

Effects of the Spock videogame on improving emotional intelligence in adolescents

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Abstract

Introduction. The aim of the present research is to experimentally assess the effects of a videogame program (*Spock*) for improving emotional intelligence (EI) as an ability among a sample of adolescents.

Method. The sample was made up of 92 adolescents, aged 17 to 19, who were currently studying the second year of *Bachillerato*. The instrument used was the Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT). The study used a quasi-experimental design, a design of pre-test / post-test repeated measurements with a control group. In order to assess program effects, descriptive analyses (average and standard deviations) and variance analyses (ANOVAs) were carried out on the adolescents assigned to the experimental and control condition in the pre-test stage. Secondly, descriptive and covariance analyses of post-test scores were carried out (post-test ANCOVAs covarying the pre-test), thereby demonstrating program impact. Moreover, the effect size was calculated (Cohen's *d*).

Results. The results of the post-test ANCOVAs (covarying the pre-test differences) in the emotional intelligence variables that were under study in the experimental and control condition, confirm statistically-significant differences in the global scores of ability emotional intelligence, and the variables of emotional perception, emotional facilitation and emotional regulation. Additionally, the results of the post-test ANCOVA show that the change stimulated by the program was similar in both sexes. However, the results obtained in the post-test ANCOVAs confirm statistically-significant differences in favor of male participants in their global scores on ability emotional intelligence.

Discussion The study provides an effective intervention tool which has been experimentally validated. Overall results suggest the importance of implementing programs for fostering EI as an ability during adolescence.

Keywords: emotional intelligence, program, videogame, adolescents.

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Efectos del videojuego *Spock* sobre la mejora de la inteligencia emocional en adolescentes

Resumen

Introducción. El objetivo de la presente investigación es evaluar experimentalmente los efectos de un programa de videojuego (*Spock*) para mejorar la inteligencia emocional (IE) como capacidad en una muestra de adolescentes.

Método. La muestra ha estado compuesta de 92 adolescentes, de 17 a 19 años, que cursan 2º curso de Bachillerato. El instrumento utilizado ha sido: Mayer-Salovey-Caruso *Emotional Intelligence Test* (MSCEIT). El estudio utilizó un diseño cuasi-experimental, un diseño de medidas repetidas pretest-postest con grupo de control. Para evaluar el efecto del programa se realizaron análisis descriptivos (medias y desviaciones típicas) y de varianza (ANOVAs) por los adolescentes asignados a la condición experimental y control en la fase *pretest*. En segundo lugar, se llevaron a cabo análisis descriptivos y de covarianza de las puntuaciones *postest* (ANCOVAs *postest* covariando el pretest), lo que permite evidenciar el impacto del programa. Además, se calculó el tamaño del efecto (*d* de Cohen).

Resultados. Los resultados de los ANCOVAs *postest* (covariando las diferencias pretest) en las variables de inteligencia emocional capacidad en la condición experimental y control confirman diferencias estadísticamente significativas en la puntuación global de inteligencia emocional como capacidad, en la variable percepción emocional, en la variable facilitación emocional y en la variable regulación emocional. Los resultados del ANCOVA *postest* muestran que el cambio estimulado por el programa en ambos sexos fue similar. Sin embargo, los resultados de los ANCOVAs *postest* confirman diferencias estadísticamente significativas a favor de los varones en la puntuación global de inteligencia emocional como capacidad.

Discusión y conclusión. El trabajo aporta una herramienta de intervención eficaz que ha sido validada experimentalmente. Los resultados en su conjunto permiten enfatizar la importancia de implementar, durante la adolescencia, programas para fomentar la IE como capacidad.

Palabras Clave: inteligencia emocional, programa, videojuego, adolescentes.

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Introduction

Emotional intelligence (hereafter EI), in its twenty-five scientific trajectory (Salovey & Mayer, 1990), has gone from being a fashionable concept to an exciting, fruitful field of research. Although the different theoretical and assessment approaches are sometimes opposed, and there are conflicts in the construct's possible implications in vital areas of individual functioning (e.g. health, education, work, family life), this has only sparked more interest in the study of EI (Fernández-Berrocal & Extremera, 2006).

