



## Digital Commons @ Assumption University

---

Education Department Faculty Works

Education Department

---

2018

### Effects of Parent Implemented Visual Schedule Routines for African American Children with ASD in Low-Income Home Settings

Samantha E. Goldman  
*Assumption College*, [s.goldman@assumption.edu](mailto:s.goldman@assumption.edu)

Carrie A. Glover  
*Vanderbilt University*

Blair P. Lloyd  
*Vanderbilt University*

Erin E. Barton  
*Vanderbilt University*

Maria P. Mello  
*Vanderbilt University*

Follow this and additional works at: <https://digitalcommons.assumption.edu/education-faculty>

 Part of the [Special Education and Teaching Commons](#)

---

#### Recommended Citation

Goldman, S. E.; Glover, C. A. ; Lloyd, B. P. ; Barton, E. E. ; and Mello, M. P. (2018). Effects of Parent Implemented Visual Schedule Routines for African American Children with ASD in Low-Income Home Settings. *Exceptionality: A Special Education Journal* 26(3): 162-175. <https://doi.org/10.1080/09362835.2017.1294984>

This Article is brought to you for free and open access by the Education Department at Digital Commons @ Assumption University. It has been accepted for inclusion in Education Department Faculty Works by an authorized administrator of Digital Commons @ Assumption University. For more information, please contact [digitalcommons@assumption.edu](mailto:digitalcommons@assumption.edu).

Effects of Parent Implemented Visual Schedule Routines

For African American Children with ASD in Low-Income Home Settings

Samantha E. Goldman<sup>1</sup>, Carrie A. Glover<sup>2</sup>, Blair P. Lloyd<sup>2</sup>, Erin E. Barton<sup>2</sup>, & Maria P. Mello<sup>2</sup>

<sup>1</sup> Assumption College, Department of Education,

<sup>2</sup> Vanderbilt University, Department of Special Education

Corresponding Author:  
Samantha E. Goldman, Ph.D., BCBA  
s.goldman@Assumption.edu  
Assumption College  
500 Salisbury St.  
Worcester, MA 01609

Acknowledgements: Support for this research was provided by the Office of Special Education Programs Grant for Leadership Training in High-Need Students with Severe Disabilities/Autism (H325D100010). We would also like to thank Dr. Robert Hodapp for his support on this study, as well as the participants themselves for the many hours during which they welcomed us into their homes.

### Abstract

Low-income, minority families are underrepresented in the literature on parent training for school-age children with ASD. Although the use of visual supports, such as visual schedules, is considered to be an evidence-based practice for children with ASD in school, it is not known whether this strategy is effective for minority, low-income families when implemented by the parent in the home setting. This study used a multiple-baseline across routines design replicated across two African American child-mother dyads to examine the effects of a parent-implemented visual schedule procedure on child independent schedule use and between-activity transitions. Parent participants were trained to implement a visual schedule intervention during home routines. Although a functional relation was demonstrated across routines for one mother-child dyad, results varied across participants, highlighting the importance of treatment fidelity. Implications for future research, including the challenges involved in parent-implemented interventions in low-income settings for minority children with ASD, are addressed.

*Keywords:* autism spectrum disorder, parent implementation, routine, visual schedule

## Effects of Parent-Implemented Visual Schedule Routines

### For African American Children with ASD in Low-Income Home Settings

The core deficits associated with autism spectrum disorder (ASD) often result in a need for high levels of support to acquire and generalize new skills and complete tasks independently. Many evidence-based instructional practices have been identified for children with ASD to address these goals (Wong et al., 2015). In particular, antecedent strategies, such as environmental modifications, have been effective for promoting independence in children with ASD by creating structure and predictability within routines (Wong et al., 2015). In the home, parents can embed naturally occurring learning opportunities during structured daily routines using environmental modifications (McCollum & Yates, 1994). For example, mealtimes and bedtimes might be naturally occurring opportunities to increase independence using this strategy.

Visual schedules are a commonly used environmental modification for facilitating independent engagement within routines for children with ASD. This strategy builds on the visual strengths of many children with ASD (Ganz, 2007) to facilitate independence (Banda, Grimmer, & Hart, 2009; MacDuff, Krantz, & McClannahan, 1993). These visual schedules can be either “within-activity,” to teach the steps of a single activity or routine, or “between-activity,” to support transitions between distinct activities or routines (Ganz, 2007). There is strong empirical support for the use of visual schedules to increase task engagement and completion in children with ASD (Banda, Grimmer, & Hart, 2009; Ganz, 2007) across ages and levels of intellectual functioning (Koyama & Wang, 2011). Additionally, parents can be taught to successfully use visual schedules at home with their children with disabilities (Johnson et al., 2007; Marshall & Mirenda, 2002).

Although many studies have shown the efficacy of parent-implemented interventions for

children with ASD (Odom, Collet-Klingenberg, Rogers, & Hatton, 2010), few have included families from diverse racial backgrounds or socioeconomic status (SES; Cheremshynski, Lucyshyn, & Olson, 2013). In a recent review on evidence-based practices for learners with ASD, West and colleagues (2016) identified a limited representation of participants from diverse racial and ethnic backgrounds. Further, research suggests that family members of children with ASD experience more stress than parents of typically developing children *and* parents of children with other disabilities (Hayes & Watson, 2013). This strain on families can be intensified for those who also experience poverty, given its added stressors. Low levels of engagement in parent training due to stressors related to experiencing poverty can impact implementation fidelity (Lau, 2006), intervention effectiveness (Post, Cegala, & Marinelli, 2001), and skill generalization. The additional stressors associated with poverty might complicate and interfere with intervention effectiveness for families of children with ASD (Corr, Santos, & Fowler, 2015; Forehand & Kotchik, 2002).

Further confounding the issue is the potential for inadequate cultural fit between prescribed interventions and families from diverse backgrounds. Inadequate cultural fit can relate to diverse interpretations of disability, different coping and interaction styles, and limited access to information (Harry, 2002), which can negatively impact intervention effectiveness. Specific to African American families, a ‘cultural clash’ between African American parents and the broader special education system has been recognized (Boyd & Correa, 2005), yet there is a lack of empirical research to identify evidence-based strategies to address these challenges. Turnbull, Blue-Banning, Turbiville, and Park (1999) suggested that by developing better parent-professional partnerships, professionals might acquire a clearer understanding of the values and cultural norms of families from diverse backgrounds that should be considered when planning

interventions. If interventions are driven by individual family needs that fit within the lifestyle, culture, and existing routines, parents are more likely to consistently apply the learned skills (Dunlap & Fox, 2007). This concept of *contextual fit* refers to the compatibility between an intervention plan and characteristics of the family and environment (Albin et al., 1996).

