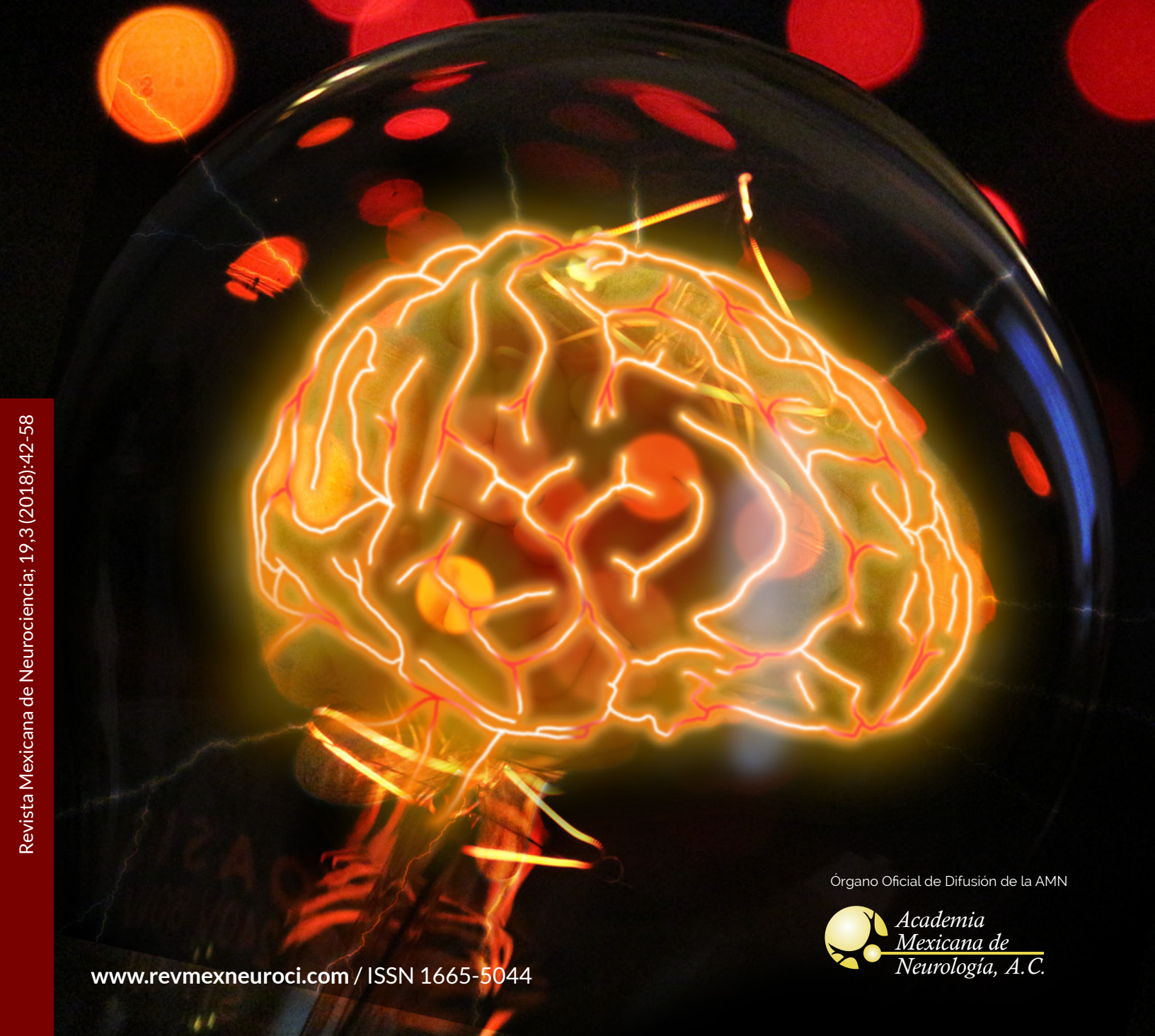
Rev Mex Neuroci ahora en CONACyT

Vol. 19, issue. 3 (may-june 2018)

Revista Mexicana de Neurociencia

Publicación oficial de la Academia Mexicana de Neurología A.C.



Revista Mexicana de Neurociencia; 19,3 (2018):42-58

Órgano Oficial de Difusión de la AMN

Academia Mexicana de Neurología, A.C.

www.revmexneuroci.com / ISSN 1665-5044

Original contribution

Cristian Villanueva-Bonilla,[1] Jasmín Bonilla-Santos,[2] Ángela Magnolia Ríos-Gallardo,[3] Yulia Solovieva.[4]

[1]*Psychologist, South Colombian University. Young Researcher at Colciencias. Dneuropsy Research Group. South Colombian University.*
[2]*PhD. Cognitive Neuroscience. Psicosaberes Research Group. Cooperative University of Colombia.*
[3]*PhD. Cognitive Neuroscience. Dneuropsy Research Group. Vice-Rector Research and Social Projection, South Colombian University.*
[4]*Master's Degree in Neuropsychology, School of Psychology, Autonomous University of Puebla, Mexico.*

Developing Emotional, Neurocognitive, and Social Skills in Children with Autism: Evaluation and Intervention through Social Role-Playing

Desarrollando habilidades emocionales, neurocognitivas y sociales en niños con autismo. Evaluación e intervención en juego de roles sociales

Abstract

Introduction: Autism is a neurodevelopmental disorder that is characterized by difficulties with socialization, communication, and cognition as well as repetitive and unusual behaviors. Social role-playing is a guiding activity that produces positive changes in children's development in terms of imagination, voluntary activity, language, reflexive thought, and conversational abilities.

Objective: To describe the effect of an intervention program on emotional, neurocognitive and social skills in three children with autism spectrum disorder (ASD).

Methods: A multiple-case design, based on the principles of the microgenetic method, was used to determine the emotional, neurocognitive, and social characteristics of three children with autism following the application of an intervention program involving social role-playing. Case 1: A 9-year-old child with poor identification and emotional expression, as well as difficulties in maintaining fluent and coherent conversations. Case 2: A 10-year-old child with mechanical language, poor fluency, and difficulty initiating and maintaining conversation. Case 3: An 8-year-old girl presents deficits in nonverbal communicative behaviors used in social interaction and difficulties in adapting to non-daily situations.

Results: Positive changes in emotional identification, understanding, and expression as well as mental states and social language. The children also demonstrated improvements in their cognitive and social abilities following the intervention program. The above results should be interpreted carefully because of the preliminary character of the study. A larger sample that allows the generalization of the results is suggested for future investigations.

Keywords

Autism, emotional abilities, social abilities, role-playing, theory of mind.

Resumen

Introducción: El autismo es un trastorno del neurodesarrollo, se caracteriza por dificultades en la socialización, comunicación, cognición y conductas repetitivas e inusuales. Por su parte, el juego de roles sociales es la actividad rectora que propicia cambios positivos en el desarrollo de los niños en aspectos como la imaginación, actividad voluntaria, lenguaje, pensamiento reflexivo y habilidades conversacionales.

Objetivo: Describir el efecto de un programa de intervención sobre las habilidades emocionales, neurocognitivas y sociales en tres niños con trastorno del espectro autista (TEA).