The concept of EI first appeared in 1990 in an article entitled “Emotional Intelligence”, published by Peter Salovey and John Mayer. According to Mayer and Salovey (1997, p.10), EI may be defined as “the ability to perceive emotions, to access and generate emotions so as to assist thought, to understand emotions and emotional knowledge, and to reflectively regulate emotions so as to promote emotional and intellectual growth”. From other theoretical approaches, EI refers to a set of behavioral dispositions and self-perceptions related to the abilities of recognizing, processing and using emotionally-charged information (Petrides & Furnham, 2003). As indicated by the two preceding definitions, from the earliest attempts to conceptualize EI (Salovey & Mayer, 1990), there have been very distinct theoretical positions for analyzing the construct.

Another controversial topic in the study of EI has to do with methods of measurement. We think it is pertinent here to recall the classic division proposed by Cronbach (1960), between *maximum performance* tests (e.g. aptitude tests) and *typical performance* tests (e.g. personality questionnaires). According to Cronbach (1960), *maximum performance* tests offer the subject instructions for the purpose of obtaining the best possible score (e.g. performance and aptitude tests); in other words, the tests present problems where the individual can show his/her problem-solving ability, so that skills, aptitudes and performance may be assessed. By contrast, the objective of typical performance tests is to understand the individual's usual or *normal* behavior (e.g. personality tests). In other words, typical performance tests inquire into a noncognitive area of human behavior, such as personality traits, interests and attitudes (Martínez-Arias, 1996).

Also worth mentioning are contributions from authors such as Petrides and Furnham (2000, 2001), where they distinguish between two EI constructs: trait EI (or emotional self-

efficacy) and ability EI (or cognitive-emotional ability). The first is measured through typical performance tests, while the second should be measured through maximum performance tests.

On the other hand, the most-recognized conceptual categorization in EI distinguishes between mixed models and ability models based on information processing (Mayer, Caruso & Salovey, 2000). Fernández-Berrocal and Extremera (2006, p. 67) state that “the mixed model is a very broad view that conceives of EI as a set of stable personality traits, socio-emotional competencies, motivational aspects and diverse cognitive skills” (Bar-On, 2000; Goleman, 1995). The ability model is a more limited view defended by such authors as Salovey and Mayer, which conceives of EI as a genuine intelligence based on the adaptive use of emotions and their application to thought. However, we share the thinking of Pérez-González, Petrides and Furnham (2007, p. 83), who defend that the distinction between mixed vs. ability models does not concur with today’s accepted psychometric theory, in that it overlooks the aspect of measuring methods, and fails to harmonize with all the available empirical evidence to date, which shows clearly that self-report measures of EI tend to be strongly inter-correlated to each other, regardless of whether they are based on mixed models or ability models. All the pertinent published data continues to highlight the need to distinguish between two EI constructs: Trait EI and Ability EI (O’Connor & Little, 2003).

Furthermore, Pérez-González, Petrides and Furnham (2007, p. 82) add that “the distinction between mixed models and ability models does not take into account the more important aspect of operationalizing a construct (e.g., its method of measurement)”. We emphasize the positive impact of well developed EI in all its dimensions on multiple circumstances of life. This reality is supported by a growing volume of research that sheds light on and provides evidence of the impact of EI. One of the lines of EI research that has attracted the greatest interest is analyzing the role that emotions play in the educational context, and especially, studying the influence of EI as a variable in determining students’ academic success and their social adaptation at school (Jiménez & López-Zafra, 2009).

After reviewing the research, three fundamental areas were found where EI presents a certain impact in the educational sphere: students’ psychosocial adjustment (Ciarrochi, Chan & Bajgar, 2001; Frederickson, Petrides & Simmonds, 2012; Salguero, Fernández-Berrocal, Ruiz-Aranda, Castillo & Palomera, 2011; Salguero, Palomera & Fernández-Berrocal, 2012); academic performance, though more controversial and sometimes with contradictory results

(Downey, Mountstephen, Lloyd, Hansen & Stough, 2008; Jiménez & López-Zafra, 2009; Vidal Rodeiro, Bell & Emery, 2009); and finally, social adaptation at school (Mavroveli, Petrides, Sangareau & Furnham, 2009).

On a different note, Bisquerra (2012, p.95) claims that the practice of EI education may adopt multiple forms and insists that the best form is probably through the program model. Along these lines, many authors share the idea that the methodology for developing EI must be eminently practical and attractive to students. Bisquerra (2009, p. 166) feels that “instruction in theory can be reduced to a minimum; especially at younger ages. Examples of dynamics that can be used are introspection, relaxation, modeling, group dynamics (role playing, discussion groups, dramatization, etc.), and so on”. Despite agreement as to the primarily practical methodology of EI education, Vallés and Vallés (2003, p.271) state that researchers need to offer guidance about what methodological procedures are more effective in comparison to others. In this sense, we found no educational intervention program for improving EI that had a solid theoretical foundation and included a process for assessing effectiveness and that made use of interactive video games.