Overall, there are many challenges to parent training and it is not known whether specific practices are best matched with certain interventions or populations of families (Barton & Fetting, 2013). Further, there is evidence that parents from low-income and minority backgrounds experience greater exclusion from decision-making processes in planning and implementing interventions (Harry, Grenot-Scheyer, Smith-Lewis, & Park, 1995). One promising remedy to these barriers might be using family-centered problem solving before an intervention is implemented, which might help minority families to become more active stakeholders in their children's program (Argus-Calvo, Tafoya, & Grupp, 2005). However, additional research with minority families of children with ASD is needed to examine the benefits of parent-professional collaboration and culturally sensitive, evidence-based interventions with strong contextual fit. In the current study, we trained mothers of two school-age African American children with ASD to implement visual schedules in their home settings following a collaborative process of identifying and structuring home routines. We addressed the following research question: What are the effects of parent implemented visual schedule procedures on independent schedule use and between-activity transitions for two school-age African American children with ASD in low income home settings?

## **Method**

### **Participants**

Over an 8-month period of recruitment through community disability networks and public schools, we recruited two school-age children with ASD and their mothers to participate in this study. Two graduate students in special education implemented the study procedures, each with one mother-child dyad. Both children and mothers were African American and lived in the same southeastern city. Child participants met the following inclusion criteria: (a) educational eligibility of ASD according to school records, (b) between the ages of 5 and 12, (c) eligible for free/reduced lunch based on federal income eligibility guidelines (United States Department of Agriculture [USDA], 2014), (d) member of a minority ethnic or racial group as defined by the US Census Bureau, (e) demonstrated picture-object correspondence through a matching or labeling task, and (f) engagement in problem behaviors or a need for support when transitioning between activities during specified routines (based on parent report during an initial screening interview). Participants were excluded from the study if they were currently using a visual schedule in the home setting during a routine.

Anthony was a 10-year-old, minimally verbal male. He occasionally communicated using gestures and word approximations, but predominantly responded to verbal prompts from his mother. Anthony initially attended a self-contained classroom in a public middle school, but during the course of the study, transitioned into a regular education classroom with the assistance of a paraprofessional. Anthony received speech and occupational therapy (OT) services at school but no home based services. Based on school assessments, he had a standard score on the Adaptive Behavior Assessment System (Harrison & Oakland, 2003) of 40. Anthony's mother, Aliyah, was his primary caregiver. She was a 34-year-old African American, single female with two of her three children living with her: Anthony and his 2-year-old sister. Aliyah was a financial analyst with an annual income that qualified their household for free/reduced lunch

(i.e., less than \$36,131 for a family of three in 2014; USDA, 2014).

Shanesha was a 6-year-old female who attended a local public school and received special education services in a regular education classroom. She was verbal and worked at grade level for all academic subjects, according to the Woodcock Johnson III Tests of Cognitive Abilities (McGrew & Woodcock, 2001). She received one-on-one paraprofessional support in the classroom and OT once per week but no home based services. Shanesha's mother, Suzanne, was married and had four children. Shanesha's three adult brothers continued to live at home with their family. The family was supported financially by Shanesha's father, a grocery store manager, who earned approximately \$30,000 annually, which was below the federal poverty level for a family of six (United States Department of Health & Human Services [DHHS], 2014).

### **Setting and Materials**

The study took place in the participants' homes in the context of targeted routines and corresponding settings. Anthony's routines were completed in the dining area, bathroom, and bedroom. Shanesha's routines were completed in the kitchen, dining area, bathroom, and living room. Occasionally, other family members or friends were present or arrived at the home during a routine, but they did not interact with participants during study activities.

The family's materials were used to the extent possible for routines, but we provided materials as necessary. For example, both mothers requested supplementary homework activities. In addition, we provided craft activities for Shanesha's leisure routine and an organizational system for Anthony's homework routine to minimize costs for the families.

Both mothers were provided with printed explanations of intervention procedures for each routine. These included summaries of prompting procedures and routine-specific activity steps, which were accessible during intervention sessions. Visual schedules were individualized



based on each child's level of functioning and parent input. Anthony's visual schedule was green on the left side, where three pictures were located at the start of the routine; after activity completion, each picture was moved to the right side, which was colored red and labeled "done." This type of visual schedule was chosen by Aliyah because of its color cues and simplicity. Shanesha's visual schedule consisted of a vertical strip of paper with five velcroed photos of Shanesha with task materials and corresponding text. She also was provided with an "all done" box in which to place visual schedule photos after completing each corresponding activity.

A paper and pencil data collection method was used to collect data on all variables. Aliyah was not comfortable being recorded in her home; therefore, we collected data in situ for Anthony. With family permission, we video-recorded Shanesha's sessions and collected data from video recordings.

### **Response Definitions and Recording Procedures**

**Routines.** Each target routine was chosen based on collaboration with the parent and our initial observations in the home. We asked Aliyah and Suzanne basic questions about their child's existing routines and areas of need (i.e., "Are there certain times of the day when problem behaviors are more likely?" "Are there particular times of the day when you would like to build routines for your child?"). We then conducted observations of the typical activities that occurred at these parent-identified times of day. Based on both sources of information, we selected three target routines per child-parent dyad and collaboratively developed corresponding activities for each routine. After discussing these activities, we provided a written list of suggested routines and corresponding activities to obtain feedback from the parent and make any requested changes. Anthony's target routines included homework, dinner, and bedtime. Aliyah and the researchers identified three activities for each of Anthony's routines (see Table 1). Although a dinner routine

was initially planned, due to time constraints, the intervention was not introduced in this routine. Further, after an extended baseline in the bedtime routine, we added an activity to this routine (i.e., putting on Vaseline) per Aliyah's request. This change was implemented in Session 31 prior to introducing the visual schedule procedure in the bedtime routine. Shanesha's target routines included homework, leisure, and bedtime. Suzanne wanted to prioritize transitioning from more preferred activities (e.g., iPad) to less preferred activities (e.g., going to the bathroom). Based on Shanesha's reported and observed level of functioning, Suzanne and the researcher collaboratively defined five steps per routine (see Table 1).

**Independent schedule use.** Anthony's independent correct schedule use was recorded for each of the following steps for all three activities in the routine if Anthony completed the step without prompting from Aliyah: (1) move to within 2 ft of the schedule and look at the schedule, (2) move to the correct area and gather correct materials, (3) initiate task completion (i.e., on-task behaviors), (4) after putting away completed activity/materials, move to within 2 ft of the schedule and look at the schedule, (5) remove correct visual from schedule, and (6) place visual in the correct location on the "All Done" side. Following each session, the number of steps completed independently was divided by the total number of steps and multiplied by 100 to compute a percentage of independent schedule use. Data on this variable were not collected for Shanesha because this was not identified as an area of need.

