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The Evaluation of the Effectiveness of Teaching Pretend Play Skills in a Child with Autism Spectrum Disorders using Video Modelling: A Case Study

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Abstract

Background: A twelve-year-old boy diagnosed with autism spectrum disorders participated in the study.

Methods: His pretend play skills and social interaction levels were measured pre intervention, post intervention, and at a follow up stage. The participant viewed a videotaped scenario of an adult model playing with a toy set and he was asked to play with the same toys.

Results: The child performance increased in scripted actions and in social interaction during the video modeling phase compared to baseline levels. At the follow up session, scripted pretend play skills and social interaction were for the short-term maintained but generalizations were limited. However, long-term maintenance was not measured. Post intervention measures indicated that the intervention was implemented accurately and was considered valuable.

Conclusions: This study examined the effectiveness of teaching pretend play skills in a child with autism through video modelling. Pretend play skills were improved, lead to an increase in social interaction.

Keywords: Autism, Video modeling, Pretend play, Child

Introduction

Autism spectrum disorder (ASD) is a developmental disorder that is characterised by qualitative impairments in social interaction present in the use of non-verbal behaviours such as eye contact, joint attention; qualitative impairments in social communication shown by limitations in language development with difficulties in conversations, and social interaction deficits [1]. Moreover, individuals with ASD perform a restricted repertoire of interests, behaviours and activities accompanied with abnormal over focus on particular topics and/or objects, and/or non-functional routines [2]. In addition, difficulties in sensory regulation are present, including either hypersensitivity or hyposensitivity for example in sounds [3]. The above social and communication impairments have partially been explained by the Theory of Mind (ToM) deficit that is an impairment to understand the thoughts, desires, beliefs of other people [4]. In addition, executive functions include the ability to shift attention flexibly, generate goal-directed behaviour, and solve problems in a strategic way [5]. EF is an umbrella term that encompasses a set of functions including working memory/updating, cognitive flexibility/shifting, and response selection/inhibition [6]. The autistic individuals' difficulties in EF and ToM deficits [7] have been found to be correlated with the development of the typical play [8,9].

The role of play in typical development

Play is essential in children's world as it is an integral part of their life [10]. As children gradually develop, the play they produce is said to be more flexible and creative; evolving from the simple exploration of objects to simple repetitive play, to relational and constructive play, to functional play, and finally to pretend play [11]. Play has been found to be correlated with the development of social communication, social interaction, receptive/expressive language, cognition, and emotions [12,13]. Thus, the development of social competence contributes not only to the growth of social competence but also in confidence in dealing with peers [12]. The typical development of play could lead to a confident child who potentially initi-

ates play and participates in group play activities in various social environments. However, it is known that individuals with ASD demonstrate delayed or absent play skills and, in cases they demonstrate play actions that are performed in a less varied, elaborated, sustained, and integrated manner than those of typically developed individuals and those with Down syndrome [14].

Pretend play and typical development

According to Leslie [15], symbolic play can take three forms. Object substitution (one thing stands for another i.e., use a banana as a telephone); the attribution of false properties (i.e. pretend that the tea is hot); and the attribution of pretence to imaginary objects (i.e. pretend that a cup is not there, when it is. In this article, where the term 'pretend' or 'pretence' is used, it should be considered interchangeable with the term symbolic). Three major trends in the development of pretence were identified, namely decontextualization, which allows pretend play to occur with decreasing environmental support. The second is decentration, where symbolic actions are freed from the body of the child, allowing the manipulation of dolls and/ or other subjects for expressing pretend actions and allowing the adoption of other's actions; and thirdly integration, leading to sequentially and later hierarchically organised play [16]. The above gradual integration of reality into 'as if' situations, substantiates that the child has the ability to shift the physical stimuli into internal, flexible, and planned actions [17]. Even though the child fully understands the real situation, he pretends that another different reality takes place and has the opportunity to discriminate between the two situations [15]. Pretend play has been found to contribute to the children's development, as research indicates [18,19]. Specifically, pretend play skills have been considered as key elements of children's language development, especially expressive language [20], and cognitive development [21]. Equally, pretend play is linked to social interaction [22]. In addition, the development of pretend play has been found to increase the levels of imagination [23]. What is more, it is said that pretend play is associated with ToM competence [24]; hence, denying children opportunities to engage in pretend play could impair their social understanding and as an extension, affect their ToM skills [24]. However, the development of pretend play could be affected by either biological or environmental factors [25].

Pretend play competence in ASD

It is said that individuals with ASD face a specific pretend play deficit [26,27]. Two of the competing accounts that have been published in order to explain the basis of the pretend play deficit, which ASD individuals exhibit, are stated below. On the one hand, it is plausible that ASD individuals lack the competence to produce and understand pretence, due to their ToM deficits, which reflect a difficulty in mentalising [27]. The above means that individuals with ASD face great difficulty to represent in their mind someone else's thoughts, beliefs, or desires [28]. The above hypothesis could surely predict limitations in non-structured pretend play situations in ASD. However, in structured pretend play actions, an ability to produce or comprehend pretence exists only if there is a true awareness of the situation's pretend nature. The said awareness may exist when the pretend action is accompanied with relevant to the situation vocalizations such as sounds and/or speech. On the other hand, it is supported that ASD individuals face impairments in spontaneous production of pretend play potentially due to language and cognitive deficits [29]; reflecting the failure to create the ideas for pretence, despite the fact that ASD individuals might have the capacity to understand pretend play. Therefore, there is a need to focus upon the field of the pretend play competence in autism; in order to develop efficient approaches to teach pretend play in individuals with ASD. As pretend play difficulties are clearly seen in the ASD population, proper intervention programs could potentially lead to improved pretend play behaviours and in other domains as mentioned before (for example in social interaction).

