Universidad Pablo de Olavide (España)
International Journal of Educational Research and Innovation
número 24, 2025
ISSN: 2386-4303
DOI: 10.46661/ijeri.11218
Sección: Artículos
Recibido: 06-11-2024
Aceptado: 14-11-2024
Publicado: 00-00-0000
Páginas: 1-19

INTERNATIONAL JOURNAL OF EDUCATIONAL RESEARCH AND INNOVATION
REVISTA INTERNACIONAL DE INVESTIGACIÓN E INNOVACIÓN EDUCATIVA

Evaluación de una Intervención para la Conciencia Emocional en Adolescentes con Síndrome de Asperger: Perspectivas y resultados

Evaluating an Emotional Awareness Intervention for Adolescents with Asperger Syndrome: Insights and outcomes

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RESUMEN

El propósito del estudio fue evaluar la eficacia de una intervención en la mejora de la conciencia emocional en niños con síndrome de Asperger. Se aplicó la guía de intervención de Alice Kassotaki (2015) para "Reconocer, Expresar y Regular las Emociones". La intervención se basa en la metodología de los tres niveles de emociones básicas. Se realizó un estudio en el grupo de edad de 12 a 15 años en el norte de Grecia. Se compararon las puntuaciones de conciencia emocional de los grupos experimental y de control antes y después de la intervención. Los resultados indican que la intervención mejoró la conciencia emocional, lo cual es crucial para la conciencia social y la gestión de las relaciones interpersonales. Esta investigación sugiere la importancia de promover más investigaciones en el ámbito de la cognición social y las emociones sociales, que desempeñan un papel central en la socialización y las relaciones sociales.

PALABRAS CLAVE

Trastorno del espectro autista; conciencia emocional; habilidades sociales.

ABSTRACT

The purpose of the study was to evaluate the effectiveness of intervention in improving emotional awareness in children with Asperger syndrome. The intervention guide of Alice Kassotaki (2015) for "Recognizing, Expressing & Regulating Emotions" was applied. The intervention is based on the methodology of the three levels of basic emotions. A survey was conducted in the age group of 12-15 years in North Greece. Emotional awareness scores of the experimental and control groups before and after intervention are compared.

Cómo citar: Relka, G., & Calmaestra Villén, J. (2025). Evaluación de una intervención para la conciencia emocional en adolescentes con síndrome de Asperger: perspectivas y resultados. International Journal of Educational Research and Innovation, 24, 1–19. https://doi.org/10.46661/ijeri.11218

The results indicate that the intervention improved emotional awareness, which is crucial for social awareness and managing interpersonal relationships. This research suggests the importance of promoting further research in the field of social cognition and social emotions, which play a central role in socialization and social relations.

KEYWORDS

Autism spectrum disorder; emotional awareness; social skills.

1. INTRODUCTION

Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder characterized by impairments in social interaction, communication, and the presence of repetitive patterns of behaviour (Jachim et al., 2015). The impact of Autism Spectrum Disorder reaches far beyond the surface-level symptoms, affecting individuals in complex and multifaceted ways. The challenge of understanding the underlying causes of ASD is due to the heterogeneous clinical representation, which has led to an increase in research efforts to unravel its complexities. It is estimated that approximately 1 in 68 children in the U.S. are affected by ASD, highlighting the significant prevalence of this condition (Barbaro & Yaari, 2020). More importantly, individuals with ASD often require lifelong support or accommodations due to the challenges they face in living independently.

Furthermore, ASD is not solely limited to impairments in social interaction and communication. Individuals with ASD may also experience unusual sensory experiences, which can impact their perception and interaction with the world around them (Boyd et al., 2018). Individuals with ASD often experience challenges with recognizing and understanding emotions, leading to difficulties in expressing and interpreting their own feelings, as well as those of others. This difficulty in emotional awareness can significantly impact their social interactions and relationships, making it challenging for them to navigate social cues and understand the emotions of their peers. Moreover, the inability to effectively communicate their own emotions can lead to feelings of frustration and isolation.

Emotional awareness consists of individual differences in the way people differentiate, express, analyse, and pay attention to their own and others' emotions (Lahaye et al., 2011). Emotional awareness has been defined as "an attentional process that serves to monitor and differentiate emotions, locate their antecedents, but ignore the physical arousal that is part of the emotional experience" (Rieffe et al., 2011:656). The Emotion Awareness Questionnaire for children (EAQ30; Rieffe et al., 2008) is indeed such a questionnaire. It is a self-report questionnaire, especially designed for children and adolescents, which aims to identify what children feel and think about their own emotions and the emotions of others.

Overcoming emotional self-awareness challenges can also help to frame the reasoning behind these problems. Although difficulties with emotional self-awareness are largely present at an early age, may be associated with the fundamental problems of autism (Happé, 1995). However, if emotional self-awareness problems occur later on, they arise for other reasons, such as co-occurring mental health problems (Huggins et al., 2021).

Social skills are defined as children's ability to establish functional social relationships, which facilitates positive interactions, appropriate socio-cultural norms, thus attaining their objectives and while also being mindful of others' needs (Ionescu, 2019). Children's key risk factors for the development of their social and emotional abilities were grouped, in intrapersonal and interpersonal factors (Ionescu, 2019). Biological and cognitive variables might also be intrapersonal factors (Busschaert et al., 2016). Social skills are acceptable in society, thus, learned behaviours enable persons to do numerous social activities competently (Moody & Laugeson, 2020). These specific behaviours, or skills, improve the likelihood that people will be perceived positively (Moody & Laugeson, 2020).

