USING VISUAL ACTIVITY SCHEDULES EMBEDDED WITH VIDEO MODELS TO INCREASE SOCIAL INTERACTION IN CHILDREN WITH AUTISM

By

Kelsey Hetherington

A THESIS

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

Applied Behavior Analysis – Master of Arts

2025

ABSTRACT

Individuals with Autism Spectrum Disorder (ASD) often struggle with social interaction and communication, limiting their ability to form relationships and engage in meaningful exchanges. Activity schedules provide structured visual supports that promotes independence and social engagement. While research supports their effectiveness, few studies have examined the integration of video modeling within these schedules to enhance social interactions. This study evaluated the effectiveness of embedding video models into activity schedules to increase social interactions to children with ASD using a multiple probe across participants design in an Early Intensive Behavioral Intervention (EIBI) clinic. Results showed Noah demonstrated an increase in independently performed social interaction components, improving from 0 (range 0–0) at baseline to an average of 4 (range 0–6) during intervention. Morgan showed no change, maintaining 0 (range 0–0) throughout all phases. These findings suggest video modeling may facilitate social skill acquisition for some but not all learners. Future research should explore individual learner characteristics, long-term effectiveness, and generalizability.

Keywords: photo activity schedules, social interaction, autism, video modeling

TABLE OF CONTENTS

INTRODUCTION

Autism Spectrum Disorder (ASD) is a neurodevelopmental condition characterized by challenges in social communication and interaction (American Psychological Association [APA], 2023). Children and adolescents diagnosed with ASD often experience difficulties in navigating social interactions and engaging in age-appropriate activities (APA, 2023). Without appropriate intervention, these core deficits are likely to persist and may worsen over time (Osos et al., 2021). Numerous interventions have been developed to teach new skills to children with ASD, aiming to address these challenges and enhance overall functioning (Osos et al., 2021; Wichnick-Gillis et al., 2016; Brodhead et al., 2014; Betz et al., 2008; Bellini & Akullian, 2007).

In recent years, there has been an increased focus on the development of effective interventions that support individuals with ASD in acquiring critical social and adaptive skills. Researchers and practitioners have explored various strategies aimed at addressing these challenges while fostering meaningful social engagement and skill development. Teaching social skills to individuals with ASD is essential not only for their social and emotional growth but also for their ability to integrate into broader social, academic, and community settings (Osos et al., 2021). Early intervention focused on social skill development enhances communication abilities, which in turn helps individuals express their needs, thoughts, and emotions, while also promoting relationship-building (McClannahan & Krantz, 2010). Improved social skills contribute to a better quality of life, facilitating greater participation in social activities, increasing independence, and reducing social anxiety (McClannahan & Krantz, 2010).

Among the various evidence-based interventions, activity schedules (Bryan et al., 2000; Betz et al., 2008; Carlile et al., 2013; Brodhead et al., 2018) and video modeling techniques (Bellini & Akullian, 2007; Plavnick et al., 2015; Osos et al., 2021) have emerged as promising approaches for promoting social engagement, communication, and adaptive behaviors in children and adolescents with ASD. Both activity schedules and video modeling provide structured, visually supported frameworks for teaching new skills and facilitating social interactions (Betz et al., 2008; Carlile et al., 2013; Osos et al., 2021). Meta-analytic studies have examined the effectiveness of these interventions, contributing to a growing body of literature that underscores their potential benefits (Bellini & Akullian, 2007; Plavnick et al., 2015).

Activity Schedules

Activity schedules are evidence-based practices that can be implemented in various formats and adaptations. These schedules serve as written or visual supports designed to help learners' complete tasks independently, engage in social interactions, and promote on-task behavior (Bryan et al., 2000; McClannahan & Krantz, 2010). Formats for activity schedules include written or typed lists, binders with individual pages containing pictures or words representing activities, audio-taped schedules, or video modeling schedules (McClannahan & Krantz, 2010). Each schedule incorporates different textual cues, such as pictures, symbols, sound cues, or video prompts, to function as a discriminative stimulus for the sequence of behaviors necessary to complete an activity (Osos et al., 2021).

Research has demonstrated that activity schedules are effective in enhancing on-task behavior (Bryan et al., 2000), improving on-schedule behavior (Bryan et al., 2000), and promoting independence in children with autism (Bryan et al., 2000; Osos et al., 2021). They have been successfully used to teach routines, leisure skills (Carlile et al., 2013), facilitate varied applications (Brodhead et al., 2018), and encourage peer engagement (Betz et al., 2008).

Additionally, activity schedules have been shown to support social interaction among children with ASD (Betz et al., 2008; Wichnick-Gillis et al., 2016; Osos et al., 2021). For example, Betz et al. (2008) explored the use of joint activity schedules to foster engagement between students with autism during interactive play. Unlike traditional activity schedules, joint activity schedules require two participants to follow different, yet synchronized schedules. This method was shown to increase peer engagement and the number of games completed for two out of three pairs of participants, with skills maintained during generalization (Betz et al., 2008).

