological wellbeing and physical health, not to mention coping strategies used for overcoming different situations that occur in the course of life (Sanjuán & Magallanes, 2006). Several studies have found that optimists experience fewer negative emotions, such as negative moods or depressive symptomatology, anxiety or hostility when faced with stressful situations (Sanjuán & Magallanes, 2006). It has been demonstrated that optimistic subjects cope better with life's problems, suffer less stress and therefore have less illnesses (Ortiz, Ramos & Vera-Villarroel, 2003). Specifically in connection with coping strategies, optimistic subjects are found to have more problem-focused coping strategies than do pessimists, they assess stressful situations more positively, and seek for more social support. By contrast, pessimistic subjects tend to refuse, to give up and to not take on objectives, focusing on negative feelings (Carver & Gaines, 1987; Scheier, Weintraub & Carver, 1986).

Creativity and psychopathology

Traditionally, creativity has been related to psychopathology (Andreasen, 1996). Initially, Lombroso (1891) related more creative individuals with greater levels of psychopathology. However, this position has become very controversial, to the point that we would say there are two separate lines of research regarding psychopathology and creativity (Alonso, 2000) that have contributed proofs in favor of and against this hypothesis. There are those that establish a positive relationship (Carlsson, 2002; Clapham, 2001) and those that establish a negative relationship (Mikulincer, Kedem & Paz, 1990) between the two.

Several studies have shown that there is a relationship between creative capacity and mental disorders, generally related to the schizophrenia spectrum: associative looseness, broader attentional focus and the ability to connect new information unconventionally (Richards, 2001; Woody & Claridge, 1977). Data have been found that offer evidence for an association between creativity and schizotypical traits, since they share similar cognitive and emotional characteristics (Joscelyn *et al.*, 2004). This is related to several aspects: that the family members of schizophrenic patients present greater levels of creativity, that bipolar patients have a greater number of creative achievements (Claridge & Blakey, 2009) and that greater levels of schizotypical personality traits are associated with a greater number of problem-solving strategies, although at the cost of taking longer to solve them (Stoneham & Coughtrey, 2009). Some authors have proposed that schizotypical traits facilitate divergent processing, while emotional alteration in the form of mania provides the necessary impetus and mood for creative production (Nettle, 2002). Perhaps for this reason, there are data to uphold that creativity is not only associated with psychopathology, but that a predominance of positive emotions would benefit creativity (Lyubomirsky, King & Diener, 2005), perhaps in relation to hypomanic states (Nettle, 2006).

This fact may come under what some authors have suggested as addiction to novelty in persons with high creativity (Galang, 2010). According to these propositions, the most creative individuals would present high motivation for novelty, which could be (as the authors suggest) a form of self-regulation in order to mitigate moods derived from low cortical activation, through a capacity for generating new ideas. This addiction to novelty should be related at least in part to the fundamentals of addiction, according to which people with few D2 receptors would need higher levels of stimulation in order to feel the rewarding effects of usual

activities (Volkow, Fowler, Wang, & Swanson, 2004). This proposition is backed by studies that confirm that individuals who score high in divergent production present fewer D2 receptors, which might shed light on the association that has been found between creativity and psychopathology in the schizophrenia spectrum (De Manzano, Cervenka, Karabanov, Farde & Ullèn, 2010).

Although creativity may present characteristic forms of information processing, what seems to be accepted is that emotional alteration is not a prerequisite for creativity in the sense of there being a causal relationship between them (Glover, Ronning & Reinolds, 1989). Some promising findings underscore the importance of intelligence as a threshold favorable to creativity. Other studies have not confirmed this proposition (Kim, 2005; Preckel, Holling & Wiese, 2006). However, recent proposals underscore the importance of intelligence measured through working memory as a capacity directly related to divergent production (Vandervert, 2007). Thus, one distinction between individuals with high creativity lies in being able to select the most plausible and most promising associations (Galang, 2010), something that individuals with schizophrenic symptomatology cannot correctly achieve, thereby giving rise to overinclusion and unproductive ideations due to deficits in controlling cognitive inhibition (Lubow & Gewirtz, 1995). Thus, creativity could be associated with psychopathology due to its relationship with personality variables that would cause such a predisposition, more than because of any direct relationship with emotional alteration (Chavez-Eakle, Lara & Cruz-Fuentes, 2006). As Behrens (1975) acknowledges, the difference between the creative person and the lunatic would be the same as that between Cervantes and Don Quijote: one constructs metaphors, the other believes them to be real. Therefore, does creativity represent a protecting factor against psychopathology? Does it represent a risk due to its association with altered forms of thought, with cognitive styles that can also produce psychopathological symptoms?

