

Effects of a Play Program on Creative Thinking of Preschool Children

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The purpose of this study was to evaluate the effects of a play program in the creative thinking of preschool children. The study used a repeated measures experimental pretest-posttest design with control groups. The sample included 86 participants aged 5 to 6 years (53 experimental and 33 control participants). Before and after administering the program, two evaluation instruments were applied: The Torrance Test of Creative Thinking (Torrance, 1990) and Behaviors and Traits of Creative Personality Scale (Garaigordobil & Berruero, 2007). The program consisted of a weekly 75-minute play session throughout the school year. ANOVA results showed that the program significantly increased the verbal creativity (fluency, flexibility, originality), graphic creativity (elaboration, fluency, originality), and behaviors and traits of creative personality. In the pretest phase, there were no differences in the creativity of boys and girls, and the program stimulated a similar level of change in both sexes. The discussion focuses on the importance of implementing creative programs with preschool children.

Keywords: program evaluation, play, creativity, childhood.

El objetivo del estudio fue evaluar los efectos de un programa de juego en la creatividad infantil. Se utilizó un diseño experimental de medidas repetidas pretest-posttest con grupos de control. La muestra se configuró con 86 participantes de 5 a 6 años (53 experimentales y 33 control). Antes y después de la intervención se aplicaron 2 instrumentos de evaluación: El Test de Pensamiento Creativo de Torrance (Torrance, 1990) y La Escala de Conductas y Rasgos de Personalidad Creadora (Garaigordobil & Berruero, 2007). El programa consistió en una sesión de juego semanal de 75 minutos de duración durante un curso escolar. Los resultados del ANOVA mostraron que el programa incrementó significativamente la creatividad verbal (fluidez, flexibilidad, originalidad), la creatividad gráfica (elaboración, fluidez, originalidad), así como las conductas y rasgos de personalidad creadora. En la fase pretest no había diferencias en la creatividad de niños y niñas, y el programa estimuló un nivel de cambio similar en ambos sexos. La discusión se centra en la importancia de implementar programas de creatividad con niños de edad preescolar.

Palabras clave: evaluación de programas, juego, creatividad, infancia.

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Creativity is the capacity to create, to produce new things. It is the capacity of the human brain to reach new conclusions and ideas and to solve problems in an original fashion. It can manifest in artistic, literary, scientific forms... and it can also unfold in the area of daily life, improving its quality. The latter aspect will probably not leave its mark on the history of humanity, but it is basically what makes life worth living (Csikszentmihalyi, 1996). Creativity is a key process for personal development and social progress, and it is therefore included in Positive Psychology.

In view of current research, many investigators share the belief that creativity can be developed by training, and diverse studies that have assessed the effects of programs that stimulate creativity confirm this belief (Antonietti, 2000; Baer, 1996; Fleith, Renzulli, & Westberg, 2002; Katiyar & Jarial, 1983; Komarik & Brutenicova, 2003; Ma, 2006; Parker, 1998; Prieto, López, Bermejo, Renzulli, & Castejón, 2002; Saxon, Treffinger, Young, & Wittig, 2003; Tettamanzi, Sarotti, & Frontino, 2009; Zachopoulou, Trevlas, & Konstadinidou, 2006).

Among them, we underline the study of Antonietti (2000), who assessed the efficacy of a program to train creative analogical thinking in children between 5 and 7 years of age. The program deployed for 6 months included seeking analogies related to a story and identification of similarities, among other activities. The results showed that the program increased analogical thinking, and the dimension that benefitted the most was creativity. Along the same lines, Prieto et al. (2002) applied a program of creativity to preschoolers and to children from Primary Education, following a normal syllabus and in the normal classroom setting. The assessment revealed improved creativity, although the effects varied depending on the creativity factor assessed, the type of focus, and the educational level. Flexibility and graphic originality were the creativity aspects on which the program had the most impact, and the program was more efficient at the preschool level. The meta-analysis performed by Ma (2006) to study the effects of creativity training programs found significant differences as a function of the training program and age, observing that the older the participants, the larger the effect size, at least until preuniversity level.

With regard to gender differences in creativity, a group of studies has revealed the absence of differences in creativity for boys and girls (Cheung, Lau, Chan, & Wu, 2004; Park, 2007; Shi, Xu, Zhou, & Zha, 1999; Zachopoulou & Makri, 2005) but, whereas some works have found that creativity programs stimulate similar changes in both sexes (Katiyar & Jarial, 1983; Liikanen, 1975), others confirm some gender differences (Flaherty, 1992).