In another study, Wichnick-Gillis et al. (2016) incorporated scripts into photographic activity schedules to teach young children with autism key social interaction skills. Using a script-fading procedure (Brown et al., 2008), the study focused on teaching students how to approach peers, initiate conversations, orient to speakers, wait while others spoke, and respond reciprocally. The results indicated that embedding social interaction cues within the natural environment—through visual supports and prompts—enhanced the success of teaching these skills. Additionally, script fading was found to be effective in transferring these learned behaviors to real-world social settings (Wichnick-Gillis et al., 2016).

Video Modeling

Video modeling is another effective tool for teaching social behavior to children with ASD (Bellini & Akullian, 2007). Video modeling involves the learner watching a video that demonstrates the target behavior and then having the opportunity to perform the behavior themselves (Osos et al., 2021). Bellini and Akullian (2007) conducted a meta-analysis synthesizing findings from multiple studies on video modeling and self-modeling interventions for children and adolescents with ASD, highlighting significant improvements in various domains, including social skills. Osos et al. (2021) further noted that video modeling offers several advantages in educational settings, such as fostering creativity, ensuring consistency, and, in some cases, promoting generalized skills.

Technological advancements have also led to the integration of mobile devices in video modeling and activity schedules. Carlile et al. (2013) explored the use of iPod Touch devices to implement activity schedules for teaching leisure skills to children with ASD. Their findings demonstrated the feasibility and effectiveness of using technology-based interventions to promote skill acquisition and engagement, emphasizing the potential of mobile devices as portable and personalized tools for intervention.

The rise of technology also facilitated the development of technology-based activity schedules (Plavnick et al., 2015; Osos et al., 2021), which incorporate digital elements such as pictures, text, and video clips to aid in task completion. These schedules have been shown to increase independent engagement in leisure activities in classroom settings (Carlile et al., 2013).

Osos et al. (2021) examined the use of tablet technology and video-enhanced activity schedules to promote social interactions in children with ASD. Their study found that video-enhanced schedules were effective in teaching preschoolers to self-initiate social interactions with peers when combined with least-to-most prompting. In this study, Osos et al. (2021) sought to determine whether integrating video modeling into activity schedules would accelerate the acquisition and generalization of social skills compared to using static images alone. The study involved four participants, all diagnosed with ASD, who were enrolled in an early intensive behavioral intervention (EIBI) program. The researchers employed electronic activity schedules created using Apple Keynote applications (Brodhead et al., 2018; Osos et al., 2021), with an alternating treatment design to compare the effects of video-enhanced schedules versus electronic schedules featuring static images (Osos et al., 2021).

The electronic activity schedule in the study featured pre-determined slides with static images on a light blue background, whereas the video-enhanced schedule used video models as visual prompts on a red background (Osos et al., 2021). Osos et al. (2021) assessed five conditions: baseline, activity schedule probe, electronic activity schedule, video-enhanced activity schedule, and transfer of training. Results indicated that video-enhanced activity schedules, when paired with video modeling, significantly improved social interactions in children with ASD. While electronic schedules alone benefited some participants, video modeling was found to be particularly effective in teaching children to initiate social interactions (Osos et al., 2021).

Despite these positive outcomes, Osos et al. (2021) acknowledged limitations, including the small sample size, variability in participant outcomes, and the lack of improvements in social competence. To address these issues, they recommended increasing ecological validity by teaching varied social skills across multiple contexts. The current study seeks to extend these findings by targeting three different types of social interactions, rather than just one. Rather than focusing on teaching isolated social skills, this study emphasizes increasing the occurrence and variety of social interactions among young children with ASD. By expanding on the work of Osos et al. (2021), this study aims to contribute to ongoing efforts to refine the effectiveness and applicability of video modeling paired with activity schedules in increasing social interactions in children with ASD.

The primary research question guiding this study is: To what extent does video modeling embedded in photo-based activity schedules increase social interactions among young children with ASD?

METHOD

Participants

Participants included two individuals with a medical diagnosis of ASD. Participants were recruited through the help of a Board-Certified Behavior Analyst (BCBA) and staff at a university-based early intensive behavioral intervention (EIBI) clinic for children with ASD. Two additional participants were initially enrolled in the study but were removed by the experimenter due to engaging in behaviors that interfered with conducting research session. Participants had a mean age of three and a half, and ages ranged from three to four. All participants attended an EIBI clinic where they received 30 hours of applied behavior analysis (ABA) therapy weekly.

All participants met a series of inclusion criteria: (a) had previous imitation skills, (b) ability to follow a three-to-four-page activity schedule, (c) ability to follow a video model and (d) had a form of functional communication modality in English (verbal, Picture Exchange Communication, AAC device, etc.).

Consent was obtained from all participant’s caregivers. To protect the privacy of participants, they will be given alias names.

Participant 1 was Noah, a three-year-old male diagnosed with ASD. Based on his most recent Verbal Behavior Milestones Assessment and Placement Program (VB-MAPP) assessment, he achieved a total score of 131. His strongest skill areas included manding, tacting, play, social skills, and listener responding.

Participant 2 was Morgan, a four-year-old female diagnosed with ASD. According to her most recent VB-MAPP assessment, she obtained a total score of 63. Her highest-performing areas were reading, math, and play.

Participant 3 was Michael, a four-year-old boy diagnosed with ASD. Michael was withdrawn from the study due to the emergence of behaviors that suggested he was distressed upon seeing the video camera. When the camera was directed toward him, Michael would immediately begin to cry, scream, and drop to the floor. These behaviors occurred reliably during baseline, which led the researchers withdrawing Michael from the study.