In a meta-analytical study that relates positive and negative emotions with creativity, it was inferred that creativity has complex relationships with positive and negative emotions (Baas, De Drew & Bernard, 2008). The authors suggest that perhaps it is not a matter of establishing whether positive or negative emotions have better effects on creativity, but establishing their interaction with activation levels and cognitive effects related to creativity (cognitive flexibility, fluency, originality, etc.). Specifically, in this meta-analysis, an increase in creative product was also found in relationship to negative emotions such as anxiety and fear, because of persistence with an objective and focusing attention on it (Baas, De Drew & Ber-

nard, 2008), necessary characteristics for developing a creative product. In short, this meta-analysis finds that the hedonic tone variable and level of activation interact: neither is sufficient to explain the effects of emotions on creativity. Therefore, in some situations negative emotions might also favor creativity. On occasion, given a creative capacity, the creative product or performance could be encouraged or favored by both positive and negative emotions (which may lead to psychopathological symptoms). Therefore, more research would be needed in order to fully understand the relationship between psychopathology and creativity.

Objectives and hypotheses

1. To evaluate the hypothesis of optimism as a protective factor against psychopathology, as indicated by data from other studies, such that optimism would relate negatively to psychopathological symptoms. To contribute this evidence by relating the measure of dispositional optimism, LOT-R (Scheier, Carver & Bridges, 1994) with the psychopathology measure, SCL-90 (Derogatis, Lipman & Covi, 1973). No other research studies were found that take this approach.

2. To verify, in a university student population, whether this association between creativity and psychopathology was found to exist in one direction or another, given the controversy seen in research studies to date. Our hypothesis is that creativity would be negatively related to psychopathological symptoms.

Method

Participants

The sample was made up of 113 students from the University of Murcia in different degree programs.

The percentage of women (63.72%) was greater than the percentage of men (36.28%). Mean age for the sample was 22 years old. Characteristics can be found in Table 1. 77.7 % of

the participants reported a medium socioeconomic level, 18.4% a low level, and 3.9 % a high level. Table 1 illustrates the sample profile.

Table 1. *Sample descriptive data on gender and age*

	N (%)	Mean age (s.d.)
Men	41 (36,28)	23.76 (7.33)
Women	72 (63,72)	22.06 (4.50)
Total	113	22.65 (5.68)

Instruments

LOT-R (Life Orientation Test—Revised): dispositional optimism was evaluated using the measure by Scheier, Carver and Bridges (1994), in its Spanish version by Ferrando, Chico and Tous (2002). It is a self-report that evaluates general expectations toward positive or negative outcomes for the future, such that high scores on this questionnaire indicate high dispositional optimism, and low scores report low dispositional optimism. It is composed of 10 items, 4 of which are fill-in (ítems 2, 5, 6, 8) and have no validity for the analysis. Of the remaining 6 items, 3 are scored directly and the others indirectly. Subjects are asked to indicate their degree of agreement or disagreement with affirmations like "during hard times, I generally expect the best", using a 5-point scale from 0 (disagree strongly) to 4 (agree strongly).

The psychometric studies performed with this inventory show that its internal consistency (Cronbach alpha) ranges between .74 (Schou, Ekeber, Ruland, Sandwick & Karesen, 2004) and .78 (Scheier *et al.*, 1994). As for psychometric properties of the Spanish version, Ferrando and collaborators (2002) confirm adequate validity of the questionnaire and Martínez, Reyes del Paso, García and González (2006) obtain a reliability α of .75.

CREA: in order to evaluate creativity, the test by Corbalán (CREA) was used, providing a global, quantitative measurement of creativity. This test presents a 4 minute duration for formulating questions about a picture card that is presented to the subjects. The number of questions that are generated is interpreted as an indicator of cognitive flexibility and as a measurement of the subject's capacity to relate cognitive schemas, something highly related to

creativity (Corbalan, Martínez, Donolo, Tejerina & Limiñana, 2003). The instrument has been used on other occasions and has been recognized for its good psychometric qualities (TEA EDICIONES Prize 2001). It has been shown to be related to other instruments and measurements of creativity, with high correlations between them. According to the instrument data, it presented a reliability index of 0.7919, thereby indicating good psychometric properties.