One line of research has emphasized the close connections between play and creativity. From diverse theoretical perspectives, play is considered to be children's first creator activity and imagination emerges from and is developed through play. Creative play in its diverse

modalities is very important for development because it stimulates curiosity, flexibility, improvisation, and it promotes problem-solving behavior that leads to learning, imitation, and adaptation to change. Play has been referred to as children's work and its importance in cognitive development has been acknowledged frequently. Children's tendency to play has been specifically linked to creative thinking skills. Moreover, some studies (Russ, Robins, & Christiano, 1999) have revealed that children's tendency to play indicates a disposition towards creativity in later life. In general, it is accepted that creative practices in preschool years influence children's subsequent development of creative potential; this underlines the importance of creative training at early ages.

Studies conducted from diverse epistemological frameworks have confirmed that play stimulates creativity (Baggerly, 1999; Dansky, 1980a, 1980b; Garaigordobil, 2006a; Howard-Jones, Taylor, & Sutton, 2002; Kalmar & Kalmar, 1987; Mellou, 1995; Russ, 2003b), and have identified make believe play as a predictor of divergent thinking, and have linked affectivity, play, and creativity (Russ, 1998, 2003a, 2003b, Russ & Kaugars, 2001). Within this context, Dansky (1980b) assessed the effect of sociodramatic play on creativity in a sample of 36 preschool children from disadvantaged socioeconomic settings. The participants were randomly assigned to a training program of sociodramatic play, a program related to exploring skills, or a free play situation. The results showed that sociodramatic play significantly improved sociodramatic activity, imagination, and the production of sequentially well organized information. Subsequently, Kalmar and Kalmar (1987) assessed the effects of an artistic-play program in children from 5 to 6 years that included activities related to making puppets and collages. The assessment confirmed a significant increase in the experimental participants of the three indicators of graphic creativity assessed: fluency, flexibility, and originality.

From a therapeutic approach, Baggerly (1999) investigated the efficacy of play therapy with children from 5th grade and preschool children who presented adaptation problems. The preschoolers from the experimental group carried out play sessions for 10 weeks, implemented by the 5th-grade students, who had previously undergone ten 35-minute training sessions for procedures and skills of play therapy. The results indicated that the children from the experimental group showed a significant reduction of somatic complaints, and their self-concept, social behavior, and creativity improved in comparison to the control group. In the last decade, Howard-Jones et al. (2002), with a sample of children between 6-7 years, investigated whether previous unstructured play experience could affect the creativity of a subsequent activity, finding a positive effect. Garaigordobil (2006a) performed a program of cooperative-creative play with children between 10-11 years, which was administered weekly during a school course, confirming a positive effect on verbal (originality) and graphic creativity (originality, elaboration,

and creative performance), assessed by the Torrance tests and the direct judgments of expert judges (painters).

As emphasized by some investigators, during the early years, there is no difference between playing and learning. Therefore, Pramling Samuelsson and Asplund Carlsson (2008) propose a development of pedagogy that does not separate play from learning in preschool children, but instead is based on the similarities, in order to promote creativity in future generations. The studies carried out allow us to confirm that play provides new ways of exploring reality and different strategies to deal with it. Play favors a space for spontaneous action in a world where most things are regulated. Games allow group members to discover new facets of their imagination, to think of many alternatives for a problem, to develop different ways and styles of thinking, and they favor behavioral change, which is enriched and diversified in group exchanges.

The interactive perspective of the development of creativity, on which this study is based, emphasizes the relevant role of social and affective factors in the development of play and creativity, in connection with Vygotsky's (1933/1967) proposed model, which relates play, cooperative interaction, and creativity. A relevant premise of Vygotsky's theory is that imagination develops through children's play, which is not only a recollection but also a reconstruction of past experience, in which events are combined and new realities are built. Through play, children develop combinatory imagination, and this contributes to artistic and scientific creativity. According to Vygotsky, play is an important activity in the cognitive and affective processes involved in creativity.

The present work is part of a line of research (Garaigordobil, 2003a) in which four intervention programs for children from 4 to 12 years were designed and their effects assessed. The program, targeting preschool children and assessed in this study, relates play, cooperative interaction, and creativity along the lines of other studies that have linked creativity and cooperation, and it suggests ways to stimulate creative thinking through cooperative groups, thus avoiding routine in class and offering opportunities to develop creative capacities (Baloche, 1994; Strom & Strom, 2002).

With regard to sources and obstacles to creativity within the framework of a socio-cultural approach, Eteläpelto and Lahti (2008) showed that creative collaboration occurs when group members presented alternative viewpoints and produced new ideas. The main obstacles to creative collaboration were related to emotional climate and power relations within the group. The least creative circumstance involved situations in which the participants proposed different viewpoints, invalidating contrary opinions, which fomented an emotionally negative atmosphere in the group; whereas the most creative situation was characterized by the complementarity of the participants' conversation and the inclusive use of their viewpoints.

