

# Evaluating the Ability of the PBS Children’s Show *Daniel Tiger’s Neighborhood* to Teach Skills to Two Young Children with Autism Spectrum Disorder

Wesley H. Dotson<sup>1</sup> · Eric E Rasmussen<sup>2</sup> · Autumn Shafer<sup>3</sup> · Malinda Colwell<sup>4</sup> ·  
Rebecca L. Densley<sup>2</sup> · Adam T. Brewer<sup>5</sup> · Marisol C. Alonzo<sup>5</sup> · Laura A. Martinez<sup>5</sup>

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**Abstract** *Daniel Tiger’s Neighborhood* is a children’s television show incorporating many elements of video modeling, an intervention that can teach skills to children with autism spectrum disorders (ASD). This study evaluated the impact of watching *Daniel Tiger’s Neighborhood* episodes on the accurate performance of trying new foods and stopping play politely with two five-year-old children with ASD. Both children showed improved performance of skills only following exposure to episodes of *Daniel Tiger’s Neighborhood*, suggesting that watching episodes can help children with ASD learn specific skills.

**Utility of the Work for Clinicians** • *Daniel Tiger’s Neighborhood* episodes teach relevant skills for children with ASD using elements of video modeling.

- Watching episodes led to increased rates of accurate performance of trying new foods and stopping play politely in children with ASD
- *Daniel Tiger’s Neighborhood* is a potentially salient and easily accessed resource to supplement instruction for children with ASD

✉ Wesley H. Dotson  
wesley.dotson@ttu.edu

<sup>1</sup> Burkhart Center for Autism Education and Research & Department of Educational Psychology & Leadership, Texas Tech University, 2902 18th Street, Room 207, Lubbock, TX 79409, USA

<sup>2</sup> College of Media & Communication, Texas Tech University, Lubbock, TX, USA

<sup>3</sup> School of Journalism and Communication, University of Oregon, Eugene, OR, USA

<sup>4</sup> Human Development and Family Studies, Texas Tech University, Lubbock, TX, USA

<sup>5</sup> Burkhart Center for Autism Education and Research, Texas Tech University, Lubbock, TX, USA

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Children with autism spectrum disorders (ASD) have deficits in social communication and patterns of restrictive and repetitive behaviors that negatively impact their ability to fully integrate into their communities. Interventions to address deficits include elements such as labeling and breaking down targeted skills, modeling appropriate behaviors, and encouraging practice (Odom, Boyd, Hall, & Hume, 2010). Video modeling interventions including those elements have effectively taught skills to children with ASD (e.g., Ayres & Langone, 2005; Shukla-Mehta, Miller, & Callahan, 2009). Video modeling interventions involve repeatedly presenting the child with a video of themselves or another person engaging in a desired behavior and providing an opportunity to practice the behavior. Typically, a teacher, parent, or peer will prompt the child’s attention to the video model and supervise and provide feedback for practice of the skill. Video models are usually individualized for the child to maximize salience.

Another way to deliver video-based instruction to a child is television. Young children attend more readily to television shows that are age appropriate and include salient features such as sound effects, movement, and animation. Attending at a higher rate leads to increased comprehension of content (e.g., Anderson, Lorch, Field, & Sanders, 1981; Schmitt, Anderson, & Collins, 1999). Thus, children’s shows designed to maximize age appropriate and salient content may encourage attention to instruction delivered via the show’s characters.

*Daniel Tiger’s Neighborhood* is a children’s show on PBS that includes programming elements consistently related to children’s learning, such as interactive learning approaches (Wartella, Lee, & Caplovitz, 2012), elements of fantasy or

make-believe (Brazelton & Greenspan, 2006), simple songs (Kalliopuska & Ruokonen, 1986), and a socially meaningful character (Lauricella, Gola, & Calvert, 2011). Each thematic episode incorporates many elements of video modeling to teach children a skill such as trying new foods, stopping play, sharing, or calming down.

To date, no empirical studies have explored whether watching children's television programming leads to learning by children with ASD. If children with ASD can learn skills by watching carefully-structured programs, this could represent a readily available, beneficial supplement to more intensive and individualized video modeling interventions. Thus, the purpose of the present short report was to evaluate the impact of watching *Daniel Tiger's Neighborhood* episodes on accurate performance of targeted skills by young children with ASD.