SCL-90 (Symptom checklist 90—Revised): The 90-symptom questionnaire by Derogatis (1973) is a self-administered instrument that assesses the presence and intensity of 90 psychiatric and psychosomatic psychopathological symptoms. The Spanish version was developed by Gónzalez de Rivera and collaborators (1989), who find adequate psychometric characteristics of the instrument. However, it should not be used for diagnosis of psychopathology (Thompson, 1989). After its application, 9 symptomatic dimensions of psychopathology are obtained, and three global indices. Test duration ranges from 12 to 15 minutes. Scope of application is from 13 years of age and older. The scales include symptoms related to somatization (SOM), obsession-compulsion (OBS), interpersonal sensitivity (shyness, embarrassment, feeling inferior to others, oversensitivity to the opinions of others) (INT), Depression (DEP), Anxiety (ANX), Hostility (HOS), Phobic anxiety (PHO), Paranoid ideation (PAR), psychoticism (PSY) and an additional scale with various items not covered in the above (ADD). Each item of the SCL-90 is rated on a 5-point Likert scale, indicating the discomfort perceived over the last 7 days.

As for the psychometric properties of the Spanish version, González de Rivera, De Las Cuevas, Rodriguez and Rodriguez (2002) confirm adequate validity of the questionnaire. For reliability, they obtain an α greater than 0.81 on all the scales of the SCL-90.

Procedure and statistical analysis

The three tests were applied to a sample of 113 univeristy students (72 women and 41 men) from different degree programs and different years of study, taking advantage of a public speaking course offered by the university. The tests of creativity, optimism and psychopathological symptoms described above were administered.

The scores obtained after correlating the instruments were analyzed using Pearson's correlation index in order to evaluate the degree of association between these three variables.

A $p<0.05$ was taken as stastistically significant. Likewise, regression analyses were performed in order to evaluate the percentage of variance of the psychopathological symptoms explained by the variable optimism and creativity. Just as other studies have done in order to study levels of creativity and their relationship with psychopathology, an analysis of variance was also carried out in order to compare the means of different levels of creativity and the psychopathological symptoms. In order to execute this analysis, the subjects were grouped into three groups (low, medium and high creativity), based on cut-off scores set at one standard deviation above and below the mean, and the SCL-90 psychopathology scales were compared as a function of this grouping.

Results

Gender differences in psychopathology, creativity and dispositional optimism

No significant differences according to gender were found in the variables of creativity, dispositional optimism and psychopathological symptoms. Only marginally significant differences were found ($t = 1.879$; $p = .063$) in depressive symptomatology, indicating that the women present more depressive symptomatology than the men. See Table 2 for more information.

Table 2. *Differences of means between genders. Descriptive data (mean and standard deviation) for each gender on the different dimensions of the SCL-90.*

	Gender	n	Mean	sd	Error	T	d.f.	P
SOM	Women	71	.9965	.74261	.08813	1.602	108	.112
	Men	39	.7799	.53921	.08634			
OBS	Women	71	1.2634	.67934	.08062	1.038	108	.302
	Men	39	1.1231	.67647	.10832			
INT	Women	71	1.2034	.82487	.09789	1.131	108	.260
	Men	39	1.0228	.75582	.12103			
DEP	Women	71	1.1300	.76467	.09075	1.879	108	.063
	Men	39	.8600	.63306	.10137			
ANX	Women	71	.9690	.63574	.07545	.649	108	.518
	Men	39	.8872	.62668	.10035			
HOS	Women	71	.8028	.67100	.07963	.408	108	.684
	Men	39	.7479	.68278	.10933			
PHO	Women	71	.4809	.55865	.06630	.937	108	.351
	Men	39	.3846	.42499	.06805			
PAR	Women	71	1.4038	.94519	.11217	.997	108	.321
	Men	39	1.2179	.91539	.14658			
PSY	Women	71	.6366	.60857	.07222	-.080	108	.936
	Men	39	.6462	.57849	.09263			
MIS	Women	71	.9839	.72182	.08566	.541	108	.589
	Men	39	.9084	.65669	.10515			
GSI	Women	71	.9962	.59245	.07031	1.226	108	.223
	Men	39	.8573	.52245	.08366			
PST	Women	71	46.4930	18.67074	2.21581	.689	108	.492
	Men	39	43.8462	20.33346	3.25596			
PSDI	Women	71	1.8184	.52656	.06249	1.614	108	.109
	Men	39	1.6571	.45103	.07222			

Correlational analyses

Significant negative correlations were found between optimism and all the psychopathological aspects evaluated by the SCL-90, except hostility (HOS). The most intense correlation was between depression and optimism (r=-.502; p<.001) and between interpersonal difficulties and optimism (r=-.447; p<.001). The Global Severity Index (GSI) was also inversely related to optimism as measured by the LOT-R (r=-.459; p<.001). These results indicate an

inverse relationship between presenting psychopathological symptoms and levels of optimism.