Participant 4 was Mara, a four-year-old girl also diagnosed with ASD. Mara was withdrawn from the study due to engaging in screaming, crying, and hitting her behavior technician when corrected for an error in completing the activity schedule. These behaviors occurred reliably during baseline sessions which led to the researchers withdrawing Mara from the research study.

Setting and Materials

This study was conducted in a classroom within an Early Intensive Behavioral Intervention (EIBI) clinic housed in a public-school building. The classroom supported eight children diagnosed with ASD, each receiving one-on-one instruction from one of eight behavior technicians (BTs) under the supervision of a Board-Certified Behavior Analyst (BCBA). BTs were assigned to work with one child for half the day and a different child for the second half.

The classroom environment was structured to promote individualized learning and engagement. It featured an open play area, a reading corner, two large group tables, a bookshelf, and a dedicated shelf for activity schedule materials. Each child and their assigned BT had a designated learning area equipped with a table, two chairs, and a three-tier cart containing program materials and reinforcers. This setup ensured accessibility to necessary resources while facilitating structured instruction.

A handheld camera was used to record each session for later analysis of treatment fidelity and reliability. Additionally, the researcher collected real-time data using a self-constructed datasheet and a writing utensil. The Photo Activity Schedule (PAS) datasheet (Appendix C) was used to track participants' progression through their activity schedules and video modeling tasks. The PAS recorded specific behaviors such as opening or turning pages, looking, or pointing, obtaining items, completing activities, and putting materials away. Additionally, social interaction components, including approaching a partner, orienting the body, emitting responses, and ending interactions, were documented and scored.

Each session began with a preference assessment to identify motivating reinforcers for participants, which varied between edible and tangible items. Discrete trial activities incorporated into the study included a ring stacker, shape sorter, puzzles (ranging from four to twelve pieces), sorting bears, and stringing beads. These materials were stored on a designated shelf in the classroom for easy access.

Activity Schedule

The electronic activity schedules used in this study were created on an Apple® iPad, with individual slides designed using Microsoft PowerPoint. Each slide featured a white background to maintain a consistent and visually clear format. The first slide of the activity schedule displayed the participant's name in black text, ensuring personalization and ease of identification. Participants could navigate through the schedule using an arrow located in the bottom right corner of each slide. Upon advancing to the next slide, either a discrete trial activity or a social interaction with a peer would be presented in video format against the white background. The specific activities included in the schedule were selected using a random number generator, where each discrete trial activity was assigned a number between one and five. The researcher used an online random number generator to determine which activity would be included on a given slide.

Additionally, video models were incorporated into the activity schedules to demonstrate target behaviors. These video models were created using Microsoft PowerPoint and consisted of slides displaying the participant's name, two leisure activities (see Table 1.1 for definitions), and a corresponding video model. Each slide featured a white background with black text at the top indicating the activity. For example, a slide labeled "Puzzle" would include the activity name at the top, followed by an image of the puzzle beneath it. This structured and visually supported format ensured clarity and ease of use for participants while reinforcing the learning objectives of the study.

Table 1: Lesisure Activities for Data Collection.

Activity	**Definition/ Description**
Ring Stacker	Recommended age: 12 months and older. White, long, plastic center piece that five colorful (red, orange, yellow, green, blue) rings that are placed on by size (largest to smallest). Individuals are expected to take the rings and stack them in size order.

Table 1 (cont'd)

Shape Sorter	Recommended age: 18 months and older. Rectangle shaped box with removeable lid. Built into the lid are five different shape cut outs (triangle, square, circle, star, cross). The individual sorts, stacks, and drops shapes through the shape-sorter lid. Individuals are expected to take the shape and sort them into the corresponding shape.
Puzzles (4 to 12 pieces)	Recommended age: two and up. Individuals are expected to obtain the puzzle from activity schedule shelf, take the pieces off the puzzles, place the pieces in the correct spots on the puzzle board, continue putting pieces on until they are all on, put the completed puzzle back on the shelf, and walk back to table.

Table 1 (cont'd)

Sorting Bears	Recommended age: 6 months- 3 years old. Six cups in distinct colors (red, orange, yellow, green, blue, purple) that come with up to ten bears in the same colors as the cups. Individuals are expected to take the bears provided and sort them into the coordinating/matching color cup.
Stringing Beads	Recommended age: 1 to 3 years old. Colorful beads (red, orange, yellow, green, blue purple) in varying shapes (circle, square, hexagon) that have holes at either end. Individuals are expected to take the beads and put them on the string through the two holes.

Video Models

The video models for the activity schedule were recorded on an Apple® iPad using the camera application, with each video averaging seven seconds in length. All recordings took place in an empty classroom within the EIBI clinic attended by all participants. To maintain consistency and clarity, the researcher ensured minimal background noise, eliminated potential distractions, and verified that the video quality was appropriate for instructional use. The controlled environment helped standardize the videos, ensuring participants could focus on the modeled behaviors without external interference.

Each video model for a social interaction depicted the researcher approaching a peer, emitting a request for attention, engaging in the action, and concluding the interaction. The social interaction served as the thumbnail image displayed on the slide, providing a visual cue for the participant. For example, if the target social interaction was a high five, the thumbnail captured a still frame of the researcher and a social partner at the exact moment their hands met. When the participant pressed the play button, the video demonstrated the full sequence of events, showing the researcher locating the social partner and engaging in the designated interaction.