At this juncture, the following question must be asked: is there empirical evidence to support that EI can be taught and be improved through intervention programs? First, there are very interesting reflections from Van Rooy, Viswesvaran and Pluta (2005), where they conclude that EI is a valuable performance predictor in a wide variety of situations and settings, as was presented above, and it would be extremely valuable to be able to improve it. Consequently, future research should seek to discover to what extent EI may be improved through training.

Also very interesting are the distinctions made by Pérez-González (2012) between so-called emotional education in a broad sense, and emotional education in a strict sense. The former seeks to foster socioemotional learning by using a comprehensive educational approach, and through preventive programs or personal development programs. The latter is understood as “EI education”, whose main purpose is to improve EI levels in the subjects. This second consideration is connected with the psychological construct of EI and is basically what we are referring to in this research study.

Despite the proliferation of initiatives for improving EI, mainly in the last decade, one important limitation of these experiences has been a lack of planning for thorough assessment of the programs' impact on the students targeted. As Ruiz-Aranda, Fernández-Berrocal, Cabello and Salguero (2008) explain: "most intervention programs lack the minimal scientific and methodological rigor which would include a pretest-intervention-posttest assessment design with a comparable control group, allowing us to compare the results with other types of programs" (p. 245).

Pérez-González (2008) reports contributions from Goetz, Frenzel, Pekrun and Hall (2005), explaining that despite the proliferation of diverse emotional education programs, in the broad sense, most of these lack a solid scientific and theoretical basis; therefore we should be cautious in applying them. According to Ruiz-Aranda, Fernández-Berrocal, Cabello and Salguero (2008), interventions for the improvement of EI must be carried out systematically, and use a program with proven effectiveness. Similarly, Castillo, Salguero, Fernández-Berrocal and Balluerka (2013) highlight the importance of educational intervention in EI ability through the use of programs.

In order to address the question of whether EI can be taught, Schutte, Malouff and Thorsteinsson (2013) compare empirical results in a review of studies on EI training, and conclude that, based on correlational and experimental research, it is possible to increase EI through proper training. In presenting this review, Schutte, Malouff and Thorsteinsson (2013) organize their paper along different spheres where there is evidence of EI teachability: studies in the organizational sphere, studies in the mental health sphere, study in the sphere of sports, and studies in the sphere of education. Represented below are studies related to the effectiveness of certain educational programs for improving EI in the educational context.

In the research work of Ulutas and Ömeroglu (2007), they design an EI training program and implement it with 6-year-old pupils. The main objective of the EI education program was to improve their ability to recognize, understand and manage their emotions. Results showed a significant increase in EI scores in the intervention group as compared to the control group.

We also point to studies carried out by Ogunyemi (2008). The main purpose of these research studies was to evaluate the effects of an EI improvement program in students from

the last two years of secondary education. Ogunyemi (2008) used a quasi-experimental design, with an intervention group and a control group. Results showed improved EI levels in students that participated in the program as compared to students from the control group.

Of undoubted importance, however, are the studies carried out in Belgium by Nelis, Kotsou, Quoidbach, Hansenne, Weytens, Dupuis and Mikolajczak (2011), where they designed an intervention program for improving EI in university students. The intervention program was based on the theoretical model of Mayer and Salovey (1997) and structured according to its four branches. Results showed significant improvements in program participants as compared to subjects assigned to the control group, both on ability EI scores and on trait EI scores, specifically in emotional awareness and identification and in self-regulation abilities.

The *Spock* video game, then, is based on the hierarchical, four-branch model of EI (Mayer & Salovey, 1997). This model is hierarchically organized into branches following a logical sequence from the more basic psychological processes to the more complex ones. Mayer and Salovey (1997) propose that the more basic processes are subordinated to higher-level processes, and therefore, higher dimensions require the prior development of the lower dimensions. However, Mayer and Salovey's affirmation of a hierarchical organization (Mayer & Salovey, 1997) has been criticized by Zeidner, Matthews, Roberts and MacCann (2003, p. 73), who defend that the evidence suggests parallel rather than serial development of the four branches.

