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Comparing pictorial and video modeling activity schedules during transitions for students with autism spectrum disorders

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ABSTRACT

This study evaluated the differential effects of two different visual schedule strategies. In the context of an alternating treatments design, static-picture schedules were compared to video based activity schedules as supports for three middle school aged students with autism. Students used the visual schedules to transition between activities in their classroom. All participants began transition more independently after being exposed to the visual schedules. Two participants reached criteria faster with static-picture schedules while the third participant made slightly faster progress with the video based schedule. The positive outcomes for both interventions are discussed in the context of practitioners' need for a variety of evidenced based practices to meet the needs of a diverse student body as well and that similar interventions may have different outcomes depending on the characteristics and preferences of the learner.

According to the Center for Disease Control and Prevention (2009), the prevalence of autism spectrum disorders (ASD) is approximately one in 110 children. Characteristics of children with ASD include (a) communication, (b) socialization, and (c) interest and activities (American Psychiatric Association, 2000). Children with ASD also are often resistant to environmental changes and insist on sameness, which negatively impacts their abilities to predict future events or cope with changes in daily routines (Heflin & Alaimo, 2007). This makes it difficult for teachers to establish new routines and procedures. Deviations from usual classroom routines can cause anxiety for students with ASD, which might manifest in problematic behaviors (Steingard, Zimnitzky, DeMaso, Bauman, & Bucci, 1997). Students with ASD also may become dependent on teacher prompts especially during transition times (Dettmer, Simpson, Myles, & Ganz, 2000). Since more students with ASD are being identified and are receiving educational services in the general education classroom (Lindsay, 2007), increased expectations to adapt and transition to new task, activities, and settings will be required for students with ASD.

Current literature suggests that many individuals with ASD benefit from visual supports (e.g., Bryan & Gast, 2000; Dettmer et al., 2000; Dooley, Wilczenski, & Torem, 2001; Heflin & Alaimo, 2007). Heflin and Simpson (1998) noted that visual supports allow students to make sense of their environments, predict scheduled events, comprehend expectations, and anticipate changes throughout the day. Because students with ASD typically respond to visual input as their primary source of information (Quill, 1995, 1997), the use of visual support systems can supplement verbal directions when students have deficits in auditory processing. In addition, children with ASD may prefer photographs of people to the people themselves; even when directly interacting with people.

Pictorial activity schedules are a promising educational strategy to support transitions for students with autism (Scheuermann & Webber, 2002; Wetherby & Prizant, 2000). An activity schedule is a visual support system that combines photographs, images, or drawings in a sequential format to represent a targeted sequence of the student's day. Activity

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schedules provide predictability throughout the student's day and allow a student to anticipate changes in the daily routine. Providing the student with increased time to process upcoming changes enhances the opportunity for increased participation in existing routines and transitions (Jamieson, 2004). Researchers in a number of studies have consistently found activity schedules to be an effective intervention for students with ASD (Banda & Grimmett, 2008). Beyond finding that static-picture activity schedule interventions have successfully reduced problem behaviors during transitions (Pierce & Schreibman, 1994) researchers also have reported improvements in time on task (Bryan & Gast, 2000; Krantz, MacDuff, & McClanahan, 1993; Massey & Wheeler, 2000), increased independence (Watanabe & Strumey, 2003) improved play behaviors (Dauphin, Kinney, & Stromer, 2004; Morrison, Sainato, Benchaaban, & Endo, 2002) and decreased transition time (Dettmer et al., 2000; Dooley et al., 2001; Massey & Wheeler, 2000). The evidence supporting static picture activity schedules suggests they are a flexible antecedent based intervention that can be customized to meet a range of challenging situations.

Another visual strategy for students with ASD that has emerging empirical support spanning a wide range of domains is video modeling. Video-based instruction was suggested as a viable teaching tool since students view positive and successful behaviors as opposed to negative and unsuccessful behaviors (Dowrick, 1999). In 2007, Bellini and Akullian (2007) conducted a meta-analysis of 23 studies examining the effectiveness of video modeling procedures. Bellini and Akullian suggested that students with ASD successfully acquired, maintained and generalized a variety of skills ranging from vocational (e.g., Alberto, Cihak, & Gama, 2005) to play (e.g., Nikopoulos & Keenan, 2004), and from community (e.g., Cihak, Alberto, Taber-Doughty, & Gama, 2006;) to domestic (e.g., Lasater & Brady, 1995). Students also demonstrated improved communication (e.g., Taylor, Levin, & Jasper, 1999), conversational (e.g., Sherer et al., 2001), and purchasing (Haring, Kennedy, Adams, & Pitts-Conway, 1987) skills. In addition, several recent reviews of the literature validate the use of video modeling procedures as an evidence-based practice (Ayres & Langone, 2005; Delano, 2007; Hitchcock, Dowrick, & Prater, 2003; Mechling, Pridgen, & Cronin, 2005).