Research Aims and Questions

The current study is similar to others [30-32] as it focuses on the impact of teaching pretend play skills to ASD individuals through scripting and video modeling. The current study aimed to investigate the effectiveness of teaching pretend play skills in an individual with autism on play and social interaction. Hence, the research was guided by the following questions:

1. Would the teaching of pretend play skills through a tailored intervention program improve autistic individuals' pretend play behaviours?
2. Do the improved play behaviours lead to an increase in social interaction?

Methodology- Case Presentation

Participants

A twelve-year four month (12.4) old boy who had been diagnosed with autism based on the DSM-V [1] was the focus of the said single-subject study. From now on, the above individual will be called as child X. Since the diagnosis, he has had therapy in a range of settings with a variety of speech and language pathologists. At the time of the study, the boy was enrolled in a regular school, with support services provided by a special education teacher and a classroom tutor. He was also attending lessons at an inclusion class. As research was held in Greece, inclusion class is characterized as the class where children with special needs spend two hours, at the most, every day with a special education teacher. In addition, his teacher worked with him in the inclusion class every day approximately for 1.5 hours on one-to-one basis. When taking the detailed history, it was reported that child X had not developed reading, mathematical, or writing skills. The child was non-verbal with limited verbal skills most of the times in the form of echolalia. Furthermore, the child X was noted to

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be stressed when coping with new people and/or materials. Pragmatically, he had difficulties such as: poor body language, poor eye contact, rigid idiosyncratic topics, and poor awareness of listener needs. In addition, his receptive language was superior to his expressive language; however, both were inferior to his chronological age. No standardized instruments were used for the above measures, only subjective clinical pieces of information as observed by the researcher. Overall, the said individual was reported to have few play skills, and the history indicated considerable communication difficulties. Thus, he had never received any play training before, and it would be interesting to examine if the pretend play training would benefit him.

Keyworkers were X's parents. They were 39 and 43 years old at the time of the research and they had both finished High schools. However, the ASD individual spent more time with his mother as his father was working and was away from home many hours during the day. Keyworkers had not been diagnosed with ASD or any other developmental disorder.

Materials

Questionnaires

A mixed type of collecting data including observation and questionnaires was used. The questionnaires provided the researcher with both quantitative and qualitative data, as scale-type and open questions were provided. Questionnaires were selected for practical reasons as they are manageable time wise, and they ensure anonymity/confidentiality [**33**]. Specifically, questionnaires were given to X's parents. The questionnaires were designed to assess the social interaction (**Appendix 1**) and the pretend play skills (**Appendix 2**) of the individual based on the keyworkers' regular observations before the intervention, immediately after the intervention, and after one week. Questionnaires included a four-point Likert-type scale, as never, seldom, half times, or often. Parents depended on their regular observations of their child within the home setting. Questionnaires were based on elements taken from The Social Play Record: A toolkit for Assessing and Developing social play from Infancy to Adolescence [**34**] which is developed specifically for individuals on the autism spectrum.

Observations

The other approach, in order to gather data, was observation; due to the opportunity given to the researcher to observe situations as they took place in a setting, and the opportunity to observe individuals who face a lack to express their ideas verbally [**35**]. In addition, the observational role of the author as a researcher was both participant and non- participant according to the area assessed each time. Moreover, observation checklists (**Appendix 4**) based on the pretend play script were used in order to help the researcher during the analysis of the data. In addition, in order to avoid subjectivity, one more professional checked the video and filled the observation checklists. Ethical issues that arise from the video observation are stated in the ethical considerations part. Both the questionnaires and the observation checklists were based on standardized tools. However, the above tools were translated in Greek language, which means that the tools were not standardized in the country where research took place. However, the use of standardized tools did not play a major role as the said project aimed to individualization; hence, the procedures for collecting data (observation checklists and questionnaires) were critically examined to assess to which extent they could be reliable and valid [**36**] in the said project. That means that a pilot study took place in order for the questionnaires and the observation checklists to be checked. In addition, checklist was used to help avoid problems in question wording [**37**]. Reliability was assessed by piloting the questionnaires as many times as possible in order to be sure that all questions were clear to the readers; and so did happen with the observation checklists just to make sure that they were appropriate for X's needs [**35**]. Furthermore, validity was assured by asking relevant to the field tutors whether both the questionnaires and the observation checklists were likely to do what the researcher expected them to [**36**]. Moreover, score sheets were designed in order to help the researcher present the results and for readability purposes as well.

Research setting

The said research was carried out in a real environment –rather than in a laboratory- and specifically in child X's home setting. The home setting offered a quiet place that was appropriate for child X. The above was important as child X was usually distracted by external sounds; and thus, a quiet environment was necessary for him. Specifically, the research procedures were conducted in his room. In the middle of the room, there was a table with three chairs. Play sessions were conducted at the table, and the video model was shown in a separate area of his room, where the laptop was placed.