**Between-activity transitions.** Data on independent between-activity transitions were recorded for both participants. For Anthony, these transitions included completion of the following two steps for each of the three activities per routine: (a) moving to the correct area and retrieving the correct materials and (b) initiating the task (i.e., on-task behavior). For Shanesha, the independent transition to each of the five steps per routine was individually defined to

capture retrieving the correct materials and initiating each activity. Across participants, the number of steps completed independently was divided by the total number of transition steps (i.e., a total of five steps for Shanisha and six steps for Anthony) and multiplied by 100 to compute a percentage of independent between-activity transitions per session.

### **Procedural Fidelity**

The trainers (first and second authors) self-reported implementation fidelity data during the initial parent training sessions using a checklist with 11 steps (available from authors upon request). Implementation fidelity was 100% for all routines across participants. Trained data collectors measured intervention fidelity during each session. For both participants, intervention components included: (a) all materials needed for routine completion are present; (b) caregiver provides direction specific to the routine (e.g., “Time to do homework.”); (c) visual schedule is prepared for use (i.e., all pictures reset in correct location) before beginning routine; (d) visual schedule materials are visible and accessible to the child (i.e., on table or wall within arm’s reach); and (e) least-to-most prompting procedure is used correctly by caregiver. The presence of components a-b and the absence of components c-e also were measured during baseline. For Anthony and Aliyah, we included three additional fidelity components based on initial observations and parent preference: (a) child is in correct location when caregiver provides direction to initiate routine; (b) caregiver is present throughout routine; and (c) token is given at completion of routine. We computed a total fidelity percentage per session by dividing the number of steps implemented correctly by the total number of steps and multiplying by 100. A separate percentage was calculated for independent fidelity and prompted fidelity for Aliyah because we provided frequent coaching, as necessary, to maximize fidelity (see Table 2).

Given researcher prompts, Aliyah’s average intervention fidelity was 66.7% (range, 33%-

88%) in the homework routine and 43.6% (range, 38%-71%) in the bedtime routine. As shown in Table 2, Aliyah independently implemented certain components across routines (e.g., keeping the visual schedule visible and accessible). She followed researcher prompts to implement additional components in 70% - 80% of sessions. However, critical components (e.g., correctly using the least-to-most prompting procedure, being present for the duration of the routine) were less often implemented accurately. For Suzanne, intervention fidelity averaged 100% in the homework routine, 93.8% in the leisure routine (83%-100%), and 100% in the bedtime routine. IOA on intervention fidelity, assessed using a point-by-point method and collected in at least 33% of sessions by a trained, independent coder, was 91% for Suzanne and 90% for Aliyah.

### **Experimental Design**

A multiple baseline across routines design was planned for both dyads to evaluate the effectiveness of the visual schedule procedure. The criterion for introducing the visual schedule intervention to a new routine was three consecutive sessions with 100% independence. After observing unexpectedly low percentages of independent schedule use in the homework routine for Anthony, we modified his criterion to changes in level and trend as compared to the previous baseline condition. To provide additional opportunities for demonstrations of effect, we then implemented an A-B-A-B withdrawal design in the homework routine. Due to time constraints, the intervention was not introduced in Anthony's third tier (i.e., dinner routine).

### **Procedures**

Sessions were conducted 1 - 3 days per week for approximately two hours between 4:30 and 7:30 pm, depending on the participants' schedules and efficiency in completing routines.

**Initial observations.** After obtaining consent, we conducted between three and five initial observations and planning sessions in person or over the phone with each participant dyad.

The purpose of these initial observations was to (a) confirm inclusion criteria, (b) discuss potential target routines and activities with the caregiver, (c) observe typical home activities, (d) desensitize the child-parent dyads to our presence in the home, and (e) train data collectors to criterion. These initial observation and planning sessions lasted between 30 minutes and 2 hours, depending on parent availability and readiness. The semi-structured interview protocol is available from the authors upon request. During the final home visit before beginning baseline data collection, we consulted with Aliyah and Suzanne to finalize routines.

**Baseline.** During baseline sessions, we instructed Aliyah and Suzanne to help Anthony and Shanisha complete the pre-determined steps of each routine that had been listed and printed for them as they typically would, without further instruction.

**Parent training.** Between the last baseline session and the first intervention session in each routine, we conducted one 30-min training session on intervention procedures. We provided Aliyah and Suzanne with copies of prompting procedures, the instruction for the onset of routines (e.g., “Time for homework”), and routine steps to be completed by the child. We also verbally explained each intervention component and modeled the steps using each child’s visual schedule. At the conclusion of the training, we asked Aliyah and Suzanne to complete a practice walk-through of the intervention procedures and we provided performance-based feedback. We conducted a re-training session with Aliyah for the homework routine after observing a return to near-baseline levels of intervention fidelity and independent schedule use (Session 16), which followed a 3.5 week break in sessions due to a sudden death in Aliyah’s family.

**Intervention.** Following the initial parent training session, we began data collection in the intervention condition as Aliyah and Suzanne implemented the visual schedule procedure. The intervention consisted of the parent-implemented visual schedule with a least-to-most

prompting procedure for schedule use. Least-to-most prompting was chosen based on parent preference (i.e., Aliyah's desire to avoid physical prompts). Further, observations indicated that physical prompts were aversive to Anthony, and he was verbal prompt dependent. Although most-to-least prompting and graduated guidance have been used successfully to teach visual schedule use (MacDuff et al., 1993), least-to-most prompting was chosen as the instructional procedure, given that least-to-most prompting reduces the likelihood of needing the controlling prompt (i.e., physical prompt) and uses clearly identified prompts. Conversely, most-to-least prompting begins with the controlling prompt (i.e., physical prompt), which was a known aversive for Anthony; graduated guidance uses less clear and structured prompts, which might be difficult for parents to discern. We used the following prompt hierarchy to avoid verbal prompts for Anthony: (1) gestural prompt, (2) light physical prompt, and (3) full physical prompt. Both verbally and in writing, we explicitly instructed Aliyah to avoid verbal prompts. Intervention procedures for Anthony also included a token board based on Aliyah's request. The token boards were separate for each routine, and Anthony earned one token at the completion of each routine. Upon earning ten tokens, Anthony was given the choice between preferred objects or activities identified by Aliyah. Suzanne used the following prompting hierarchy: (a) verbal prompt, (b) gestural prompt, (c) model prompt, and (d) physical prompt; we did not observe verbal prompt dependence for Shanesha either before or during the study.