The video models for social interactions varied across different actions, including giving a fist bump, requesting a tangible item from a peer, and greeting a social partner. These interactions were carefully selected to promote fundamental social skills essential for peer engagement. The use of short, structured video models provided clear, repeatable demonstrations of the target behaviors, reinforcing learning and facilitating skill acquisition among participants.

Dependent Measures

Dependent Variables

The primary dependent variable in this study was the number of independently performed social interaction components while using a photo activity schedule embedded with video models. Social interactions were operationally defined as reciprocal exchanges between at least two peers, including giving a fist bump, greeting a peer (e.g., saying "hello" or waving), or requesting a tangible item from a peer.

To ensure objective measurement, social interaction components were broken down into four distinct, measurable components: : (1) approach partner, (2) orienting body toward partner, (3) emitting request and (4) ending the interaction. Participants received a correct score when they completed all components independently. If prompting was required or an error occurred, the response was scored as incorrect.

A structured scoring system was used to evaluate each component of the social interaction, with scores ranging from 0 to 4 per video model. A score of 0 indicated the component was missing or not completed, while a score of 4 reflected that the component was fully met and executed correctly. At the end of each session, the researcher calculated a total score by summing the number of components the participant performed independently. The total possible score increased with the number of video models shown, as each model was scored individually on the 0–4 scale. For example, if one video model was presented, the total score ranged from 0 to 4; with two models, the range was 0 to 8; and with three models, the range extended to 0 to 12. Table 2 outlines the operational definitions for each social interaction component.

Table 2: Operational Definitions of Social Skills.

Term	**Operational Definition**
Fist Bump	Approach a peer, orient body toward social partner, use a closed hand fist and reach arm toward partner to lightly hit against the social partner close hand fist then end the interaction (saying a variation of bye, see you later, high fiving, etc.)

Table 2 (cont'd)

Asking for a Tangible Item	Approach peer, oriented body towards the social partner, emit the request for attention (Communication modality, or vocal language to ask for tangible item), and say something to end the interaction (say thank you, high fiving, saying bye etc.).
Greeting a Peer	Approach peer, oriented body towards the social partner, emit the request for attention (waving or communication modality or vocal language to say a variation of hi) and something to end the interaction (saying a variation of bye, high fiving, etc.).

Interobserver Agreement

To assess the reliability of data collection, interobserver agreement (IOA) was measured for 33% of sessions across all conditions and participants. IOA was calculated using a point-by-point agreement method, with an agreement defined as both observers assigning identical scores across all components. The IOA percentage was computed by dividing the number of agreements by the total number of agreements plus disagreements, then multiplying by 100.

Prior to formal data collection, the secondary observer completed training that included a PowerPoint presentation outlining the study overview, operational definitions, data sheet procedures, and scoring criteria. Training also included guided practice with pre-recorded video samples, followed by independent scoring of additional videos to ensure consistency and accuracy.

All IOA data were collected via video recordings of study sessions to maintain standardization and allow for detailed review. If IOA for any session fell below 80%, the primary researcher reviewed discrepancies with the observer and recalibrated the scoring procedures before continuing further data collection.

IOA data were collected across all phases of the study. For Participant 1, IOA was 100% during baseline, and intervention, indicating perfect agreement between observers throughout. Similarly, for Participant 2, IOA remained at 100% during both baseline and intervention phases. These consistently high IOA scores reflect strong procedural fidelity and high observer accuracy, supporting the internal validity of the study and the reliability of the recorded data.

Experimental Design

A multiple probe across participants design was employed for this study (Ledford & Gast, 2018; Osos et al., 2021). This design allowed for the evaluation of the effects of video models embedded within an activity schedule on participants' social interaction components while maintaining experimental control. By staggering the introduction of the intervention across participants, the design helped control demonstration effects and ensured that changes in behavior could be attributed to the intervention rather than external factors (Ledford & Gast, 2018).

The order in which participants received baseline and intervention conditions was determined based on the stability of their baseline performance. A multiple probe design, rather than a traditional multiple baseline design, was selected because participants were expected to demonstrate zero or low levels of target behaviors prior to the intervention. It was anticipated that participants would only be able to effectively use the photo activity schedule with embedded video models once explicit instruction was provided. Additionally, by reducing the number of sessions, this design helped minimize the potential for frustration and problem behaviors that could arise from repeated unsuccessful attempts at completing tasks independently.

Procedures

Baseline

The purpose of the baseline condition was to assess participants' current skill levels independently following an activity schedule and engaging in social interaction components. Each session began with the researcher sitting near the participant and conducting a brief Multiple Stimulus Without Replacement (MSWO) preference assessment. This assessment involved placing five items in front of the participant and allowing them to select one as a reinforcer.

Once the reinforcer was identified, the researcher initiated the session by approaching the participant in their designated learning area. The iPad containing the activity schedule was placed in front of the participant. The researcher then provided the vocal instruction, “Follow your schedule.” After delivering this initial instruction, the researcher moved approximately four feet away to allow the participant to complete the activity schedule independently.