Video modeling also has been used to assist students with autism during transitions. Schreibman, Whalen, and Stahmer (2000) used video modeling as a priming technique to assist three children with autism to transition independently from their home to various community stores with their parents. The parents of the children all reported that tantrums occurred when changing locations. Therefore, videotaped recordings of the child's point-of-view transitioning from their home to different stores in the community were developed and implemented. Prior to transitioning to a new setting, the parents showed their child a video tape of transitioning to different places without tantruming. As a result, each child's tantrums decreased and maintained at low levels 4 weeks later. Buggey (2005) also examined the effects of video modeling for students with ASD who demonstrated tantrum or aggressive behaviors during transitions. Using video self-modeling, students watched videos of themselves transitioning independently or refraining from inappropriate behaviors from place to place. All students' tantrums and aggressive behaviors decreased and maintained at low levels 3 weeks later following the use of video modeling. Although Delano (2007) suggested the need for additional video modeling research across settings, both Schreibman et al. and Buggey demonstrated the potential viability of using video modeling to assist students with ASD to adapt with environmental changes in the classroom.

Stromer, Kimball, Kinney, and Taylor (2006) suggested the potential for teachers to incorporate video into traditional picture activity schedules. They cited a paper presented by Kalaigian, Kinney, Taylor, Stromer, and Spinnato (2002) in which the researchers incorporated video clips into a student's activity schedule and improved her independence. Recently, Mechling, Gast, and Seid (2009) combined video, picture and auditory prompting in an intervention using a personal digital assistant (PDA). Students with autism learned to use the self-prompting device to independently complete three recipes. The PDA contained the task analyses with video of target steps, auditory instructions as well as photos. Because this use of self-prompting with video shares many features in common with the use of picture activity schedules in that a sequence of events is visual presented and the learner manipulates or interacts with the visuals as they complete tasks, there is reason to believe that video based activity schedules may likewise promote greater independence.

In terms of scheduling and following task directions, static picture schedules and video based schedules have advantages and disadvantages. Picture activity schedules are permanent visual prompts, meaning that a student can look at the picture, then look away, and then back to the picture, without missing any information. Alberto et al. (2005) noted that static picture prompts may facilitate learning better for students who are easily distracted. Video activity schedules can be fleeting. Students need to attend to them for extended (albeit) short, uninterrupted periods of time if they are to see everything in the video. However, if students attend to the video, they are able to view the actual motions and actions that are required to move to and or engage in the new task. Picture activity schedules do not offer this advantage as they only capture a moment in time and show only a single image; however in terms of design and complexity, static picture schedules may be easier for teachers to generate and reuse.

The current study compares the use of a traditional static picture activity schedule to a similarly formatted video activity schedule. Although researchers have suggested the use of static pictures and video modeling interventions as activity schedules to assist students with ASD during transitions, these strategies have not been compared to determine if one is more effective and/or efficient than the other. Therefore, the purpose of this study was to investigate possible differential effects of static pictures schedules and video modeling schedules for students with ASD during transitional situations. Specifically, this study examined whether there were functional differences in student transitions between static picture schedules and video modeling schedules for adolescences with autism spectrum disorders?

1. Methods

1.1. Participants and Settings

Two K-12 certified special education teachers, both with at least 5 years of teaching experience participated in this study along with four adolescents diagnosed with autism. The student participants were diagnosed by their physician. Table 1 lists student characteristics. Each was selected to participate based on (a) an IEP objective related to improving adaptive social-behavior skills, (b) no hearing or vision impairments that may impede video instruction, (c) agreeing participate in the study, and (d) parental permission.