Many psychology reports (see Howard-Jones, 2008) suggest that the capacity to think creatively is influenced by many factors: the environment, the task itself, and the teacher. Although the creative act has elements of spontaneity, many investigators have emphasized the very relevant role that teachers may play in the stimulation of creative processes through the environment and the strategies they employ. In Italy, Cerioli and Antonietti (1993) observed that preschool children whose teachers had received training in creativity increased their fluency, flexibility, and originality to a greater extent than children whose teachers had not received any training, which reinforces the idea of training teachers to increase the efficacy of creativity programs.

Along these lines, Craft, Cremin, Burnard, and Chappell (2007) conducted a study of creative teaching in England with children aged 4 to 16 years, stressing the relevant role of the teachers' attitudes towards creative learning and the teaching of creativity. This investigation emphasized the importance of the task, the context, and the teachers' expectations-attitude towards the children's progress. The important role played by the teacher in the type of tasks and processes provided to the children was confirmed. The areas in which the teachers were particularly influential were: attitude toward students' participation, attitude towards creativity, and attitude towards the teaching of creativity. Their results revealed: (a) an evolution from child-centered possibilities towards options progressively more modeled by adults; and (b) an emphasis on collaboration in the early years but a progressively more individualized approach towards creativity and creative learning.

Gupta (2009) also examined the type of environmental factors that support the balance between preschool child-centered practices and practices directed by the teacher, describing the implementation of a dramatic play program with 4-year-olds and the positive effects it had on the group members. The discussion is within the Vygotskian framework, attempting to connect the relation between the program, language, and cognition, the construction of the zone of proximal development, cultural signs and tools, the sociocultural construction of knowledge... Recently, Chien and Hui (2010) analyzed teachers' perception of creativity in preschool children in three Chinese societies, concluding that creativity depends to a great extent on contextual factors. Hong Kong, Shanghai, and Taiwan have established policies for the education of creativity, but the teachers' perceptions of creative teaching and creative learning are very different in these three societies, and this affects their viewpoints of the obstacles and improvements for education of creativity. This study emphasizes the relevant role of teachers' perceptions and context in the stimulation of creativity.

Taking into account the relevance of creativity for personal adaptation and human development, many countries are increasing the priority of stimulating creative thinking

at school. However, few programs stimulate creativity at early ages, and still fewer are experimentally validated. Therefore, the question or research problem proposed in this study focuses on clarifying whether the development of creative thinking can be stimulated at early ages through a cooperative-creative play program that contains activities with a low level of structuring.

On the basis of the above-mentioned research, the main goal of the work is to design, apply, and assess experimentally the effects of a cooperative-creative play program on preschool children's creativity. The study hypothesizes that the play program will stimulate creative thinking at early ages, proposing four hypotheses. Hypothesis 1 proposes that the program will increase verbal creativity in the indicators of fluency, flexibility, and originality. Hypothesis 2 postulates that the program will increase graphic-figurative creativity in indicators such as fluency, originality, resistance to premature closure and elaboration. Hypothesis 3 states that the program will stimulate an increase of diverse creative behaviors and personality traits as assessed by parents and teachers. Within the context of the current hypothesis of gender similarity at early ages, Hypothesis 4 proposes that the program will promote similar enrichment of creativity in both sexes.

Method

Participants

The sample comprises 86 participants aged 5 to 6 years, distributed in 5 groups belonging to four school centers from the Community La Rioja (Spain). The centers were randomly selected from the list of centers of the Community, specifically, two public centers and two private centers. Out of the total sample, 53 participants were randomly assigned to the experimental condition (3 groups) and 33 to the control condition (2 groups). There were 47 boys (54.7%) and 39 girls (45.3%). Distribution by sex in the experimental condition was 54.71% (29) boys and 45.28% (24) girls, whereas in the control condition, it was 54.54% (18) boys and 45.45% (15) girls. The experimental and control groups were equivalent in terms of age, sex, and academic aptitudes and performance.

Instruments

To measure the dependent variables, we administered two assessment instruments, with adequate psychometric guarantees of reliability and validity, before and after the program.

TTCT. Torrance Test of Creative Thinking (Torrance, 1990). The test is made up of two parts, a verbal and a graphic part. The verbal battery uses 6 activities based on language to appraise verbal creativity: asking questions,