***Coaching.*** Throughout the intervention condition, we provided coaching to facilitate Aliyah's and Suzanne's fidelity. Coaching procedures included verbal reminders of specific fidelity components before beginning the routine (e.g., "Remember to provide a delay before prompting Anthony") and prompts when possible during the routine (e.g., immediately before a particular routine step, reminding Aliyah to gesture to the visual schedule and avoid providing a

verbal prompt). We chose the components based on observed fidelity errors during previous opportunities. In addition, we provided performance-based feedback immediately after each routine to highlight instances of correct implementation and three or fewer fidelity errors. We also modeled specific intervention components when requested and shared graphs of dependent variables to show progress and collaboratively make data-based decisions.

**Withdrawal.** For Anthony, the visual schedule procedure was withdrawn from the homework routine to evaluate whether independent schedule use would return to baseline levels. After the last session in the first intervention condition, we physically removed the visual schedule from the home to ensure that it was not used during the withdrawal condition. No coaching was provided for the parent in this condition, other than reminders of why and for how long the visual schedule procedure would be removed.

**Maintenance.** We conducted probes one to four weeks after the final intervention session in each tier to assess maintenance of independent schedule use as an objective measure of social validity (Kennedy, 2002). For Anthony, due to time and scheduling constraints, one probe was collected in each routine two to three weeks after the final intervention session. For Shanisha, one probe was collected weekly for a month after mastery criterion was reached.

### **Inter-Observer Agreement**

For each participant, IOA data were collected by an independent, trained observer during at least 33% of sessions for all routines, distributed across conditions. Due to the nature of the intervention, observers were unable to be blind to condition. IOA was calculated using a point-by-point method, by dividing the total number of agreements by the number of agreements plus disagreements, and multiplying by 100. If IOA dropped below 80%, data collectors participated in supplemental training meetings to discuss disagreements, review operational definitions, and

identify additional examples and non-examples. As shown in Table 3, average IOA was in an acceptable range (i.e., >80%) across participants, conditions, and routines.

### **Social Validity**

At the end of intervention data collection, a modified version of a goodness-of-fit survey (Albin et al., 1996) was used to measure the mothers' perceptions of implementation, contextual fit, and sustainability of the intervention. The measure consisted of 20 items rated on a scale from 1 (*not at all*) to 5 (*very well/very much*). Overall, both Aliyah and Suzanne reported high goodness-of-fit for the parent-implemented intervention, with Aliyah providing an average rating of 4.60 in both routines and Suzanne providing a rating of 4.75 across routines.

## **Results**

### **Anthony**

As shown in Figure 1, Anthony's baseline percentage of independent schedule use and between-activity transitions was stable at 0% in the homework routine. After introduction of the intervention, both independent schedule use and independent transitioning increased in level and variability, with an initial accelerating trend. Percentage of independent schedule use ranged from 6% to 47% of steps in the intervention phase. Data on independent transitions were also highly variable in the intervention phase, ranging from 0% to 67% independence. For both dependent variables, after the 3.5 week break in sessions between Sessions 15 and 16 (i.e., sudden death in the family), percentage of independence returned to a low level, followed by continued variability. During the withdrawal condition, percentage of independent schedule use and independent transitions immediately returned to baseline levels, with only one data point overlapping with the initial intervention condition. When the intervention was re-introduced, the change in level and variability was replicated, with independent schedule use and transitioning



reaching similar levels as in the first intervention phase and in the maintenance probe.

After an extended baseline in the bedtime routine, we modified routine activities based on a request by Aliyah. Even after this modification, baseline levels stayed within the same range of variability as earlier baseline data on original bedtime routine activities (i.e., median of 17% of schedule use steps completed independently and highly variable independent transitions, ranging from 0% to 50%). Given these baseline data, the visual schedule procedure was then introduced in the bedtime routine. Upon introduction of the intervention, there was an immediate change in the level of independent schedule use, but a decelerating trend over the next four sessions; data on between-activity transitions also demonstrated an immediate change in level, which then stabilized at 23% independence in the last three sessions. Four out of five data points for independent transitions in the intervention phase overlapped with the prior six baseline data points on the modified activities. Maintenance probes demonstrated an increase to 60% of schedule use steps and 50% of between-activity transitions.

### **Shanesha**

The results of Shanesha's independent transitions are displayed in Figure 2. After five baseline sessions, data in the homework routine were stable at 60% for three consecutive sessions, so intervention was introduced in this routine. With the introduction of the visual schedule procedure in the homework routine, there was an immediate change in level to 80% independence, with an accelerating trend followed by stable data at 100% independence for three sessions. Once this criterion was met, the visual schedule procedure was implemented in the leisure routine. Following some sessions that overlapped with baseline levels, Shanesha's independent transitioning demonstrated an accelerating trend, followed by 100% independence for three consecutive sessions. Suzanne then introduced the visual schedule procedure in the

bedtime routine, resulting in an immediate change in level of independent transitions from 20% in baseline to 80% in intervention. However, this increase was followed by a decrease in session 17 across all routines, during which Shanesha exhibited non-compliance in schedule use. Before beginning the next session, Suzanne was reminded to provide behavior specific praise during all subsequent sessions only when Shanesha completed a transition independently. Following this reminder, Shanesha's independent transitions immediately increased to 100% in the bedtime routine and stabilized at that level for the next three consecutive sessions. Performance in the homework and leisure routines stabilized at 100% independence by the final two sessions. Maintenance probes across four sessions demonstrated that Shanesha continued to use the visual schedule to independently transition for 80%-100% of steps in the homework and leisure routines. In the bedtime routine, the intervention was implemented for the fewest number of sessions, and Shanesha independently transitioned for 60%-100% of steps across sessions.

### **Discussion**

The purpose of this study was to evaluate whether a parent-implemented visual schedule procedure would increase independent schedule use and between-activity transitioning for two African American school-age children with ASD in low-income home settings. This investigation presents mixed evidence for the use of this parent-implemented intervention for children with ASD in the home. A functional relation was demonstrated for Shanesha and Suzanne with stability over time for two of the three routines (i.e., homework and leisure). However, results were less clear for Anthony and Aliyah. We interpreted Anthony's data to indicate a functional relation between the parent-implemented visual schedule use and between-activity transitions in the homework routine, although levels were lower and more variable than expected; no functional relation was demonstrated in the bedtime routine. Although the

maintenance probes suggested a percentage of independence that was stable over time, Anthony did not demonstrate independent schedule use and Aliyah did not implement the intervention with fidelity. Thus, parents might use visual schedules effectively to increase independence in their children, but challenges to implementation must be addressed (Allen & Warzak, 2000).