Jack, a 13-year-old student in the eighth grade scored in the severe range on the Gilliam Autism Rating Scale (GARS; Gilliam, 1995). Jack also scored an adaptive behavior composite of 51 on Vineland Adaptive Behavior Scales-II (VABS-II; Sparrow, Cicchetti, & Balla, 2006). Kim, an 11-year-old, sixth grade student scored in the severe autism range on the GARS and on the VABS-II she scored an adaptive behavior composite of 56. Bill a 12-year-old, seventh grade student also scored in the severe range on the GARS and an adaptive behavior composite of 48. Finally, Cody, a 13-year-old, eighth grade student scored in the severe range on the GARS and an adaptive behavior composite of 60.

The study took place in two middle schools. Jack and Kim were in the same classroom at one school and had five other students with severe disabilities in their classroom. Bill and Cody were in a different school and attended the same class that included an additional four students with severe disabilities. Both classrooms also were staffed with one full-time teacher's assistant.

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1.2. Materials

Digital static pictures were taken of participants engaging in each of five activities. These pictures were then printed and displayed horizontally in the order of activity occurrence. The picture activity schedule was displayed in a central location of the classroom near the computer area. Videos were created using a Sony 72× Digital Zoom camera and Microsoft Windows Movie Maker. Video clips in the form of a positive self-model (Dowrick, 1999) showed students engaged in the five activities and transitioning independently from task to task. The student and teacher role-played transitioning independently in order to videotape each student's performance. This occurred prior to baseline measurements. Students' inappropriate behaviors were edited from the video and the final clip only showed the desired performance. The videos incorporated video self-modeling and point-of-view modeling (Cihak & Schrader, 2008) to show each student transitioning independently. The self-model portion depicted the student transitioning to a new task and the point-of-view perspective showed the students' vantage point as they moved to the new task. The length of video clips ranged from 10 to 15 s depending on the distance of the designated location.

Students accessed the videos on a centrally located Windows computer with a touch screen and Microsoft Media Player. Students touched a thumbnail icon that showed a video clip of themselves transitioning to the next activity. The thumbnail icons were displayed horizontally in order of activity occurrence.

1.3. Response measurement and data collection

Event recording was used to record the number of times a student independently or incorrectly transitioned to a new task. If the student did not start transitioning after 5 s from a teacher's request or displayed a target inappropriate behavior,

Table 1
Student characteristics.

Instrument/subtest	Jack		Kim		Bill		Cody	
	SS	%	SS	%	SS	%	SS	%
GARS								
Stereotype behaviors	11	63	8	25	10	50	9	37
Communication	11	63	10	50	13	84	7	16
Social Interaction	11	63	10	50	13	84	10	50
Autism Index	106	65	96	39	113	81	91	27
VABS-II								
Communication	56	1	58	1	51	1	62	1
Daily Living Skills	56	1	60	1	49	1	63	1
Socialization	50	1	55	1	55	1	61	1
ABC	51	1	56	1	48	1	60	1

Note. SS = standard score, % = percentile rank, GARS = Gilliam Autism Rating Scale, VABS-II = Vineland Adaptive Behavior Scales-II, ABC = adaptive behavior composite.

Table 2
Students' transitions by condition.

Students:	Jack	Kim	Bill	Cody
Conditions	Static pictures	Video modeling	Video modeling	Static pictures
Morning transitions	(1) Unpack to calendar (2) Calendar to reading (3) Reading to computer (4) Computer to music room (5) Classroom to lunch	(1) Unpack to calendar (2) Calendar to reading (3) Reading to computer (4) Computer to music room (5) Classroom to lunch	(1) Unpack to calendar (2) Calendar to computer (3) Computer to reading (4) Computer to art room (5) Classroom to lunch	(1) Unpack to calendar (2) Calendar to computer (3) Computer to reading (4) Computer to art room (5) Classroom to lunch
Students:	Jack	Kim	Bill	Cody
Conditions	Video modeling	Static pictures	Static pictures	Video modeling
Afternoon transitions	(6) Classroom to recess (7) Recess to math (8) Math to vocational (9) Vocational to cooking (10) Pack-up to bus	(6) Classroom to recess (7) Recess to math (8) Math to vocational (9) Vocational to cooking (10) Pack-up to bus	(6) Classroom to recess (7) Recess to vocational (8) Vocational to math (9) Math to cooking (10) Pack-up to bus	(6) Classroom to recess (7) Recess to vocational (8) Vocational to math (9) Math to cooking (10) Pack-up to bus

then the teacher recorded the transition as incorrect and implemented a system of least prompts. Jack's target inappropriate behavior was physical aggression. Physical aggression was defined as hitting or throwing materials at another person. Kim also engaged in physical aggression and it was defined as pushing another person. Bill performed loud vocalizations that were audible at least 10 feet away from him. Cody's target behavior was sitting on the floor. Cody would physically move to the floor and sit with his legs crossed.

