Facilitating transitions through the use of multimodal intervention for a child with autism

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Facilitating Transitions Through the Use of Multimodal Intervention for a Child with Autism

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Abstract

Children with Autism Spectrum Disorder (ASD) have difficulty adapting to changes in routine, to the extent that they can struggle while transitioning out of one activity and into another. The inability to transition independently from one activity to the next can lead to negative behaviors, strained teacher-student relationships, and a loss of educational time in the classroom. The present study aimed to increase a six year old child’s independence while decreasing his problem behaviors observed during his transitions throughout the day at an autism clinic. A multimodal intervention along with a modified multimodal intervention was used to increase independence while decreasing problem behaviors. Upon the completion of an independent transition with no problem behaviors, the child received a positive auditory consequence and positive touch. The intervention conditions were implemented sequentially across an A-B-C design. The multimodal intervention without guided compliance showed an increase in independence and decrease in escape behaviors that maintained across sessions.
Facilitating Transitions Through the Use of Multimodal Intervention for a Child with Autism

Autism Spectrum Disorder (ASD) is a neurological disorder that currently has no known cause or cure, but affects millions around the world. Most recent data show an increase in prevalence of autism that effects one in 68 children, which is higher than ever before (American Psychiatric Association, 2013). Autism is a spectrum disorder that affects children and adults differently throughout the many areas of life. Among social and communication deficits, individuals with autism tend to struggle when making transitions. According to the DSM-5, individuals with autism will often display “insistence or sameness, inflexible adherence to routines, or ritualized patterns of verbal nonverbal behavior” (American Psychiatric Association, 2013). This extreme dislike for small changes can lead to resistance when changing activities, which can have an effect on the quality of one’s life. In fact, individuals with autism find pleasure in any modification that gives predictability to the ambiguity of change in schedule (Heflin & Simpson, 1998). It is estimated that during a child’s time in elementary school, he or she will spend anywhere from 20 to 35% of his or her time transitioning from one activity to the next (Sainato & Lyon, 1983). Transitions can range from switching from math class to science class in a school setting to ending a play activity for dinner in a home setting, but in any setting, transitions are an integral part of daily living. Because of the amount of time spent in transitions daily, being able to transition effectively is a necessary skill for independent, successful functioning in not only the educational setting, but extending also into life.

In the early studies of behavioral intervention, researchers spent less time focusing on improving transitions, but instead focused their time on social and communication skills. Autism spectrum disorder does not yet have a known cure, although applied behavior analysis is a well-
researched model of treatment to moderate severity and ameliorate problem behaviors, researchers and professionals aim to modify routines and environments for individuals so that the world will become less overwhelming and more predictable (Sainato et. al, 1987). Odom and Strain (1986) conducted a study where they examined the effects of peer-initiated intervention and teacher-antecedent intervention when teaching social reciprocity to three children with autism. Results showed that while social responses did increase in peer-initiated intervention, social responses and initiation increased when the teacher prompted the student to initiate conversation with the confederate. This study gave validity to the antecedent strategy, and could later be generalized to study transitions.

Sainato, Strain, Lefebvre, and Rapp (1987) were some of the first researchers to publish a study that directly looked at transition times while utilizing the supporting research on antecedent interventions. In this study, researchers analyzed the relative effectiveness of a peer-mediated and an antecedent prompt procedure during three specific transition periods. The peer-mediated condition utilized the “buddy system”, where typically developing peers modeled a proper transition. The antecedent prompt procedure included a bell that signaled the transition time. Similar to previous studies, the antecedent verbal prompt proved more effective than the peer-mediated intervention. This provided the first piece of evidence showing the effectiveness of antecedent interventions for children with disabilities during these difficult periods of transitioning.

Building on the previous study, Cote, Thompson, and McKerchar (2005) analyzed which mode of antecedent intervention yielded the best results. To do this, researchers set two conditions: one with a verbal antecedent prompt and one with a tangible antecedent prompt. The
results of this study showed that neither antecedent condition were effective without the use of continued prompts throughout the entire transition. This study adds a vital piece of information that antecedent strategies may not be sufficient in decreasing inappropriate behaviors during transition.