guessing causes, guessing consequences, improving a product, listing possible but unusual uses for an object, listing the consequences that could derive from a given hypothetical situation. Three indicators are assessed: fluency or the capacity to produce ideas, flexibility or the aptitude to change from one line of thinking to another, and originality or the aptitude to contribute new ideas or solutions that are far from the obvious, common, or established ones. The graphic battery is made up of 3 activities: making a drawing, completing drawings, and making drawings with lines/circles. Four indicators of creativity were assessed: resistance to premature closure of the figures, elaboration or the subject's aptitude to develop or embellish ideas, fluency, and originality. The test can be administered as of 5 years of age. The evaluators were trained in the standardized administration of the test, which was conducted individually. In the verbal tasks, the evaluator presented the instructions and recorded the children's responses. In the graphic tasks, a workbook in which to make the drawings was handed out to the children. The indicators were scored as follows: fluency (1 point per idea), flexibility (1 point per category), originality (0, 1, 2, or 3 points depending on the statistical frequency of the idea), resistance to closure (0, 1, or 2 points depending on the type of closure given to the figure, the quicker and more direct the closure, the lower the score), and elaboration (1, 2, or 3 points depending on the number of additional details drawn). To score each protocol, a norm was developed with a Spanish standardization sample of 172 children from 5 to 6 years (Garaigordobil, 2007), which presents a list with the responses to the tasks and the score of each idea as a function of its statistical frequency. Many psychometric studies of the TTCT confirm its validity and reliability. Studies of test-retest reliability have shown indexes above .80 (Torrance 1972a, 1972b, 1981). With regard to validity, longitudinal investigations have revealed a correlation between the TTCT and diverse creative behavior criteria (Torrance 1972b). Test consistency (Cronbach's alpha) with the sample from the present study was high (verbal creativity: $\alpha = .81$; graphic creativity: $\alpha = .85$)

EPC. Escala de conductas y rasgos de personalidad creadora [Scale of creative behaviors and personality traits] (Garaigordobil & Berruero, 2007). The EPC has 15 sentences by means of which parents and teachers of the experimental and control participants rate the degree to which the diverse creative behaviors (inventing games, building toys...) and personality traits (sense of humor, perseverance, openness to new experiences...) expressed in the statements can be applied to their child/student. Examples of these statements are: "He/she is open to new experiences, likes novelties, changes," "He/she makes toys with any materials he/she finds around," "He/she is perseverant, when beginning a task, he/she is constant and finishes it despite the effort involved," "He/she likes to play imaginative games, fantasy..." Previous psychometric studies (Garaigordobil, 2006b) confirm

the reliability and validity of the test. Firstly, we found significant correlations ($r = .37, p < .001$) between the parents' scores (EPC-parents) and those of the teachers (EPC-teachers) that confirm interjudge reliability. In addition, we found correlations ($p < .001$) of the EPC scores (as a self-report administered to 139 ten-year-old participants) with graphic ($r = .30$) and verbal creativity ($r = .29$) on the TTCT, with nomination of creative classmate ($r = .29$) and with creative self-concept ($r = .41$). Test-retest reliability confirmed its temporal stability (parents: $r = .83$; teachers: $r = .60$). The consistency of the test with the sample from the present study was high (EPC parents: $\alpha = .77$; EPC-teachers: $\alpha = .82$)

Procedure

The study employed experimental methodology, specifically, a pretest-posttest repeated measures design with control group. After randomly selecting the school centers, we held a meeting with the headmasters and the teachers corresponding to the groups, who decided to participate in the study. The parents also attended a meeting in which we informed them about the investigation, and they gave their informed consent, after which the decision to participate was taken. In the pretest phase, the assessment instruments were administered during the first weeks of the school course. Subsequently, the experimental group participated in the intervention program, which consisted of one weekly 75-minute play session during the entire school course. In order to avoid the Hawthorne effect, the control participants carried out the curricular activities of their school program, thereby receiving a different type of instruction and the same level of attention. In the posttest phase, the same pretest instruments were administered at the end of the school course. The study met the ethical values required in research with human beings (informed consent and the right to information, protection of personal data, and guarantees of confidentiality, no discrimination, gratuity, and the possibility of dropping out of the study at any phase).

The intervention program

The program assessed in this study is part of a line of research of psychoeducational intervention made up of 4 cooperative-creative play programs targeting children from 4 to 12 years of age (Garaigordobil, 2003a, 2003b, 2004, 2005, 2007). The intervention applied and assessed in this investigation (Garaigordobil, 2007) consisted of a weekly play session directed by the habitual group teacher, administered in the same weekly schedule, in the same physical space, a psychomotricity classroom or gym.

A play session is structured in 3 phases. The session begins with an *opening phase* (5 minutes) in which the group members, sitting in a circle on the floor, comment the goals of cooperative-creative play (having fun, making friends, learning to help each other, collaborating, listening

to each other, being creative, imaginative...). Subsequently, the *development phase of the play sequence* (60 minutes) is carried out, in which the 2 or 3 games that make up the session are played successively. The adult gives the instructions of the first game, and the participants play it. Then, they return to the circle and in this relaxed position, the adult gives the instructions of the second game, and so on with all the games that make up that session. The session concludes with a *closing phase* (10 minutes) in which the children reflect and talk about what went on in the session (their feelings, their participation, rejections, respecting the rules, cooperation...), and everything involved in the action and interactions that occurred during the games is analyzed. The adult asks questions about the goals of the program and the games played, about what he or she observed in the group processes, about the products of the playful activities generated by the participants...