Correlations between psychopathological symptoms and creativity were null. The relationship between creativity and dispositional optimism, although positive, was not significant and it approached 0 (*r*=.035; n.s.), indicating that they are two different constructs and not related to each other. Table 3 shows the correlation between the psychopathological symptoms scales and their relationship to optimism (LOT-R) and creativity (CREA).

Table 3. *Correlations between creativity, optimism and psychopathological variables measured by the SCL-90 (* p<0.05; **p<0.01;***p<0.001).*

	Lot-R	CREA
SOM	-.289**	.121
OBS	-.438***	.089
INT	-.447***	.026
DEP	-.502***	.007
ANX	-.406***	.106
HOS	-.106	.097
PHO	-.383***	.013
PAR	-.401***	.156
PSY	-.403***	.043
MIS	-.273***	.106
GSI	-.459***	.089
PST	-.390***	.073
PSDI	-.403***	.076

Regression analysis

Given that the correlations could be understood in two directions (e.g. it may be that those who have less psychopathology present more optimism), regression analysis was performed in order to come closer to the consideration of a causal relationship.

Regression analyses carried out using the optimism variable show that the psychopathological symptoms measured using the SCL-90 are predicted by the LOT-R score. The variables best explained by optimism were depressive symptoms (DEP; 24.5% of the explained variance) and the general level of somatic and psychological suffering (GSI; 20.3%). The remaining results are found in Table 4.

Table 4. Simple regression analysis using the variable optimism as a predictor of each of the psychopathological symptoms scales of the SCL-90.

LOT-R	R	R^2	R^2 cor.	E. typ.	Estimat. F	SIG.
SOM	.289	.084	.075	.62089	9.688	.002
OBS	.438	.192	.184	.61029	25.152	.000
INT	.447	.199	.192	.71382	26.416	.000
DEP	.502	.252	.245	.61091	35.780	.000
ANX	.406	.165	.157	.57877	20.957	.000
HOS	.106	.011	.002	.66708	1.208	.274
PHO	.383	.147	.139	.48079	18.221	.000
PAR	.401	.161	.153	.86077	20.323	.000
PSY	.403	.163	.155	.54352	20.582	.000
MIS	.273	.074	.066	.066	8.530	.004
GSI	.459	.211	.203	.50338	28.306	.000
PST	.390	.152	.144	17.72113	19.033	.000
PSDI	.403	.162	.154	.45224	20.540	.000

SOM = Somatization; OBS = Obsession-Compulsion; INT = Interpersonal Sensitivity; DEP = Depresión; ANX= Anxiety; HOS = Hostility; PHO = Phobic Anxiety; PAR = Paranoid Ideation; PSY = Psychoticism; MIS = Miscellaneous; PSDI = Positive Symptoms Distress Index; GSI = Global Severity Index; PST =Positive Symptoms Total.

When regression analyses were performed using the creativity variable as the predictive variable, no significant prediction was observed between creativity and the different dimensions of psychopathology. Results of these analyses are seen in Table 5.

Table 5. Simple regression analysis using the variable creativity as a predictor of each of the psychopathological symptoms scales of the SCL-90.