Métodos: Se utilizó un diseño de caso múltiple, orientado por principios de metodología microgenética para determinar las características emocionales, neurocognitivas y sociales de tres niños con autismo posterior a la aplicación de un programa de intervención basado en el juego de roles sociales. Caso 1: Niño de 9 años de edad, con escasa identificación y expresión emocional, así como dificultades para mantener conversaciones fluidas y coherentes. Caso 2: Niño de 10 años de edad, con lenguaje mecánico, poco fluido y dificultades para iniciar y mantener una conversación. Caso 3: Niña de 8 años de edad, presenta déficits en conductas comunicativas no verbales usadas en la interacción social y dificultades para adaptarse a situaciones no cotidianas.

Resultados: Se evidencian cambios positivos en la identificación, comprensión y expresión emocional, estados mentales y lenguaje social. Además, los niños presentaron mejoría en sus habilidades cognitivas y sociales después del programa de intervención. Los resultados mencionados se deben interpretar cuidadosamente debido al carácter preliminar del estudio. Se sugiere para futuras investigaciones una muestra mayor que permita la generalización de los resultados.

Palabras clave

Autismo, habilidades emocionales, habilidades sociales, juego de rol, teoría de la mente.

Corresponding Author:
Ps. Cristian Villanueva-Bonilla.
Facultad de Salud de la Universidad Surcolombiana, contiguo Hospital Universitario Hernando Moncaleano.
Calle 9 carrero 4. Neiva, Huila, Colombia.
Phone.: (57) (8) 8718310. Ext. 3137.
E-mail: cristian.villanueva@usco.edu.co

Introduction

Autism is a neurodevelopment disorder characterized by difficulties in socialization, communication, cognition, and repetitive and unusual behaviors with different levels of severity that occur in the first years of life.[1] In 1985, autism was related to difficulties specific to Theory of Mind (ToM). The research conducted allowed inferring that this process was part of one of the deficits that people with autism have. ToM is a complex process, which requires skills to make inferences about what other people may be thinking or feeling and the difficulties in perceiving such mental states are manifested in communication and social interaction problems.[2,3] Investigations grew exponentially from the aforementioned studies, as evidenced by some reviews.[4,5] ToM is currently defined as the ability to understand and predict other people's behavior, knowledge, intentions, and beliefs and has different levels of complexity.[6]

The social difficulties associated with the ToM deficits in children with autism raise the need for a progressive and comprehensive evaluation and intervention, including the assessment of psychological, cognitive, and emotional processes in order to characterize the essential aspects of its stage of development in terms of strengths and difficulties. The intervention process was performed with social role-play, which is defined as the preschool activity that allows consolidating important formations such as directed social communication, reflection, and shared actions, formations which occur to a lesser extent in children with autism.[7] Role-play is an essential activity for the development of peer contact, which shares a single objective among everyone and does not require isolated participation from each individual.[7] The game must be initiated and regulated independently by the children to make way for the development of their creativity. The child develops the ability to understand the representation of a specific role and its interaction with the other, learning to see himself through the eyes of others, which is an essential component of ToM.[8]

The methodology of social role-play and the ToM are the axes of the intervention program developed in this study. The scientific evidence of the methodology indicates positive changes in cognitive and social areas.[9-11] In addition, numerous investigations that specifically intervene in components or precursors of ToM cited in a systematic review, empirically support the creation and implementation of the intervention program.[4] The objective of this research is to describe the effect of an intervention program on emotional, neurocognitive, and social skills in three children with autism spectrum disorder (ASD).

Methods

Participants

The databases of the possible participants were provided by institutions providing health services specialized in caring for people with autism, Down syndrome, pervasive developmental disorders, attention-deficit/hyperactivity disorders, and other pathologies that affect behavior through professionals in the branches of physiotherapy, speech therapy, psychology, occupational therapy, and special education. Six children fulfilling the characteristics required by the study (inclusion criteria) were pre-selected. The relatives of these children were contacted and informed about the research and the possibility of participation. Three children were finally selected, with the signature and authorization of the parents.

Inclusion criteria

- Diagnosis of autism. A consensus of professionals in pediatrics, clinical psychology, neuropsychology, neurology, and psychiatry. Diagnostic criteria of the DSM-V.[12]

- Age between 7 and 11 years old. The authors indicate this age range as the appropriate one to generate changes in the cognitive and communicative areas from social role-play.[7]

• Level 1 and Level 2 of the three ranges of severity of autism established in the DSM-V.[12]

Clinical cases

Case 1 (J1)

A nine-year-old boy with a diagnosis of autism. In the prenatal history, the mother reported anemia and headache during the last month of pregnancy. The delivery was natural and full term. The motor development (head control, sitting, crawling, standing, walking, sphincter control) and language (eye contact, babbling, joined two words, said three words, constructed sentences) were appropriate until 24 months, after which a progressive involution was generated in the child's psychomotor development. The child received physical, language, and behavioral therapy from age six. History of recurrent difficulties of adaptation to the school environment. Currently, there are difficulties in interaction and social communication in his daily life, expressed through scarce emotional identification and expression as well as deficits in the proper maintenance of fluent and coherent conversations with other people. According to the clinical history and the initial cognitive evaluation for this study, the child had difficulties in the cognitive domains of attention and understanding of language, which were evidenced in inappropriate resolutions of tasks that required follow-up of instructions and cognitive effort. J1 presented simple stereotyped movements, extreme discomfort with small changes related to subjects of his taste, restricted interests, and sensory hyperreactivity to auditory stimuli. He was not in school during the development of this intervention program.

Case 2 (J2)

A 10-year-old boy with a diagnosis of autism. The prenatal history reported that the mother suffered from toxoplasmosis. The delivery was natural and full term. The motor and language development was appropriate until 24 months, after which a progressive involution was generated in the child's psychomotor development. The child started to receive behavioral therapy at four years of age. Adaptation to the school environment with the permanent accompaniment of a therapist. Currently presented difficulties in communication and social interaction, simple stereotyped movements, and sensory hyperreactivity to olfactory and visual stimuli. Presented aggressive behaviors due to the inability to perform some tasks that required cognitive effort (cognitive flexibility, behavior planning and organization). Maintained a constant attention level with academic tasks and adapted with difficulty to everyday situations.

Case 3 (J3)

An eight-year-old girl with a diagnosis of autism. The prenatal history reported there was a threat of miscarriage. The birth was natural and full term. The motor development was appropriate. Language acquisition presented the following characteristics: babbling at two months, joined two words at 12 months, said three words at 18 months and built sentences at four years ("the girl was quiet all the time"). J3 received phonoaudiology therapy since the age of two. She currently had difficulties with non-verbal communicative behaviors used in social interaction in different areas of her daily life, expressed as difficulties maintaining eye contact and expressing emotions. Her expressive language was automatic, poorly articulated, and dysprosodic, presenting poor emotional control, simple stereotyped movements, extreme discomfort to changes in routine, and difficulties adapting to non-everyday situations. Adopted a rigid and strict thinking pattern. During the research, she was in second grade of primary school, without any type of school support. Her behavior and inflexible thinking caused her difficulties in her school environment.

Design

This was a within-subjects, quasi-experimental, pre-post research design guided by principles of microgenetic methodology.8 It allowed a detailed approach to the emotional, neurocognitive, and social processes of the children through the

intervention program.[13] This design was used in order to record the greatest number of behaviors in a sequence of time and, in turn, to identify the occurrence of changes in emotional and social skills.

The research protocol and informed consent were approved by the Research Ethics Committee of the Faculty of Health of the South Colombian University.