Closure is an exercise of reflection, in which the players verbalize the positive aspects of the experience, as well as the problems that arose and the solutions to them; thus, its role in the children's cognitive-moral development is important. In addition to promoting communication about the experience, the adult provides social reinforcement, verbal appraisal of the helping behaviors, dialogue, or cooperation observed, emphasizing the value and creativity of the products elaborated. For example, during the game "Our handprint" (see Chart 1), the adult might ask questions like: "What were your feelings when you made your handprint on the paper? What do you think of the cooperative picture you made together? What do you imagine when you see all the handprints together? What forms do they suggest? Were there any problems to carry out this activity?" And the group members talk about their feelings of pleasure when leaving their handprint, their fear of getting dirty, they say they see clouds or figures, they talk about how nice the colors were when they mixed them, they tell how some classmate put his handprint on top of someone else's and they didn't like that...

During the session, the adult promotes: (a) creative behavior by emphasizing the novelty and originality of the products when giving the instructions for the activities; (b) cooperation by emphasizing the importance of taking into account the ideas of all the team members and of making the creative product with everyone's contribution; and (c) creative personality traits by underlining the importance of experimenting, persevering in task performance, and fun and good humor as basic elements of the play session.

In order to control the experimenters' adherence to the program, that is, the standard the instructions for its administration, the teachers who deployed the program were trained. Before starting the program, they received the handbook which describes the 24 intervention sessions (activities, instructions, questions to promote debate after the activity...) and they also received individualized advice

from the research team members who systematically visited the classrooms to observe the sessions during the intervention and to facilitate the development of the play sessions.

The games included in this program stimulate verbal, graphic-figurative, dramatic, and plastic-constructive creativity in the context of cooperative interaction, and they have five structural characteristics: (a) Participation, because all the group members participate in these games, nobody is eliminated, nobody loses; the aim is to achieve group goals and, for this purpose, each participant has a necessary role to accomplish the game; (b) Communication, because these games structure verbal and nonverbal communication processes, processes that involve active listening, talking, making decisions, negotiating...; (c) Cooperation, because

these games stimulate a relational dynamic that leads the players to help each other mutually to contribute to a common end, a group goal; (d) Fiction-creation, because in the program games, they are playing “make believe” reality: “let’s make believe we are painters, magicians, ghosts, butterflies, robots, blind people...,” as well as combining stimuli to create new ideas, new objects, something new (for example, joining the body parts of different animals to make up a new animal species); and (e) Fun, because the games included in this program are fun, through this experience, we intend to encourage the children of these ages to have fun interacting in a positive, constructive, friendly, and creative way with the members of their group. In order to clarify the characteristics of the program, four playful activities are described in Chart 1.

Chart 1

Program games and spheres of creativity stimulated

Title	Description of the game	Creative sphere
Surprise situations	The adult proposes an initially surprising situation and the group members must invent, with the contribution of everyone, a story that structures the development and the end of the proposed surprise situation. Examples: Ana is at school and suddenly she hears a very, very, very loud noise...; The mailman has brought Juan a very, very, very large package...; Pedro is very, very happy, they have just given him good news...	Verbal creativity
Our stories	The group is divided into teams with 5 players. By means of a communication process, each team should choose a story that becomes that team’s favorite story and, subsequently, they represent it.	Dramatic creativity
Our handprint	In this activity, the group is divided into two teams. The game consists of impregnating their hands with color and placing their handprints on the paper to make up a joint configuration with the handprints of all the team members. The children can print the handprints as they wish, they can place their hand on top of someone else’s hand, print their fist, the back of the hand... The mural should at least include the handprint of each team member. While they carried out the activity, they listened to relaxing background music.	Graphic-figurative creativity
New story characters	The group is divided into teams of 4 players, each one of whom receives various drawings of different story characters (Little Red Riding Hood, the wolf, the ogre, Snow White, Cinderella, the Three Pigs, the prince, Aladdin, the Ugly Duckling, the witch...), a piece of white cardboard, four pairs of scissors, and sticks of glue. The game consists of cooperatively inventing a new story character. Each team chooses the photos they like the best, they cut them out, separating the different body parts of the character: ears, eyes, arms...When they have enough cutouts of different body parts of different characters, they begin to glue them onto the cardboard, making up a new invented story character, whom they should name. At the end, the characters are exhibited.	Plastic constructive creativity