Materials for the intervention stage

A play set based on the real-life experience of a supermarket situation was used to teach pretend play and a script was developed for the play set. Relevant to the supermarket theme materials were used, such as a bag and a cash machine (**Appendix 4**). In addition, two of X's favourite characters were used, namely the spider man and the super man; in order for the theme to be more attractive to child X. The spider man was the shopper, and the super man was the cashier. All the above materials were used in the video modeling scripts. Specific script (**Appendix 5**) was recorded on a VHS-C camcorder and shown on a Laptop Toshiba Satellite A 100. The script is explained in the following paragraph. The laptop was placed on a table separate from the area in which the child would play with the toy set.

Procedure

The said project followed a research cycle which involves the

stages that are explained in this point.

Stage 1 of the cycle- Baseline measures to identify strengths and needs

Video measures

Child X was videotaped before the training, after the training, and in a follow-up period, in a play action namely the supermarket in order for specific scripted actions to be measured. The play event was recorded for four minutes and contained the play of the child playing alone while the researcher was watching him. In addition, other recorded episodes included the individual interacting with his mother in order to measure his social interaction level based on eye contact frequency [34]. In the said sessions, his mother was simply asked to play with the child using the training toys and was not directed to elicit pretend play. She was informed that the child would be learning to engage in more advanced play during the intervention.

Questionnaires

Questionnaires were given to X's parents at a pre intervention, post intervention and follow up stage.

Stage 2 of the cycle- Intervention

Specific play script was developed for the set of supermarket materials. The script required the child to hold each character, and to have the characters manipulate the materials. For example, one aim was for him to have a character as the cashier and use the cash machine properly. Each script had a sequence of ten coordinated actions. The researcher decided to include ten actions based on X's strengths. An adult was videotaped acting out the sequence of the pretend play scenario. This video model was shown to the child two times consecutively. Due to X's language impairments, scripted verbalizations were not used during intervention. However, the existence of scripted verbalizations could potentially help us understand better whether child X truly pretended or not. Immediately after viewing the video modeling script, the researcher gave the cue 'It's time to play' and the child was given four minutes to play with the materials, while the researcher was standing directly behind the child. The researcher gave no reinforcement or prompting during training or probe sessions. The number of X's scripted actions was scored from videotapes with 'yes' in cases where the scripted action was present and 'no' when scripted actions were not present, respectively (**Appendix 3**). Scripted actions were defined as motor responses that matched the actions of the video model and resulted in the same change in the environment as seen in the model. A play action was scored only if the complete sequence of play was performed. During the training sessions the child was brought close to the laptop to watch the video model play script two times. Child X was then immediately directed to the play materials and told 'It's time to play.' As in baseline, the child was given four minutes to play with the toys while the researcher was standing behind the child. No prompts or reinforcement were delivered during training. Training sessions continued for a period of two months, three times per week. After two months the child was assessed again, without watching the video this time. During these probe sessions the child was presented with the toy set and given the instruction to play. Probe sessions were identical to baseline sessions.

Stage 3 of the cycle- Post intervention measures

Again, in that point video measures and questionnaires were used in order to assess X's social interaction level, and pretend play skills after the intervention had finished.

Stage 4 of the cycle- Follow-Up measures

Follow-up assessments were conducted one week after the intervention was finished. These assessments were identical to pre and post intervention assessments.

Ethical Considerations

Informed Consent

It is usual to seek the consent of those involved in the research. Actually, the consent helps the participants understand the nature of the research and their ability to withdraw from it if they decide so even after initially giving consent, as stated by the Educational Research produced by the British Educational Research Association (BERA).

Right to Withdraw

Ethical Guidelines [38] highlight the participants' right to withdraw from the project at any time. In the said research, in order to avoid the above situation, the researcher reflected upon her own actions on a regular basis. The above happened in order to make sure that her actions would not lead the participants to withdrawal. To do this, the researcher met the individual's parents weekly and discussed with them whether they were happy with the project's procedure or if they wanted to make any changes to the research process.

Discussion- Results and Findings

Firstly, findings related to pretend play skills and social interaction levels for the pre intervention stage are provided, based on the questionnaires and video data. Secondly, post intervention findings are given and then findings for the follow up stage. Tables are provided for detailed scores. Moreover, there are graphs available (**Appendix 6**) where pretend play and social interaction scores can be seen for the pre and post intervention and follow up stage as assessed by observers and keyworkers.

Pre intervention findings

Pretend play skills findings

Table 1 displays the questionnaire data for the pretend play skills as provided by the keyworkers. It can be clearly seen that at baseline sessions the pretend play skills that Child X

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Table 1. Scores of the pretend play skills in pre intervention questionnaires given to key workers.

