Critical Review:
What is the evidence that video modeling is an effective intervention to teach pretend play skills to young children with Autism Spectrum Disorder (ASD)?*

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This critical review examines the effectiveness of video modeling as an intervention tool to teach pretend play skills to young children with Autism Spectrum Disorder (ASD). Five experimental single subject, multiple baseline design studies were reviewed as a result of a literature search using computerized databases. All participants were between the ages of 3;8 and 7 years and had a diagnosis of ASD. Overall, the results of this critical appraisal yield promising evidence for the use of video modeling as an appropriate intervention to teach scripted play skills to children with autism in independent, pretend play scenarios. Clinical implications are discussed.

Introduction

Autism Spectrum Disorder (ASD) is characterized by impairments in verbal and nonverbal communication skills, restricted or repetitive behaviours, and social interaction (American Psychiatric Association, 2013). Deficits in symbolic and pretend play are also trademarks of the disorder for many children with this diagnosis (Lifter, 2000). In fact, the play of children with ASD is often characterized as repetitive, ritualistic, and lacking in imaginative themes, indicating a marked difficulty in engaging in appropriate play behaviours (Paterson & Arco, 2007). As symbolic play has been shown to be a predictor of both language abilities and social communication skills, particularly for young children with this diagnosis, the development of pretend play skills is important to include in intervention plans (Barton & Pavilanis, 2012). To target play skills, video modeling has been used as a form of intervention to provide children with ASD exemplars and scripts of appropriate play skills.

Barton & Pavilanis, (2012) defined a taxonomy for categorizing and defining pretend play to provide consistent and measurable definitions for assessing and teaching pretend play in children. They include four types of pretend play:

a) Functional play with pretense (e.g. taking a sip from an empty cup)
b) Object substitution (e.g. using a bowl as a hat)
c) Imagining absent objects (e.g. talking on the phone with an empty hand)
d) Assigning absent attributes (e.g. saying "the baby is hungry" referring to a doll) (Barton & Pavilanis, 2012, p. 7)

The video modeling procedure typically consists of presenting a videotaped sample of models engaged in a predetermined series of actions and/or verbalizations. Next, the model is shown two to three times to the child, and then the child is directed to perform the scripted behaviours shown in the video (Charlop-Christy, Le, & Freeman, 2000).

Variations of video modeling also exist. For example, video self-modeling describes a process in which the individuals receiving the intervention are included in the video model. Another variation is point-of-view modeling, which involves recording the video models from the perspective of the person who is the target of the intervention without showing the entire person modeling the behaviour in the video (Hine & Wolery, 2006). The consistency and predictability of the video models and the known visual strengths of children with ASD suggest that video modeling should be explored further as a valid intervention tool to teach play skills to this population (Hine & Wolery, 2006).

Objective

The primary objective for this paper was to critically evaluate current research regarding the effectiveness of video modeling as a primary intervention method to teach pretend play skills to children with ASD.

Methods

Search Strategy

The following databases were used to find articles related to the topic of interest: Scopus, Web of Science, and PsychINFO. Keywords for the database searches included: [(video modeling) AND (autism) AND (preschool) OR (young children) AND (pretend play) OR (symbolic play)]. In addition, relevant studies

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referenced in the articles obtained were reviewed for selection.

Selection Criteria

Articles included in this review were required to have participants who were enrolled in preschool programs and were diagnosed with ASD. Each study also had to explicitly examine the efficacy of video modeling as an intervention to increase solitary pretend play skills (i.e. the child acting upon toys/objects without interacting with a partner) as interactive play was not a focus of this review. Articles were included if they used a variation of video modeling (ie. point-of-view video modeling). The articles were also required to be available online. No limits were set on the dates of the articles published or the study design used.

Data Collection

Results of the literature search described above yielded five articles that met the selection criteria and were included in this review. Each study utilized a single subject, multiple baseline design.

Results

Single Subject Experimental Designs

Single subject experimental designs by nature are beneficial in that individual differences of each participant are taken into account to measure true behavioural change. In testing a population in which each participant exhibits a different presentation of autism, this type of design is appropriate. The use of a multiple baseline design also decreases the possibility of other factors such as natural maturity or the passage of time to account for the observed changes in each study, increasing their internal validity as a whole.