As people with autism spectrum disorders (ASD) enter adolescence and adulthood, their interest in social interactions often increases (Miller et al., 2014). People with ASD are more aware of the difficulties they face when interacting with their peers (Sasson et al., 2017). Autism spectrum disorder is characterised by deficits in communication, social skills and a tendency towards repetitive behaviours, making social interactions extremely challenging for those on the spectrum (Kroncke et al., 2016). Individuals with autism have difficulty not only recognising and interpreting facial expressions and body language, but also understanding the motivations and feelings of others, skills that often appear to come naturally to their neurotypical peers (Kroncke et al., 2016). Emotions influence the cognitive, motivational, and regulatory processes of learning and success (Pekrun & Linnenbrink-Garcia, 2014). In learning settings, emotions are used to indicate the presence of significant, difficult or complex aspects of the task that require sustained attention and effort (Boekaerts, 2010). Emotions can also affect adolescents and student interest and motivation to learn, positive emotions can increase inherent motivation, while negative emotions can lead to low levels of interest (Pekrun & Linnenbrink-Garcia, 2014). Unfortunately, many students with ASD encounter difficulties in succeeding in university, and even when they do, they struggle to graduate. The fact that students with Asperger Syndrome are known for their normal and sometimes high intelligence is unique. Therefore, it is difficult for these students to respond to the demands of a real classroom that requires cooperation with classmates, empathy and general exposure to many stimuli that students with ASD can't manage. In addition, an effort has been made to transition from a traditional classroom to a global network of education for highly academically successful international doctoral groups (Martines Peres, 2018). Maintaining and adapting these efforts to enable students with Asperger syndrome to advance academically would be remarkable.

A scientific goal of autism clinical practice is the development and enhancement of a person's social functioning (Huggins et al., 2021). A key objective in this process can be the ability to describe and recognize one's own feelings and emotions. Therefore, the term "emotional self-awareness" is used (Huggins et al., 2021; Kashdan et al., 2015). According to Kinnaird et al. (2019), emotional self-awareness is diminished among autistic people and these difficulties anticipate lower emotional contagion and recognition in this group (Bird & Cook, 2013).

Contrasts in friendships and social systems increment as children age (Azad et al., 2017). According to Rotheram-Fuller et al. (2010), when comparing children with typical development, ASD children were more likely to be excluded from or distant from social ties. Throughout all of the elementary grades in the classroom, even in the upper elementary years, this difference persisted in growing. When analysing social interactions across a single academic year, children with ASD demonstrated much lower centrality in their social networks and significantly fewer nominations for friendship, compared to typically developing children and those with non-ASD disabilities (Locke et al., 2013).

For the purpose of examining children with autism spectrum disorders, it is important to develop and test new and innovative intervention strategies for improving cognitive, social and life skills of children with ASD. A significant contribution promoting student immersion in their learning process through interaction with digital devices is Gamified Augmented Environment (GAE), an immersive digital space that combines enjoyable learning with AR-supported activities. It was designed to combine gamified activities and AR resources in a virtual environment to develop communicated competence in students with ASD. More specifically, it is a personalized intervention providing functional, spontaneous communication, promoting social, linguistic, and cognitive abilities linked to symbolic play (López-Bouzas & Del Moral-Pérez, 2023). However, the usage of AR intervention methods poses limitations such as the lack of teacher training and improvement, the few educational experiences, the lack of conceptual foundation, the limited educational research and the lack of institutional support (Barroso-Osuna et al., 2019).

In addition, to make it easier through the intervention, the transition of children with autism spectrum disorders from special schools to more inclusive school environments is recommended. Also, supporting the inclusion of children with ASD in regular classrooms and developing interventions in actual school environments with significant long-term impacts on children's lives with ASD is also suggested. Numerous educational intervention applications have been created

for individuals with autism, and are available not only in education but also in many e-shops and catalogs. For this reason, all teachers, particularly special education teachers, shall be digitally competent and foster continuous professional development (Sanromà-Giménez et al., 2021). Last but not least, the most effective intervention strategies should be assessed for autistic children of different ages and schools (elementary, intermediate and special schools).

Presently, some complex emotional awareness systems display emotions with information about the context in which users have experienced them. One tool is AffectAura (McDuff et al., 2012), a reflective tool that combines automatic labels for valence (negative, neutral, positive), arousal (low, high) and engagement (low, high) with contextual information such as user calendar events, activity, location, files and interactions with the application every hour. A further case is the MoodMap tool (Fessl et al., 2012) allows users to record and review their own mood over time, and get an overview of the team's mood based on a specific meeting and date. Nevertheless, few advanced visualizations of emotions are offered in a learning environment (Leony et al., 2013) and much of the research is devoted to teachers to monitor their learners. These systems provide teachers with information about situational circumstances that provoke the emotions of students and can thus help them to resolve these situations. According to Ruiz et al. (2016) in their examination of multiple emotional visualisations in the field of education, information on situational circumstances or emotional histories could be added to visualizations to help students reflect on their emotions. This would allow them to learn how to recognize situations that cause positive or negative emotions. The meta-analysis of Bora & Pantelis (2016) provided the first responses, particularly for children and adolescents. Patients with Attention deficit hyperactivity disorder (ADHD) are intermediaries between autism spectrum disorders and healthy individuals in social cognition deficiency among adolescents. A major response is now expected in the adult population, where more education is required.

Aiming to provide additional considerations on the underlying mechanisms for dealing with emotional recognition, numerous authors have also measured intellectual performance (such as Schneidt et al., 2019) using the Ambivalence task, which identifies images with ambiguous emotional facial expression. Ambiguity is provided by a combination of different levels of mixed emotions or attentive-executive functioning. As well as Kis et al. (2017) who implement the Tübinger Affect Battery (TAB; German version of the Florida Affect Battery), measurement of the ability to perceive emotional faces and emotional prosody by observing or listening to a professional actress express anger, sadness, fear, joy or emotional neutrality was performed. Bisch et al. (2016) used the classification of colourful video footage, where professional actors utter a word in a neutral, happy, seductive, angry or disgusted intonation with congruent facial expressions. They were presented under three different conditions: auditive, visual and audio-visual. Lastly, in a number of articles, cognitive/behavioural assessment has been linked to fMRI data (Schulz et al., 2014) or event-related potential (ERP; Ibáñez et al., 2014; Thoma et al., 2020) and Actigraph sleep recording (Cohen et al., 2021). The results show functional abnormalities in the limbic networks of patients with ADHD during a task involving cognitive control of the treatment and use of facial emotions.