	Keyworker 1	Keyworker 2
Phase	Pre Intervention	Pre Intervention
Pretend Play Score	1/27	1/27

performed were significantly low as assessed by the keyworkers. In addition, both keyworkers scored the same answer. Their agreement shows that they have the same opinion of the pretend play behaviours that Child X performed. Both parents said that Child X pretended to be a certain fictional character as seen on television but in a repetitive way, without a relevant play context around him, and without proper verbalizations but with repetition of whole phrases as heard on television. The above statements might mean that even though parents stated that Child X acted as if somebody else (a fictional character), in fact, this is not true pretence [15]. This might happen when a second-order representation known as a metarepresentation [15] is absent, which is the idea that typically developed individuals demonstrate: that a situation (for example pretending to be a fictional character) is not true [15]. In other words, Child X acted as though he were a fictional character but not in a pretend way. The above can be better understood if we consider that there was no relevant play context available when he pretended to be someone; there were no other gestures and/or vocalizations and/or sound effects and/or speech produced apart from the strictly imitated and repeated phrases and/or movements as seen and heard on television. Thus, data from the questionnaires confirmed that Child X performed extremely low and had almost non-existent pretend play skills as assessed by his regular observers.

Moreover, in accordance with the video observation data, Child X did not score in the scripted pretend play actions as displayed in **Table 2**. Child X showed a baseline measure of 0/10 scripted pretend play actions. There was 100% agreement between the observers. In addition, the video observation findings agreed with the keyworkers' findings, and all confirm the pretend play deficit that Child X performed to produce pretend play actions either in free play or in structured play sessions. This replicates the findings of other researchers, demonstrating that there is a pretend play deficit within the ASD population [26-28]. Thus, it can be concluded that Child X was not engaged in pretend play before training.

Table 2. Scores of the pretend play actions from the script in pre intervention video observations.

	Observer 1	Observer 2
Phase	Pre Intervention	Pre Intervention
Pretend Play Scripted Actions	0/10	0/10

Social interaction findings

In accordance with social interaction levels, the pre intervention data are displayed in **Tables 3** and **4** respectively as retrieved by the questionnaires and the video observation records. As it can be seen in **Table 3**, keyworkers noted that at baseline sessions Child X performed an average of 3.5/27 points for social interaction, based on regular observations of their child. Keyworker 1 pointed out that Child X seldom seeks joint play with other children. Furthermore, Child X was involved in joint play only when the play was related to ball games as balls are his favourite item. In addition, it was stated that Child X continues playing even when a child comes alongside. However, Child X was found to take part in turn taking activities with other children, only when provided with adult support, for a specific and limited range of games. Furthermore, other children sometimes initiated joint play with Child X, especially in cases where they knew that he would enjoy playing. On the other hand, while keyworker 2 answered the questions in a similar manner, he answered that he had never observed Child X taking part in turn taking activities with other children, even with adult support. This difference between the keyworkers may be due to the limited time spent between keyworker 2 and Child X. However, the agreement between the answers of the keyworkers is again high, which means that there is a shared assessment of X's social interaction levels as assessed by his parents. These levels were found to be very low. Therefore, data from questionnaires shows that the social interaction levels were found to be impaired at the pre intervention stage.

Table 4 shows the video observation data. It can be seen that the eye contact frequency demonstrated by Child X within four minutes was quite low. Child X was observed to make eye contact with his mother only nine times within four minutes. The agreement between observers is 100% at this stage. Similarly, video observation data reported that the social interaction levels pre intervention were low. Thus, the above findings highlight the limited levels of pre-intervention social interaction, which is in line with the ASD community [1]. What is more, the above reduced levels of social interaction could potentially derive from the autism diagnosis [1]. Furthermore, it was expected that the individual would show low levels

Table 3. Scores of social interaction levels in pre intervention questionnaires given to keyworkers.

	Keyworker 1	Keyworker 2
Phase	Pre Intervention	Pre Intervention
Social Interaction levels Score	4/27	3/27

Table 4. Eye contact frequency in pre intervention video observations.

	Observer 1	Observer 2
Phase	Pre Intervention	Pre Intervention
Eye Contact Frequency	9 times/4 minutes	9 times/4 minutes

of social interaction, as the pretend play deficit that Child X performed pre intervention has been found to be correlated with decreased social interaction. As shown in **Tables 1-4**, pre intervention analysis revealed that all the measures for both the pretend play skills and the social interaction levels were significantly low. Thus, the above decreased performance shows that Child X exhibited no pretend play in both spontaneous conditions as assessed by his parents and in scaffolded conditions as assessed by the observers, based on the script developed for the purpose of the study. Child X also showed poor social interaction levels.

Post intervention findings

Pretend play skills findings

At the post intervention stage, immediately after completing the intervention, data from the questionnaires and the video observations related to the pretend play behaviours were analysed. **Table 5** displays the data for the pretend play responses from the regular observations of the parents of Child X. Following the introduction of the video modeling intervention, the frequency of the pretend play skills was increased from an average baseline score of 1/27 points to an average of 4/27 points based on the keyworkers' questionnaires. Data from keyworker 1 are depicted in the left part of **Table 5**; and these revealed an increase of three points in comparison to the pre intervention score. Sometimes, Child X did carry out limited pretend play actions related to the supermarket situation, but these actions were repeated again and again in a stereotypical manner. Moreover, Child X played the role of the cashier at the supermarket as taught by using the relevant materials, but for limited time, without adding new (not learned) actions and again in a stereotypical way. What is more, Child X gave his favourite toy the role of the shopper and let him take the basket, as taught. In general, it can be seen that there was an improvement, and generalization at free play sessions as observed from keyworkers. However, all the pretend play actions were related to the supermarket situation. Correspondingly, the right part of **Table 5** displays data from keyworker 2, indicating that there is an improvement of three points compared to the pre intervention score.