Results

Effects of the creativity program

To analyze the effect of the program, we used multivariate analysis. The results of the pretest MANOVA between the scores obtained by the experimental and control participants in the series of the 9 creativity variables assessed, $F(1,84) = 5.21, p < .001$, revealed significant differences between the experimental and the control condition before implementing the program. Therefore, we carried out a MANCOVA of the pretest-posttest differences (of the change in the series of variables in both conditions), using the pretest scores as covariates, the results of which, $F(1,84) = 3.69, p < .001$, revealed significant pretest-posttest differences between the conditions, with a very large effect size ($\eta^2 = .414, r = .64$). These data confirm that, despite the differences observed a priori between the conditions, the intervention had an important impact on creativity, and the change in the experimental and control participants was significantly different, with a higher increase in the experimental participants' creativity. The descriptive results (means and standard deviations) and variance results (ANOVAs and ANCOVAs) of each variable are presented in Table 1.

Verbal Creativity: The results of the pretest MANOVA with the 3 creativity variables assessed did not reveal significant a priori differences between the experimental and control groups in verbal creativity, $F(1,84) = 1.89, p > .05$), however, the pretest-posttest MANOVA indicated

significant differences between them, $F(1,84) = 10.93, p < .001$, in the same direction as the pretest-posttest MANCOVA, $F(1,84) = 15.67, p < .001$. The analysis of each variable independently (see Table 1) confirms that the program stimulated a significant increase of verbal creativity of the experimental group in the indicators of flexibility, fluency, and originality.

Graphic Creativity: The results of the pretest MANOVA of the scores of the 4 indicators of graphic creativity did not reveal significant differences between the experimental and control groups in graphic creativity, $F(1,84) = 1.58, p > .05$, but both the pretest-posttest MANOVA, $F(1,84) = 10.15, p < .001$, and the pretest-posttest MANCOVA, $F(1,84) = 9.30, p < .001$, yielded significant differences. The analysis of each indicator independently (see Table 1) confirmed that the intervention stimulated a significant increase of graphic creativity in the experimental group in the indicators of elaboration, fluency, and originality.

Creative behaviors and personality traits: The results of the pretest MANOVA revealed significant differences between the experimental and control groups, $F(1,64) = 4.40, p < .05$, and the results of the pretest-posttest MANCOVA confirmed the tendency of the differences between the two conditions, $F(1,64) = 2.50, p = .082$. The analysis of each variable (see Table 1) ratified significant differences in the assessment of the change made by the teachers, who observed a significantly higher increase in creative behaviors and personality traits in the experimental group. Although the parents' assessment also observed a

Table 1

Means, standard deviations, and results of the analysis of variance of the experimental and control groups in creativity at pretest and posttest, and the pretest-posttest difference

	Experimental group ($n = 53$)						Control group ($n = 33$)						Experimental – Control ($n = 86$)			
	Pretest		Posttest		Pre-Post		Pretest		Posttest		Pre-Post		ANOVA $F(1,84)$		ANCOVA $F(1,84)$	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	Pretest	Posttest	Pre-Post	Pre-Post
Verbal TTCT																
Flexibility	15.92	4.23	23.66	5.78	7.74	6.47	14.70	4.86	15.39	3.89	0.70	4.16	1.52	52.54 ***	31.01 ***	46.00 ***
Fluency	25.47	8.42	41.77	13.88	16.30	13.22	22.00	9.03	24.55	9.13	2.55	8.61	3.27	39.99 ***	28.21 ***	32.82 ***
Originality	29.34	15.45	58.23	30.33	28.89	30.34	25.79	18.81	26.52	17.55	0.73	14.80	0.90	29.77 ***	24.68 ***	23.09 ***
Graphic TTCT																
Resistance Closure	6.83	4.00	7.98	3.89	1.15	4.48	8.52	5.04	7.42	4.14	-1.09	4.85	2.94	0.39	4.78 *	3.06
Elaboration	16.13	8.09	29.60	9.61	13.47	7.36	19.00	9.89	21.09	8.03	2.09	8.88	2.15	18.02 ***	41.48 ***	38.27 ***
Fluency	5.64	4.16	12.55	5.10	6.91	5.00	6.97	4.93	8.36	4.33	1.39	5.47	1.79	15.31 ***	23.02 ***	24.97 ***
Originality	7.94	7.52	19.06	9.80	11.11	9.16	8.79	8.10	10.94	8.52	2.15	9.91	0.24	15.38 ***	18.28 ***	25.29 ***
EPC																
Parents' assessment	28.25	5.84	29.53	6.18	1.27	4.99	27.80	6.16	28.20	6.32	0.40	5.80	0.06	0.53	0.33	0.07
Teachers' assessment	23.96	7.01	26.94	6.32	2.98	4.02	18.40	4.78	19.73	7.11	1.33	3.77	8.26 **	14.24 ***	1.99	5.06 *

* $p < .05$ ** $p < .01$ *** $p < .001$

higher increase in the experimental group, the differences were not statistically significant.