In summary, the hierarchical, four-branch model encompasses four interrelated abilities: perception of emotions, emotional facilitation, understanding emotions and emotional regulation.

- *Perception of emotions* is defined as the ability to perceive and identify emotions in oneself and in others, as well as in other forms of stimuli, including human voices, stories, music and works of art (Ekman & Friesen, 1975; Nowicki & Mitchell, 1998; Scherer, Banse & Wallbott, 2001).
- *Use of emotion to facilitate thought* refers to the ability to use emotions to focus one's attention and to think in a more rational, logical and creative fashion.
- *Understanding emotions* implies a considerable amount of language and propositional thought in order to reflect the ability to analyze emotions. It includes under-

standing the emotional lexicon and the manner in which emotions combine with each other, progress and evolve from one to another.

- *Emotional regulation* includes the ability to regulate one's moods, one's emotions and the emotions of others.

The *Spock* video game is configured with interactive activities whose purpose is to improve ability EI (see Appendix 1). The game presents students with hypothetical situations, both intrapersonal and interpersonal in nature, and shows them possible solutions. Students must decide which of the alternative responses is most adequate for the situation posed. Each situation offers four possible responses. Two of the tasks that form part of the *Spock* video game are presented below.

In Session 4 (understanding emotions), the student is presented with the following situation (see Appendix 1): *“Next you will be presented with a situation where you must choose which of the four emotions described is most likely to result from the circumstances given. For example, if Aitor continues to work hard as he has so far, his football coach will probably make him the team captain, something he has always wanted. David is most like to feel: a) anxiety; b) happiness; c) surprise; d) fear”*.

In Session 9 (emotional regulation), the student is presented with the following situation and the following instructions (see Appendix 1): *“Next you will be presented with a situation that has to do with your daily life. Even though more than one option may be acceptable, you are asked to choose only one, the most effective one. In other words, choose what is most practical and useful for successfully facing the situation presented. Remember that you need not necessarily choose what you would do, or the best option, but choose the most effective response for that situation. For example, Daniel has been accepted for the study program that he wanted to do. This involves moving to another city and being separated from his family and his old friends. He finally decides that it is worth the sacrifice. What action would be most effective for Daniel? (a) Come up with some system to stay in touch, like telephone calls, weekly emails or social networks; (b) Think about the great opportunity that this change means for him; (c) Not go; (d) Realize that he shouldn't have applied for this study program if he didn't want to leave.”*

In short, the *Spock* video game seeks to simulate intrapersonal and interpersonal situations, using tasks that are sufficiently attractive or motivating to the students in order to encourage reflection. All the sessions have the same presentation structure, including the following phases: first, the session objectives are established; second, the session dynamic is explained; third, the student individually performs the tasks proposed in the video game; and finally, the conclusions drawn from the game are shared and discussed in the class group. The discussion session is always supervised by the teacher and includes the teacher giving a theoretical explanation of the topics addressed, and a debate among the students and teacher about the most adequate responses to the situations proposed.

The intervention consisted of completing ten 55-minute sessions over the school year, administered in the computer science classroom. Additionally, a series of methodological recommendations were taken into account (Garaigordobil, 2008) on how to arrange the setting for the intervention using the *Spock* video game. The variable constants for carrying out this experience were as follows:

- *Intersession consistency*: one weekly session with a one-hour duration, coinciding with the Psychology class hour for this group of 2nd-year *Bachillerato* students (final year of university-preparation studies).
- *Space-time consistency*: the experience was carried out in the same weekly timeframe and in the same physical space.
- *Consistency in the adult figures who administered the intervention*: the sessions were always led by the same teacher for all 10 sessions.
- *Consistency in the session structure or format*: the session began with a brief description of the session objectives, after which the proposed activities were carried out.

Thus, all the activities of the *Spock* video game include both the student's individual work with the video game, and a group discussion of the conclusions reached during the game. All sessions are always led by a teacher. The program activities have four main objectives: (1) Enhance perception and identification of emotions in oneself and in others; (2) Foster the use of emotions for focusing attention and thinking more rationally, logically and creatively; (3) Improve one's analysis and understanding of emotions, (4) Regulate one's own moods and emotions. In order to design the activities, different sources were reviewed and utilized (Nelis et al., 2011; Pérez-González, Cejudo & Benito, 2015; Ruiz-Aranda et al., 2008).