Table 5. Scores of the pretend play skills in post intervention questionnaires given to key workers.

	Keyworker 1	Keyworker 2
Phase	Post Intervention	Post Intervention
Pretend Play Score	4/27	4/27

The above improvement reflects the existence of pretend play skills related to the situation taught. An increase in the frequency of the pretend play behaviours was not observed. In other words, at the post intervention stage keyworkers observed that there was an increase in the pretend play skills but not in the pretend play frequency. Therefore, the intervention led to an improvement in pretend play skills as indicated by the keyworkers' data and generalizations were observed but only for the supermarket situation. Nonetheless, the above statements were keyworkers' observations; thus, they could be biased as they may be looking for improvements. Hence, these findings should be interpreted with caution.

Video observation data related to scripted pretend play actions are displayed in **Table 6**. The left part of **Table 6** depicts the number of scripted pretend play actions for the supermarket sequence as checked by observer 1. Similarly, the right part of Table 6 shows the number of the scripted pretend play actions for the same sequence as seen from observer 2. Both observers ticked the same number of scripted pretend play actions, which reveals complete inter observer agreement. The said agreement could be potentially because specific scripted pretend play actions were observed.

Table 6. Scores of the pretend play actions from the script in post intervention video observations.

	Observer 1	Observer 2
Phase	Post Intervention	Post Intervention
Pretend Play Scripted Actions	2/10	2/10

Following the introduction of the video modeling intervention, the number of the scripted pretend play actions increased from 0 responses during baseline sessions to 2 responses per session at post intervention stage. Initially, Child X manipulated the shopper to take the basket. In addition, Child X manipulated again the shopper to pay, by giving the money to the cashier. However, none expected that Child X would open the wallet, instead of the shopper character, and give the money to the shopper character in order for him to pay. The above could potentially mean that Child X faced difficulties in manipulating the character to open the wallet. This might be due to the small size of the objects. In other words, Child X perhaps wanted to pretend by manipulating the shopper character to open the wallet, but he could not. Unfortunately, the data collections procedures were not sensitive enough to detect the above behaviours; thus, they were not scored. Likewise, the same happened with the use of the cash machine, where Child X ignored the cashier character, and he used the cash machine on his own. The above behaviour was not scored; however, it might be inferred that Child X did like pretending to be the cashier and this was the reason he ignored the cashier character. However, as mentioned before, these behaviours were not detected and thus not scored. As it can be seen in **Table 6**, there is 100% agreement between observer 1 and 2. Thus, video observation data indicates that the intervention led to a slight improvement. However, the qualitative analysis showed a bigger improvement. If the data collection procedures had been more sensitive, the improvement might have not been characterized as slight. In general, the above encouraging findings could potentially mean that

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Child X was supported by the play intervention and thus, he performed some pretend play skills. Child X performed two learned actions. However, the increase in pretend play skills was limited and present only in probes that included the supermarket situation. For example, during regular observation, parents saw Child X making spider man hold the shopping bag as seen in the video modeling intervention. In addition, Child X performed some scripted pretend play skills; but these were the simplest scripted pretend play actions and not accompanied with verbalizations. The above could lead to a basic question: was there a true pretence? Specifically, repetitive patterns of motor behaviours are characteristic of children with autism [30]; thus, it remains unknown whether Child X truly pretended or there was only imitation. Moreover, he did generalize a pretend play action in free sessions but did not add new persons, ideas, materials, or vocalizations. The factors that were found to make the pretend play script difficult for Child X was his inability to produce pretend play before the intervention, his low mental age, language, and cognitive skills. He tended to perform the same action sequences all the time. In summary, Child X on average increased somehow his pretend play behaviour but not substantially, and in a clinically moderate way after pretend play training. Similar findings were also found in studies by D'Ateno [30]. They summarized that after a video modeling intervention of pretend play skills, individuals on the autism spectrum showed an improvement in the scripted pretend play actions. Owing to the difficulties that Child X had in completing the non-standardized assessments, and the lack of sensitivity of the data collection procedures to detect some behaviours, the above results should be treated with caution.

Social interaction findings

At the post intervention stage, data from the questionnaires and the video observations were analysed to find out social interaction levels. **Table 7** displays the data for the social interaction responses across the regular observations of the parents of Child X. Following the introduction of the video modeling intervention, the social interaction levels increased from an average baseline score of 3.5/27 points to an average of 8/27 points based on the keyworkers' questionnaires. Data from the keyworker 1 are depicted in the left part of **Table 7**;

Table 7. Scores of social interaction levels in post intervention questionnaires given to keyworkers.