Gender differences in creativity and the effects of the program in boys and girls

In order to explore possible gender differences in creativity, we carried out a pretest MANOVA with the set of variables assessed, the results of which, $F(1,53) = 1.50, p > .05$, showed that before starting the intervention, the boys and girls had a similar level of creativity. To assess whether the program had a different effect as a function of sex, that is to analyze whether the program stimulated a higher level of change in the boys or the girls, or whether both sexes increased their creativity similarly, we carried out a pretest-posttest MANOVA, the results of which, $F(1,53) = 0.99, p > .05$, were nonsignificant, with a medium effect size ($\eta^2 = .180, r = .42$). The results of the pretest-posttest MANCOVA pointed in the same direction, $F(1,53) = 0.62, p > .05$. Therefore, the results show that the change stimulated by the intervention in creativity was similar in both sexes. Moreover, we conducted pretest-posttest ANCOVAs, using the pretest scores as covariates, the results of which are displayed in Table 2.

Table 2 shows that, at pretest, there were no differences between the experimental boys and girls in any of the indicators, nor were any statistically significant differences found in the change they experienced as an effect of the program. Therefore, the intervention did not have a differential impact as a function of sex, because the girls and boys improved their creativity similarly.

Discussion

The study proposed the goal of assessing the effect of a cooperative-creative play program on preschool children's creativity. Firstly, the results obtained suggest that the program significantly stimulated verbal creativity in the three indicators assessed (flexibility, fluency, and originality). It increased verbal flexibility, the capacity for thinking to flow from one category to another; a high level of flexibility leads to the possibility of seeing situations from different viewpoints. It also increased fluency or the number of responses, and their level of originality or novelty. Therefore, the results confirm Hypothesis 1.

Secondly, the intervention stimulated graphic creativity in three of the four indicators assessed (elaboration, fluency, and originality). The graphic productions of the experimental group significantly increased their level of elaboration because their drawings had a higher number of details. Furthermore, the experimental group increased its graphic fluency, displaying more ideas than the control group, as well as its graphic originality, because the group's ideas were unusual, more original and novel. Therefore, the results ratify Hypothesis 2 almost entirely.

Thirdly, the results confirmed a significant increase of creative behaviors and personality traits. The teachers observed a significant increase in the number of creative behaviors and personality traits in the experimental participants, such as: (a) formulating many and unusual questions, intellectual curiosity, novel solutions to the problems; (b) inventing games, making toys, and playing

Table 2

Means, standard deviations, and results of the analysis of variance of the indicators of creativity as a function of gender at pretest and in the pretest-posttest difference in the experimental sample

	Pretest-Posttest Differences								ANOVA Pretest $F(1,51)$	ANCOVA Pretest-Posttest $F(1,51)$	ANCOVA Pretest-Posttest $F(1,51)$
	Boys ($n = 29$)		Girls ($n = 24$)		Boys ($n = 29$)		Girls ($n = 24$)				
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
TTCT. Verbal											
Flexibility	16.36	4.32	15.91	3.89	6.82	6.53	8.04	6.01	0.14	0.47	2.14
Fluency	25.75	9.88	25.65	6.50	14.57	13.35	17.35	13.23	0.01	0.55	1.54
Originality	30.61	17.65	27.96	13.29	25.29	28.77	33.47	32.75	0.35	0.66	1.39
TTCT. Graphic											
Resistance Closure	6.79	4.22	6.70	3.93	1.68	4.37	0.65	4.78	0.00	0.63	2.68
Elaboration	14.25	8.01	18.43	8.10	15.14	7.81	11.96	6.60	3.41	2.40	0.90
Fluency	4.07	3.15	7.61	4.62	8.18	5.03	5.52	4.84	10.47 **	3.64	0.02
Originality	6.43	6.85	9.91	8.28	11.96	9.94	10.43	8.46	2.70	0.34	0.12
EPC											
Parents' assessment	27.54	6.33	29.13	5.17	1.54	5.14	0.96	4.89	0.94	0.16	0.08
Teachers' assessment	23.75	7.57	24.22	6.41	3.04	3.53	2.91	4.63	0.05	0.01	0.10

* $p < .05$ ** $p < .01$ *** $p < .001$

many imaginative and fantastic games, original symbolic or make-believe games, games involving drawing, painting, modeling, intellectual games, plays of words...; and (c) a sense of humor, perseverance, and an attitude of openness to new experiences. Although the parents' assessment also reported a higher increase in the experimental group, these differences were not statistically significant. The differences between the parents' and the teachers' assessments may be partially explained because some of the EPC items, for example, "he/she has original ideas in make-believe play..." are easier to observe in the school setting than in the family context. The data show that Hypothesis 3 is almost entirely confirmed.