CREA	R	R^2	R^2 cor.	E. typ.	Estimat.F	SIG.
SOM	.121	.015	.005	.67411	1.550	.216
OBS	.089	.008	-.002	.68353	.833	.363
INT	.026	.001	-.009	.80660	.068	.794
DEP	.007	.000	-.009	.74056	.005	.943
ANX	.106	.011	.002	.62733	1.202	.275
HOS	.097	.009	.000	.67003	.999	.320
PHO	.013	.000	-.009	.50458	.019	.891
PAR	.156	.024	.015	.92043	2.609	.109
PSY	.043	.002	-.008	.60282	.196	.659
MIS	.106	.011	.002	.70129	1.194	.277
GSI	.089	.008	-.001	.57119	.844	.360
PST	.073	.005	-.004	19.21800	.569	.452
PSDI	.076	.006	-.004	.50960	.605	.438

SOM = Somatization; OBS = Obsession-Compulsion; INT = Interpersonal Sensitivity; DEP = Depresión; ANX= Anxiety; HOS = Hostility; PHO = Phobic Anxiety; PAR = Paranoid Ideation; PSY = Psychoticism; MIS = Miscellaneous; PSDI = Positive Symptoms Distress Index; GSI = Global Severity Index; PST =Positive Symptoms Total.

Differences of means in psychopathology between different levels of creativity

We decided to study the differences between different levels of creativity (low, medium and high), using one standard deviation above and below the mean as cutoff points, as they relate to psychopathology symptoms. Different levels of psychopathology were found as a function of creativity levels. For the less creative group, marginally significant differences appeared for the phobic anxiety variables (F = 2.567; p = .082) and the psychoticism variable (F = 3.384; p = .038). For the highly creative group, such differences appeared in paranoid ideation (F = 3.052; p = .052). Generally speaking, participants with medium levels of creativity present lower psychopathology scores on the majority of scales. Results are found in Table 6.

Table 6. Differences of means in psychopathology according to the level of creativity. Mean and standard deviation for each creativity group (ANOVA)

	Creativity levels	N	Mean	sd	Error	d.f.	F	P
SOM	Low C	11	.9015	.62674	.18897			
	Medium C	82	.9045	.68320	.07545	2	.294	.746
	High C	14	1.0536	.70226	.18769	104		
	Total	107	.9237	.67585	.06534	106		
OBS	Low C	11	1.4545	.82263	.24803			
	Medium C	82	1.1634	.63877	.07054	2	1.350	.264
	High C	14	1.3857	.80274	.21454	104		
	Total	107	1.2224	.68299	.06603	106		
INT	Low C	11	1.5051	1.13133	.34111			
	Medium C	82	1.0759	.71261	.07869	2	1.784	.173
	High C	14	1.3254	.96714	.25848	104		
	Total	107	1.1526	.80305	.07763	106		
DEP	Low C	11	1.3986	.89365	.26944			
	Medium C	82	.9728	.66791	.07376	2	1.715	.185
	High C	14	1.1044	.94578	.25277	104		
	Total	107	1.0338	.73708	.07126	106		
ANX	Low C	11	1.1364	.82616	.24910			
	Medium C	82	.8732	.55534	.06133	2	1.989	.142
	High C	14	1.1714	.80616	.21545	104		
	Total	107	.9393	.62793	.06070	106		
HOS	Low C	11	.7424	.64275	.19380			
	Medium C	82	.7642	.64786	.07154	2	.557	.575
	High C	14	.9643	.82994	.22181	104		
	Total	107	.7882	.67003	.06477	106		
PHO	Low C	11	.6883	.83009	.25028			
	Medium C	82	.3885	.42785	.04725	2	2.567	.082
	High C	14	.6020	.53797	.14378	104		
	Total	107	.4473	.50224	.04855	106		

PAR	Low C	11	1.3636	1.13240	.34143			
	Medium C	82	1.2317	.79942	.08828	2	3.052	.052
	High C	14	1.8810	1.28673	.34389	104		
	Total	107	1.3302	.92739	.08965	106		
PSY	Low C	11	.9727	.74712	.22526			
	Medium C	82	.5683	.49861	.05506	2	3.384	.038
	High C	14	.8643	.88457	.23641	104		
	Total	107	.6486	.60053	.05806	106		
MIS	Low C	11	1.0519	.70933	.21387			
	Medium C	82	.8955	.65563	.07240	2	1.886	.157
	High C	14	1.2755	.90084	.24076	104		
	Total	107	.9613	.70193	.06786	106		
GSI	Low C	11	1.1444	.74356	.22419			
	Medium C	82	.8911	.50976	.05629	2	1.956	.147
	High C	14	1.1484	.71808	.19192	104		
	Total	107	.9508	.57077	.05518	106		
PST	Low C	11	50.2727	20.89541	6.30020			
	Medium C	82	44.4390	18.18838	2.00857	2	.721	.489
	High C	14	49.2143	23.68764	6.33079	104		
	Total	107	45.6636	19.17887	1.85409	106		
PSDI	Low C	11	1.9095	.58382	.17603			
	Medium C	82	1.7112	.48558	.05362	2	2.118	.125
	High C	14	1.9731	.54384	.14535	104		
	Total	107	1.7658	.50865	.04917	106		