	Keyworker 1	Keyworker 2
Phase	Post Intervention	Post Intervention
Social Interaction levels Score	11/27	5/27

and reveal an increase of 7 points. Specifically, there is an improvement from seldom to half of the times for spending a greater amount of time watching other children play without joining in; continuing to play when another child came alongside; taking part in turn taking activities with other children with adult support; and other children initiating joint play with the child. In addition, keyworker 1 observed that Child X did seldom seek joint play with other children when related to either ball games or supermarket situations. Moreover, Child X was rarely observed to play alongside his sister using similar toys. In the cases where the toys were related to the supermarket situation, he produced play; otherwise, he just held the same toys but did not play purposefully or in a pretend way. Furthermore, Child X started joint play with his sister and/or other children around the age of four only when supermarket and/or ball items were available. The right part of **Table 7** displays data from keyworker 2, indicating that there is an improvement of two points compared to the pre intervention score. Specifically, keyworker 2 observed that Child X played alongside other children using similar toys for a limited time at a limited base. Moreover, keyworker 2 mentioned that Child X, seldom started to take part in turn taking activities with other children with adult support when favourite activities and/or supermarket related activities were taking place. We can see that there is not such a high agreement between the answers of the keyworkers. This could be because keyworker 2 may have had limited opportunities to observe Child X within the home and/or other setting(s) compared to keyworker 1. Nevertheless, an improvement in social interaction is clearly seen. Child X started to spend time playing alongside in parallel play and/ or playing with other children. However, the chronological age of the children he preferred to play with was around the age of four. This might be because Child X has a sister around this age with whom he may feel more comfortable. Also, X's mental age has been assessed to be around the age of three, which means that the play of the children around the age of four is more appropriate for him. Both keyworkers specified that Child X showed an improvement in social interaction but only when ball games or situations related to the supermarket were played. Thus, an increase in the frequency of social interaction had taken place as well as new social skills: however, only related to ball games and/ or supermarket situations. Notwithstanding, the above statements were keyworkers' observations. They could be biased as they might be looking for improvements. Hence, findings should be interpreted with caution. Similarly, video observation data related to eye contact frequency are displayed in **Table 8**. The left part of **Table 8** depicts the eye contact frequency as checked from observer 1. In addition, the right part of **Table 8** shows the eye contact frequency as seen from observer 2. Following the introduction of the video modeling intervention, the eye contact frequency increased from nine times per four minutes during the pre-intervention stage to 14 times per four minutes at the post intervention stage. It can be clearly seen in **Table 8** that there is 100% agreement between observer 1 and 2. Thus, video observation data indicate that Child X spent a greater amount of time engaged in social interaction at the post intervention stage.

Table 8. Eye contact frequency in post intervention video observations.

	Observer 1	Observer 2
Phase	Post Intervention	Post Intervention
Eye Contact Frequency	14 times/4 minutes	14 times/4 minutes

From the above findings we can deduce that Child X was supported by the play intervention and thus an improvement in pretend play correlates with an increase in social interaction levels. Child X performed social actions spontaneously and when supported by an adult, with children around the age of four. However, the social interaction was low and apparent in probes that included ball games and/or the supermarket situation. Thus, after training no increase in social interaction was evident when dealing with older children across other play context(s). The above means that even though Child X had increased his social skills, he did not do it to a degree so that he could be independently adapted to a social environment. Correspondingly, the factors that were found to make the social actions difficult for Child X were his low eye contact frequency, low social behaviours as assessed from keyworkers before the intervention, his impaired pretend play, and his impaired verbal communication skills. In summary, Child X on average increased his social interaction level after pretend play training. In addition, a correlation between pretend play deficit and social skills impairment has been found. Stanley and Konstantareas [39] found that comorbid learning difficulties could act as a moderating factor in the relationship between pretend play and social development. This finding is supported in the current piece of research as X's learning difficulties were found to be linked to both pretend play deficit and social skills impairment. Owing to the difficulties that Child X had in completing the non-standardized assessments, and the small deviation between the keyworkers' answers, the above results should be cautiously interpreted.

Follow up findings

Pretend play skills findings

At the follow up stage, one week after the intervention completion, the findings were the same as those at the post-intervention stage. The scores are displayed in **Table 9**. Child X did make progress at the follow up stage; and keyworkers scored the same points at the same questions as at the post intervention stage. Specifically, keyworkers stated that Child X did pretend to be a fictional character, but again it was not potentially true pretence but most probably the repetitive patterns that are present in autism [30]. Moreover, he did carry out pretend play actions related to the supermarket situation but in a stereotyped manner. In addition, he played roles but only those that were related to the supermarket setting. Although the pretend play skills were maintained at the follow up measure, the keyworkers did not mention generalizations of the pretend actions to new toys and/or persons or an increase in the frequency of the pretend play actions. The video observation data are displayed at **Table 10**. As it can be seen, the pretend play performance for the supermarket situation remained stable during the follow up assessment. Child X did act the same two scripted actions. Child X presented the pretend play actions exactly in the same way with the same toys and in the same play context. The above could potentially be related either to the restricted repetitive and stereotyped patterns of behaviour presented in autism [1] and/or to specific impairments in pretend play [25,28,39]. In general, Child X's pretend play skills were not decreased during the follow up assessment, but they remained stable instead. This may have happened as X's learning skills were limited and he had never attended pretend play training before. Another reason could be that the follow up assessment took place one week after the intervention was completed, and thus, there is the possibility that the short time between the training and the follow up study did not allow Child X to generalize the taught pretend play behaviours. Furthermore, no further follow up assessment took place; hence the above findings should be interpreted with caution.