It is clear that additional research is needed with diverse, school-age participants with ASD to better understand how to provide support to families from diverse backgrounds, especially given that most research on evidence-based practices has been conducted with White, middle-class families (West et al., 2016). Other than the current study, we are aware of only one study to date on parent-implemented visual schedules conducted in the home with a parent from a minority background (Cheremshynski et al., 2013). Although ASD occurs equally across racial and cultural groups (Fombonne, 2003), research has not represented this level of diversity (Carr & Lord, 2012), which relates to other disparities for African American children with ASD. For example, African American children with ASD are diagnosed at older ages (Liptak et al., 2008) and receive fewer hours of treatment (Carr & Lord, 2012) than White children. However, historical and cultural challenges exist in recruiting African American participants for research, and care must be used in taking culturally sensitive approaches to research with minority groups (Tillman, 2002), especially for studies examining parent implemented interventions.

Given our participants' racial and economic backgrounds and the lack of research in this area, our study further extends the literature on effective parent-implemented practices for school-age children with ASD by using a collaborative approach to planning and decision-making to maximize contextual fit. A growing body of research has addressed the need for collaboration with parents in assessing ecological factors in the home and working with families to plan interventions within already established home routines. These studies often use a semi-

structured interview to assess ecological factors, such as caregiving demands, family support, and daily routines (Moes & Frea, 2002). Because this study similarly addressed the need for collaboration and assessing ecological factors, it was important for the parent to feel respected as a partner in the decision-making process and to feel comfortable with and in agreement with intervention procedures. To accomplish this, we honored Suzanne's and Aliyah's requests when possible (e.g., inclusion of token board component or changing steps of a routine when requested), and all components of the intervention were planned and approved collaboratively. Though likely contributing to the high levels of goodness-of-fit reported by Suzanne and Aliyah, this collaborative approach may have resulted in a less effective intervention package and contributed to low levels of control over confounding variables in the home, especially for Anthony and Aliyah. Unfortunately, this is a common challenge of interventions that are implemented in the home setting by parents. Although ecological validity is high, additional threats to internal validity may be introduced. More research is needed to better understand how to balance contextual fit with evidence-based, standard practices when implemented in the home.

An additional contribution of this study is the inclusion of both implementation fidelity and intervention fidelity data. We considered not only how well the parents implemented the visual schedule procedure (i.e., intervention fidelity), but also how our initial training functioned to support Aliyah and Suzanne in doing so (i.e., implementation fidelity; Barton & Fettig, 2013). Clear reporting of both types of procedural fidelity is necessary to better understand the effectiveness of parent-implemented intervention procedures. In a recent review on parent-implemented interventions for children with disabilities, Barton and Fettig (2013) found that less than half of studies reported measuring implementation fidelity. Thus, this study adds to the field by addressing the importance of both types of procedural fidelity and providing clear procedures

that can be systematically replicated in future research, while highlighting the need for a better understanding of contingencies that relate to parent intervention fidelity and treatment adherence for families in homes with many potential challenges (Allen & Warzak, 2000).

### **Limitations and Future Research**

This study had several limitations. First, although both participant dyads fit our inclusion criteria, some participant differences should be acknowledged. The child participants themselves varied in their language and communication levels and academic functioning. Shanesha was younger than Anthony but had greater reading, communication, and daily living skills. Anthony did not have an effective system of communication. His level of academic functioning was unclear, and he required significant support in completing daily living skills. These participant differences likely contributed to differences in results. To address this limitation, additional research with participants similar to Shanesha is needed before generalizing our findings to a broader span of the autism spectrum. For example, child participants should demonstrate a pre-requisite level of independence on within-activity tasks and should possess functional receptive and expressive communication skills (with or without an assistive device). These requirements, beyond the basic inclusion criterion of picture-object correspondence used in this study, may produce replications that would support Shanesha's results.

Further, although both interventions were implemented in low-income household settings, differences across participants also existed with respect to this criterion. Shanesha was the youngest of her siblings, and her mother stayed home to address her needs while her father supported the family. In contrast, Aliyah was a single mother working multiple jobs who also cared for Anthony's younger sister. These differences might have contributed to additional confounding factors in Anthony's home. Even though Aliyah reported high levels of contextual

fit, a more intensive treatment with additional family-focused support might have increased her adherence to the procedures. For example, a more thorough training focusing on the functions of behaviors and communication training or “wrap-around” services with a focus on building support networks may have better matched the level of support they needed.

An additional explanation for the differences in results across participants relates to intervention fidelity. Although Suzanne consistently implemented the visual schedule procedure with close to 100% fidelity, Aliyah did not consistently implement the procedures. Specifically, Aliyah often used verbal prompts despite training and coaching efforts to the contrary. Future research should address additional strategies for supporting parent implementation of visual schedule interventions. For example, the child’s use of the visual schedule might be initially taught in a controlled environment, such as a classroom or clinic, and then generalized to the home setting with the parent. Likewise, other prompting procedures (e.g., most-to-least) that have been validated in other studies on visual schedules might be used if they are acceptable to the family. Different coaching practices, such as self-video modeling or self-monitoring checklists, might also be effective for supporting parents’ implementation. Such strategies may establish contingencies that strengthen parent adherence and improve intervention fidelity (Allen & Warzak, 2000).

Future research also should examine measures of contextual fit and how this construct might relate to parent adherence and intervention fidelity. Despite Aliyah’s self-reported high levels of contextual fit, she did not implement the intervention procedure with sufficient fidelity. To address this type of research question, some studies have compared standard, “prescriptive” treatment conditions to “contextualized” treatment conditions with regard to the stability and maintenance of treatment effects (Moes & Frea, 2000, 2002). Such studies represent one way to

evaluate potential benefits of modifying standardized best practices to enhance contextual fit. Though we believe Anthony would have acquired the skill of independent schedule use had the least-to-most prompting procedure been implemented with fidelity, a different prompting procedure that did include verbal prompts might have led to higher levels of fidelity, albeit slower rates of skill acquisition. Although not consistent with our knowledge of best practices (e.g., avoiding the use of verbal prompts to decrease prompt dependence), such modifications that better address family culture and contextual fit are worthy of investigation.

Finally, although this study focused on a parent-implemented intervention with families living in low-income households, federal poverty guidelines set extreme poverty for a family of three at less than \$19,790 annually (DHHS, 2014). Given the considerable challenges experienced by our participants, who lived in single income households, future research should examine effective strategies for supporting school-age children with ASD and their families living in extreme poverty or households with additional environmental risk factors.