The activity schedule used during the baseline phase did not include video models; instead, it contained only static images. The thumbnails for social interactions were presented as static pictures, and each activity schedule consisted of two discrete trial activities and one static image representing a social interaction with a peer. These variables remained consistent across all baseline sessions to establish a clear comparison with the intervention phase and determine a functional relationship between conditions.

Participants were expected to complete the entire activity schedule, progressing through all pages independently. A session was terminated if the participant failed to initiate the first scheduled activity within 10 to 15 seconds of the instruction or if they disengaged from the schedule for 10 to 15 seconds. No additional prompts, reinforcements, or corrective feedback were provided during baseline to accurately measure the participants' independent performance levels.

Throughout the session, the researcher recorded data using a datasheet (Appendix C) while maintaining four feet from the participant. The same datasheet was used across all conditions to ensure consistency. The researcher documented performance by marking a (+) for correctly completed steps and a (-) for incorrect or skipped steps. If a participant made an error, no prompts or corrections were provided.

All baseline sessions were recorded using a handheld camera to ensure accurate data collection and allow for later review.

Intervention

Intervention sessions were identical to baseline sessions in structure, location, and procedures—with one key modification: video models were embedded in place of static images for the social interaction slides. Discrete trial activity pages remained unchanged and continued to use static images. The intervention aimed to increase the number of social interaction components completed by incorporating short video clips demonstrating specific behaviors, such as giving a fist bump, requesting a tangible item, or greeting a peer (e.g., waving or saying "hello").

The activity schedules, created using Microsoft PowerPoint and presented on an iPad, consisted of four to six slides. Each participant began with one social interaction video, which was systematically, by one video, increased as mastery criteria were met.

As in baseline, each session began with the instruction, “Follow your schedule,” and the researcher stepped four feet away to allow for independent responding. The researcher recorded data using a task analysis sheet, marking a (+) for independent responses and a (−) for incorrect or prompted steps.

If the participant failed to initiate the activity within 5 to 10 seconds or showed signs of disengagement during the session, a gestural prompting protocol was introduced as needed. Gestural prompts involved using a pointed finger to draw the participant’s attention—starting from the participant’s eyes and moving toward the tablet to redirect their focus. Importantly, prompts were used solely to support attending to the tablet and were not intended to guide or correct schedule completion behavior. Mastery was defined as completing 100% of steps independently for two consecutive sessions.

Sessions were terminated if the participant exhibited distress (e.g., crying, yelling, self-injury, aggression) or engaged in elopement behaviors. All intervention sessions were recorded using a handheld camera for accuracy and subsequent analysis

Procedural Fidelity

For all components of the intervention a second researcher collected treatment fidelity data using a task analysis checklist developed by the primary researcher (see Appendix B). Treatment fidelity data were collected for 33% of Noah’s intervention sessions and 40% of Morgan’s intervention sessions. Sessions were randomly selected using an online random number generator. For Noah, treatment fidelity ranged from 80% to 100%, with most sessions demonstrating high procedural integrity. For Morgan, treatment ranged from 90% to 100%. These data indicate that the independent variable was implemented with acceptable fidelity.

RESULTS

Figure 1 depicts Noah's (top) number of independently performed social interaction components during baseline and intervention phases. At baseline, Noah did not engage in any independent social interaction components (0, range 0–0). During Phase One of the intervention, when one video model was embedded into the photo activity schedule, Noah began demonstrating increased independence, performing all four social interaction components by the 12th session. Upon transitioning into Phase Two, where two video models were embedded, Noah's performance initially maintained at four independently performed components. Then Noah's score rose to six independently completed components, indicating a promising trend. However, this increase was short-lived, as his performance dropped to zero during the following sessions and remained low for the rest of the intervention phase.

Figure 1 also depicts Morgan's (bottom) number of independently performed social interaction components across all phases. Like Noah, Morgan engaged in zero independent social interaction components at baseline (range 0–0). However, unlike Noah, Morgan's performance remained at zero throughout the intervention phase, showing no measurable change despite the introduction of video modeling.

These results suggest that while video modeling embedded into photo activity schedules may support the acquisition of social skills in some children with ASD, such as Noah, it may not be universally effective for all learners, as evidenced by Morgan's lack of progress.