Evaluation instruments

Pediatric Neuropsychological Evaluation (PNE)

Assesses the neurocognitive component (construction skills, memory, attention, and executive functions, among others) in children between 5 and 16 years of age.[14] Inter-rater reliability ranged between .874 and .987 and statistically significant correlations were recorded with most of the subtests of the Wechsler Intelligence Scale for Children (WISC-R).[15]

Emotion recognition test of facial expressions

The test consists of 36 videos that represent the basic emotions (joy, sadness, anger, surprise, fear, and disgust) used to evaluate the identification of basic emotions. It does not have psychometric properties.[6]

Autonomous Scale for the Detection of Asperger Syndrome and High Functioning Autism (ASDA)

This instrument was given to the relatives and teachers. It is composed of 18 items evaluating six dimensions: social skills, fiction and imagination, cognitive processes, mentalistic abilities, executive functions, language and communication and the scores range from 1 to 4 (1 represents the appropriate level expected of a child of this age). Reliability, internal consistency =.97; Inter-rater reliability =.87; Test-retest reliability =.94 and .97 in parents and teachers respectively.[16]

Australian Scale for Asperger Syndrome (ASAS)

Designed to identify social and emotional skills, communication, cognitive skills, specific interests, and motor skills that may be indicative of Asperger syndrome in children during their early school years.[17] Consists of 24 questions to apply to parents or teachers which are scored from 0 to 6 (0 represents the appropriate level expected of a child of this age). Reliability of 0.88 through the Cronbach alpha test.[18]

Observational Instrument of Emotional Behaviors (OIEB)

It assesses the level of identification, expression, and comprehension of six dimensions or basic emotions in contextual situations (joy, sadness, anger, surprise, fear, and disgust) and allows registering defined behaviors in a fixed period of time. It was designed for this investigation based on the levels of complexity of the ToM[6] and was validated by expert judges in the areas of research, autism, and ToM (content validity). One researcher listed in each of the sessions the frequency in which the corresponding behavior was presented.

Procedures

Taking into account the aforementioned classification by levels, the ToM skills intervention program (Figure 1) was structured as follows:

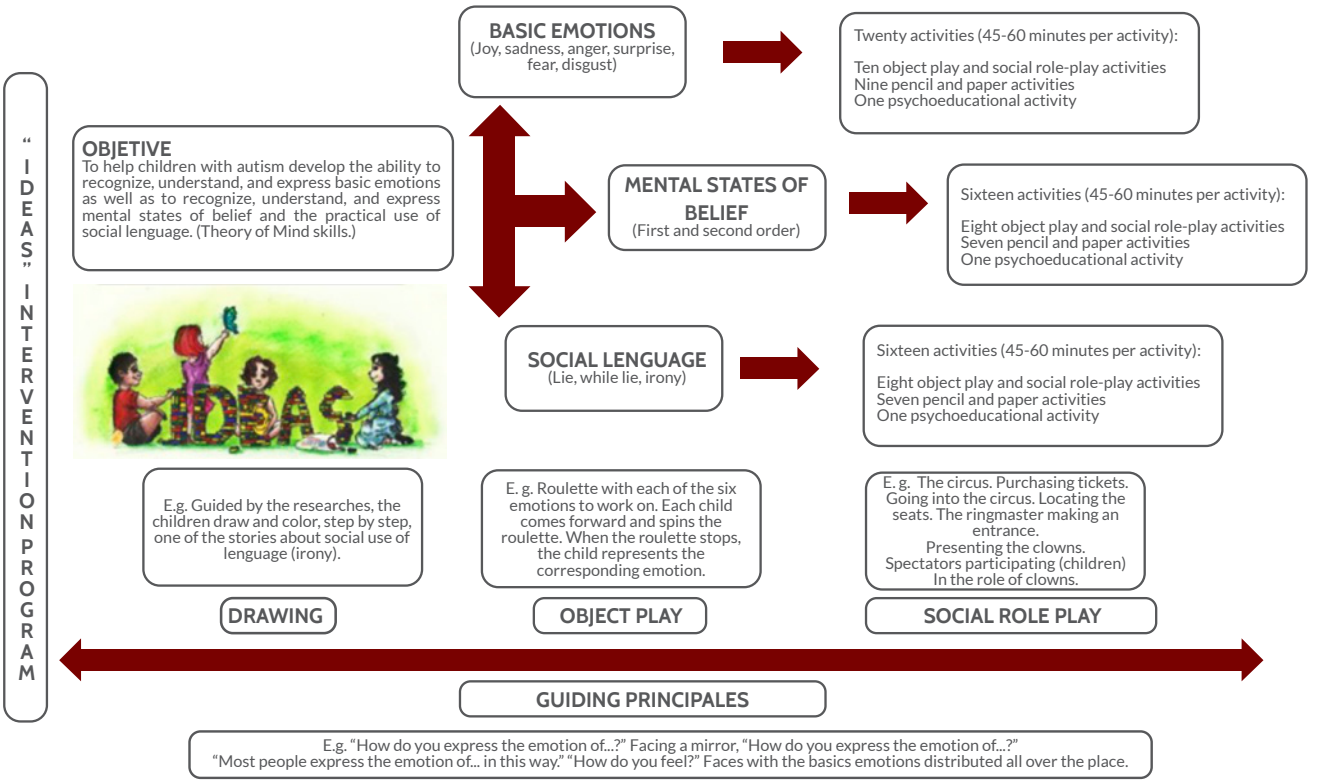
1. Basic emotions (joy, sadness, anger, fear, surprise, disgust).
Objective: to enable children to recognize, understand, and express verbally and with a facial expression each of the basic emotions through play activities.

2. Mental states of belief (first and second order).
Objective: to enable children to recognize, understand, and express mental states of belief of first and second order through play activities.

3. Social language (lie, pious lie, and irony).
Objective: to enable children to recognize, understand, and appropriately use social language through play activities.

The program consisted of 25 face-to-face sessions of play activities, 24 pencil and paper activities that were developed by the children with the help of their family members in order to appropriate and reinforce what they learned in face-to-face activities, and three sessions of psychoeducation aimed at people who share daily life with the child (family, therapists, teachers). The implementation of the program was performed throughout 13 weeks. Face-to-face activities were held twice

Figure 1. IDEAS - Intelligence, Emotional Development, and Social Activity Intervention Program.



a week at the facilities of the South Colombian University, in a place conditioned according to the didactic specifications required for the activities. Each week consisted of two face-to-face activities and one or two "at home" activities. At the end of the last session every week, the child's family member or companion was given a paper and pencil "at home" task for the next meeting. Each "at home" activity was directly related to the contents reviewed in the face-to-face play sessions. Over the course of the 13 weeks, the three psychoeducational sessions were distributed equally among the children's family members, therapists, and teachers.

An active game with rules was used in the first phase of the program. It was characterized by not having roles distributed among the participants and by having clear rules about their execution. To fulfill the study's objectives for each of the phases, children's games that could be adapted to teach ToM skills were taken into consideration, such as a collage of emotions, a roulette of emotions, and the mural of emotions, among others.

Social role-playing was performed with themes and characters proposed by the researchers according to the tastes and interests of the participants and adapted to fulfill the objectives set out in the final phase of the program (the circus, the soccer match, the hospital, the birthday party, the school, and the chef, among others). For example, in "the chef," the children were invited to a TV show where the chef asked them to prepare a fruit salad. The children had to identify the fruits that were in good condition but, if any were not, they needed to make the expression of disgust, and the chef thanked them for their participation. The children took different roles during the session: chef, assistants, and spectators.