D'Ateno, Mangiapanello, & Taylor (2003) completed a multiple baseline study across response categories with one child (3;8 years) attending a centre-based education group for children with autism. The participant was described in a limited way for the purposes of this study. The number of scripted and unscripted verbal statements and the number of modeled and not-modeled motor responses were measured across three pretend play sequences to determine the effectiveness of the video modeling intervention being introduced to the child. Experimental control was achieved via the multiple baseline approach to ensure the intervention caused observed changes in the participant. Baseline and intervention sessions took place, with criteria for introducing the next treatment condition established. Acceptable inter-observer reliability was reported based on the agreement measures calculated for both motor and verbal responses (mean agreement for all categories $\geq$95%).

Visual analysis revealed that stable baselines were obtained for each play sequence. The study was completed over 38 sessions for the tea party, 37 sessions for the shopping sequence and 38 sessions for the baking sequence. The video modeling intervention was introduced on sessions 6, 13, and 26, accordingly. The video modeling intervention was clearly associated with an increase in modeled motor responses and scripted verbal responses in each play sequence, as shown in the well-labelled graphs provided in the paper. However, the video modeling intervention produced little increase in the number of unscripted verbal responses and un-modeled motor responses in all play sets.

There were 3 limitations of this study identified by D'Ateno et al. (2003). First, novel responses were not observed consistently during the intervention, which the authors suggest could be due to the stringent definitions implemented of what was able to be scored as a novel response. Second, the use of only one video vignette for each play sequence was suggested to reduce novel responding in the participant. Third, data collection procedures were not sensitive to detecting repetitive patterns of behaviour in the participant. As children with ASD often exhibit repetitive patterns of behaviour in play scenarios, this flaw in the data collection procedure may have compromised the results of this study to be more favourable than they truly are.

The results of this study demonstrated that video modeling led to rapid acquisition of both verbal and motor responses for all play sequences taught to the participant, without any reinforcement contingencies in place. It was concluded that video modeling as a treatment technique to increase play skills was effective in this child. Although this study did not demonstrate that the video modeling intervention produced many novel responses from the participant, it has substantial strengths in its design and analysis of results. Therefore, it provides a suggestive level of evidence for the use of video modeling to teach relatively long sequences of verbal and motor responses within a pretend play scenario to a young child with ASD.

MacDonald, Clark, Garrigan & Vangala (2005) extended the D'Ateno et al. (2003) study utilizing a very similar design to evaluate the effectiveness of a video modeling intervention to teach thematic pretend play skills using toy sets that had figurines and objects to two preschool children with ASD. This study used a multiple baseline approach within child across play sets to establish experimental control. Both participants were well described, and consisted of two children (ages 4 and 7) with ASD enrolled in an intensive behavioral preschool program. The participants were known to

have previous experience with video modeling teaching procedures in other domains. Scripted verbalizations and play actions were measured across three play sets to assess the efficacy of the video modeling intervention. In this study, specific play scripts were developed for each set of play materials, which required the child to hold and speak for each character in the set.

The MacDonald et al. study consisted of baseline sessions followed by training sessions, which continued until the participants reached mastery criterion of 80% on all actions and verbalizations. Mastery probes were then conducted without the video, and when the child demonstrated 80% accuracy on these probes, training began on the next play set. Follow-up probes were also implemented identical to baseline sessions on any of the previously mastered scripts.

Visual inspection was used to analyze the results. A steady baseline for each play set was obtained, where both boys only demonstrated 0-3 verbalizations or play actions per play set. When the video model was introduced during the intervention phase, each participant's verbalizations and play actions rapidly increased. These levels of acquisition for scripted verbalizations and actions were also generally maintained during follow-up probes for both participants, with one participant needing only one additional training session to return to the mastery criterion level during follow-up probes for two play sets. It was concluded that video modeling was an effective intervention in this study by producing extended sequences of scripted play for both children who did not exhibit these kinds of play skills prior to intervention.

This study demonstrated reliability with strong inter-rater agreement based on the mean agreement measures for play actions and verbalizations between observers (mean agreement for all categories $\geq$90%). The study's multiple baseline design also helped to demonstrate experimental control of the children's behaviour during the study. Additionally, a unique aspect of this study is the development of play scripts, which were based upon the authors observing typically developing children playing with the three commercially available play sets used with the participants, thereby increasing the study's content validity. A limitation in this study does exist, similar to the previous paper completed by D'Ateno et al. (2003): unscripted play did not emerge in the participants during the video modeling intervention. However, the level of evidence for this study was compelling due to the nature of the complexity of the scripted play actions and verbalizations required by the participants. In this study, the use of figurines in the play sequences that were taught required the participants to engage in more complex social behaviour, which the authors suggest relates to the skill of perspective-taking, a deficit that many children with autism have. In comparison to the D'Ateno et al. study in which the participants acted on play objects directly, this research implies that a higher level of pretend play can be taught to children with ASD using video modeling with figurines.