Discussion

This study seeks to verify whether optimism and/or creativity are protective factors against psychopathology. Regarding optimism, a large quantity of research was found that reveals the protective effect of optimism, in terms of both psychopathological variables and physical health, proceeding from either conception of optimism (as an expectation of the future or as an explanatory style). The results of this study are supportive of the proposed hypothesis of dispositional optimism as a protective factor against psychopathology, in all the dimensions of the SCL-90 (with the exception of the hostility dimension). The data carry strong statistical significance, especially in depressive symptomatology, concurring with the proposal from Seligman (1998; 2005), where he proposes a program to foster optimism in schools as prevention against depression. The data from this study point in this direction, likewise suggesting a need for programs that promote psychological wellbeing and the prevention of psychopathology, including the fostering of optimism in students. Also worth noting is the strong negative relationship between dispositional optimism and interpersonal difficulties, such that

the encouragement of optimism could have an enhancing effect on programs that seek to improve social skills. Dispositional optimism could also be a protective factor against interpersonal difficulties that may appear, keeping in mind the importance of social support for psychological wellbeing, which in turn depends on having good interpersonal skills (Inglés, 2007), where optimism also seems to place a decisive role (Seligman, 2005). Regression analyses helped in coming closer to a causal relationship between dispositional optimism and psychopathology, beyond the correlations found. Programs for fostering optimism have normally worked on explanatory style, particularly when facing negative situations. However, an optimistic explanatory style when facing positive situations has also been found to be a protective factor against depressive symptomatology (Sánchez & Méndez, 2009b), and to be related to dispositional optimism, such that expecting good results in life, along with explaining these good results through internal, stable and global causes, could substantially increase the benefits on health and psychological wellbeing that these variables might have separately (Sanjuán & Magallanes, 2006).

Regarding creativity, although this study did not find a significant relationship between creativity and psychopathology, the different psychopathological profiles found for the different levels of creativity clarify the traditional view that indicates a direct relationship between psychopathology and the great creative minds (Eysenck, 1993). The data show a U effect where both extremes of creativity are accompanied by higher levels of psychopathology. With low levels of creativity we found greater levels of psychopathology in depression, phobic symptoms and the psychoticism scale, which could be explained by greater cognitive rigidity. However, the highest level of paranoid ideation is found in participants with a high level of creativity. Other authors, in analyzing creative individuals, found that they scored higher on psychopathic deviation and schizophrenia, using the MMPI, and interpreted this as the use of unusual thinking, less inhibition and greater imaginative freedom (MacKinon, 1962). Creativity could be favored by cognitive styles that encourage thoughts that range far from the customary, and, as in a study by MacKinon, this could be confused with distancing from reality or psychotic symptoms. However, in the case of low creativity, the lack of cognitive flexibility would also involve adaptation difficulties that could translate into psychopathological symptoms if the subject cannot meet the demands of the environment.

The present research produced data with higher scores in paranoid ideation for subjects with high creativity. One possible explanation for the high scores in paranoid ideation

(PI) may be found in two items included in scoring this scale: "having ideas or thoughts that others do not understand" and "feeling that others do not value me as much as I deserve". In this sense, making distant, original associations, described as a requirement for creativity, could be related to these experiences.

Along these same lines, greater levels of divergent production are also related to higher levels of unusual associations and lesser access to physical sensations, which, according to Damasio's theory of somatic markers (Damasio A., 1994), has been related to greater difficulty in conditioning and learning, and subsequently lower levels of socialization. And according to some authors, these lower levels could be related to higher levels of psychoticism, as hypothesized by Eysenck (Galang, 2010). This situation could explain why we do not find a greater protective effect at higher levels of creativity than at medium levels: the negative effects of unusual associations could also produce greater psychopathology.

It is interesting to note that the data collected here point in the same direction as another study where a group composed of individuals with medium levels of psychopathology presented higher scores on creativity, indicating a slight association with psychopathology (Ghadirian, Gregoire & Kosmidis, 2001). This concurs partially with trends found in this study.