The alternative behavior for all students was transitioning independently from task to task. An independent transition was defined as physically moving from task to task within 5 s of a teacher request and without performing targeted inappropriate behaviors. A student's transition was recorded as independent when he or she checked their schedule, physically moved to the new task, and completed the first step of the new activity. If the student did not physically move within 5 s of the teacher's request or performed a targeted inappropriate, the transition was recorded as an incorrect transition.

Each student participated in 10 transitions per day. Five transitions were assigned to the static picture activity schedule condition and five transitions were assigned to the video modeling activity schedule condition. Students participated in both activity schedule conditions, which were counterbalanced across students. For example, Jack used the static-picture schedule during morning activities and used the video modeling schedule during afternoon activities. Conversely, Kim participated in the video modeling schedule during morning activities and used the static picture schedule during afternoon activities. Table 2 lists each student's transitions. The total number of independent transitions was divided by the number of opportunities to transition to calculate the percentage of independent transitions for each student.

1.4. Experimental design

An alternating treatments design (Barlow & Hersen, 1984) was used to examine the differential effects of static pictures and video modeling on the transitioning performance of each student. The use of static picture prompts and video modeling were counterbalanced to reduce carryover effects across students and tasks. Table 2 presents the instructional strategy and transition for each student.

1.5. Experimental procedures

Baseline. During baseline, the number of independent transitions from task to task was recorded. Students participated in 10 transitions daily. The teacher verbally requested the student to go to the next task. If a student did not move to the new task or performed a targeted behavior, the transition was recorded as an incorrect. When a student was observed transitioning incorrectly, the teacher implemented a system of least prompts. Five seconds were allowed between prompts for the student to begin the transition. The least-to-most prompt hierarchy consisted of the following levels (a) verbal prompt (e.g., "[Name] it is time for reading", (b) gesture plus verbal explanation (e.g., pointing to the reading center and saying "[Name] it is time for reading"), and (c) physical assistance plus verbal explanation (e.g., holding the student's hand, guiding the student to the new task, and saying "[Name] it is time for reading"). The baseline phase continued until a stable baseline was achieved for a minimum of five sessions.

Comparison of visual supports. Prior to the start of morning and afternoon activities, the teacher informed the students whether they would be using pictures or videos to transition. Students participated in five activity transitions both in the morning and afternoon. For the static picture schedule, students were shown five pictures of themselves performing their new task. The teacher verbally requested the student to "check your schedule". Students were required to go to their picture schedule, located in the center of the room, look at their schedule, move to the task, and start the activity.

During the video modeling schedule condition, the teacher also verbally requested the student "check your schedule". Students were shown five video clips of themselves performing their new task. Students were required to go to their computer, located in the center of the room in the same location as the picture schedule. Then, they had to select the thumbnail icon, watch the vide clip, move to the activity location, and start the activity.

The teacher provided the student with verbal praise contingently if they transitioned independently from task to task. However, if the student did not begin transitioning after 5 s of the teacher request to "check your schedule" or demonstrated an inappropriate behavior, the teacher verbally prompted the student (i.e., "[Name], lets look at the picture schedule" or "[Name], lets watch the video schedule". If the student continued to incorrectly transition following an additional 5 s or continued to demonstrate inappropriate behaviors, then the teacher implemented a least-to-most prompt hierarchy similar to the baseline phase. Criterion for each student was 100% independent transitions for three consecutive sessions.

Preferred schedule. The schedule in which each student reached criteria (i.e., 100% independent transitions for three consecutive sessions) in the previous phase was replicated across both morning and afternoon activities. If a student reached criteria under both conditions, then the schedule which produced fewer assisted transitions was replicated. In the event that both schedules were equally effective and efficient, then student and teacher preferences were used to determine which schedule to replicate.