### **Conclusion**

The present study demonstrated the impacts and challenges of a parent-implemented visual schedule procedure to increase the independence of African American, school-age children with ASD living in low-income households. Continued research in this area is critical to inform how to best support parent implemented interventions to improve outcomes for *all* children with ASD, including those from under-represented backgrounds.

## References

- Argus-Calvo, B., Tafoya, N., & Grupp, L. (2005). Prereferral: A time to empower culturally and linguistically diverse families through a family-centered approach. *Multiple Voices for Ethnically Diverse Exceptional Learners*, 8, 71-83.
- Albin, R. W., Llucyshyn, I. M., Horner, R. H., & Flannery, K. B. (1996). Contextual-fit for behavioral support plans: A model for "goodness-of-fit." In L. K. Koegel, R. I. Koegel, & G. Dunlap (Eds.), *Positive behavioral support: Including people with difficult behavior in the community* (pp. 81-98). Baltimore: Brookes.
- Allen, K. D., & Warzak, W. J. (2000). The problem of parental nonadherence in clinical behavior analysis. *Journal of Applied Behavior Analysis*, 33, 373-391.
- Banda, D. R., Grimmert, E., & Hart, S. L. (2009). Activity schedules: Helping students with autism spectrum disorders in general education classrooms manage transition issues. *Teaching Exceptional Children*, 41, 16-21.
- Barton, E. E., & Fettig, A. (2013). Parent-implemented interventions for young children with disabilities: A review of fidelity features. *Journal of Early Intervention*, 35, 194-219.
- Boyd, B. A., & Correa, V. I. (2005). Developing a framework for reducing the cultural clash between African American parents and the special education system. *Multicultural Perspectives*, 7, 3-11.
- Carr, T. & Lord, C. (2012). Longitudinal study of perceived negative impact in African American and Caucasian mothers of children with autism spectrum disorder. *Autism*, 17, 405-417.
- Cheremshynski, C., Lucyshyn, J. M., & Olson, D. L. (2013). Implementation of a culturally appropriate positive behavior support plan with a Japanese mother of a child with autism. *Journal of Positive Behavior Interventions*, 15, 242-253.



- Corr, C., Santos, R. M., & Fowler, S. A. (2015). The components of Early Intervention Services for families living in poverty: A review of the literature. *Topics in Early Childhood Education*. Advanced online publication. doi: 10.1177/0271121415595551
- Dunlap, G., & Fox, L. (2007). Parent-professional partnerships: A valuable context for addressing challenging behaviours. *International Journal of Disability, Development, and Education*, 54, 273-285.
- Fombonne, E. (2003). Prevalence of autism. *American Journal of Medical Genetics*, 289, 87-89.
- Forehand, R., & Kotchick, B. A. (2002). Behavioral parent training: Current challenges and potential solutions. *Journal of Child and Family Studies*, 11, 377-384.
- Ganz, J. B. (2007). Classroom structuring methods and strategies for children and youth with autism spectrum disorders. *Exceptionality*, 15, 249-260.
- Harry, B. (2002). Trends and issues in serving culturally diverse families of children with disabilities. *The Journal of Special Education*, 36, 132-140.
- Harry, B., Grenot-Scheyer, M., Smith-Lewis, M., & Park, H. S. (1995). Developing culturally inclusive services for individuals with severe disabilities. *Journal of the Association for Persons with Severe Handicaps*, 20, 99-109.
- Harrison, P. L., & Oakland, T. (2003). *Adaptive Behavior Assessment System*. Minneapolis, MN: Pearson Assessment.
- Hayes, S. A., & Watson, S. L. (2013). The impact of parenting stress: A meta-analysis of studies comparing the experience of parenting stress in parents of children with and without autism spectrum disorder. *Journal of Autism and Developmental Disorders*, 43, 629-642.
- Johnson, C. R., Handen, B. L., Butter, E., Wagner, A., Mulick, J., Sukhodolsky, D. G., ... Smith, T. (2007). Development of a parent training program for children with pervasive

- developmental disorders. *Behavioral Interventions*, 22, 201-221.
- Kennedy, C. H. (2002). The maintenance of behavior change as an indicator of social validity. *Behavior Modification*, 26, 594-604.
- Koyama, T., & Wang, H. (2011). Use of activity schedule to promote independent performance of individuals with autism and other intellectual disabilities: A review. *Research in Developmental Disabilities*, 32, 2235-2242.
- Lau, A. S. (2006). Making the case for selective and directed cultural adaptations of evidence-based treatments. *Clinical Psychology and Practice*, 13, 295-310.
- Liptak, G. S., Benzoni, L. B., Mruzek, D. W., Nolan, K. W., Thingvoll, M. A., Wade, C. M., & Fryer, G. E. (2008). Disparities in diagnosis and access to health services for children with autism. *Journal of Developmental & Behavioral Pediatrics*, 29, 152-160.
- MacDuff, G. S., Krantz, P. J., & McClannahan, L. E. (1993). Teaching children with autism to use photographic activity schedules. *Journal of Applied Behavior Analysis*, 26, 89-97.
- Marshall, J. K., & Mirenda, P. (2002). Parent-professional collaboration for positive behavior support in the home. *Focus on Autism and Other Developmental Disabilities*, 17, 216-228.
- McCollum, J. A., & Yates, T. J. (1994). Dyad as focus, triad as means: A family-centered approach to supporting parent-child interactions. *Infants & Young Children*, 6, 54-63.
- McGrew, K. S., & Woodcock, R. W. (2001). *Woodcock- Johnson III*. Itasca, IL: Riverside.
- Moes, D. R., & Frea, W. D. (2000). Using family context to inform intervention planning for the treatment of a child with autism. *Journal of Positive Behavior Interventions*, 2, 40-46.
- Moes, D. R., & Frea, W. D. (2002). Contextualized behavior support in early intervention for children with autism. *Journal of Autism and Developmental Disorders*, 32, 519-533.

Odom, S. L., Collet-Klingenberg, L., Rogers, S. J., & Hatton, D. D. (2010). Evidence-based practices in interventions for children and youth with autism spectrum disorders.

*Preventing School Failure, 54*, 275-282.

Post, D. M., Cegala, D. J., & Marinelli, T. M. (2001). Teaching patients to communicate with physicians: The impact of race. *Journal of the National Medical Association, 93*, 6-12.

Tillman, L. C. (2002). Culturally sensitive research approaches: An African American perspective. *Educational Researcher, 31*, 3-12.

Turnbull, A. P., Blue-Banning, M., Turbiville, V., & Park, J. (1999). From parent education to partnership education. *Topics in Early Childhood Special Education, 19*, 164-172.