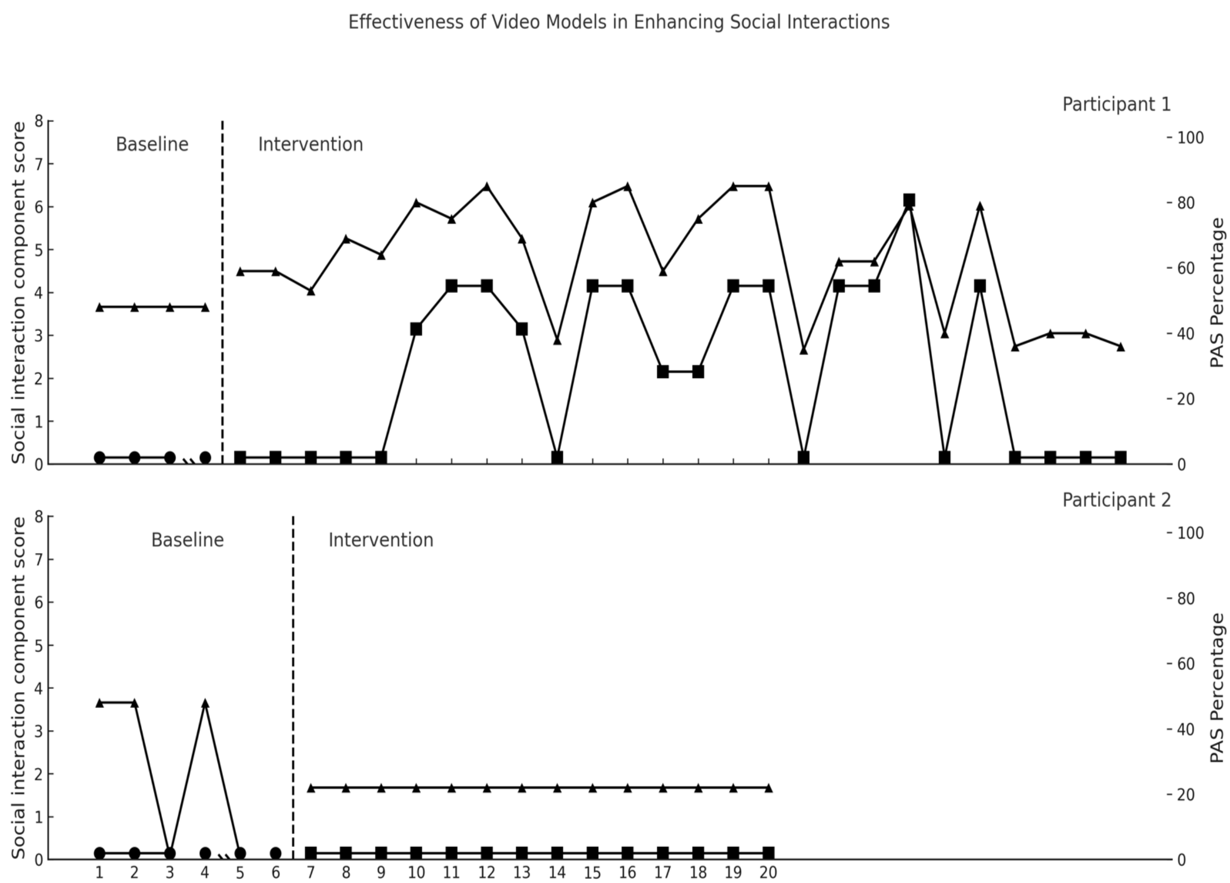


Figure 1: Noah and Morgan's number of independently performed social interaction components and PAS completion percentage. The closed black circles represent baseline session data points. The closed black squares represent intervention sessions. The closed black triangles represent total photo activity schedule (PAS) completion in a percentage.

This graph displays the effect of video modeling on participants' social interaction components. Each panel represents an individual participant's performance across sessions. The left Y-axis shows the social interaction component score, while the right Y-axis represents the PAS percentage (i.e., the percentage of program activities completed). Session numbers are presented along the X-axis. A parallel break on the X-axis indicates a long interruption due to winter break. Data points are marked with distinct symbols: filled black circles represent baseline sessions, black squares indicate intervention sessions, and black triangles show PAS completion data. Dashed vertical lines denote phase changes from baseline to intervention, and a horizontal dashed line connects the phase changes between participants to highlight the staggered intervention introduction.

DISCUSSION

The purpose of this study was to examine whether embedding video models within a photo activity schedule could support increases in social interactions among children with ASD. Using a multiple probe across participants design, the study aimed to determine if participants could independently engage in targeted social interaction components following exposure to video modeling. Both participants demonstrated zero independent social interaction components during baseline. However, following intervention, only Noah showed a modest and variable increase in performance, while Morgan demonstrated no change—highlighting individual differences in response to the intervention.

Noah's performance provides limited support for the use of video-enhanced activity schedules in increasing independent social interaction components. In Phase One, he demonstrated progress with one video model, suggesting an initial increase of targeted social skills components was possible under these conditions. Notably, during Phase Two, when the number of embedded video models increased to two, Noah achieved his highest performance—completing six social interaction components independently. However, this gain was short-lived, followed by a sharp and sustained decline to zero. Despite no changes to the session structure or expectations. This pattern suggests that the increased complexity may have exceeded Noah's instructional tolerance, disrupted stimulus control, or reduced motivation. Alternatively, he may have struggled to generalize imitation across multiple models, or the novelty of the video model may have worn off. These results raise important considerations about the sustainability and generalization of skills acquired through video modeling.

In contrast, Morgan did not demonstrate improvement at any point during the intervention, despite receiving the same materials and procedures. Her consistently low performance suggests that video modeling alone was not sufficient to promote social interaction components for her. This underscores the importance of evaluating individual readiness factors, such as attending to models, imitation ability, and motivation for social engagement. It is possible that Morgan required more explicit instructional supports, such as direct prompting or reinforcement, to bridge the gap between observation and performance. Her outcome reinforces the notion that video modeling is not universally effective and must be considered as one of several potential strategies in an individualized intervention plan.