1.6. Reliability

Interobserver agreement data (IOA) and procedural reliability data were collected simultaneously by the primary investigator and the classroom teacher during 25% of baseline and each concurrent phase. Observers independently and simultaneously recorded the number of independent or incorrect transitions from task to task. Interobserver agreement was calculated by dividing the number of agreements of student independent transitions by the number of agreements plus disagreements and multiplying by 100. Interobserver reliability ranged from 95 to 100%, with a mean of 97% agreement. The mean interobserver reliability agreement for each student across conditions was Jack, 97%; Kim, 95%; Bill, 97%, and Cody, 100%.

Procedural integrity measures verified the teachers' performance of providing the verbal request (i.e., "check you schedule"), administering verbal praise contingent on independent transitions, or implementing the 5 s, least to most prompting hierarchy continent on the performance of the student's behavior (i.e., unresponsive after 5 s or inappropriate target behaviors). The teacher used a scripted instructional lesson plan that described each step to be performed and under what circumstances. The procedural agreement level was calculated by dividing the number of observed teacher behaviors by the number of planned teacher behaviors and multiplying by 100 (Billingsley, White, & Munson, 1980). Procedural reliability ranged from 99 to 100%, with a mean of 99%. The mean procedural reliability agreement for each student across conditions was Jack, 100%; Kim, 100%; Bill, 99%, and Cody, 100%.

2. Results

Table 3 lists the number of independent transitions, number of assisted transitions, number of transitions, across baseline, static pictures and video modeling conditions for all students. As a group, students performed 17 (8.5%) independent transitions during baseline. When using the static picture schedule, students made 118 (69%) independent transitions. Students required assistance during 52 (31%) transitions during the static-picture schedule condition. When using the video modeling schedule, students made 124 (73%) independent transitions. Students required assistance during 46 (27%) transitions during the video modeling schedule condition. Three students reached criteria using the static picture schedule while two students reached criteria using the video modeling schedule. Bill reached criteria using both types of schedules.

Jack. Fig. 1 displays Jack's percentage of independent transitions using both schedules. The mean percentage of independent transitions during baseline was 2% ($n = 1$). Using the static picture schedule, Jack's independent transitions increased to 63% ($n = 25$). Jack required assistance during 38% ($n = 15$) of the transitions. Using the video modeling schedule, Jack's independent transitions increased to 65% ($n = 26$) and he performed 35% ($n = 14$) of the transitions with assistances. Since Jack reached criterion using the static picture schedule, the static-picture schedule was replicated. Jack continued to demonstrate 100% independent transition using the static-picture schedule.

Table 3
The number of independent transitions, number of assisted transitions, and the number of transitions across baseline, static pictures and video modeling schedules.

Students		Static pictures				Video modeling			
	BL	I	A	T	Met criterion	I	A	T	Met criterion
Jack	1	25	15	40	Yes	26	14	40	No
Kim	4	31	14	45	Yes	23	22	45	No
Bill	6	37	8	45	Yes	41	4	45	Yes
Cody	6	25	15	40	No	34	6	40	Yes
Overall	17	118	52	170	3	124	46	170	2

Note. BL = independent transition during baseline, I = independent transitions, A = assisted transitions, T = number of transitions during alternating schedule phase.

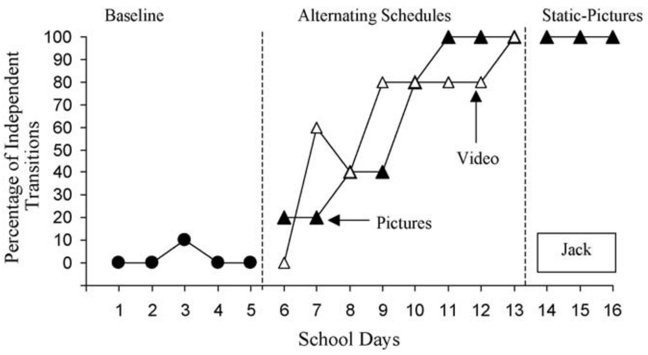

Fig. 1. Jack's percentage of independent transition using static picture and video modeling schedules.

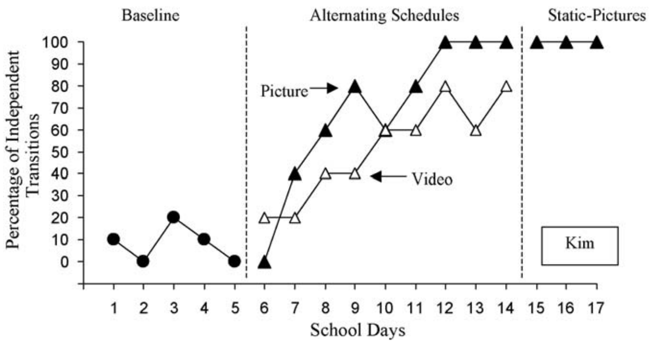

Fig. 2. Kim's percentage of independent transition using static picture and video modeling schedules.