All the group activities included the three children

participating in the research and, on several occasions, the relatives or companions and the researchers participated as well. The roles within each activity were distributed in a coherent manner corresponding to each child's stage of development within the program, always geared towards each child's learning benefit. The concept of a guiding principle, defined as "the theoretical and practical information that helps a subject perform a specific action," was taken into account while planning the game activities.[7] The guiding principle was focused on achieving the proposed objectives, for example: in order to enable the children to identify the facial expression of each emotion, images of the expressions were distributed in the play area (images that guided the course of the action).

The researchers determined the roles considering the characteristics of each participant and their level of cognitive development; in addition, the roles were redistributed each session based on the progress and performance achieved in previous sessions by each child. During all the face-to-face activities, the people who lived with the child had the opportunity to observe and take an active role in the activity in order to generate an appropriation of the strategies used during the course of the program. Each child was accompanied by a researcher during each session to facilitate the learning process.

Results

The results obtained in the emotional skills, cognitive abilities, and social skills of the three children participating in the research are described next.

Emotional skills

Emotional identification

The three children presented a greater number of correct answers after the execution of the first phase (Posttest 1) and at the end of the intervention program (Posttest 2) compared to the initial evaluation (Figure 2). J1 and J2 showed positive inter-phase changes (Posttest 1-Posttest 2).

Identification, understanding, and emotional expression

A positive overall change in the basic emotions behavior was evidenced (name the emotion, express the emotion verbally, and express the emotion facially, denominate the emotion in images, and recognize the emotion in other people, identify-justify adequately the emotional situation). In general, the ascending tendency for each of the emotions in the three children was evident (Figure 3).

Cognitive skills

The percentage of correct responses by neurocognitive subdomain in pre- and posttest evaluation was recorded (Table 1).

A percentage increase in neurocognitive subdomains was observed after the execution of the IDEAS program. The three children presented the highest percentage of correct answers in tasks that evaluated construction skills, perceptual skills, attention, conceptual skills, and reading. In addition to the percentage increase in successes in the subdomains mentioned above, J1 showed positive changes in memory (coding and evocation), language (expression and comprehension), metalinguistic and spatial skills, graphic fluency, cognitive flexibility, planning and organization, writing, and arithmetic. J2 also showed positive changes in memory (evocation), metalinguistic abilities, and arithmetic (counting). J3 presented a higher percentage of successes in planning and organization.

Social skills

The ASDA showed a decrease in the average score in the three cases (Figure 4). J1 presented positive changes in social and mental skills according to parents and therapist, and the mother reported improvement in language and communication. In addition, the total average score of the scale decreased according to the parents. J2 presented positive changes in language and communication, social skills, mentalistic abilities, and in the total scale according to the mother. The therapist scored positively on social skills, language and

Figure 2. Pre-, Post-1, and Post-2 evaluations in facial recognition of emotions. In parentheses, total number of possible correct hits.

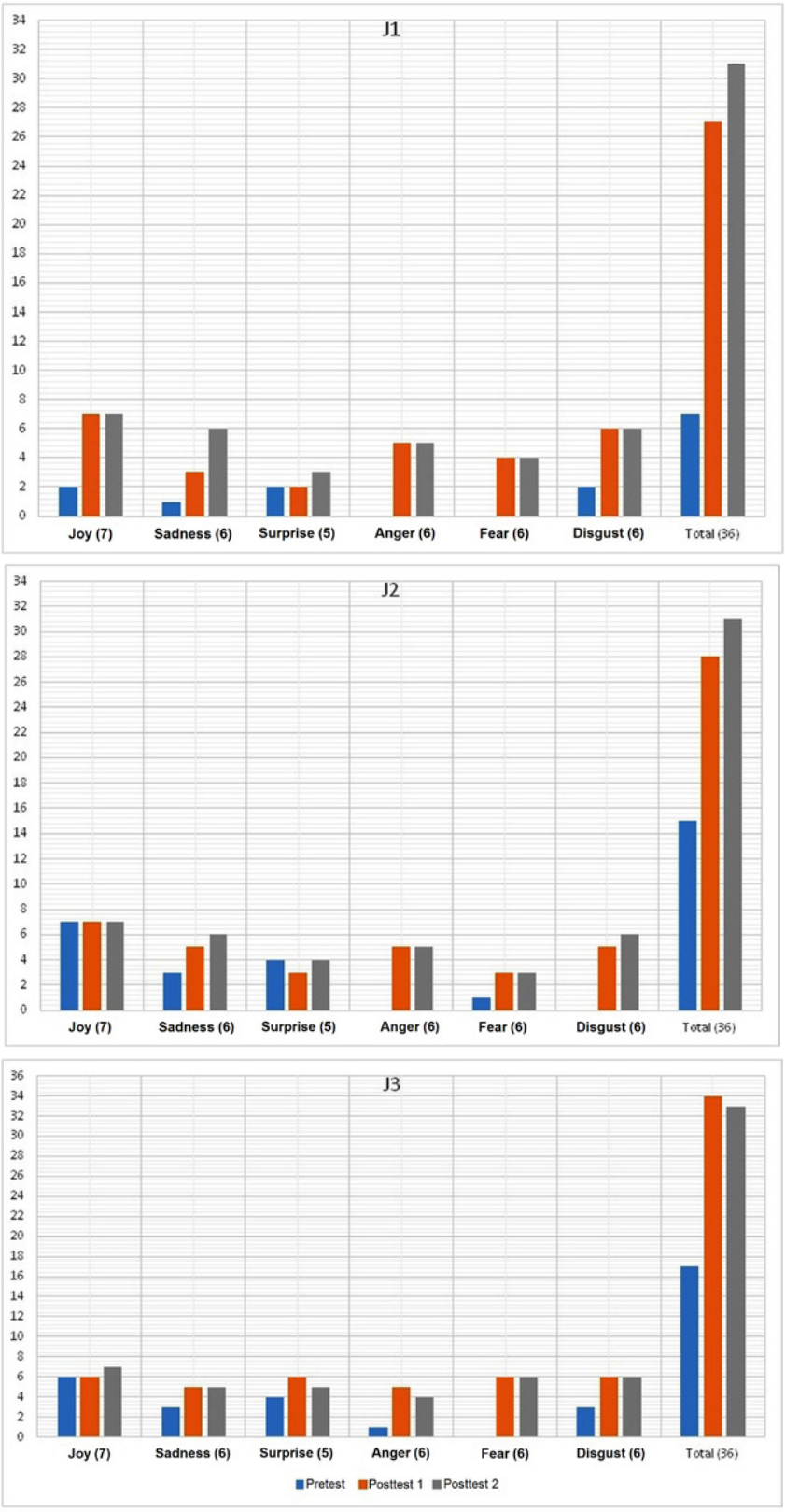


Figure 3. Total trend for basic emotion behaviors (J1-J2-J3). J1 did not attend three activities. J2 and J3 did not attend one activity.