Table 9. Scores of the pretend play skills questionnaires given to key workers-follow up assessment.

	Keyworker 1	Keyworker 2
Phase	Follow up	Follow up
Pretend Play Score	4/27	4/27

Table 10. Scores of the pretend play actions from the script-follow up video observations.

	Observer 1	Observer 2
Phase	Follow up	Follow up
Pretend Play Scripted Actions	2/10	2/10

Social interaction findings

Table 11 displays the data from the social interaction level questionnaires at follow up assessment. It is observed that keyworkers scored the same points for the same questions as at post intervention stage. Specifically, Child X remained on average at the same low level (8/27). The above could be due to the fact that the keyworkers relied on their regular observations, which means that Child X was potentially observed in unstructured settings with many people around him. Thus, it was difficult for him to interact under these circumstances. In addition, there is again no high agreement between the answers of the keyworkers. The above may be due to the limited opportunities the keyworker 2 had to observe his child. However, there is a remarkable improvement in comparison to the pre intervention findings. The video observation data that measured eye contact frequency are shown in **Table 12**. As it can be seen, there is a slight improvement from 14 times per four minutes at the post intervention stage to 16 times

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Table 11. Scores of social interaction levels at follow up questionnaires given to keyworkers.

	Keyworker 1	Keyworker 2
Phase	Follow up	Follow up
Social Interaction levels Score	11/27	5/27

Table 12. Eye contact frequency at follow up video observations.

	Observer 1	Observer 2
Phase	Follow up	Follow up
Eye Contact Frequency	16 times/4 minutes	16 times/4 minutes

per four minutes at the follow up assessment. The above improvement may be explained by the one-to-one basis of the assessment within a specific play context. In other words, it is possible that Child X found it easier to interact with one person at a time in a structured play setting than with many persons across different free play or other sessions. So, it could be better if another structured play situation was included, in order to observe whether Child X would interact or not. In addition, maybe the fact that Child X was interacting with his mother, with whom he regularly spends much more time than with others, was correlated with the eye contact increase. Thus, another person could be included in the study in order to observe if Child X would also perform increased eye contact frequency. Child X was characterized by extremely low social interaction levels. Thus, an improvement in eye contact frequency seems logical as eye contact frequency takes place prior to social interaction [**40**].

To conclude, at follow up assessments, Child X was found to be at the same levels as at the post intervention stage. He slightly increased his eye contact frequency. This can be viewed in the graphs (**Appendix 6**). All the above findings revealed that Child X had benefitted from the pretend play training. However, future research is necessary.

Conclusion

This study examined the effectiveness of teaching pretend play skills in a child with autism through video modelling. One major aim of the study was to replicate earlier studies demonstrating that teaching pretend play skills through a tailored intervention program can improve the pretend play behaviours of individuals with autism e.g. [**30**]. A script related to the supermarket situation was used, which required child X to manipulate two characters by acting out the scripted sequences. Pretend play skills were measured before, after intervention and at a follow up stage from keyworkers, who were X's parents and from two observers. Data collection procedures included questionnaires and video observation data. A second major aim was to assess if the improved pretend play behaviours lead to an increase in social interaction. Child X learned to use one of the two characters in order to perform pretend play actions with the available materials as modeled in the play script. Nonetheless, Child X acted out actions which could be scored as pretend play actions but they were not due to the lack of sensitivity of the data collection procedures to detect these actions. Regarding the measures of social interaction levels, they were based on the regular observations of the parents. Similarly, social interaction was also measured based on the eye contact frequency Child X performed when interacting with his primary caretaker and specifically his mother, using video data procedures.

The first question was addressed by examining the pretend play skills of Child X at a pre, post intervention and follow up stage. At pre intervention stage, child X exhibited no scripted pretend play actions as assessed from observers, and some pretend play skills as assessed from keyworkers. However, the above pretend play actions were characterized as false pretence because Child X was using repetitive actions and there was a lack of relevant play context and/or the use of proper verbalizations. Hence, this study revealed that Child X did perform false pretence for the pre intervention stage. At the post intervention stage, Child X increased pretend play actions related to the supermarket situation as assessed from both keyworkers and observers. These findings support research suggesting that individuals on the autism spectrum can improve their pretend play skills through a tailored intervention program (e.g. [**30**,**41**]. In order for a play intervention to be effective, measurable changes in play need to be observed at post intervention stage. Thus, the above in combination with the provided evidence suggesting that Child X increased pretend play actions, could lead to the conclusion that the specific pretend play intervention used in the current study was beneficial for the specific child. However, generalizations were limited. These findings are inconsistent with those suggesting that play actions learned through video modeling carry-over to unfamiliar actions [**42**,**43**]. However, participants of the above studies were of higher function than the Child X. Pretend play intervention through video modeling was an effective intervention to teach pretend play in the said Child X without prompting, correction, or reinforcement from adults. However, keyworkers' observations could be biased as they may be looking for improvements. Thus, the above findings should be interpreted with caution. The follow up study revealed that there was a short-term maintenance of scripted pretend play performance as assessed by keyworkers and observers. However, no generalizations to new toys and/or toys were observed. The above findings are consistent with those suggesting that frequency of play skills is maintained or decreased slightly but remains higher than baseline sessions [**43**]. Pretend play behaviours of Child X were successfully maintained following a one-week period in which he viewed neither the video script nor the toy set. The above finding is consistent with those of Nikopoulos and Keenan [**44**]. Specifically, they found that levels of appropriate toy play were maintained in the absence of video viewing even after a 1-and 2-month follow up period.