Hine & Wolery (2006) examined the impact of point-of-view video modeling in the acquisition and maintenance of modeled toy actions in two preschool girls with ASD. The authors utilized a multiple baseline design across two behaviours and two participants to evaluate the effectiveness of the point-of-view video modeling approach. The participants were described in detail, including descriptions of their typical play behaviours obtained from teacher reports. Sensory bin activities were used as the focus of this study, which can be described as a container filled with material aimed to stimulate the various senses (i.e. sand or soil). Sensory activities were used as the focus of this study as both children participated in these activities regularly in the classroom, and also allowed the girls to appear more like their typically developing peers.

Intervention for both target behaviours (gardening task and cooking task) consisted of three phases including a baseline phase, a treatment phase, and a posttreatment maintenance phase that both children participated in. Separate videos for each target behaviour showing adult hands manipulating the sensory material while performing the actions with the toys were shown to the participants during the treatment phase. For each child, data was also collected during baseline probes, daily treatment probes, daily treatment practice sessions, and posttreatment maintenance probes. The treatment procedure was modified for one participant beginning in the eighth session of the treatment phase during the cooking task due to her satiation with the materials, which included novel material and specific reinforcement. Setting and material generalization probes were also conducted at least once during the baseline and maintenance conditions to determine if the participants could maintain their acquired skills in different settings and with novel stimuli.

The study's design helped to achieve experimental control of the children's behaviour during the intervention using a multiple baseline approach. To determine the validity of the video modeling intervention, 20 graduate students were randomly assigned to view four video clips and directed to rate the videos of the pretraining and posttraining sessions from the intervention. They also completed a social validity assessment by filling out a questionnaire containing 5

items for each segment they viewed to rate the following: child's engagement, manipulation of materials, enjoyment of the activity, appropriate use of materials, and need for help on a Likert scale from 1-5. The raters were blind to whether the video was from before or after implementation of the video modeling intervention. Inter-observer agreement was highly reliable at 97.7% for the gardening task and 100% for the cooking task. A procedural fidelity checklist was also implemented to assess whether all intervention sessions were being executed according to protocol, and results of this showed that all protocols were followed with 95% accuracy.

Results of the social validity assessment indicated that the raters viewed the treatment as being socially valid in nature. The results of this study indicated an overall increase in the acquisition of modeled toy actions in the behaviour sets without specific reinforcement for performing the target actions or receiving any instructions on how to interact with the materials. For the one participant, the addition of reinforcement during practice sessions was necessary to acquire the actions of one of the behaviour sets. The skills acquired during this intervention were also generalized to untrained materials for both tasks (gardening and cooking), and to the classroom for one of the tasks (gardening).

It was concluded that point-of-view video modeling was an effective tool to teach specific actions on toys/sensory materials to the two participants with ASD. However, there were some limitations within this research. For instance, the video modeling intervention may not be sufficient in promoting skill acquisition in some cases, as one participant required verbal instructions to imitate the video as well as needed contingent reinforcement. In addition, a high number of probes were used in this study, thereby leading to an increased treatment time and possible contributions to satiation of the materials by the participants due to the extremely repetitive nature of this study's design. Lastly, limited measures of generalization were employed, specifically for generalization to the classroom environment, which had many other stimulating activities available to the participants.

Despite its limitations, this study provides a suggestive level of evidence for the acquisition of toy-play actions using point-of-view video modeling with preschoolers with ASD.