Autistic individuals are regarded as having difficulty identifying and understanding their own emotions (Huggins et al., 2021). This is what is known as emotional self-awareness. It is important to explain emotional self-awareness as individuals who are more able to understand their own emotions, whether they are autistic or not, and whether they have a better ability to respond appropriately and identify them in other people. Whether individuals with autism have difficulties with emotional self-awareness has yet to be confirmed, or whether reported difficulties are in fact, due to the way emotional self-awareness is measured in autistic individuals. If these difficulties exist, it is not clear when they arise either. The aim of the present research was to examine whether intervention can improve the emotional awareness of children with Autism Spectrum Disorder through analysis of their emotional awareness before and after the intervention.

Research efforts aimed at understanding the underlying mechanisms of ASD and developing effective interventions have been gaining momentum. As a result, various interventions and therapies have been developed to support individuals with ASD in improving their social communication skills, managing sensory sensitivities, and developing strategies for emotional regulation. One

of the key interventions for individuals with ASD is social skills training, which focuses on teaching them specific social behaviours and responses. This type of intervention aims to improve their ability to understand and navigate social cues, fostering meaningful connections and relationships. Furthermore, the EASE programme is an intervention which was developed to address ASD-specific obstacles to effective emotion regulation (Mazefsky et al., 2021). Another intervention that has proven effective in enhancing emotional awareness in children with autism spectrum disorder is the use of digital tools, such as the EmoTEA mobile app. (Garcia-Garcia et al., 2019) demonstrated that this application can improve social skills and emotional intelligence in children through interactive games focused on recognizing and expressing emotions. A further important intervention is cognitive-behavioural therapy, which helps individuals with ASD identify and modify their thought patterns and behaviours that may contribute to social difficulties. Children with ASD who had attended cognitive behavioural therapy (CBT), scored significantly higher on the "Attending to Others' Emotions" and on the analyses of their own emotions (Roberts-Collins et al., 2018).

As a result, cognitive-behavioural therapy has shown promise in assisting individuals with ASD in recognizing and regulating their emotions. This type of therapy helps individuals with ASD develop strategies for identifying and managing their emotional states, allowing them to navigate social situations more effectively. All of these interventions require the application of a specialized therapist, which is the main drawback. Kassiotaki's intervention is both simple and affordable, without any specific training required. This intervention can be applied by anyone, including parents.

2. METHOD

Participants

The research sample consisted of two groups, the experimental group and the control group. A total of 28 children participated, 14 in each group. All of the children were between the ages of 12-15. In the experimental group there were 12 boys and 2 girls, while in the control group all 14 were boys. The participants were from schools in North Greece that speak Greek.

The preconditions for participation in both the experimental and the control group were for all the children to be diagnosed with Asperger syndrome by the public medico-pedagogical centre in Greece. Everyone could speak without any phonological or articulation difficulty nor any other disability. All faced similar difficulties in their sociability and socializing with their peers. Each child lived in the North of Greece and attended Special education school. They also had the same socio-economic status.

All of the above information was obtained from the children's individual files maintained in the schools. These files included children's diagnoses by doctors, psychologist evaluations, teacher evaluations, speech therapist evaluations, evaluations by the public medical education center (KE.DA.SY), and social worker histories incorporating information regarding family status and living and economic standards.

Procedure

The study was introduced to school directors and their permission to conduct the research was given. Parents and children then received information about the confidentiality of their answers and were asked for permission to participate. The children taking part were asked to complete the questionnaire in class.

The experimental group underwent an intervention aimed at developing emotional awareness, regulation, and expression of emotions. The intervention was performed for three months with a frequency of two individual sessions per week. The session time was 50 minutes. In the control group no intervention was carried out. The children in this group followed the dynamic of their classes. Firstly, this group was given a questionnaire to complete. A period of three months passed where absolutely no intervention was made and the same questionnaire was given again three months later. The intervention that was applied came from the scientific publications of Upbillity.gr

and specifically the intervention guide of Alice Kassotaki (2015) for "Recognising, Expressing & Regulating Emotions". Both levels were applied, both the basic and more advanced. The intervention was carried out by three different psychologists, all of whom followed the same instructions that existed in the theoretical part of intervention. There was regular communication between them whereby they discussed how the process was developed in order to maintain consistency. In the larger part of the sample (9 students) the intervention was carried out by the same person. The second psychologist intervened with three students and the third only with two. The interventions were carried out in the schools attended by the school psychologists. Specifically, the psychologists were chosen for practical reasons as they had access to their individual files and would be able to complete the intervention during the sessions they would be conducting with these children. However, according to the creator of this specific intervention it can be applied by anyone.

The time that elapsed from the end of the intervention and the administration of the questionnaires was one week.