Kim. Fig. 2 displays Kim's percentage of independent transitions using both schedules. The mean percentage of independent transitions during baseline was 8% ($n = 4$). Using the static picture schedule, Kim's independent transitions increased to 69% ($n = 31$). She required assistance during 14 transitions (31%) during the static-picture schedule condition. Using the video modeling schedule, Kim's independent transitions increased to 51% ($n = 26$) and she required assistances during 49% ($n = 22$) of the transitions. Since Kim reached criteria using the static picture schedule and fractionization of the data paths was observed, the static picture schedule was replicated. Kim continued to demonstrate 100% independent transition using the static picture schedule.

Bill. Fig. 3 displays Bill's percentage of independent transitions using both schedules. The mean percentage of independent transitions during baseline was 12% ($n = 6$). Using the static picture schedule, Bill's independent transitions increased to 82% ($n = 37$). Bill required assistances during eight transitions during the static-picture schedule condition. Using the video modeling schedule, Bill's independent transitions increased to 91% ($n = 41$) and he required assistances during 9% ($n = 4$) of the transitions. Bill reached criterion using both schedules. However, the video-modeling schedule was replicated because he fewer assisted transitions were observed. Bill continued to demonstrate 100% independent transition using the video modeling schedule.

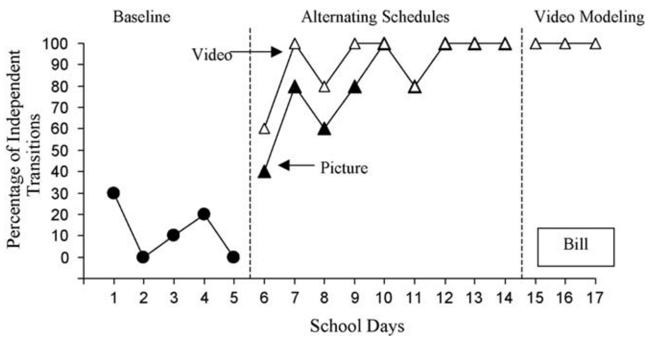

Fig. 3. Bill's percentage of independent transition using static picture and video modeling schedules.

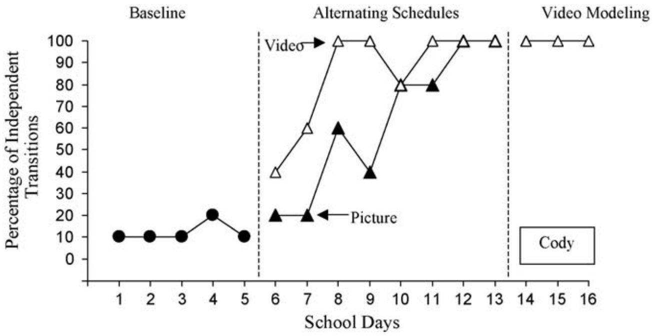

Fig. 4. Cody's percentage of independent transition using static picture and video modeling schedules.

Cody. Fig. 4 displays Cody's percentage of independent transitions using both schedules. The mean percentage of independent transitions during baseline was 12% ($n = 6$). Using the static picture schedule, Cody's independent transitions increased to 63% ($n = 25$). Cody required assistance during 38% ($n = 15$) of the transitions during the static picture schedule condition. Using the video-modeling schedule, Cody's independent transitions increased to 85% ($n = 34$) and he required assistances during 15% ($n = 6$) of the transitions. Since Cody reached criterion using the video modeling schedule, the video-modeling schedule was replicated. Cody continued to demonstrate 100% independent transition using the video modeling schedule.

3. Discussion

The purpose of this study was to investigate differential effects of static-pictures schedules and video modeling schedules for adolescences with ASD during transitional situations. The results support previous research establishing the use of static-picture activity schedules and video modeling to improve independent transitions for students with autism (e.g., Banda & Grimmett, 2008; Bryan & Gast, 2000; Buggey, 2005; Dettmer et al., 2000; Dooley et al., 2001; Massey & Wheeler, 2000; Scheuermann & Webber, 2002; Schreibman et al., 2000). Further, the data provide preliminary information on how the two different visual supports compare.