## Method

### Participants

Two five-year-old children with ASD, Patrick and Calvin, participated in the study. Both qualified for services under the "autism" category from their local schools, were verbal and spoke in short phrases. During play sessions, both children would engage in parallel and some cooperative play, often interspersed with bouts of stereotypy including inappropriate play (e.g., spinning and stacking blocks, verbal scripting). Parents reported no prior history with video modeling interventions for either child.

### Design

The study used a multiple-baseline across-behaviors design replicated across participants. Two target skills were identified, and intervention for the second skill did not begin until a clear change occurred in the first skill.

### Measurement

Experimenters selected trying new foods and stopping play as potential target behaviors from the array of skills targeted in *Daniel Tiger* episodes because children with ASD often struggle with food selectivity and transitioning away from preferred activities. The parents of the two children reported difficulties with those skills and the baseline assessment indicated neither child engaged in those skills during probes. Table 1 presents the specific steps for each skill used for data collection in this study and details about the episodes used to teach them.

For trying new foods, the observers scored the percentage of steps (see Table 1) the child completed. If a child ate a

**Table 1** Skills steps in each of two target skills and episodes used to teach them

	Trying new food	Stopping play
Skill step		
1	Touch the offered food item	Say "ok" (or equivalent)
2	Put the food item in mouth	Avoid whining, crying
3	Chew the food item	Stop playing within 15 s
4	Swallow the food item	Walk to the experimenter
<i>Daniel Tiger's Neighborhood</i> Episode Details	Season 1, Episode 15: Be a Vegetable Taster, Daniel Tries a New Food Length: 26 min	Season 1, Episode 27: It's Time to Go, Daniel Doesn't Want to Stop Playing Length: 26 min

single bite, but completed all four steps, they received full credit. For stopping play, an observer scored the child's response to the experimenter statement that it was almost time to go. If the child did not stop playing within 15 s, the experimenter stepped away from the door and said "OK", but delivered no additional instructions or feedback. If the child stopped play and walked to the experimenter after the 15 s window, but before 60 s, observers gave the child credit for the step "walking to the experimenter", but not for the step "stopping play". This scoring contingency was used because experimenters wanted to be able to discriminate a shorter latency to transition away from play while still giving some credit for engaging in the skill if the child stopped play without prompting, but more slowly.

### Procedures

**Baseline** Sessions consisted of 20–30 min free-play periods in a 6 × 10 ft research room full of toys. Experimenters conducted probes of each target skill during each baseline session. The first probe conducted during the initial intervention session (before the child watched the episode) is also included in the data for the baseline condition for each skill. Each skill was probed one time during each free-play period. The experimenter placed two to three bites of a single food (e.g., tomatoes, green peppers, carrots, mushrooms, and pears) the child had never eaten before (per parent report) on a plate. The experimenter called the child and said, "Let us try some \_\_\_\_\_." The specific food presented during a probe varied each time, with no food being offered twice to the child during any condition. For stopping play, the experimenter waited until the child engaged with a preferred toy for at least 15 s and was on the side of the room furthest from the door before beginning a probe. The

experimenter stood at the door and said, “It’s almost time to go,” and waited silently for 15 s. During probes for each target skill, the child received no prompts, praise, or consequences related to the target behavior.