Measures

Emotional awareness was measured through the Emotional Awareness Questionnaire. The EAQ30 is a self-report questionnaire of 30 items rated on a 3-point scale (1 = not true, 2 = sometimes true, 3 = true) and includes 6 scales: (a) Differentiating Emotions ("When I am upset, I don't know if I am sad, scared, or angry"; reversed item); (b) Verbal Sharing of Emotions ("I find it difficult to explain to a friend how I feel"; reversed item); (c) Bodily Awareness ("When I am scared or nervous, I feel something in my tummy"); (d) Not Hiding Emotions ("When I am angry or upset, I try to hide this"; reversed item); (e) Analyses of Emotions ("When I have a problem, it helps me when I know how I feel about it"); (f) Attending to Others' Emotions ("If a friend is upset, I try to understand why"). Twenty items are negatively formulated and thus reversed-scored. In EAQ30 (Rieffe et al., 2008) the internal reliability of the scales was reported to be acceptable for use in the clinical practice (a) Differentiating Emotions (.770); (b) Verbal Sharing of Emotions (.710); (c) Bodily Awareness (.740); (d) Not Hiding Emotions (.490); (e) Analyses of Emotions (.670); (f) Attending to Others' Emotions (.750). The questionnaire is suitable for children and adolescents between 9 and 16. As recommended by the International Test Commission guidelines for test adaptation (Hambleton, 2001), items of the original version were first translated into Greek and then back translated into English.

Intervention

The intervention used is by Alice Kassotaki MSc, BSc Speech Therapist (2015) and is based on the methodology through the three levels of basic / primary emotions.

A) At the first level is the training in the recognition of emotions.

A1) Recognition of the feeling of joy, sadness, anger, surprise, fear, through visual and kinesthetic stimuli.

A2) Recognition at the beginning of two and then five emotions.

A3) Correspondence and identification of basic emotions.

A4) Naming basic emotions and distinguishing the basic emotions through an event.

B) In the second level the child is trained in the expression of basic emotions.

B1) Specifically in the design of emotions.

B2) In the expression of emotion through choices.

B3) In the design of emotion through an event.

B4) In the selection and naming through an event.

B5) Also, the child is trained in recognizing, expressing and justifying basic emotions.

B6) In the mirroring of emotions.

B7) In the justification of emotional states.

This study followed the Emotion Recognition Guide. The steps taken in training the basic emotions are as follows:

Step 1: Analysis of emotion recognition through facial expressions such as eyebrows, eyes, mouth (peripheral dimension and biological stimulation).

Step 2: Analyse the recognition of emotions through expressions and posture (Analysis of four steps (behavioural dimension and biological stimulation).

Step 3: Analysis of emotion recognition through facial expression / total observation-facial sketch.

Step 4: Analysis of emotion recognition through facial expression / total observation-sketch of faces-female, male.

Step 5: Emotion recognition analysis through facial expression / total observation-body sketch-female, male.

Step 6: Analysis of emotion recognition through facial expression / total observation-body sketch.

Step 7: Emotion recognition analysis through face / body expression-realistic depiction / photography.

Step 8: Analysis of emotion recognition through multiple imaging stimuli / sketch of face, body, photographs.

Beyond the multi-level intervention outlined above, key elements of the approach included the use of various types of visual materials, such as sketches, photographs, and realistic depictions, which supported understanding of emotions across multiple levels of complexity. The use of mirrors for emotion mimicry, matching worksheets, and exercises involving drawing emotions allowed children to interact naturally with emotional expressions, enhancing self-observation. Additionally, storytelling with emotional content and interactive games promoted active engagement, helping children link emotions to familiar situations.

The intervention followed a progressive structure, advancing from basic emotion recognition to expression and justification, allowing for adaptation to each child's developmental level. These components created a comprehensive and replicable framework for developing emotional skills across different settings.

3. RESULTS

Understanding the diverse challenges faced by individuals with ASD is crucial for the development and implementation of effective interventions. Specifically, using the t-test, it was determined whether there is a statistical difference in the mean of the pre and post samples (Table 1, Table 2).

Table 1. T -Test one sample groups sample.

	N	Mean	Std. Deviation	Std. Error Mean
Emotional awareness Pre	28	50,5714	5,20277	,98323
Emotional awareness Post	28	53,5714	8,41264	1,58984

Table 2. T -Test one sample test values.

	Test Value = 0					
	T	df	Sig. (2-tailed)	Mean Difference	95 % Confidence Interval of the Difference	
					Lower	Upper
Emotional awareness Pre	51,434	27	,000	50,57143	48,5540	52,5889
Emotional awareness Post	33,696	27	,000	53,57143	50,3093	56,8335

Reliability

In Table 3, the responses of the sample are presented for the academic subscales. The scores are similar with previously presented data. For the EAQ 30 scale that was used, before and after the intervention, the internal reliability is acceptable.

Table 3. Cronbach's alpha of EAQ 30 scale.

	Cronbach's alpha		
Subscales	Pre	Post	N of Items
Differentiating emotions	,781	,932	7
Verbal sharing of emotions	,545	,804	3
Not hiding emotions	,773	,549	5
Bodily awareness	,330	,835	5
Attending to others' emotions	,413	,816	5
Analyses of emotions	,489	,429	5
Total Score	,732	,533	30

In Table 4, the mean emotional awareness scores for both experimental and control groups before and after intervention are presented. The repeated measures analysis of variation revealed that time and group factor interacted significantly (Table 5, $F(1, 25) = 12{,}602$, $p < 0{,}002$).

Table 4. Emotional awareness subscales descriptives for each group before and after the intervention.