The second aim of the current study was to replicate previous research showing that improved play behaviours lead to an increase in social interaction. The results of the current study confirm this pattern. Specifically, social interaction levels at the pre intervention stage were characterized as low, based upon the video observation data and the questionnaires. Child X did perform low levels of social interaction. Similarly, eye contact frequency, as assessed by the observers, was low at pre intervention stage. Post intervention measures identified higher levels of social behaviours, with child X spending less time alone and more time engaged in alongside play. Additionally, there was an improvement in the eye contact frequency. Nonetheless, Child X engaged only in pretend play actions related to the supermarket situation. The improvement seen in the said study could potentially suggest that scripted pretend play actions might help individuals with autism learn about social interaction and/or engage in social relationships. The findings in accordance with the social interaction levels revealed that Child X learned somehow to interact. It is important to consider the mechanisms behind these changes in social interaction. The above could potentially be correlated with the increase in pretend play, which, in turn, potentially encourages other people to play with Child X. These findings are consistent with those of other researchers [45-47]. However, as mentioned before, keyworkers' observations could be biased as they may be looking for improvement. Thus, findings should be interpreted with caution. In addition, the eye contact frequency was improved at the post intervention stage. It seems to be the case that by learning what to do with the toys, Child X began to share common things with others [45]. Thus, other people potentially were encouraged to come alongside and as a result, to offer opportunities for play for the supermarket situation. Moreover, it is possible that by teaching pretend play behaviours we potentially have reduced the stereotyped patterns that Child X was performing; and consequently, Child X has become a more attractive playmate. Follow up measures revealed that Child X did maintain social interaction levels as assessed by the keyworkers. In addition, it is noteworthy to state that an increase in eye contact frequency was observed at video observation data, from 14 times per four minutes to 16 times per four minutes. The above could have happened because Child X was interacting with his primary caretaker that was his mother; and thus, Child X did perform eye contact more frequent. An unfamiliar person could be included at the current study in order to see how Child X would interact. Overall, the findings suggest that the said structured pretend play intervention was effective in teaching some pretend play actions to the said Child X. However, the above actions have not yet been applied in his free play. Child X continued to receive pretend play experiences for the supermarket situation from his parents after the completion of the project. Parents were fully trained in order to re produce the same procedure and specific guidelines were given to them on what to do and what to avoid. In addition, parents were informed that in case that Child X did reach 10/10 scripted pretend play actions for the supermarket situation, they should either visit me or another speech and language therapist in order to develop another script and to introduce a new situation.

Limitations

This case study research acknowledges that there are possible advantages for individuals with autism when their education is in part focused upon pretend play skills. However, the current study has several limitations namely: small sample size, use of non-standardized instruments, child's X developmental level of symbolic play-mental age-functioning level-language abilities and cognitive abilities were not measured, short intervention period in comparison to relevant piece of research [30], decreased sensitivity of the data collection procedures in comparison to relevant pieces of research [38,42], use of non-standardized intervention, no further follow up later on.

Recommendations for further study

This case study research acknowledges that there are possible advantages for individuals with autism when their education is in part focused upon pretend play skills. However, further research in this area is required with additional consideration given to the following parameters. Extension of the intervention period in another follow up study will be important in order to increase validity. Further observations could potentially offer clearer evidence of whether any learned behaviour(s) were generalized, maintained or developed over time. In addition, further follow-up is important in order to observe any generalizations to new toys and/ or people, and/or maintenance of the taught behaviour(s). Specifically, a generalization phase that would be the same as the intervention stage could be included, but in that phase the original toys could be replaced with novel toys sharing common physical characteristics. Similarly, a maintenance phase could be introduced, where individuals could be observed playing with the toys but without having previously viewed the video modeling. In addition, further research is required to determine whether such an intervention is beneficial for other individuals on the autism spectrum. Thus, individuals with different chronological ages and across the autism spectrum could be included in future research in order to observe if the intervention is more appropriate for a specific age group and/or for high functioning and/or verbal individuals. In addition, scripted verbalizations could be included in the examiner's observation script, in order to it make easier for the researcher to understand if true pretence exists. Moreover, it is recommended to use some standardized instruments e.g., to measure language skills, cognitive level, mental age and pretend play skills. In future research, an unscripted pretend play actions form can also be introduced. In the said form, actions that are not included in scripted pretend play actions but are contextual with respect to both the object and the

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situation, can be checked. What is more, an unfamiliar person could be introduced in the intervention phase and/or follow up session in order to see how child X will interact with him relating to the eye contact frequency. Future research could also increase the sample size. Further research is needed to extend the current research and potentially develop effective treatment interventions to address the pretend play deficits in individuals with autism spectrum disorders.

Additional files

Appendix 1
Appendix 2
Appendix 3
Appendix 4
Appendix 5
Appendix 6

Competing interests

The author declares that he have no competing interests.

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