Objective and hypothesis

Within this contextualization, the main objective of the study was to experimentally assess the effects of a video game program (*Spock*) for improving ability EI in a sample of adolescents. Two hypotheses were proposed in relation to this objective: (H1) The intervention would increase students' scores on all variables of ability emotional intelligence; and (H2) The program would not produce differentiated changes between the sexes.

Method

Participants

This study was carried out with a sample of 92 adolescents, between the ages of 17 and 19, who were enrolled in 2nd year of *Bachillerato* (pre-university education). From this sample, 42 students (45.7%) were assigned to the experimental condition and 50 (54.3%) to the control condition. Gender distribution was 45 (48.9%) male students and 47 (51.1%) female students.

Design and Procedure

The study used a quasi-experimental design, a repeated measures, pretest-posttest design with a control group. The intervention program was the independent variable, while the dependent variables were as follows: ability emotional intelligence - global, ability emotional intelligence - emotional perception branch, ability emotional intelligence - emotional facilitation branch, ability emotional intelligence - understanding emotions branch, and finally, ability emotional intelligence - emotional regulation branch.

As for the procedure, we first requested permission from the School Board; the program was explained, and approval was requested for its implementation. Next, an informational letter was sent to all the families of participating students, including a request for informed consent. After family consent was received, the pretest (assessment instrument) was applied to students from both the experimental and control groups. This was followed by implementing the intervention program in the two experimental groups (ten 55-minute sessions),

while the two control groups were to receive the program at a later time, within the framework of the school's guidance and homeroom plan. After the intervention, the same pretest instrument was administered in the posttest phase, to both the experimental and control groups.

Assessment Instrument

The *Mayer-Salovey-Caruso Emotional Intelligence Test* (MSCEIT; Mayer, Salovey & Caruso, 2000) was used to assess Ability Emotional Intelligence: the instrument measures Ability EI based on the EI branches of perception, facilitation, understanding and regulation. The MSCEIT assesses four factors that correspond to the theoretical model by Mayer and Salovey (1997): emotional perception and expression, emotional facilitation, understanding emotions and regulating one's own emotions and the emotions of others. Additionally, it provides a total score for ability emotional intelligence. The test presents adequate psychometric properties. According to the manual for the Spanish adaptation of the instrument, total score reliability is .95. Reliability for each of the branches is as follows: (EIA-P) emotional perception (.93); (EIA-F) emotional facilitation (.76); (EIA-U) understanding emotions (.83) and (EIA-R) regulating emotions (.85).

Statistical Analysis

In order to evaluate the program effect, descriptive analyses (means and standard deviations) and variance analyses (ANOVAs) were carried out using scores obtained on the MSCEIT by the adolescents assigned to both the experimental and control groups, in the pretest phase. Next, descriptive analyses and covariance analyses were carried out using the posttest scores (posttest ANCOVAs covarying the pretest), thereby providing evidence of the program impact. In addition, effect size was calculated (Cohen *d*) (small < .50; moderate .50-.79; large \geq .80). Results obtained are presented in Table 1.

Results

Effects of the Spock video game on the emotional intelligence variables

Results from univariate analyses of variance in the *pretest* phase (see Table 1) indicate that there were no statistically significant differences between the adolescents in the experimental and the control groups before beginning the intervention, except for the variable of

ability emotional intelligence -- understanding emotions branch $F(1, 90) = 4.66$ $p < .05$, showing a small effect size ($d = .44$).

However, statistically significant differences were found in the results from the posttest ANCOVAs (covarying the pretest differences), in the emotional intelligence variables under study in the experimental and control conditions (see Table 1), particularly: in the global score for ability emotional intelligence, in the emotional perception variable, in the emotional facilitation variable and in the emotional regulation variable. Significant increases were observed in the adolescents from the experimental group in these four variables of ability emotional intelligence ($AEI-G = 3.07$; $AEI-P = 3.83$; $AEI-F = 2.28$; $AEI-R = 6.67$). The effect size was moderate in the emotional perception variable ($d = .78$) and in the emotional regulation variable ($d = .68$), and large in the global score for ability emotional intelligence ($d = .80$) and in the emotional facilitation variable ($d = .93$).

Program effects in both genders

In order to evaluate whether the program impact was similar in both genders, we first performed ANOVAs with pretest scores, followed by ANCOVAs with the posttest scores (covarying the pretest scores) for the study variables, for the male and female members of the experimental group. Results are presented in Table 2.