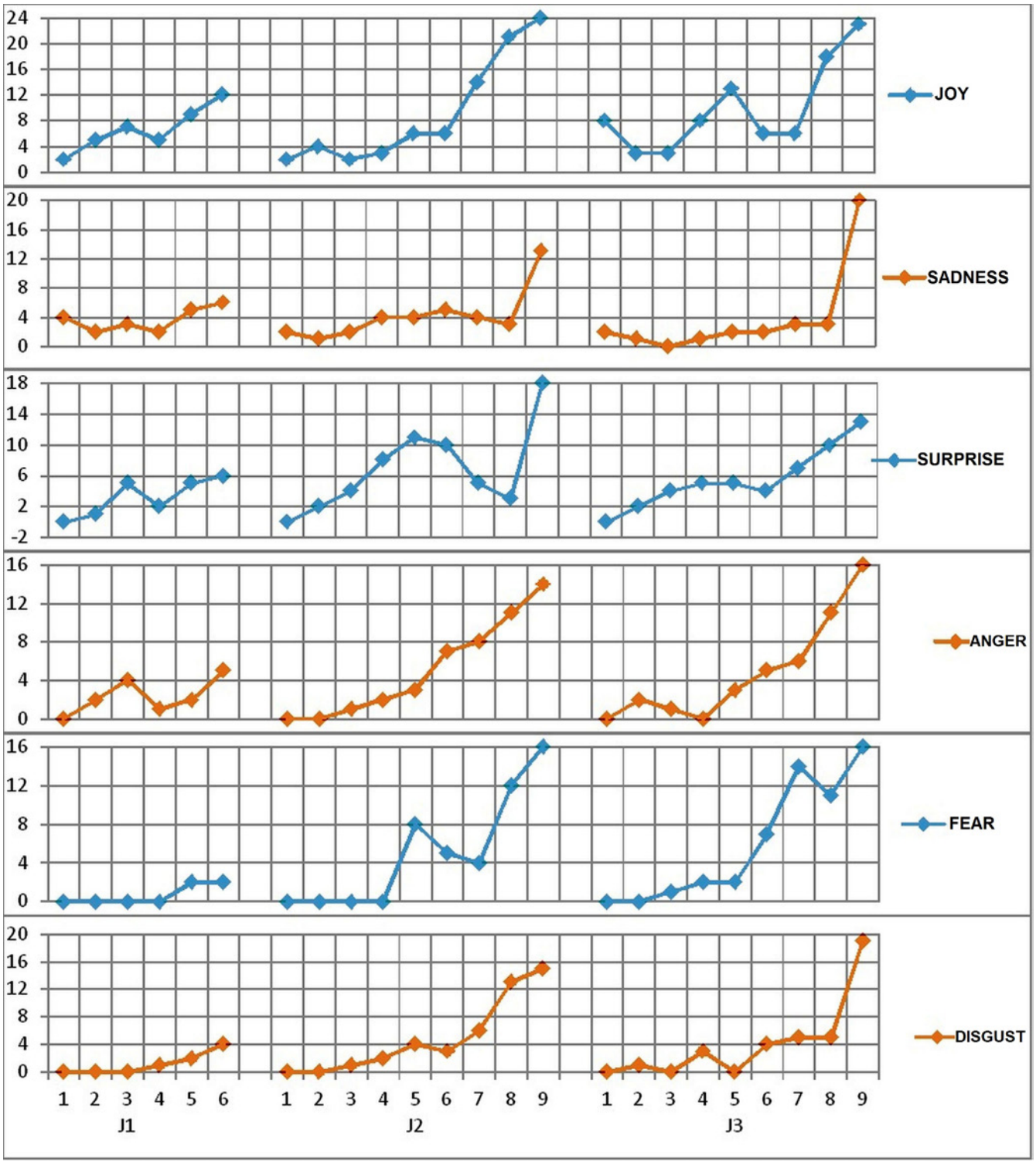


Table 1. Percentage of hits per neurocognitive subdomain.

	Case 1		Case 2		Case 3[a]	
Domains, subdomains	**Pretest**	**Posttest**	**Pretest**	**Posttest**	**Pretest**	**Posttest**
Skills construction						
Construction with sticks	50 %	88 %	50 %	88 %	38 %	75%
Skills graphic	72 %	70 %	68 %	66 %	55 %	59%
Memory (coding)						
Verbal-auditory	33 %	38 %	29 %	19 %		
Visual	38 %	50 %	38 %	31%		
Memory (evocation)						
Verbal-auditory	25 %	38 %	22 %	25 %		
Visual	30 %	38 %	22 %	30 %		
Skills perceptual						
Tactile	81 %	88 %	94 %	88 %	100 %	88 %
Visual	42 %	62 %	50 %	66 %	48 %	70 %
Auditory	44 %	56 %	53 %	81 %		
Language						
Repetition	78 %	75 %	84 %	81 %	97 %	84 %
Expression	1 %	4 %	2 %	2 %		
Understanding	33 %	61 %	61 %	59%		79 %
Skills metalinguistic	0 %	25 %	44%	75 %		
Skills spatial	45 %	75 %	33 %	28%		
Attention						
Visual	2 %	20 %	15 %	26%	27 %	42 %
Auditory	7 %	13 %	27 %	60%	53 %	40 %
Skills conceptual	0 %	3 %	6 %	28 %	31 %	50 %
Executive functions						
Graphic fluency	6 %	14 %	28%	26%	29 %	25%
Cognitive flexibility						
Correct answers	61 %	61 %	50%	46 %		
Perseverative answers	19 %	35 %	64 %	45 %		
Number of categories	33 %	67 %	52%	48 %		
Planning and organization	82 %	94 %	94%	92 %	48 %	84 %
Reading						
Precision	97 %	100 %	97 %	100%	95%	100%
Understanding	8 %	23 %	8 %	31 %		62%
Writing						
Precision	26 %	78 %	85 %	67 %		
Narrative understanding	0%	0 %	0%	0 %		
Arithmetic						
Counting	38 %	50 %	38 %	63 %		
Arithmetic handling	22 %	22 %	53 %	53 %		
Calculus	0 %	0 %	43 %	40 %		
Mathematical reasoning	0 %	13 %	13 %	13 %		

[a] Professional external assessment prior to the investigation.

communication, and full scale. J3 presented improvement in social skills and total scale according to the mother. The therapist scored positively on language, communication, and full scale.

The results of the ASAS showed a decrease in the average score in the three cases (Figure 5). J1 presented positive changes in social and emotional skills, communication, and full scale according to the father and the therapist. J2 presented positive changes in all the areas evaluated by the scale according to the mother. J3 also presented positive changes in all the areas evaluated according to mother and therapist.

Discussion

The individual differences of children diagnosed with autism create difficulties when determining whether interventions have an impact on their social skills. For this reason, multiple case designs are a viable option to evaluate the changes in children over time and during each of the phases of the intervention program.[19] Trends in each of the assessments suggest that the effect of the intervention generated positive changes in the children's emotional, cognitive, and social skills.

Children with autism present difficulties establishing social contact with other people, which are related to the inability to recognize, understand and express emotions, intentions, thoughts, and beliefs.[4] These difficulties are reflected in the activities they perform in their daily lives, generating problems at school, at home, and at other social spaces.[5,20] The children who took part in this research presented similar characteristics, creating difficulties when trying to adapt to their school environment. The essential purpose of the research was to generate positive changes in the social skills of the children and, therefore, in the different capacities that contribute to the establishment of an optimal social relationship (emotions, mental states of belief, social language, attention, memory, and executive functions among others).

The intervention program was designed to promote ToM skills in children diagnosed with autism, taking into account their individual characteristics. Different game strategies were implemented (active game, drawing, and role-play) in an environment of inclusion, where the child's family played an active role. The external activity (the game) determined the psychic development (created the zone of proximal development) and constituted the guiding activity.[21] The accompaniment of the adult is essential in the development and consolidation of abilities in the children. It's important to involve the family in the phase of psychoeducation and treatment in order to generate lasting changes over time.[22,23] Children live in a social and cultural space that includes their family and educators. The learning process must be holistic and integrated as established in the research.