These findings provide only limited support for the existing literature suggesting that video modeling can increase social skill development (Bellini & Akullian, 2007; Plavnick et al., 2015). Contrary to prior studies that have demonstrated more consistent and sustained benefits, the outcomes in this study were highly variable across participants. While Noah showed brief gains, these improvements were not maintained over time, and Morgan showed minimal to no response to the intervention. This inconsistency suggests that, for some learners, video modeling embedded in structured routines (Brodhead et al., 2018; Osos et al., 2021) may be insufficient on its own. These results highlight the need for additional or alternative strategies to support children who do not respond to video modeling as expected.

This study carries several practical implications. First, clinicians and educators should assess prerequisite skills before implementing video modeling interventions, including attention, engagement, and motivation. Second, ongoing progress monitoring is essential. If a learner does not show improvement after a few sessions, the intervention should be adjusted. For example, by simplifying the task, adding prompts, or exploring alternative instructional approaches. Third, video modeling should not be regarded as a universally effective solution; rather, it is one tool within a broader evidence-based framework. For some learners, peer modeling, live demonstrations, or more naturalistic teaching strategies may yield better outcomes.

Several limitations should be acknowledged. The small sample size (two participants) limits the generalizability of findings. While single-case designs allow for strong internal validity, larger-scale studies are necessary to better understand for whom and under what conditions video-enhanced activity schedules are most beneficial. Additionally, although Noah initially responded to the intervention, the abrupt decline in performance highlights concerns about skill maintenance and generalization—key issues that future research must address.

Future studies should explore whether learner characteristics—such as verbal ability, imitation repertoire, or social motivation—predict responsiveness to video modeling. Investigations might also examine the efficacy of combining video models with reinforcement, peer-mediated strategies, or live prompting, particularly for learners who do not respond to video modeling in isolation. Finally, future research should incorporate follow-up and generalization probes to determine whether acquired skills persist over time and transfer to novel contexts or interaction partners.

In conclusion, this study offers limited support for the use of video-enhanced activity schedules to increase social skills development in children with ASD. While one participant showed initial gains, outcomes were not sustained and were not replicated across both learners. These findings reinforce the need for individualized, flexible intervention planning and suggest that video modeling, while promising in some contexts, may need to be paired with additional supports to achieve meaningful and lasting outcomes.

REFERENCES

American Psychological Association. (2023, November 15). *Autism spectrum disorder*. American Psychological Association. https://www.apa.org/topics/autism-spectrum-disorder.

Bellini, S., & Akullian, J. (2007). A Meta-Analysis of Video Modeling and Video Self-Modeling Interventions for Children and Adolescents with Autism Spectrum Disorders. *Exceptional Children*, *73*(3), 264-287. https://doi.org/10.1177/001440290707300301

Betz, A., Higbee, T. S., & Reagon, K. A. (2008). Using joint activity schedules to promote peer engagement in preschoolers with autism. *Journal of applied behavior analysis*, *41*(2), 237–241. https://doi.org/10.1901/jaba.2008.41-237

Brodhead, M. T., Courtney, W. T., & Thaxton, J. R. (2018). Using activity schedules to promote varied application use in children with autism. *Journal of Applied Behavior Analysis, 51*, 80–86. https://doi.org/10.1002/jaba.435.

Brodhead, M. T., Higbee, T. S., Pollard, J. S., Akers, J. S., & Gerencser, K. R. (2014). The use of linked activity schedules to teach children with autism to play hide-and-seek. *Journal of Applied Behavior Analysis*, 47 (3), 645-650. https://doi.org/10.1002/jaba.145

Brown, J. L., Krantz, P. J., McClannahan, L. E., Poulson, C. L., (2008). Using script fading to promote natural environment stimulus control of verbal interactions among youth with autism. *ScienceDirect, 2, 480-497.* https://doi.org/10.1016/j.rasd.2007.08.006.

Bryan, L.C., Gast, D.L. (2000). Teaching On-Task and On-Schedule Behaviors to High-Functioning Children with Autism Via Picture Activity Schedules. *J Autism Dev Disord* 30, 553–567 https://doi.org/10.1023/A:1005687310346

Carlile, K. A., Reeve, S. A., Reeve, K. F., & DeBar, R. M. (2013). Using activity schedules on the iPod touch to teach leisure skills to children with autism. *Education and Treatment of Children, 36*, 33–57. https://doi.org/10.1353/etc.2013.0015.

Ledford , J. R., & Gast, D. L. (2018). *Single case research methodology* (3rd ed.). Routledge.

McClannahan, L. E., Krantz, P. J., & Harris, S. L. (Ed.). (2010). *Activity schedules for children with autism: Teaching independent behavior*. Topics in Autism.

Osos, J.A., Plavnick, J.B. & Avendaño, S.M. Assessing Video Enhanced Activity Schedules to Teach Social Skills to Children with Autism Spectrum Disorder. *J Autism Dev Disord* 51, 3235–3244 (2021). https://doi.org/10.1007/s10803-020-04784-x

Plavnick, J. B., MacFarland, M. C., & Ferreri, S. J. (2015). Variability in the Effectiveness of a Video Modeling Intervention Package for Children with Autism. *Journal of Positive Behavior Interventions*, *17*(2), 105-115. https://doi.org/10.1177/1098300714548798

Wichnick-Gillis, A. M., Vener, S. M., & Poulson, C. L. (2016). The effect of a script-fading procedure on social interactions among young children with autism. *ScienceDirect*, *26*, 1-9. https://doi.org/10.1016/j.rasd.2016.03.004

APPENDIX A: IOA DATA SHEET FOR BASELINE AND INTERVENTION

Figure 2: Task analysis checklist used to assess interobserver agreement during baseline and intervention phases. The checklist outlines each step completed by the researcher, including preference assessment, instruction delivery, distancing, prompting, data collection, and session termination criteria.