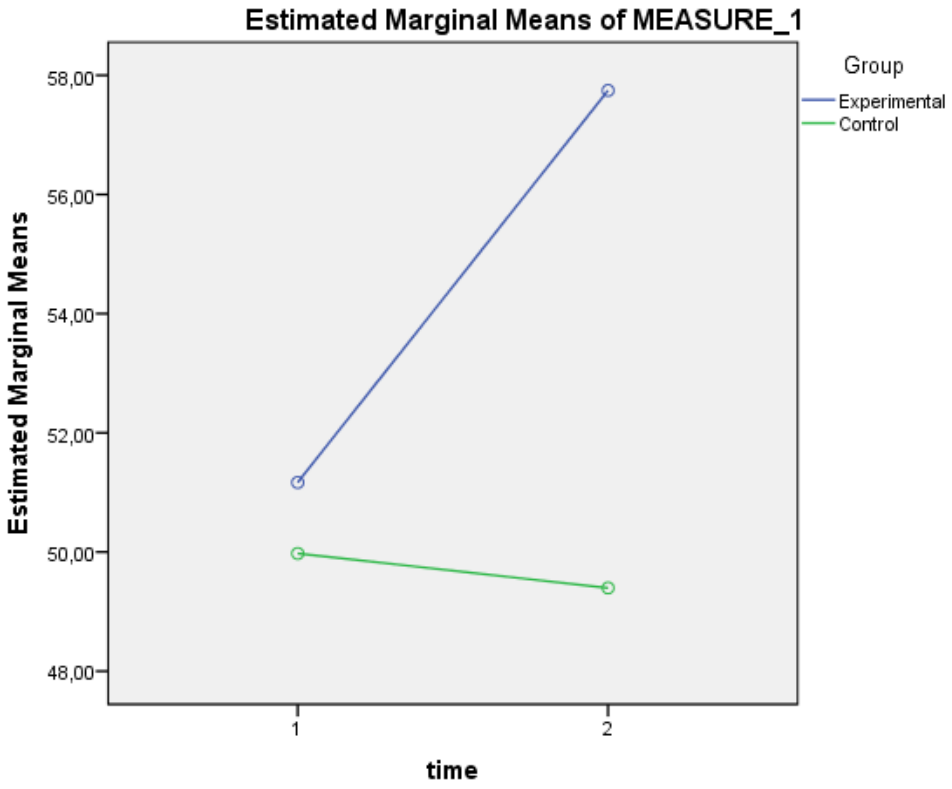
	Group	
	Experimental	**Control**
Emotional awareness Pre	51,1 (5,9)	50 (4,5)
Emotional awareness Post	57 (10)	50,1 (4,7)
Differentiating emotions Pre	10,6 (2,4)	10,4 (1,8)
Differentiating emotions Post	13,6 (4,9)	10,3 (1,8)
Verbal sharing of emotions Pre	3,8 (1,1)	3,5 (0,9)
Verbal sharing of emotions Post	5,2 (1,9)	3,6 (0,9)
Not hiding emotions Pre	9,1 (2,7)	8,4 (1,3)
Not hiding emotions Post	10 (2)	8,9 (1,2)
Bodily awareness Pre	8,4 (1,3)	8,5 (0,9)
Bodily awareness Post	6,6 (1,9)	8,5 (0,9)
Attending to others' emotions Pre	8,1 (1,8)	8,1 (1,8)
Attending to others' emotions Post	9,4 (2,4)	8,1 (1,9)
Analyses of emotions Pre	11,1 (1,1)	11 (1)
Analyses of emotions Post	12,2 (1,5)	10,9 (1,1)

Table 5. Repeated ANOVA results for Emotional awareness scale.

	Pillai's Trace				
Effect	**Type III Sum of Squares**	**Hypothesis df**	**Error df**	**F**	**Sig.**
time	36,09	1	25	2,914	,100
time * age	49,05	1	25	3,960	,058
time * group	156,09	1	25	12,602	,002

This interaction was due to the improvement in the social skill score derived from the intervention to the experimental group in contrast to the insignificant difference observed in the control group, an interaction that is visually depicted in Figure 1.

Figure 1. Interaction effect of time and group factors on Emotional awareness scale.



Emotional awareness Subscales.

Differentiating emotions.

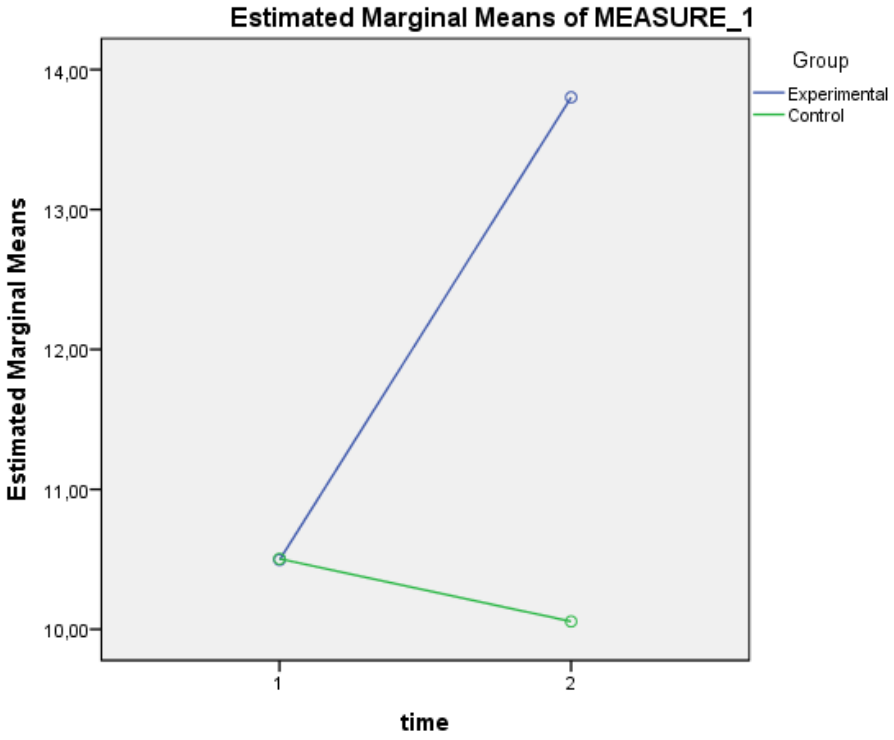
Repeated measures analysis of variation showed that there was a significant interaction between time and group factor (Table 6, F(1, 25) = 12,185, p < 0,002).

Table 6. Repeated ANOVA results for Differentiating emotions.