Some reviews suggest implementing intervention programs that affect the communicative and social aspects of children with autism.[20,24] For this reason, the role-play methodology was used, allowing the simulation of habitual situations in order to achieve the generalization of the skills learned by children in their social context. In addition, a group intervention program was implemented together with an individualized accompaniment, establishing the progressive evolution of learning and possibly favoring the development of social skills in children with autism.[25,26]

These social skills must be measured over time in the child's clinical, social, and family situations. The evaluative and formative process must be continuous and framed in the individual differences, therefore, differences should not be measured only in pre- and post-intervention evaluations because communicative, cognitive, and emotional changes are constant in early stages of development.[27-29] The assessment made during the execution of the program indicated positive changes in the identification, comprehension and emotional expression and these changes positively influenced the social skills of the children according to the adaptive scales applied to parents and therapists (ASDA, ASAS).

Figure 4. Pre-Post evaluation. Autonomous Scale for the Detection of Asperger Syndrome and High Functioning Autism (ASDA).
Average score. Father (P), Mother (M), and Therapist (T).

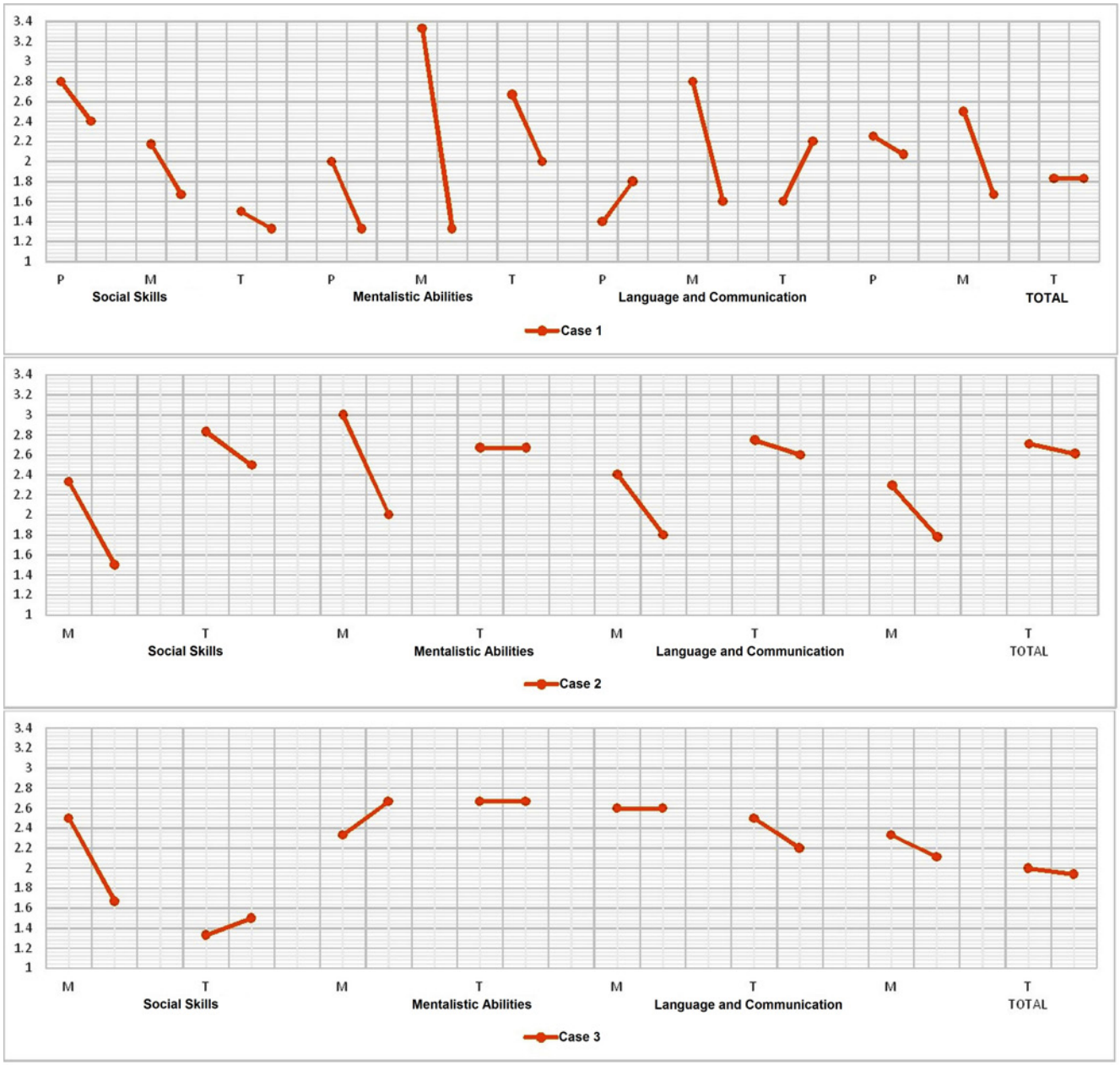
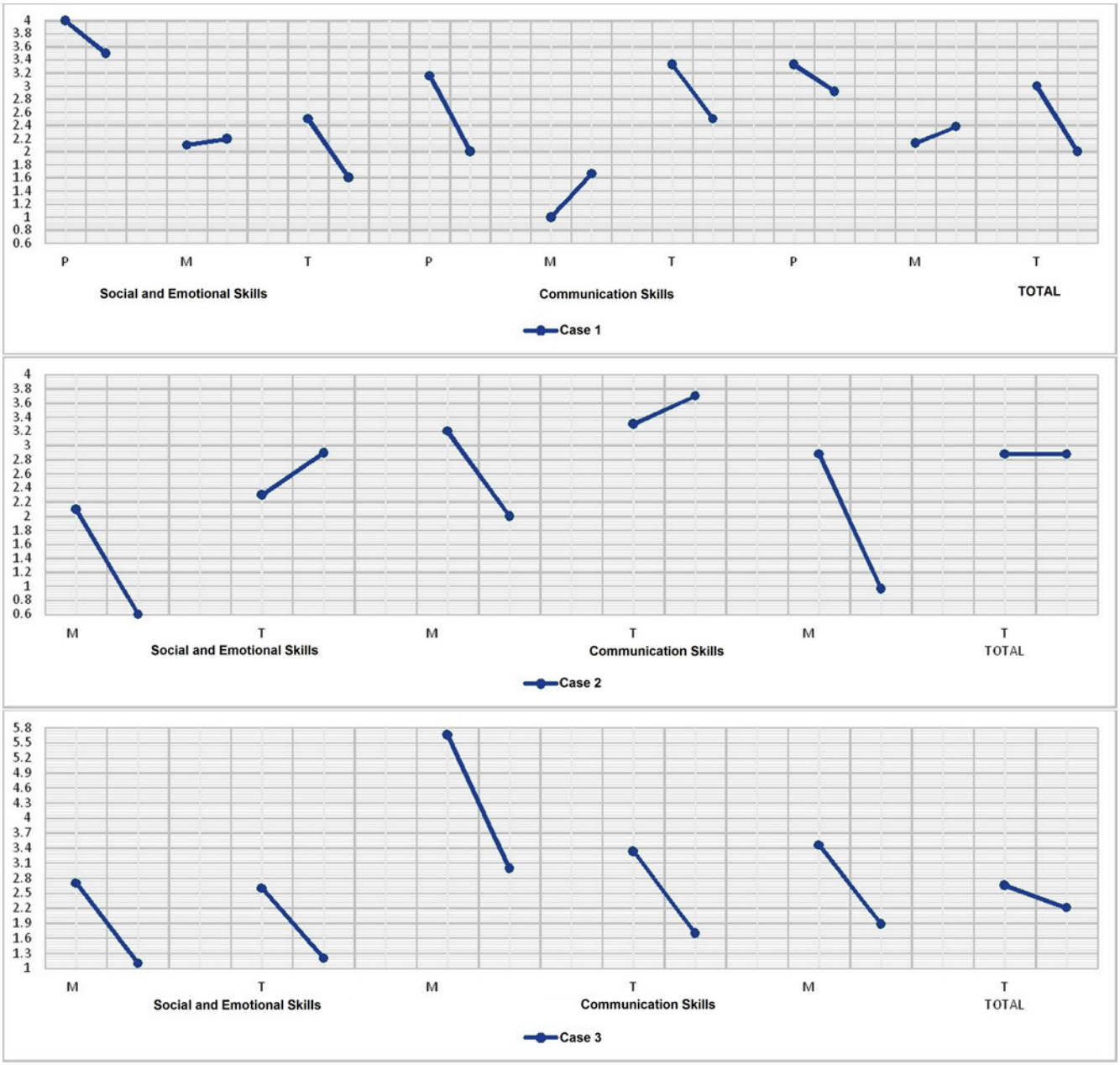