Boudreau & D'Entremont (2010) taught two preschool boys (age 4) scripted verbalizations and modeled actions for particular play sets using a multiple baseline design across participants. The study's design also helped to demonstrate experimental control of the children's behaviour by staggering the beginning of the intervention for the boys to show the measured behaviour changes were a result of the intervention itself and not the passage of time. Both participants were enrolled in an intervention agency offering individualized programming for preschoolers with ASD. The participants were described in great detail. Toys were chosen for the participants as a result of consultations with each child's parent and clinical supervisor at the intervention agency, also taking into account their interests and ability levels. Therefore, two different videos were created (one for each participant). Each child participated in four phases of the study: baseline, video modeling, generalization, and maintenance. Unlike other studies, reinforcement for performing the modeled actions and scripted verbalizations was employed in this study during the video modeling phase for each child. The study was conducted over 22 sessions for Child 1 and 25 sessions for Child 2, with video modeling beginning on sessions 5 and 8, respectively. Short-term maintenance was assessed over 4 sessions following the generalization phase, and long-term maintenance was assessed over a single session 4 weeks after the intervention was completed. Treatment fidelity was assessed using a protocol form to indicate technical difficulties during the intervention. A parent satisfaction form was also provided upon completion of the intervention that the author had previously created for past research purposes.

Visual inspection was used to analyze the results. Steady baselines were obtained over 4 sessions for Child 1 and 7 sessions for Child 2. When the video modeling intervention was introduced, each participant's modeled actions and scripted verbalizations rapidly increased. Maintenance results varied, as short-term maintenance of modeled actions and scripted verbalizations were achieved for both children, but long-term maintenance was successful for only one child. It was concluded that the video modeling intervention was successful in teaching both participants scripted verbalizations and modeled actions with their individual play sets. Generalization sessions were also successful in teaching the boys to use modeled actions and scripted verbalizations with unfamiliar stimuli and in new settings, and their number of unmodeled actions and unscripted verbalizations increased in this phase. The authors note that reinforcement sessions could have stifled the participants' inclination to respond in a novel way to the stimuli.

Parent satisfaction forms also indicated that families of both boys were satisfied with the intervention. Acceptable interrater agreement calculated using

intraclass correlations (ICCs) ($p<0.01$ and $p<0.001$) was reported for both participants with the exception of Child 2's unscripted verbalizations (0.08, non-significant). There are, however, several limitations. First, as with all of the research being reviewed, the small sample size of this study prevents the conclusions from this study to be strengthened further. Additionally, although sessions were coded blind and in random order, the first author was the primary coder and was not blind to the purpose of the study, which could increase bias. Finally, Child 2's unscripted verbalizations were coded jointly between both coders due to issues achieving reliability in determining the participant's responses. These results are suggested to be interpreted with caution.

Overall, conclusions drawn from the Bourdreau & D'Entremont paper provide compelling evidence of the effectiveness of video modeling to teach pretend play skills to children with ASD, which have the potential to be both generalizable and maintainable over time.

Dupere, MacDonald, & Ahearn (2013) used three play sets to teach three children with ASD (5-6 yrs) pretend play skills with trained and untrained characters using a video modeling intervention with substitutable loops. A substitutable loop is as an element in the play script that can be used with different characters to promote generalization to different play stimuli. A multiple baseline design was employed across play sets to assess the effectiveness of the video modeling intervention. The participants had received 6 to 36 months of early intensive behaviour intervention that included a video modeling component to teach social skills at the time of the study. Each child underwent baseline, video modeling, and posttraining sessions (identical to baseline). Each of the three play sets had three corresponding videos, each showing a different character engaging in the vocalizations and actions to make up the substitutable loop. The play sets were taught in the same order for each participant.

Baselines were well established for each participant with both boys demonstrating low levels of scripted actions and scripted vocalizations during these sessions. After the video modeling intervention was introduced, each child was able to master the script for each play set and maintained scripted actions and vocalizations during posttraining sessions, in both the training and generalization settings. Each child varied in the amount of intervention sessions needed to master the play script (i.e. Child 1 and 3 mastered the boat and zoo scripts in 5 sessions, whereas Child 2 mastered the boat script in 10 sessions). The use of the substitutable loop for each play set using trained and untrained characters produced varied results with the participants, with some children incorporating untrained characters into their play in some play sets but not others, or only incorporating them in rare occasions. It was concluded that this study provided further evidence that video modeling is an effective intervention tool to use in pretend play settings to teach children scripted actions and vocalizations, and that substitutable loops could potentially increase children's use of untrained characters into their play.

The Dupere et al. study has strength in its inter-observer reliability reported based on calculations of two independent observers (mean agreement for all categories $\geq$94%). The study's multiple baseline design also helped to demonstrate experimental control of the children's responses as a result of the video modeling intervention. In addition, adequate detail regarding response measurement was included which allows future replication of the study to be easier. Also, this study provides a unique research approach on the addition of substitutable loops to a standard video modeling intervention in efforts to promote variation in children's play.