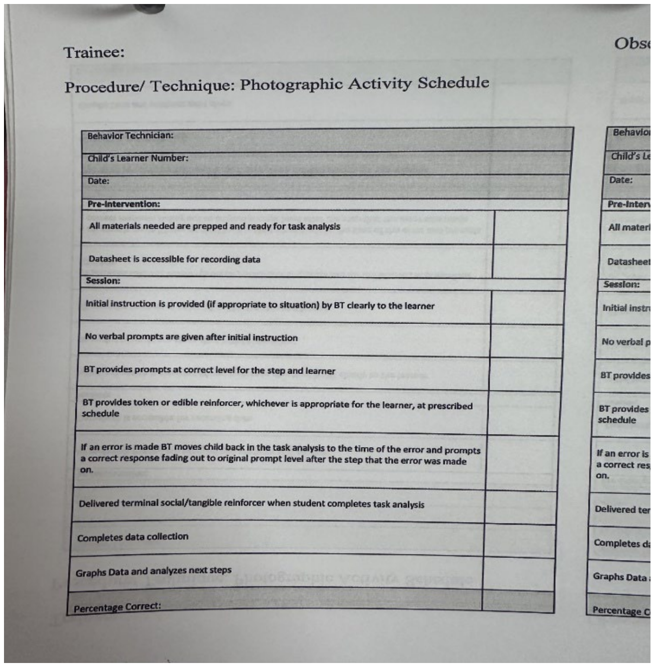
Baseline Steps	**Correct Implementation (mark +, -, or NA)**
Overview	
1. Conduct brief MSWO preference assessment.	
2. Prepare reinforcer after brief MSWO preference assessment.	
3. Researcher presents the electronic activity schedule from behind the participant.	
4. Researcher gives the verbal instruction “follow your schedule”.	
5. Researcher moves 3 to 5 feet away from participant.	
6. Researcher provides brief gestural prompt (if needed after 10-15 seconds of disengagement).	
7. Session terminated if crying, aggression, elopement, or yelling is displayed by participant.	
8. No physical prompts provided.	
9. Researcher collect paper-pencil data while participant is completing the electronic activity schedule.	
10. After the electronic activity schedule is completed, the researcher provides a reinforcer and thanks the participant.	

Figure 2 (cont'd)

Intervention Steps	Correct Implementation (mark +, -, or NA)
Overview	
1. Conduct brief MSWO preference assessment.	
2. Prepare reinforcer after brief MSWO preference assessment.	
3. Researcher presents the electronic activity schedule from behind the participant.	
4. Researcher gives the verbal instruction "follow your schedule."	
5. Researcher moves 3 to 5 feet away from participant.	
6. Researcher provides brief gestural prompt (if needed after 10-15 seconds of disengagement).	
7. Session terminated if participant displays crying, aggression, elopement, or yelling.	
8. Researcher collect paper-pencil data while participant is completing the electronic activity schedule.	
9. After the electronic activity schedule is completed, the researcher provides a reinforcer and thanks the participant.	

APPENDIX B: TREATMENT FIDELITY DATA SHEET

Figure 3: Photographic Activity Schedule (PAS) procedural fidelity checklist used to assess behavior technician implementation during intervention sessions. The checklist includes steps for pre-intervention preparation, session implementation, prompting procedures, reinforcement delivery, data collection, and graphing.



Trainee:

Procedure/ Technique: Photographic Activity Schedule

Behavior Technician:	
Child's Learner Number:	
Date:	
Pre-Intervention:	
All materials needed are prepped and ready for task analysis	
Datasheet is accessible for recording data	
Session:	
Initial instruction is provided (if appropriate to situation) by BT clearly to the learner	
No verbal prompts are given after initial instruction	
BT provides prompts at correct level for the step and learner	
BT provides token or edible reinforcer, whichever is appropriate for the learner, at prescribed schedule	
If an error is made BT moves child back in the task analysis to the time of the error and prompts a correct response fading out to original prompt level after the step that the error was made on.	
Delivered terminal social/tangible reinforcer when student completes task analysis	
Completes data collection	
Graphs Data and analyzes next steps	
Percentage Correct:	

APPENDIX C: DATA COLLECTION DATA SHEET

Figure 4: Photographic Activity Schedule (PAS) datasheet used to document participant performance. The form includes task analysis steps for activity engagement and social interaction components, as well as completion of the full schedule. Data is recorded per step across video models and summarized for total independent responses.

Client Name:	**Date:**

PAS –					
Activity	**Opens/turns page**	**Points/Looks**	**Obtains Item**	**Completes Activity**	**Puts Away**
	Approach Partner	**Orients Body Toward Partner**	**Emit Response**	**End Interaction**	
Video Model 1					
Video Model 2					
Video Model 3					
Finishes Schedule	Turns last page	Points to back of binder	Closes binder	Puts Away	
# Completed:					
Total # of components:			# completed Ind:		