These results point in the same direction as those of other studies that have confirmed the efficacy of creativity stimulation programs (Antonietti, 2000; Baer, 1996; Fleith et al., 2002; Katiyar & Jarial, 1983; Komarik & Brutenicova, 2003; Ma, 2006; Parker, 1998; Prieto et al., 2002; Saxon et al., 2003; Zachopoulou et al., 2006), as well as programs that have revealed the positive effects of play in the development of creativity (Baggerly, 1999; Dansky, 1980a, 1980b; Garaigordobil, 2006a; Howard-Jones et al., 2002; Kalmar & Kalmar, 1987; Mellou, 1995; Pramling Samuelsson & Asplund Carlsson, 2008; Russ, 1998, 2003a, 2003b; Russ et al., 1999; Russ & Kaugars, 2001).

The positive effects of the program can be explained by the structural characteristics of the games included in this intervention, with the socio-emotional processes they promote (communication, cooperation, emotional expression, fiction, creation...) and by the meta-cognitive emphasis of the closing phase of the play session (reflection and talking about the interactions, the originality of the products, the feelings enhanced by creating cooperatively...). Cooperative-creative play generated a positive atmosphere in the classroom that enhanced the development of children's creativity. The results allow us to confirm Vygotsky's thesis that relates play, cooperation, and creativity, and they are coherent with other studies that have also reported these connections (Baloché, 1994; Strom & Strom, 2002). In addition, as underlined by some investigators (Eteläpelto & Lahti, 2008), the effect of the play program is related to contextual factors such as an emotionally positive climate in the classroom, where alternative viewpoints are presented, a respectful attitude and the inclusion of diverse viewpoints, because this kind of context promotes creative collaboration.

Lastly, the data have shown that, before implementing the play program, there were no significant differences in creativity between the boys and the girls, and that the program stimulated a similar enrichment of creativity in both sexes, thus confirming Hypothesis 4. These results point in the same direction as those found in studies that have shown the absence of differences in creativity of boys and girls (Cheung et al., 2004; Park, 2007; Shi et al., 1999; Zachopoulou & Makri, 2005), as well as the works that have confirmed that creativity programs stimulate similar

changes in both sexes (Katiyar & Jarial, 1983; Liikanen, 1975), thereby ratifying the hypothesis of gender similarity at early ages, which is currently under debate. However, they do not agree with the findings of Flaherty (1992), who found sex differences, although these discrepancies could be explained by the different ages of the study samples, as Flaherty's study was conducted with third-grade primary education students.

The study confirms the value of cooperative-creative activities with a low structural level for the development of children's creativity, and it validates the program and contributes a tool to promote verbal and graphic-figurative creativity in preschool children (Garaigordobil, 2007). Given the relevance of creativity in human development, due to the personal, social, and cultural consequences involved... the results of the study reinforce the importance of including play programs to promote creative thinking from preschool age and throughout the entire educational cycles. The originality of the study lies in having assessed the effect of the verbal and graphic creativity program by means of two methodologies (task performance of the Torrance test and parent-teacher assessment of the children/students' creative behavior based on behavioral observance), as well as having assessed the effect of cooperative play activities with a low structural on the emergence of creativity.

As a limitation of the study, we did not assess the characteristics of the adults who applied the program (creativity, tolerance, listening capacity, expectations, beliefs about creativity and its development...), as this could have an impact on the effects of the intervention. Given the importance of the teacher's figure, emphasized in various studies (Cerioli & Antonietti, 1993; Chien & Hui, 2010; Craft et al., 2007; Howard-Jones, 2008), and with a view to future research, we suggest analyzing the role of the teacher and of other contextual factors as mediator variables of the effects of programs for children's creativity.

As underscored by Hennessey and Amabile (2010), the psychological study of creativity is essential for human progress and although progress should be made in sciences, humanities, and arts, we should achieve a much more detailed comprehension of the creative process, its antecedents, and its inhibitors. The analysis of the works carried out in recent years reveals psychologists' growing interest in creativity but also an increasing fragmentation of the field. Research of the psychology of creativity has increased theoretically and methodologically, and the investigators have made important contributions to an ever growing variety of disciplines. However, it is currently necessary to reach a more profound comprehension, which should involve more interdisciplinary research, based on a systematic view of creativity that acknowledges a series of interrelated strengths that operate at many levels.

Within this multidisciplinary research context, the following future lines of research are proposed: (a) the assessment of this program in other spheres or domains of

creativity, such as plastic-constructive or dramatic creativity; (b) the comparison of the effects of a cooperative-creative play program with an adaptation of the program that proposes competitive tasks; (c) exploration of the maintenance of the long-term effects of the program; (d) the role of the adult's training or formation in the effects of the intervention; and (e) experimental analyses of the effect of specific techniques or components of the intervention program.

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