Figure 5. Pre-Post evaluation. Australian Scale for Asperger Syndrome (ASAS). Average score. Father (P), Mother (M), and Therapist (T).



The children increased their number of successes in the identification of emotions after the first phase of the program and at the end of the intervention. They also presented a greater number of expressive behaviors and understanding of emotions during the development of the program. From there, a generalization of these behaviors was presented in the social context of the children, according to the results of the adaptive scales. Recent research indicates that emotional skills have a positive impact on the social skills of people with autism, which is why the results obtained in this research are highlighted.[30,31]

The changes generated in the emotional and social abilities of the children opened the possibility of changes at the neurocognitive level. The interaction within a social context requires the joint effort of different cognitive abilities that seek to adjust to the complex norms of a social organization. The development of ToM skills possibly influenced the improvement of such abilities, considering the functional interdependence of the attentional, executive, and metacognitive processes described in the literature.[32,33]

Finally, the results obtained indicate that the emotional and social abilities of the children participating in the research increased, in addition to generating positive changes in attentional, visual-construction, comprehensive, and executive processes. The group intervention programs based on flexible play activities adapted to the individual characteristics of each child, which focus on emotional, cognitive and social areas and included the family and people from their social environment, reported positive results in other investigations.[4,5,20,22,23] However, these results must be interpreted carefully due to the preliminary nature of the study. A larger sample that allows a generalization of the results is suggested for future investigations.

Conclusion

In this study, we described the effect of an intervention program on emotional, neurocognitive, and social skills in three children with ASD of eight, nine, and ten years of age. We used a pre-post quasi-experimental within-subject design, guided by principles of microgenetic methodology in order to address in detail the social skills of children during the intervention program. Neuropsychological assessment instruments, emotional recognition tests, and behavioral and social measurement scales were used. The intervention program consisted of 25 face-to-face sessions of play activities, 24 pencil and paper activities, and three sessions of psychoeducation aimed at the people who share everyday life with the child (family, therapists, teachers). In conclusion, the program generated changes in the identification, expression, and comprehension of basic emotions in the children and had a positive impact on their social skills according to the perception of their parents, teachers, or therapists, measured through behavioral scales. In addition, attentional, visual-construction, comprehensive, and executive changes were presented after the end of the program

Conflicto de intereses

The authors declare there are no relevant conflicts of interest in this study.

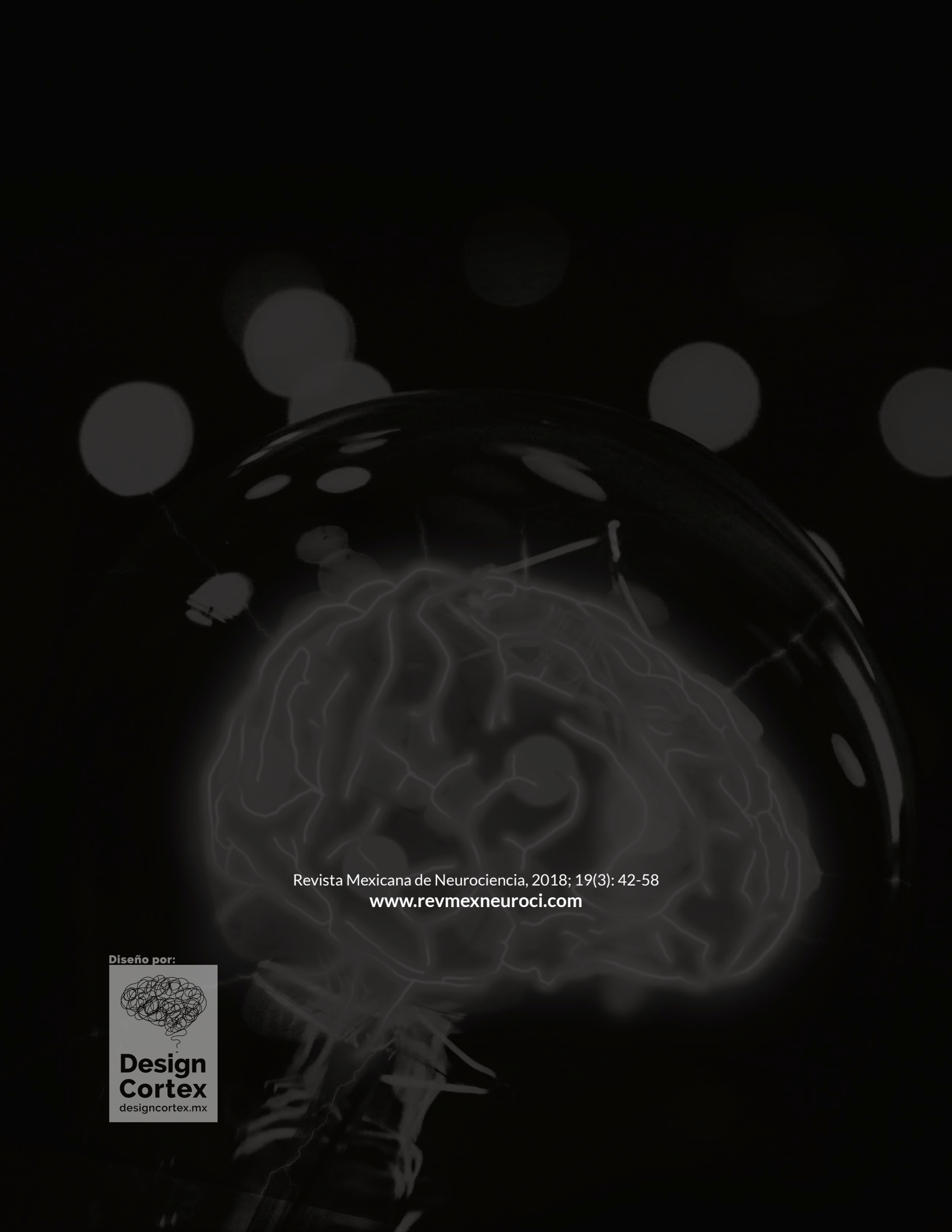
Fuentes de financiamiento

Vice-presidency of research and social projection of the South Colombian University, Colombia. Cooperative University of Colombia, Neiva headquarters.