Bill and Cody each completed more independent transition with the video modeling schedule and required less assistance, one student (Kim) preformed better with static-picture schedules, and one student (Jack) performed similarly using both schedules. Bill performed four additional independent transitions and four fewer assisted transitions when using video modeling to transition from activity to activity. Similarly, Cody performed nine additional independent transitions and nine fewer assisted transitions when using video modeling to transition from activity to activity. However, Kim demonstrated a preference for using the static-picture schedule. She demonstrated eight additional independent transitions and made eight fewer assisted transitions using static pictures. For Jack, both schedules were equally effective and efficient.

Researchers have suggested that static-pictures and video modeling interventions were analogous when teaching students with moderate intellectual disabilities vocational skills (Alberto et al., 2005; Cihak et al., 2006). Alberto et al. and Cihak et al. noted that students with moderate disabilities and attention problems benefited from the brief-stationary focus of relevant features and the absence of motor distractions of the static picture prompts compared to video modeling.

Each student increased his or her number of independent transitions with both types of schedules and while the evidence from this study adds to the research base on environmental antecedent manipulations for students with autism, it also brings into focus the choices that teachers make when selecting an intervention. Drawing on a range of instructional strategies to meet the individual needs of students is a hallmark of special education (Fisher & Frey, 2001), evidence that indicates one intervention may be more powerful for one student versus another highlights the needs for teachers to make data based decisions as they monitor the effects of their intervention. In this case, the data revealed that some students demonstrated a preference (via better performance) with one particular intervention over another. The heterogeneity of these preferences should heighten educator's awareness of the need to be flexible and to incorporate a range of research based practices to address individual problems. While preferences for instructional strategies may vary between students, Taber-Doughty (2005) found that when comparing the effectiveness and efficiency of student- and teacher-preferred strategies, those selected by the student were considerably more effective and efficient for the student. Additional studies are needed to validate the value of student participation in choosing instructional methods.

Limitations. Despite all students making improvements with visual schedules, the underlying question in this study revolved around differential effects of intervention. Within the context of the alternating treatments design used here, one must cautiously consider the potential for multi-treatment interference and carryover effects. Though students engaged in different transitions in the morning compared to the afternoon and consistently used one type of support with a given set of transitions there are a lot of similarities in the basic topographies of transition that could have resulted in effects of one intervention influencing, or carrying over to effect the other intervention. In other words, as a student became successful at transitioning with one type of schedule, he or she may have generalized some of those behaviors to the other set of transitions. Unfortunately, logistics prevented the inclusion of a third set of transitions during the comparison phase that would have received no schedule support and could have been used to detect carryover (Wolery, Gast, & Hammond, 2010). Future researchers may wish to include this as a control set of behaviors during the comparison. In addition, because one set of behaviors (e.g. the morning set of transitions) always received the same schedule support, there is the possibility of cyclic variation. That is, data vary based on when it was collected and how much time elapsed since the last data collection.

Even with these limitations, the results suggest two important considerations for teachers: visual schedules are useful antecedent manipulations to improve transitioning and the incorporation of varied types of schedules may be useful and needed to help a heterogeneous population of students succeed. If two interventions work equally well or almost as well as one another, the teacher may make a choice based upon the amount of time, skill, and other resources required for one intervention versus the other. In this case, the static pictures may be less resource and time intensive than the video supports.

Future research. With evidence that picture schedules and video based schedules aide students with completing daily tasks, one of the next logical steps is to apply those supports in a wider range of environments (e.g. work settings, leisure, etc.) where students encounter greater distractions. While Carson, Gast, and Ayres (2008) have evaluated photographic activity schedules in work places, their participants did not have autism. Whether or not this would result in different outcomes is not possible to conclude; however, in environments outside of the classroom, students will encounter more distractions. With more noise and visual stimulation, students with autism may miss critical aspects of the video footage and find photographs easier to rely on as a support. Furthermore, additional studies are needed to validate the value of student participation in choosing instructional methods. Student performance using picture schedules and video based schedules and preferences selected may be attributed to the amount and quality of past experiences. Future studies need to investigate the impact of using the same or differing forms of schedules on student performance and preferences.

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