Pillai's Trace					
Effect	**Value**	**F**	**Hypothesis df**	**Error df**	**Sig.**
Time	,066	1,760[b]	1	25	,197
time * age	,091	2,492[b]	1	25	,127
time * group	,328	12,185[b]	1	25	,002

This interaction was due to the improvement in the Differentiating emotions score derived from the intervention to the experimental group in contrast to the insignificant difference observed in the control group, an interaction that is visually depicted in Figure 2.

Figure 2. Interaction effect of time and group factors on Differentiating emotions subscale.



Verbal sharing of emotions

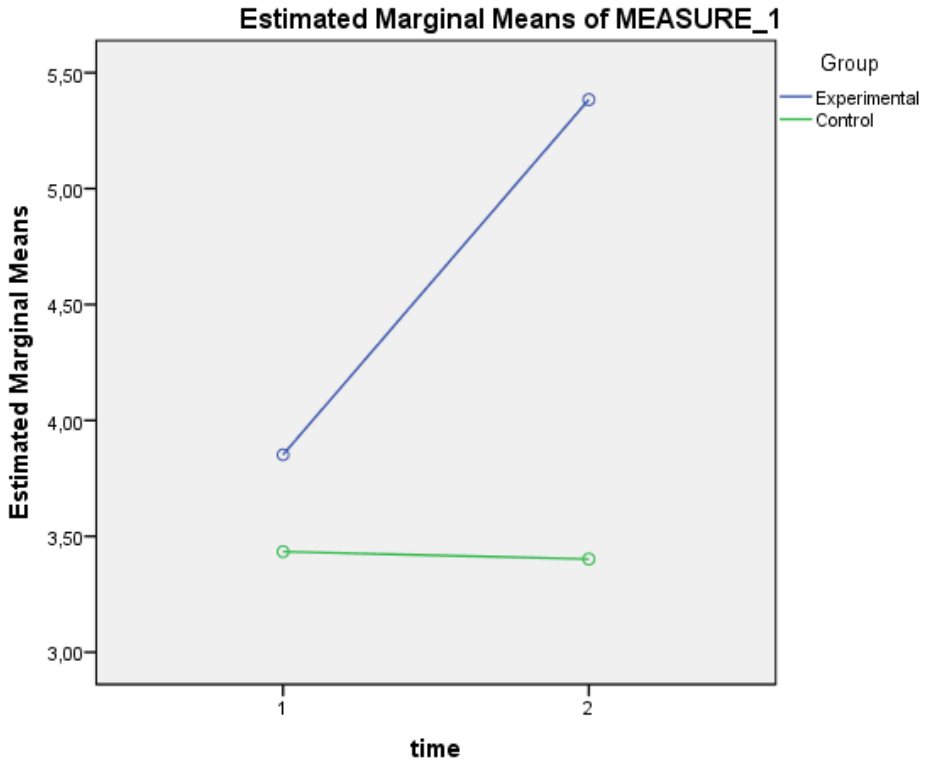
Repeated measures analysis of variation showed that there was a significant interaction between time and group factor (Table 7, F(1, 25) = 13,162, p < 0,001).

Table 7. Repeated ANOVA results for Verbal sharing of emotions.

Pillai's Trace					
Effect	**Value**	**F**	**Hypothesis df**	**Error df**	**Sig.**
Time	,039	1,019[b]	1	25	,322
time * age	,067	1,787[b]	1	25	,193
time * group	,345	13,162[b]	1	25	,001

This interaction was due to the improvement in the Verbal sharing of emotions score derived from the intervention to the experimental group in contrast to the insignificant difference observed in the control group, an interaction that is visually depicted in Figure 3.

Figure 3. Interaction effect of time and group factors on Verbal sharing of emotions subscale.



Not hiding emotions

Repeated measures analysis of variation showed that there was not a significant main effect of the intervention or group, nor a significant interaction between time and group factor (Table 8).

Table 8. Repeated ANOVA results for Not hiding emotions.

Pillai's Trace					
Effect	**Value**	**F**	**Hypothesis df**	**Error df**	**Sig.**
Time	,017	,427[b]	1	25	,520
time * age	,027	,696[b]	1	25	,412
time * group	,039	1,014[b]	1	25	,324

Bodily awareness

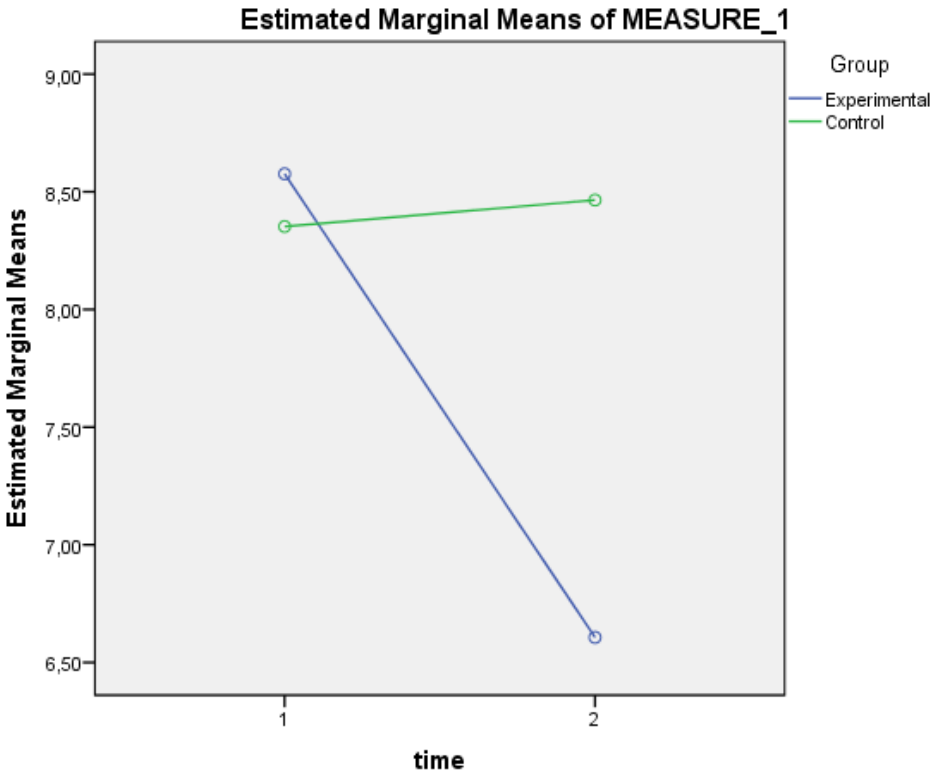
Repeated measures analysis of variation showed that there was a significant interaction between time and group factor (Table 9, $F(1, 25) = 11{,}943$, $p < 0{,}002$).