United States Department of Agriculture. (2014). *School Meals: Income Eligibility Guidelines*.

Retrieved from <http://www.fns.usda.gov/school-meals/income-eligibility-guidelines>

United States Department of Health & Human Services. (2014, January 22). *Annual update of the HHS Poverty Guidelines, 79 Fed. Reg. 3593*.

West, E. A., Travers, J. C., Kemper, T. D., Liberty, L. M., Cote, D. L., McCollow, M. M., &

Brusnahan, L. L. (2016). Racial and ethnic diversity of participants in research supports evidence-based practices for learners with autism spectrum disorder. *The Journal of Special Education*. Advance online publication. doi: 10.1177/0022466916632495

Wong, C., Odom, S. L., Hume, K., Cox, A. W., Fettig, A., Kucharczyk, S.,... Schultz, T. R.

(2015). Evidence-based practices for children, youth, and young adults with Autism Spectrum Disorder: A comprehensive review. *Journal of Autism and Developmental Disorders, 45*, 1951-1966.

Table 1

*Target Routine Activities*

Shanesha		Anthony		
Activities	# of intervention sessions	Activities	# of intervention sessions	
Homework	<ol style="list-style-type: none"> <li>1. Get homework materials</li> <li>2. Task #1</li> <li>3. Task #2</li> <li>4. Task #3</li> <li>5. Put homework materials away</li> </ol>	<ol style="list-style-type: none"> <li>1. Task #1</li> <li>2. Task #2</li> <li>3. Task #3</li> </ol>	<ol style="list-style-type: none"> <li>4<sup>2</sup></li> </ol>	
Leisure	<ol style="list-style-type: none"> <li>1. Put iPad away</li> <li>2. Get snack</li> <li>3. Get craft materials</li> <li>4. Make craft</li> <li>5. Put craft materials away</li> </ol>		<ol style="list-style-type: none"> <li>6<sup>2</sup></li> </ol>	
Dinner		<ol style="list-style-type: none"> <li>1. Eat dinner</li> <li>2. Throw away dish and utensil</li> <li>3. Wash hands</li> </ol>		
Bedtime	<ol style="list-style-type: none"> <li>1. Put on pajamas</li> <li>2. Watch TV</li> <li>3. Go to the bathroom</li> <li>4. Brush teeth</li> <li>5. Read story</li> </ol>	<ol style="list-style-type: none"> <li>1. Dry off</li> <li>2. Put on deodorant</li> <li>3. Put on pajamas</li> </ol>	<p><i>Modified activities:</i></p> <ol style="list-style-type: none"> <li>1. Take shower</li> <li>2. Dry off</li> <li>3. Put on Vaseline</li> </ol>	<ol style="list-style-type: none"> <li>5<sup>2</sup></li> </ol>

<sup>1</sup>number of intervention sessions in first intervention condition (before withdrawal)

<sup>2</sup>number of intervention sessions to criterion (i.e., 3 sessions with 100% independence)

Table 2

*Aliyah’s Intervention Fidelity by Component*

Treatment Fidelity Components	Homework							Bedtime		
	Intervention 1		Intervention 2		Total		Maint.	Intervention		Maint.
	I	P	I	P	I	P	I	I	P	I
All materials present	69.5%	82.6%	50.0%	50.0%	65.5%	74.2%	100%	100%	100%	100%
Visual schedule reset	60.9%	78.3%	87.5%	87.5%	67.7%	80.7%	100%	60.0%	80.0%	100%
Visual schedule visible and accessible to child	87.0%	87.0%	100%	100%	90.3%	90.3%	100%	100%	100%	100%
Caregiver gain’s child’s attention and presents SD	61.9%	71.4%	87.5%	87.5%	69.0%	75.9%	100%	25.0%	25.0%	
Least-to-most prompting procedure used (no verbal)	4.4%	4.4%	0%	0%	3.2%	3.2%	0%	0%	0%	0%
Child in correct location	90.9%	100%	100%	100%	93.3%	100%	100%	20.0%	20.0%	100%
Caregiver present for duration of routine	52.2%	60.9%	62.5%	62.5%	54.8%	61.3%	100%	20.0%	20.0%	100%
Token given at completion of routine	52.2%	69.6%	0%	0%	38.7%	51.6%	0%	0%	0%	0%
Total	59.0%	68.8%	60.9%	60.9%	59.5%	66.7%	75%	41.1%	43.6%	71.4%

Note. I= correctly implemented independently; P = correctly implemented independently or with prompt; Maint.= maintenance probe.

Table 3

*Inter-Observer Agreement for Independent Schedule Use and Between-Activity Transitions*

	Homework		Bedtime		Leisure
	Schedule Use	Transitions	Schedule Use	Transitions	Transitions
	Average (Range)	Average (Range)	Average (Range)	Average (Range)	Average (Range)
<b>Anthony</b>					
Baseline	100% (100%)	100% (100%)	96.2% (84.2-100%)	87.9% (50.0-100%)	
Intervention	91.7% (78.9-100%)	92.4% (66.7-100%)	100% (100%)	100% (100%)	
<b>Shanesha</b>					
Baseline		95.0% (90.0-100%)		96.6% (90.0-100%)	93.0% (90.0-100%)
Intervention		96.0% (90.0-100%)		80.0% (80.0-90.0%)	87.5% (80.0-90.0%)
Maintenance		100% (100%)		95.0% (90.0-100%)	95.0% (90.0-100%)