With regard to the variables of ability emotional intelligence, the pretest ANOVA results (see Table 2) confirmed that there were no differences between male and female in the experimental group before beginning the intervention. The results from the posttest ANCOVA show that the change prompted by the program was similar in both genders. However, statistically significant differences were found in the results from the posttest ANCOVAs (covarying the pretest differences), in favor of the male subjects, on the global score for ability emotional intelligence (see Table 1), with a moderate effect size ($d = .62$).

Table 1. Pretest and Posttest analyses on variables of emotional intelligence as an ability.

VARIABLES	PRETEST					POSTTEST				
	EXPERIMENTAL	CONTROL				EXPERIMENTAL	CONTROL			
	Mean (SD)	Mean (SD)	F (1,90)	p	d	Mean (SD)	Mean (SD)	F (1,90)	p	d
AEI-G	96.98 (10.31)	95.28 (9.41)	.68	>.05		100.05 (6.44)	94.10 (8.26)	23.98	.000	.80
AEI-P	96.98 (11.49)	99.50 (13.60)	.90	>.05		100.81 (9.92)	93.68 (8.27)	7.62	.007	.78
AEI-F	96.24 (10.40)	93.84 (9.21)	1.38	>.05		98.52 (7.57)	91.30 (7.83)	8.42	.005	.93
AEI-U	103.24 (13.69)	98.16 (8.67)	4.66	.04	.44	110.36 (9.44)	98.22 (13.13)	.04	>.05	
AEI-R	94.83 (10.17)	93.68 (10.47)	.28	>.05		101.50 (10.31)	94.78 (9.37)	4.22	.04	.68

Note. (1) AEI-G: Global score on ability emotional intelligence; AEI-P: Ability emotional intelligence - emotional perception branch; AEI-F: Ability emotional intelligence - emotional facilitation branch; AEI-U: Ability emotional intelligence - understanding emotions branch; AEI-R: Ability emotional intelligence - emotional regulation branch; (2) d = Cohen effect size. (3) EXPERIMENTAL n = 42, CONTROL n = 50.

Table 2. Pretest and Posttest analyses of variables of ability emotional intelligence in male and female subjects.

VARIABLES	PRETEST					POSTTEST				
	MALE	FEMALE				MALE	FEMALE			
	Mean (SD)	Mean (SD)	F (1,40)	p	d	Mean (SD)	Mean (SD)	F (1,39)	p	d
AEI-G	97.39 (10.19)	96.67 (10.61)	.05	>.05		102.07 (7.16)	98.05 (5.68)	2.91	.04	.62
AEI-P	97.06 (10.91)	96.92 (12.14)	.00	>.05		103.10 (11.53)	98.50 (8.67)	.00	>.05	
AEI-F	94.67 (8.80)	97.42 (11.49)	.72	>.05		99.80 (8.44)	97.25 (6.98)	.00	>.05	
AEI-U	107.11 (12.65)	100.33 (13.97)	2.62	>.05		111.67 (8.93)	109.37 (9.88)	.00	>.05	
AEI-R	94.00 (11.25)	95.46 (9.48)	.21	>.05		102.00 (2.49)	101.02 (2.11)	1.64	>.05	

Note. (1) AEI-G: Global score on ability emotional intelligence; AEI-P: Ability emotional intelligence - emotional perception branch; AEI-F: Ability emotional intelligence - emotional facilitation branch; AEI-U: Ability emotional intelligence - understanding emotions branch; AEI-R: Ability emotional intelligence - emotional regulation branch; (2) d = Cohen effect size. (3) Male n = 18, Female n = 24.

Discussion

The objective of the study was to evaluate the effects of the *Spock program*. First of all, the results confirmed that the intervention prompted the following effects in the experimental groups: (1) An increase in the global score for ability emotional intelligence; (2) An increase in the score for emotional perception; (3) an increase in the score for emotional facilitation; and (4) an increase in the score for emotional regulation. These results ratify the program's effectiveness and partially confirm Hypothesis 1, pointing in the same direction as other studies that have shown the effectiveness of EI improvement programs not based on video games (Nelis, et al., 2011; Ogunyemi, 2008; Ulutas & Ömeroglu, 2007). These results may also be explained in part by the use of active, participative and varied teaching-learning techniques that were incorporated in all the activities of the *Spock* video game. The individual activities performed by students with the video game were combined with sharing in the group and class discussion, with teacher supervision in all the proposed tasks. Moreover, the nature of all the program activities was situational, functional and meaningful.