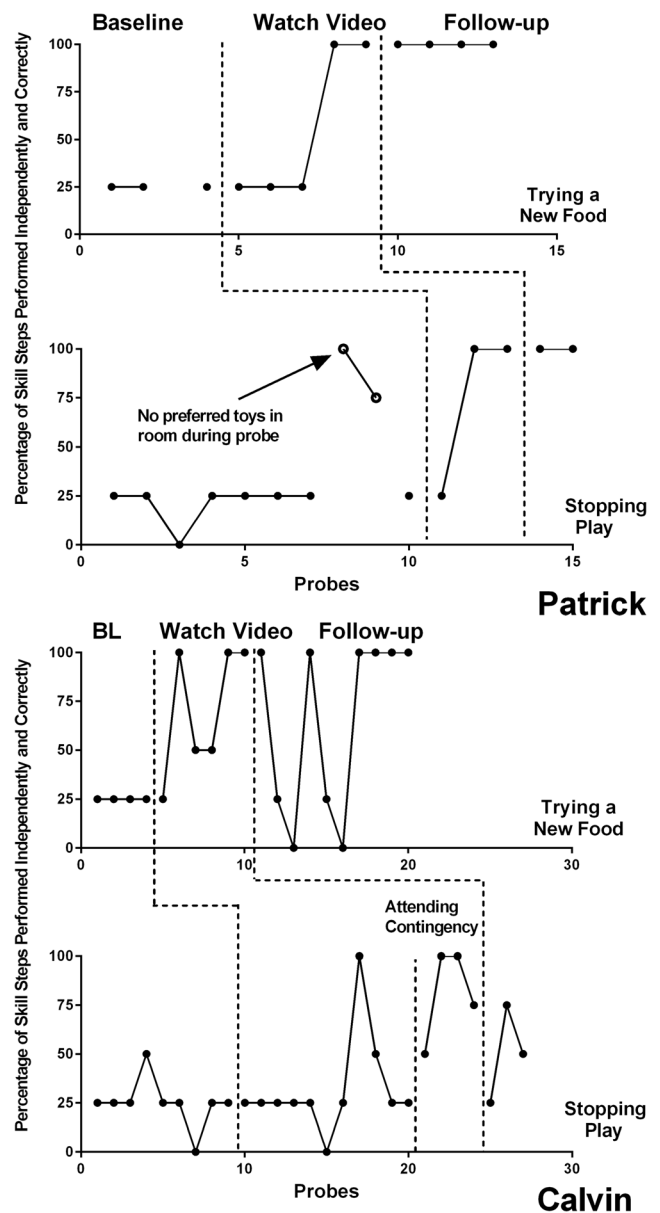
Observers scored participant behavior while probes occurred. A second observer scored video-taped probes. Inter-observer agreement (IOA) was calculated for each probe by dividing the number of skill steps for which the observers agreed by the total number of skill steps scored and multiplying by 100. Two observers scored 75 % of probes and IOA averaged 89.94 % (range: 25–100 %) across both skills and participants.

**Daniel Tiger’s Neighborhood Videos** Each session started with a 5–10 min play session in the same room as baseline, during which a single probe of each target behavior occurred. The child then went to another room to watch an episode of *Daniel Tiger’s Neighborhood*. That room was 6 × 10 ft and included a table, two chairs, and a laptop computer on which the episode was displayed. After watching the episode, the child returned to the playroom for another 5–10 min play session. Single probes of both target skills also occurred during the second play session.

While watching the episode, the child sat in a chair facing a laptop. An experimenter was in the room but did not teach or initiate verbal interactions. If the child asked questions, the experimenter would respond with one to two words. If the child became distracted, the experimenter would verbally redirect the child to the episode (e.g., “Let us watch the show”) but would not more intrusively prompt the child to engage.

For Calvin, attending became an issue during the episode about stopping play. He spent more than half of each episode spinning or rolling around in his chair, staring at his reflection in the observation mirror, or engaging in other stereotypic behaviors. After five sessions of not showing consistent progress, an attending contingency was put in place. The experimenter paused the episode any time Calvin was off task for more than 10 s and started the episode again when he was attending to the screen. He did not earn the 5 min play period at the end of the session until the episode was finished. This contingency was only used during the final two intervention sessions for stopping play.

Intervention sessions occurred 1–2 times per week and were at least 48 h apart each time. The follow-up condition began for trying new foods on the first probe of the skill after the initial time the child watched the episode about stopping play and continued until the last session of the study. Follow-up for stopping play was scored during a separate session exactly like baseline that followed the last intervention session by 7–10 days.