The data found here, however, contradict other studies where creativity not only is not associated with psychopathology, but a predominance of positive emotions benefits creativity (Lyubomirsky, King & Diener, 2005). This would follow in the line of other authors who find hypomanic states to facilitate divergent production (Nettle, 2002).

Chavez-Eakle and collaborators (2006), using the Torrance test, found inverse relationships between creativity and psychopathological symptoms measured with the SCL-90 (Chavez-Eakle, Lara & Cruz-Fuentes, 2006). The data found in this study do not totally concur with those of Chavez-Eake, since different levels of creativity present different psychopathological symptoms. On the other hand, in the study by Chavez-Eakle (2006), psychopathology was found to be more associated with personality than with creativity. Perhaps that study also measures other aspects related to personality variables in addition to the creativity variable, or perhaps the sample used in that case (highly creative subjects, control subjects and psychiatric patients) present different psychological characteristics from our group of stu-

dents, and the creativity and psychopathology variables behaave differently. It would be useful to consider whether the beneficial effect of creativity on psychopathological symptoms could be mediated by other variables such as, for example, emotional intelligence. Olatoye and collaborators (2010) find that creativity is related to emotional intelligence, the latter being positively associated with physical and mental health (Martínez, Piqueras & Ramos, 2010).

Conclusions

Regarding the first objective of this study, we confirm the findings from other research that indicate optimism as a protective factor against psychopathology (Carr, 2007; Ortiz *et al.*, 2003; Seligman, 2005). In general, statistically solid results were found that reinforce it as a protective factor, principally in the dimensions of depression and interpersonal difficulties. This supports those programs that promote wellbeing and prevention of depression based primarily on fostering optimism and interpersonal skills in the educational context (Seligman, 2005). It is especially noteworthy that new evidence has been put forward to confirm this relationship using the assessment instruments of dispositional optimism, LOT-R (Scheier, Carver & Bridges, 1994) and the psychopathology measure, SCL-90 (Derogatis, Lipman & Covi, 1973): no other research studies were found that have studied this using these two instruments. It is important to note that the programs that foster optimism have focused their work on explanatory style, primarily when facing negative situations. However, an optimistic explanatory style when facing positive situations has also been found to be a protective factor against depressive symptomatology (Sánchez & Méndez, 2009b), and to be related to dispositional optimism, such that including both cases in these programs could increase the benefits that these variables would have separately (Sanjuán & Magallanes, 2006).

We also suggest keeping in mind new concepts and their relationship with optimism, such as explanatory flexibility and other factors that might have influence, such as self-esteem, the perceived controllability of stressful situations, and the degree of importance assigned to these situations (Sánchez & Méndez, 2009b).

In this study we did not find a significant relationship between creativity and psychopathology, although data were found that imply differences in psychopathological profiles as

a function of creativity levels. If creativity can be independent of psychopathology and creativity is favored by the confluence of creativity and optimism, this may result in improved capacity for creative production and in improved health, by promoting emotional states that can encourage creativity. Other studies have found that creativity and positive emotions may be associated and that they ought to be included in health prevention programs. The purpose would be to include them within the variables being evaluated, especially in those individuals that present a greater psychopathology index. However, a bigger sample, the use of other psychopathology and creativity measurements and their relationship to other variables are all needed in order to shed greater light on the relationship between creativity profiles and different psychopathological profiles.

In response to our initial question as to whether creativity represents a protection factor against certain types of psychopathology, the results of this study did not find any significant relationship between the two variables, although differences were found according to creativity level, where medium levels of creativity are more related to lower psychopathology in depression, phobic symptoms and the psychoticism scale, while for high levels, the greater distance between concepts and associations that are at the limits of consensus and social acceptability could result in a subclinical form of psychopathology as suggested by Prentky (p. 262) (Glover, Ronning & Reinolds, 1989).

When considering the relationship between creativity and psychopathology, perhaps one should clarify what definition of creativity is being used by the measurement instrument employed, the level of creativity (low, medium, high), the specific type of psychopathology it is being linked with, and other variables, such as gender. Several studies (DeMoss, Milich, & DeMers, 1993; Andreasen 1987) have indicated that these aspects might help to clarify this complex relationship between these two variables, this undoubtedly representing an attractive field to continue to explore.

On the other hand, it is a challenge for creative individuals in particular, and for a society that pursues development and progress in the face of this century's new threats and opportunites, to integrate novelty within a context that can recover innovation in a productive form, shielding against the effect of psychopathology.

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