Second, although the results show a similar change in both genders, Hypothesis 2 was also confirmed in part, given that the male students showed a significantly greater improvement in the global score on ability EI, when compared to the female students. These results do not concur with those obtained in other correlational, descriptive investigations, where results showed significant differences in ability EI, as measured on maximum performance tests, in favor of the female subjects (Palomera, Gil-Olarte & Brackett, 2006; Sánchez, Fernández-Berrocal, Montañés & Latorre, 2008). Considering these questions, our results can probably be explained by the high motivation shown by the male subsample when we began to use the *Spock* video game.

The present research study has contributed empirical evidence of the teachability of EI (Schutte, Malouff & Thorsteinsson, 2013) through program implementation, in this case through use of the *Spock* video game. Additionally, the overall results lead us to emphasize the importance of implementing similar programs during adolescence in order to foster ability EI.

Choice of the *Spock* video game was due primarily to its grounding in a solid EI theoretical framework (Mayer & Salovey, 1997), and also to its possibilities for assessing the ob-

jectives established. In addition, the *Spock* video game includes attractive activities that are well suited to the educational level that it targets, and finally, it was possible to offer the students immediate feedback from the results. Therefore, this study contributes an effective intervention tool that has been experimentally validated.

For future lines of research, we suggest evaluating the effect of *Spock* on other variables, for example, on trait EI, social adaptation at school, or academic performance. In addition, the research sample was too small for results to be generalized to the population; we therefore suggest that the program be evaluated using a larger sample and subjects from different origins. The study should be replicated with other samples in order to analyze its generalization (external validity). On the other hand, a follow-on assessment would also be needed (approximately one year after concluding the intervention program), in order to analyze the durability of program effects.

In short, we consider that the emotional sphere can and should be addressed at school as a substantive element in personal development (Santos Guerra, 2008). Like other authors (Heckman & Kautz, 2012), we sustain that the purpose of school is the full development of the individual's whole personality. Therefore, if education is to focus on full development of the students' personality, emotions must be educated as an integral part of human beings (Bisquerra, Pérez-González & García, 2015). In conclusion, the incorporation of school psychology interventions that improve and foster EI development, such as the *Spock* video game program put forward here, can contribute to efforts for improving the quality of education.

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APPENDIX 1

OUTLINE OF SESSIONS INCLUDED IN THE *SPOCK* VIDEO GAME

BRANCH 1: IDENTIFYING AND PERCEIVING EMOTIONS

SESSION 1:

Introduction to the program.

The importance of emotions in daily life, through presentation of virtual situations.

Session conclusions.

SESSION 2:

Identifying emotions.

Analysis of the physiological, cognitive and behavioral responses of emotions.

Identifying emotions in others. Nonverbal communication.

Session conclusions.

BRANCH 2: EMOTIONAL FACILITATION.

SESSION 3:

The influence of emotions in decision-making.

Emotions and making decisions about studies.

Session conclusions.

BRANCH 3: UNDERSTANDING EMOTIONS

SESSION 4:

Happiness and sadness. Characteristics.

Relations to other similar emotions.

Session conclusions.

SESSION 5:

Anxiety and stress. Characteristics.

Relations to other similar emotions.

Session conclusions.

SESSION 6:

Anger. Characteristics.

Relations to other similar emotions.

Session conclusions.

BRANCH 4: REGULATING EMOTIONS

SESSION 7:

Regulation strategies and encouraging positive emotions.

The importance of optimism and happiness.

Session conclusions.

SESSION 8:

Sadness: Strategies for regulating emotions.

Group discussion of their effectiveness.

Session conclusions.

SESSION 9:

Anxiety and stress: Strategies for regulating emotions.

Group discussion of their effectiveness.

Session conclusions.

SESSION 10:

Anger: Strategies for regulating emotions.

Group discussion of their effectiveness.

Session conclusions.

Note: All sessions were carried out by the two authors of this research study. We would note that all sessions of the *Spock* video game include activities performed individually with the video game as well as group activities and group discussion. All emotional regulation strategies that are worked on in this program are based on contributions from Gross (1999), studies by Thayer, Newman and McClainb (1994) and the research of Livingstone and Srivastava (2012).

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