**Fig. 1** Percentage of skill steps performed correctly across probes by two children with ASD. The data from the probe on the first day of intervention before the episode was viewed is included in the baseline condition. Only data from probes conducted after the child watched each episode are included in the “Watch Video” condition

## Results and Discussion

Figure 1 presents performance on target skills for both participants. Patrick’s performance (top two panels) improved only after watching episodes. For trying new foods, he began eating each new food placed in front of him during probes after the second viewing of the video. During the course of the study, he ate six new foods. During the baseline for stopping play, Patrick did not acknowledge the experimenter’s request, stop the activity, or approach the experimenter. The only exception was one

session during which experimenters inadvertently removed Patrick's favorite toys from the probe room (open circles in Fig. 1). That day he did not want to play, and so quickly left the room when prompted. After watching one episode, Patrick began stopping play with 100 % accuracy, and ended by stopping play four consecutive times.

Calvin's behavior (bottom two panels) varied more, but also improved for both skills. During baseline, Calvin never put a bite of food to his mouth, chewed, or swallowed. After watching one episode, Calvin ate a bite of novel food. He watched the episode three times, after each of which he put at least one bite of every novel food in his mouth. Once into maintenance, his performance varied, but he ate nine total novel foods during and following intervention. For stopping play, Calvin never stopped his play activity during baseline. After watching episodes, his performance did not initially consistently change. At the sixth viewing, the experimenters instituted the attending contingency and his performance immediately improved. During maintenance, his performance was variable but higher than baseline.

For two young children with ASD, watching episodes of *Daniel Tiger's Neighborhood* led to the acquisition of two new skills: trying new foods and stopping play. The results support earlier research showing children watching structured television shows can learn skills by watching those shows (e.g., Lauricella, et al., 2011; Wartella, et al., 2012), and extends that literature by showing children with ASD can learn the same way. The results also resemble positive outcomes seen in video modeling interventions with children with ASD (e.g., Ayres & Langone, 2005; Shukla-Mehta, et al., 2009). Given the many overlapping elements of those two interventions (clear descriptions of behavior, modeling of the appropriate behavior); the results may suggest the possibility of a shared mechanism of effect for both. Future research should directly compare traditional video modeling versus using episodes of television shows to explore the relative efficacy of the interventions.

Unlike most video modeling studies, the experimenters provided no interaction beyond the episode itself until the attending contingency with Calvin. Thus, live instruction, prompting, and reinforcement were not part of this intervention. The isolation of the episode from other teaching components allowed a more specific evaluation of the effects of episode alone to independently change behavior. Media effects literature and the video modeling literature both suggest that more and higher quality learning occurs with adult facilitation of the lessons; thus, it is possible that more positive results could be achieved with the incorporation of parent or experimenter mediation while watching the episode (e.g., parent prompting

attention to target skills, asking questions, and prompting settings in which children could practice the skill).

The skills targeted here address two common issues for young children with ASD: picky eating and difficulty in transitions from preferred play activities. Results suggest that a popular, commonly available television show could facilitate effective interventions for those deficits for at least some children. Future research should explore the viability of other episodes targeting other skills to address common skill deficits among young children with ASD.

The results of this pilot study should be interpreted with caution. The experimenters did not evaluate maintenance of the learned skills extensively or measure generalization to the home environment. Additionally, both children were the same age and general level of functioning. It is unclear whether the intervention would be as effective for children who did not already have good language skills. Future studies should recruit a more diverse population of young children with ASD, include more target skills, evaluate longer-term maintenance, and measure generalization beyond the experimental setting.

While both participants showed clear changes in their behavior following intervention, it did not produce immediate effects. Both participants watched episodes multiple times. Calvin required an attending contingency to improve his performance on stopping play. Thus, to be effective, this type of intervention appears to require the child to sit and attend to the episode multiple times. This is similar to the video modeling literature, which suggests repeated exposure to the videos is important for effectiveness (Corbett & Abdullah, 2005). Future research should also explore whether parents, teachers, or peers acting as facilitators and prompters while watching the episodes leads to more immediate or durable change. Overall, the results of this brief study suggest episodes of *Daniel Tiger's Neighborhood* may be useful tools to help children with ASD learn skills, especially as further research extends and clarifies the conditions under which that learning occurs.

#### **Compliance with Ethical Standards**

**Funding** This study was not externally funded.

**Conflict of Interest** The authors declare that they have no conflict of interest.

**Ethical Approval** All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

**Informed Consent** Informed consent was obtained from the legal guardians of all individual participants included in the study.

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