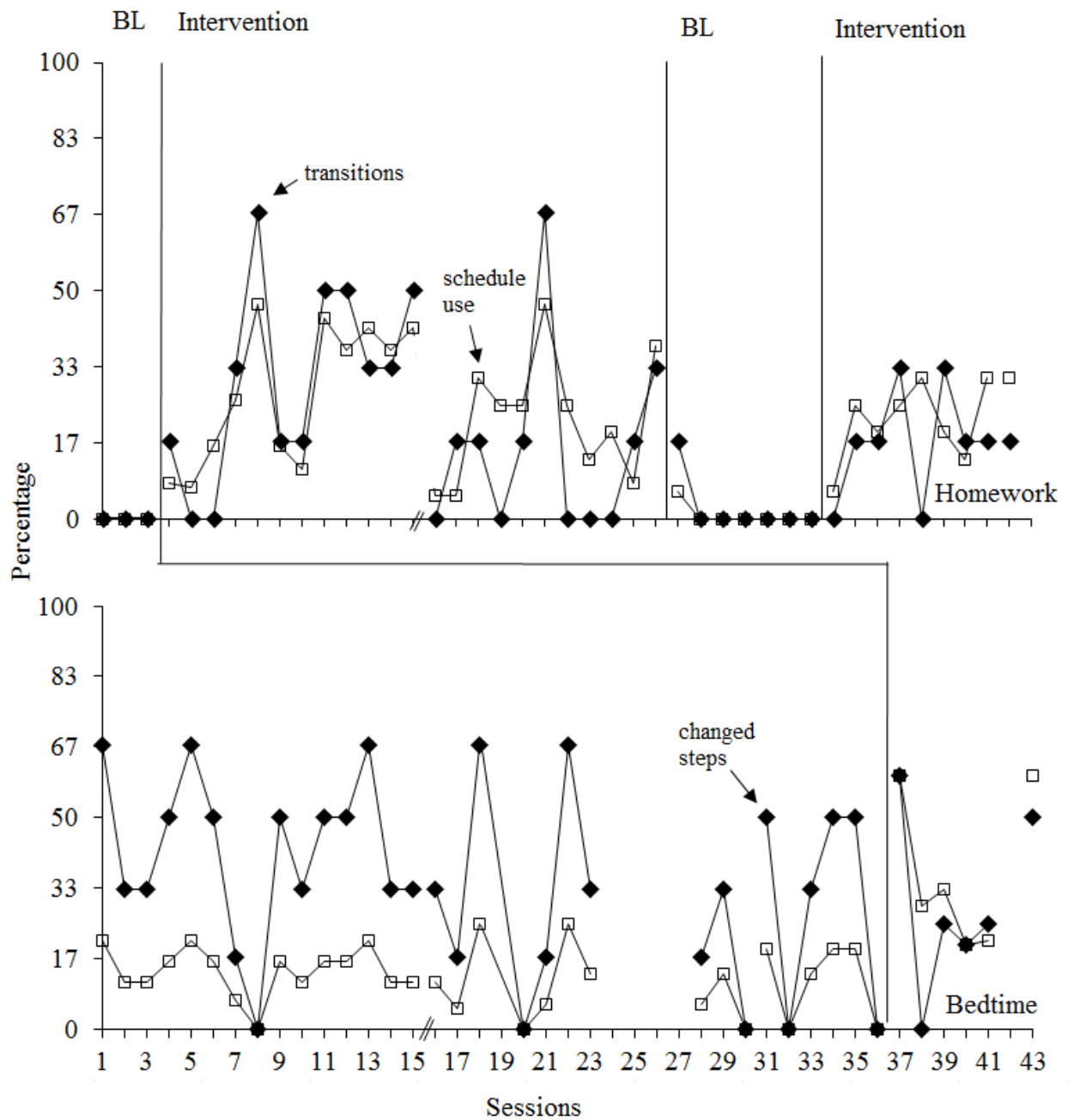


Figure 1. Anthony’s percentage of schedule use steps and between-activity transitions completed independently.

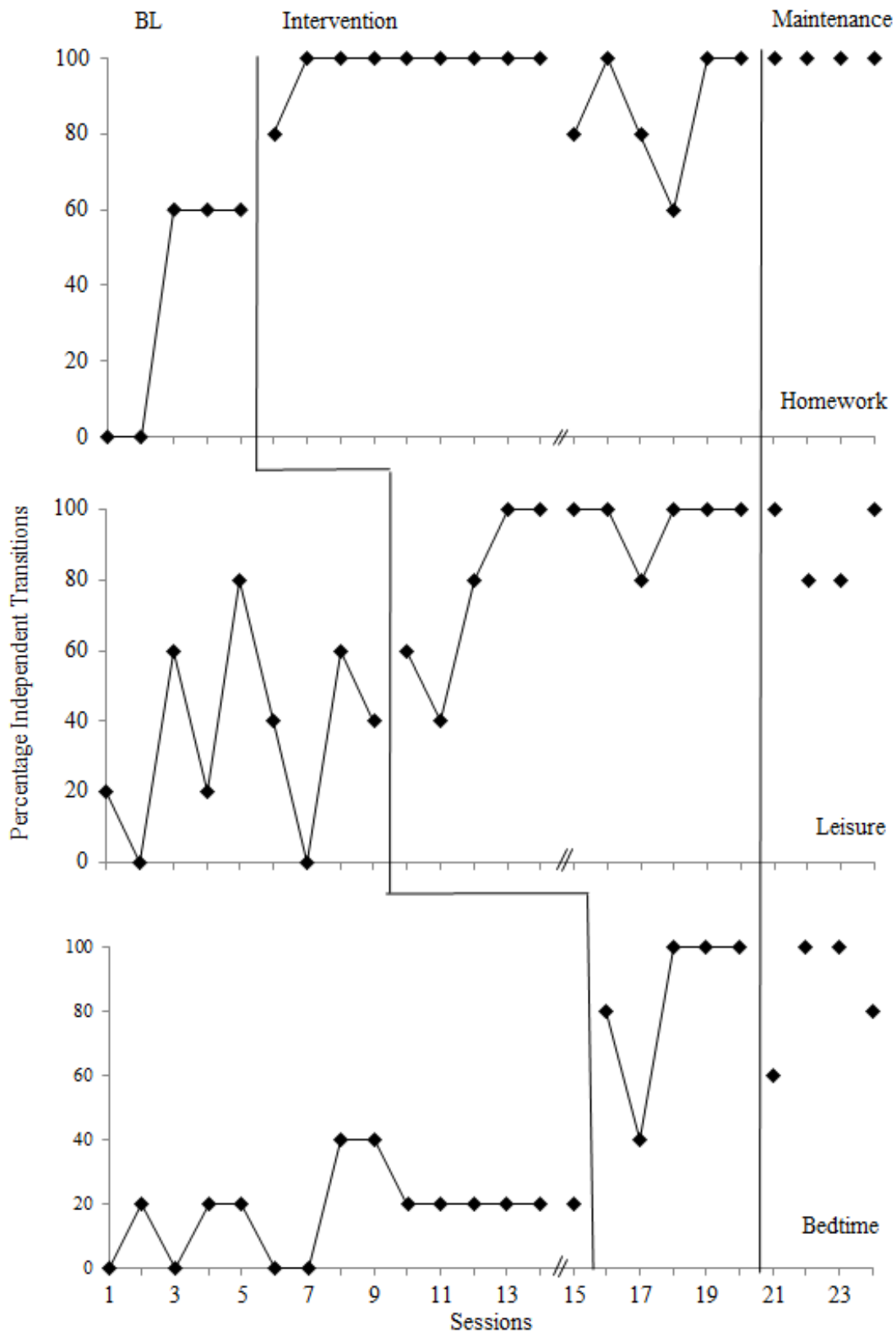


Figure 2. Shanesha’s percentage of between-activity transitions completed independently.