References

1. Volkmar F, Siegel M, Woodbury-Smith M, King B, McCracken J, State M. Practice parameter for the assessment and treatment of children and adolescents with autism spectrum disorder. *J Am Acad Child Adolesc Psychiatry.* 2014; 53: 237-257.
2. Baron-Cohen S, Leslie AM, Frith U. Does the autistic child have a ´theory of mind´? *Cognition.* 1985; 21: 37-46.
3. Baron-Cohen S. Theory of mind in normal development and autism. *Prisme.* 2001; 34: 174-183.
4. Fletcher-Watson S, McConnell F, Manola E, McConachie H. Interventions based on the Theory of Mind cognitive model for autism spectrum disorder. *Cochrane Database Syst Rev.* 2014; 3: CD008785
5. Bishop-Fitzpatrick L, Minshew N, Eack S. A systematic review of psychosocial interventions for adults with autism spectrum disorders. *J Autism Dev Disord.* 2013; 43: 687-694.
6. Tirapu J, Pérez G, Erekatxo M, Pelegrín C. ¿Que es la teoria de la mente? *Rev Neurol.* 2007; 44: 479-489.
7. Solovieva Y, Quintanar L. *La actividad de juego en la edad preescolar.* México DF: Trillas; 2012.
8. González-Moreno CX, Solovieva Y, Quintanar L. Actividad reflexiva en preescolares: perspectivas psicológicas y educativas. *Universitas Psychologica.* 2011; 10: 423-440.
9. Morales M, Lázaro E, Solovieva Y, Quintanar L. Evaluación y corrección neuropsicológica del lenguaje en la infancia. *Pensamiento Psicológico.* 2014; 12: 39-53.
10. Solovieva Y, Mata A, Quintanar L. Vías de corrección alternativa para el Trastorno de Déficit de Atención en la edad preescolar. *CES Psicología.* 2014; 7: 95-112.
11. Solovieva Y, González-Moreno CX, Quintanar L. Developmental analysis of symbolic perceptual actions in preschools. *British Journal of Education, Society & Behavioural Science.* 2016; 15: 1-13.
12. American Psychiatric Association. *Diagnostic and statistical manual of mental disorders (5th ed.).* Arlington, VA: American Psychiatric Association; 2013.
13. Garcia-Mila M, Gilabert S, Rojo N. El cambio estratégico en la adquisición del conocimiento: la metodología microgenética. *Infancia y Aprendizaje.* 2011; 34: 169-180.
14. Rosselli-Cock M, Matute-Villaseñor E, Ardila-Ardila A, Botero-Gómez VE, Tangarife-Salazar GA, Echeverría-Pulido SE, et al. Evaluación Neuropsicológica Infantil (ENI): Una batería para la evaluación de niños entre 5 y 16 años de edad. Estudio normativo colombiano. *Rev Neurol.* 2004; 38: 720-731.
15. Matute E, Rosselli-Cock M, Ardila A, Ostrosky-Solís F. *Evaluación Neuropsicológica Infantil.* México DF: Manual Moderno; 2007.
16. Belinchón M, Hernández J, Sotilo M. *Personas con síndrome de Asperger: funcionamiento, detección y necesidades.* Madrid: CPA-UAM; 2008.
17. Attwood T. El síndrome de Asperger. Barcelona: *Paidós;* 2002.
18. Ojea M, Diéguez N. Programa de desarrollo de habilidades sociales "PDHS" aplicado a estudiantes con síndrome de Asperger. *Revista Galego-Portuguesa de Psicoloxía e Educación.* 2011; 19: 227-242.
19. Wang SY, Parrila R, Cui Y. Meta-analysis of social skills interventions of single-case research for individuals with autism spectrum disorders: Results from three-level HLM. *J Autism Dev Disord.* 2013; 43: 1701-1716.
20. Warren Z, McPheeters ML, Sathe N, Foss-Feig JH, Glasser A, Veenstra-VanderWeele J. A systematic review of early intensive intervention for autism spectrum disorders. *Pediatrics.* 2011; 127: e1303-1111.
21. Vygotsky L. The methods of reflexological and psychological investigation. *Selected Works, Vol 1.* Madrid: Visor; 1991.
22. Karst JS, Van Hecke AV, Carson AM, Stevens S, Schohl K, Dolan B. Parent and Family Outcomes of PEERS: A Social Skills Intervention for Adolescents with Autism Spectrum Disorder. *J Autism Dev Disord.* 2015; 45: 752-765.
23. Woodman AC, Smith LE, Greenberg JS, Mailick MR. Change in Autism Symptoms and Maladaptive Behaviors in Adolescence and Adulthood: The Role of Positive Family Processes. *J Autism Dev Disord.* 2014; 45: 111-126.
24. Reichow B, Volkmar FR. Social skills interventions for individuals with autism: Evaluation for evidence-based practices within a best evidence synthesis framework. *J Autism Dev Disord.* 2010; 40: 149-66.

25. Kasari C, Dean M, Kretzmann M, Shih W, Orlich F, Whitney R, et al. Children with autism spectrum disorder and social skills groups at school: a randomized trial comparing intervention approach and peer composition. *J Child Psychol Psychiatry.* 2016; 57: 171-179.
26. Wolfberg P, DeWitt M, Young GS, Nguyen T. Integrated Play Groups: Promoting Symbolic Play and Social Engagement with Typical Peers in Children with ASD Across Settings. *J Autism Dev Disord.* 2015; 45: 830-845.
27. Kasari C, Smith T. Interventions in schools for children with autism spectrum disorder: Methods and recommendations. *Autism.* 2013; 17: 2542-2567.
28. Artigas J. Atención precoz de los trastornos del neurodesarrollo. A favor de la intervención precoz de los trastornos del neurodesarrollo. *Rev Neurol.* 2007; 44(Supl 3): S31-34.
29. Bradshaw J, Steiner AM, Gengoux G, Koegel LK. Feasibility and Effectiveness of Very Early Intervention for Infants At-Risk for Autism Spectrum Disorder: A Systematic Review. *J Autism Dev Disord.* 2015; 45: 778-794.
30. Rice LM, Wall CA, Fogel A, Shic F. Computer-Assisted Face Processing Instruction Improves Emotion Recognition, Mentalizing, and Social Skills in Students with ASD. *J Autism Dev Disord.* 2015; 45: 2176-2186.
31. Williams BT, Gray KM, Tonge BJ. Teaching emotion recognition skills to young children with autism: a randomised controlled trial of an emotion training programme. *J Child Psychol Psychiatry.* 2012; 53: 1268-1276.
32. Ardila A. On the evolutionary origins of executive functions. *Brain Cogn.* 2008; 68: 92-99.
33. Ardila A. Development of metacognitive and emotional executive functions in children. *Appl Neuropsychology Child.* 2013; 2: 82-87.



Revista Mexicana de Neurociencia, 2018; 19(3): 42-58
www.revmexneuroci.com

Diseño por:

Design Cortex
designcortex.mx