Table 9. Repeated ANOVA results for Bodily awareness.

Pillai's Trace					
Effect	**Value**	**F**	**Hypothesis df**	**Error df**	**Sig.**
Time	,022	,563[b]	1	25	,460
time * age	,041	1,080[b]	1	25	,309
time * group	,323	11,943[b]	1	25	,002

This interaction was due to the improvement in the Bodily awareness score derived from the intervention to the experimental group in contrast to the insignificant difference observed in the control group, an interaction that is visually depicted in Figure 4.

Figure 4. Interaction effect of time and group factors on Bodily awareness subscale.



Attending to others' emotions

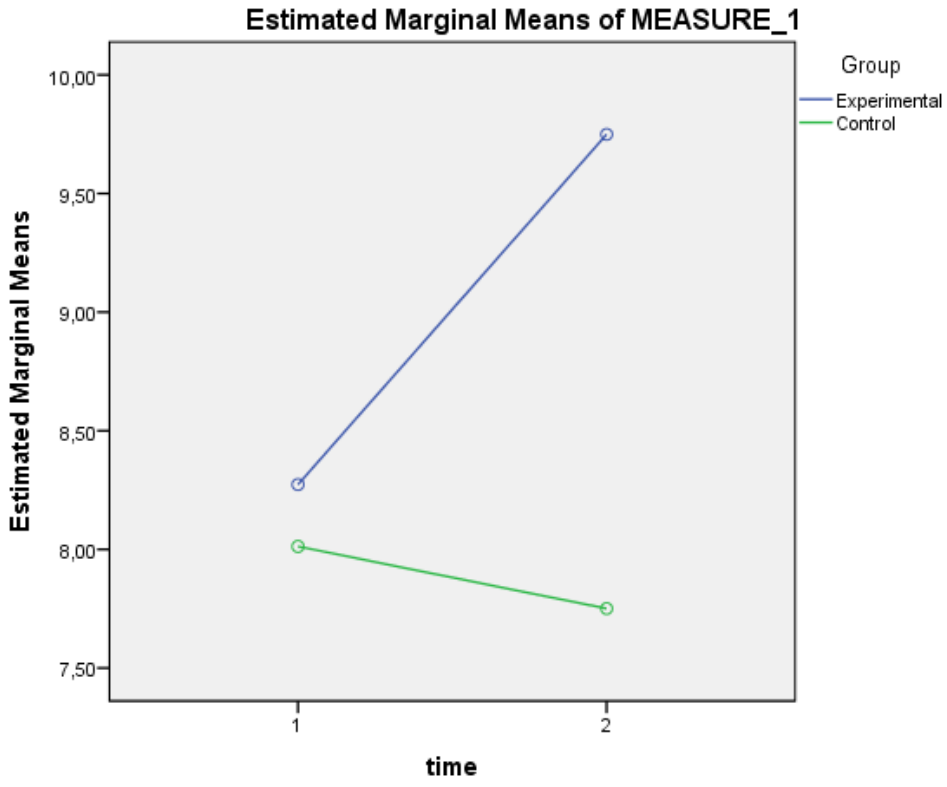
Repeated measures analysis of variation showed that there was a significant interaction between time and group factor (Table 10, $F(1, 25) = 8{,}073$, $p < 0{,}009$).

Table 10. Repeated ANOVA results for Attending to others' emotions.

Pillai's Trace					
Effect	**Value**	**F**	**Hypothesis df**	**Error df**	**Sig.**
Time	,087	2,369[b]	1	25	,136
time * age	,107	2,991[b]	1	25	,096
time * group	,244	8,073[b]	1	25	,009

This interaction was due to the improvement in the Attending to others' emotions score derived from the intervention to the experimental group in contrast to the insignificant difference observed in the control group, an interaction that is visually depicted in Figure 5.

Figure 5. Interaction effect of time and group factors on Attending to others' emotions subscale.



Covariates appearing in the model are evaluated at the following values: Age = 13,8929