Limitations, however, do exist in this paper. A limitation of this study includes that features of the individual play scripts may have accounted for differences observed across play sets. For example, the substitutable loop used for the train set was longer and more complex than for the other sets, possibly explaining why some of the children showed preference in using more characters when playing with the other sets. Additionally, the loops may have become less salient over time due to the play sets being taught in the same order for each child. Finally, measurements of unscripted toy behaviours were not taken in this study, which could have excluded relevant play behaviour from being reported. The researchers offered suggestions for future research to include both qualitative and quantitative features of play. Due to the number of aforementioned limitations, this study provides foundational evidence that substitutable loops could be beneficial additions to video modeling interventions targeting pretend play behaviours. Overall, this study represents a suggestive level of evidence that should be replicated to address the limitations mentioned.

Discussion

Video modeling, although a relatively new intervention tool, is used to teach play skills to children with ASD as it provides exemplars of appropriate verbalizations and actions relevant to independent pretend play scenarios. This paper reviewed 5 single subject, multiple baseline studies to determine if video modeling was an effective intervention in promoting pretend play skills in children

with autism. In interpreting the results of single subject designs, it is important to consider the small sample sizes of the studies reviewed, which tends to decrease the overall external validity of the research and its ability to be generalized to the general population. Despite this limitation presented by the nature of single subject designs, it is also noted that strong descriptions of the participants in this type of research can assist future clinicians or other professionals select similar children that may benefit from this intervention in the future.

All five studies had several shared strengths. First and foremost, every study reported positive results in their findings. All participants demonstrated an overall marked increase in scripted verbalizations and/or modeled actions from baseline to intervention. It was determined that the articles demonstrated a variety of levels of evidence for implementing video modeling to teach pretend play skills to children with ASD, ranging from foundational to compelling evidence. Additionally, each study utilized a single subject design, which was determined to be appropriate and effective for this research question and the population selected to receive the intervention. As previously mentioned, this type of design considers the different presentation and severity level of an individual with autism by using each participant as his/her own control subject. In using a single subject design coupled with multiple baselines, these articles also provide solid evidence that the outcomes of each study were likely due to the implementation of the intervention. Furthermore, each study reported acceptable interrater reliability of dependent measures based on scored data of 2 or more independent observers.

The gathered evidence therefore suggests that video modeling interventions could be used to teach scripted verbalizations and/or actions in independent pretend play scenarios. Nonetheless, it is important to consider the limitations discussed above when deciding what type of video modeling intervention to implement, and what other factors to consider adding to the treatment (i.e. substitutable loops, direct reinforcement).

Conclusion

Video modeling is an effective tool for teaching young children with autism pretend play skills, ranging from simple modeled toy-actions to complex play sequences involving verbalizations and motor actions. Results indicate that these taught actions/verbalizations could be maintained post-therapy as well, and have the potential to be generalized to other settings and with varied toy sets. Spontaneous novel play, however, was not found to be a consistent result of these video-modeling interventions.

Overall, the conclusion of this review is that video modeling interventions are an effective approach to teach specific scripted and modeled verbalizations and actions to children with ASD for use in pretend play scenarios.

Clinical Implications

Video modeling has the potential to be an appropriate intervention that can be incorporated into therapy implemented by speech language pathologists (SLPs) to further promote the development of independent pretend play skills in young children with autism. The nature of video modeling lends itself well to the SLP being able to individualize intervention for individuals with ASD and use this intervention in a variety of modalities, including one-on-one consultative services (Wilson, 2013). Indeed, based on the current literature surrounding video modeling, it has been suggested as a promising intervention for addressing many goals within the SLP's scope of practice, including individual play (Wilson, 2013). Nevertheless, due to the heterogeneity of this population, SLPs should ensure that the child with ASD meets the appropriate requirements for this type of intervention (i.e. adequate verbal skills, ability to imitate).

However, some caution should be noted for SLPs planning to include video modeling in an intervention plan based upon the previously mentioned limitations of some of the studies reviewed, including:

a) more evidence is needed to determine what factors could contribute to the success of video modeling in promoting spontaneous novel play behaviour in children with ASD;

b) more evidence is needed surrounding the use of substitutable loops embedded in the traditional video modeling procedure.

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