Analyses of emotions

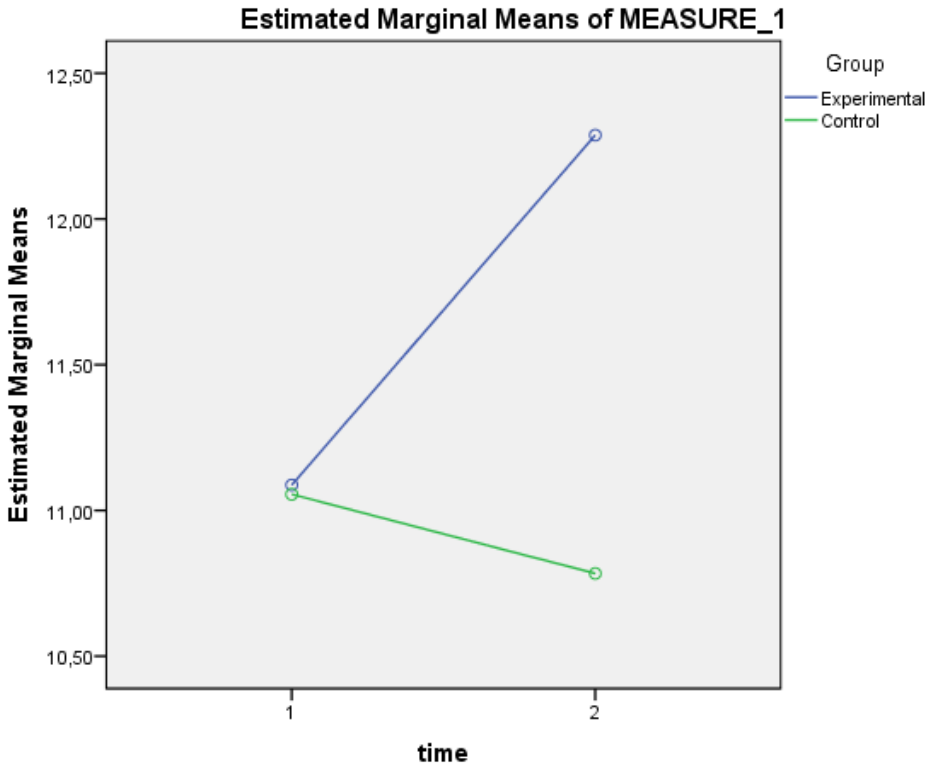
Repeated measures analysis of variation showed that there was a significant interaction between time and group factor (Table, $F(1, 25) = 15{,}352$, $p < 0{,}001$).

Table 11. Repeated ANOVA results for Analyses of emotions.

Pillai's Trace					
Effect	**Value**	**F**	**Hypothesis df**	**Error df**	**Sig.**
Time	,101	2,797[b]	1	25	,107
time * age	,127	3,642[b]	1	25	,068
time * group	,380	15,352[b]	1	25	,001

This interaction was due to the improvement in the Analyses of emotions score derived from the intervention to the experimental group in contrast to the insignificant difference observed in the control group, an interaction that is visually depicted in Figure 6.

Figure 6. Interaction effect of time and group factors on Analyses of emotions subscale.



Covariates appearing in the model are evaluated at the following values: Age = 13,8929

4. DISCUSSION

The purpose of this research was to determine whether the intervention may improve the emotional awareness of autistic children, equivalent to the EAQ30 in a sample of Greek children. The main research goal of the study was achieved. Specifically, the intervention of Kassotaki (2015) was found to promote emotional awareness, as it reflects on differentiating emotions, verbal sharing of emotions, bodily awareness, attending to others' emotions and analyses of emotions

score. In fact, the improvement observed in the Differentiating emotions and Attending to others' emotions subscale is also confirmed in research by Roberts-Collins et al. (2018) on CBT. On the other hand, the improvement observed in the other scales was not confirmed by CBT. The fact that no significant difference was observed in "no hiding emotions" is cause for concern. However, this subscale does not appear to produce differences even when comparing typical and ASD children (Roberts-Collins et al., 2018). The children's negative scores on the "bodily awareness" scale after the intervention, which is also observed in CBT, is troubling.

In particular, the intervention improved skills that are critical for social awareness and managing interpersonal relationships, suggesting it as a valuable tool for educators to enhance adaptive strategies of children to regulate emotions (Boden & Thompson, 2015; Subic-Wrana et al., 2014), which can have a positive effect on their performance and learning outcomes. In addition, it is shown that the intervention may raise students' awareness of emotions that are caused by others or with their peers (Hadwin, Järvelä & Miller, 2011; Järvelä & Hadwin, 2013).

Empathy-focused interventions for children with Asperger syndrome offer significant benefits in both social and school settings. Enhancing empathy improves social relationships, reduces anxiety and isolation, and fosters active participation and self-control. Additionally, the growth of empathy aids in school adaptation, allowing children to engage more effectively with peers and the learning environment.

Educators play a key role in fostering empathy by creating a supportive classroom, teaching essential social skills, and using activities like role-playing and visual aids to aid emotional understanding. Collaboration with parents and specialists ensures ongoing support at home. The study suggests that emotional visualization tools could help children express and regulate emotions, and it recommends future development of technology for emotional awareness in schools.

The present study included some limitations. At the outset, a relatively small sample was included in this study, which limited the strength of the results. Furthermore, although the emotions list helped students verbally express particular emotions in retrospective interviews, and become more aware of their emotions, it served as an additional limitation since participants were constrained to report emotions on a specific list. Students may have reported other emotions if they had additional options. Another limitation is that the same instrument used was a self-report questionnaire. In addition, the intervention was performed by school psychologists mainly for practical reasons, although it was not necessary for the intervention to be applied by a specialist. It is unknown whether the outcomes would be the same if the intervention had been carried out by less qualified personnel. Lastly, it is worth noting that gender was not included as a test variable since there was not a significant variation in the current sample. However, various reports indicate that gender is a possible variable that can affect social and communication skills (Elsabbagh et al., 2012). A repetition of the study is therefore suggested with a balanced sample of boys and girls. Early intervention is a crucial aspect, particularly for autism. As children grow up, their behaviours become more consolidated, and their neurological system becomes less flexible. Interventions such as Kassiotaki's must occur at a very young age as it is very important.

This study is focused on reporting how emotional instruments might be useful in a social environment to assemble analogous data in actual time, although it is complicated because it requires deep reflection from the students. It is important to offer students the relevant emotional visualization tools as a way of expressing their emotions and describing them, with the overall aim being to regulate these emotions in the school environment. It is recommended that intervention technologies be further developed in the future in order to improve the field of emotional awareness research.

FUNDING

This research is done in the frame of the Research+Development project of excellent. Ref. Prometeo/2023/006 (Generalitat Valenciana).

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