A study conducted by Quill and Grant (1996) examined the language comprehension skills of four nonverbal children with autism. Researchers introduced two intervention conditions, the first providing auditory cues alone in the form of the first phoneme of the word, and the second adding visual in the form of a picture to the auditory component. Results showed no significant difference in language performance when only provided with auditory cues. However, when the visual cues were added, researchers found that this condition not only enhanced language comprehension, but also the child’s joint attention and compliance to the teacher’s directions. This study adds value to the field of behavior modification research by examining specifically the effectiveness of auditory and visual cues as forms of support. While this study revealed an increase in performance when the visual component was added to the auditory cue, further research is needed to explore whether it is the visual component or the interaction of the two modes of support that produces increased performance.

Quill (1997) later analyzed the previous study, examining what role this visual cue played for individuals with autism. She determined that visual cues, which she defined as “the use of graphic cues as either an instructional prompt or an environmental prompt to aid organizational skills and improve self-management” (p. 699), mirrors the learning style of an individual with autism. Because individuals with autism have difficulty associating verbal instructions with the
intended meaning (Tissot & Evans, 2003), visual supports may be the piece that is needed in times of ambiguity, for example, a time of transition.

Further research sought to understand the benefits and costs of auditory versus visual supports for children with autism (Dettmer, 2000; Sterling-Turner, 2007). Sterling-Turner (2007) explored the benefits of auditory supports and found that they are simple to implement, and are often inexpensive. However, auditory supports can lead to prompt dependency, along with potential communication deficits. Visual prompts, specifically visual activity schedules, have more benefits including that they don’t often require another person, but rather a visual stimulus that can be placed in a child’s environment. This is more realistic for an applied setting, as a teacher may not be able to provide auditory support during every transition period.

Dettmer et al. (2000) built off of this research by conducting a study to analyze the effects of visual supports during transition times for two elementary aged boys with autism. During the baseline condition, researchers collected data on the typical transition, which showed reliance on frequent prompts and proximity control. Not only were many verbal and physical prompts needed, but the time it took for a transition to occur was longer than desired. In the intervention condition, researchers provided visual schedules and timers to help the child know what the transition was intended to look like, and where the child was going next. The results of this study show a decrease in transition time during the intervention condition. In fact, both participants of this study went from being physically moved from one activity to the next to almost always responding independently in the presence of the visual supports. While this study proves the effectiveness of visual supports on transition periods, this study only evaluates transitions in the context of time, not necessarily quality. This study does not measure how many
problem behaviors existed during transitions, but instead only on the quickness of the transition. This study introduces the effectiveness of the use of physical guidance in transitions in addition to antecedent-based interventions. While the visual supports with physical guidance demonstrated effectiveness, it would be interesting to see how the addition of a consequence-based intervention effected performance of the transition, and if the antecedent and consequence based interventions were effective without the use of physical guidance.

Continuing the integration of multiple modes of intervention, Wilder, Myers, Fischetti, Leon, Nicholson, and Allison (2012) conducted a study looking at the compliance among four preschoolers throughout multimodal interventions with guided compliance and differential reinforcement. The multimodal intervention strategy remained consistent across both intervention conditions, consisting of a verbal prompt followed by a preferred tangible reward for instances of compliance. In the first intervention condition, researchers aimed to increase compliance to the teacher’s instructions by adding a guided compliance component to the antecedent-based and consequence-based components of the multimodal intervention. Guided compliance was defined as the “physical guidance through the required activity contingent on problem behavior” (p. 122). When the child began to comply, the physical guidance was removed to allow independence. Upon another instance of noncompliance, the teacher would reintroduce the guided compliance procedure to complete the instruction. The second intervention condition utilized the multimodal intervention but instead of guided compliance, researchers introduced differential reinforcement. While the verbal prompt and tangible reward were still available to the child, upon instances of noncompliance the child received no reinforcement or physical guidance. Results of this study varied depending on the participant,
with two participants showing increased compliance with guided compliance and some showing increased compliance with differential reinforcement (Wilder et al., 2012). However, an interesting finding of this study revealed that across all participants, problem behaviors decreased after task demands when guided compliance was not available. This study adds value to behavioral research by showing a relationship between guided compliance and the occurrence of problem behaviors. While this study was applied to teacher instructions, procedures of this study have not been applied to transitions or situations with high levels of escape behavior. Additionally, while this study looked at overall compliance and occurrences of problem behaviors, it did not address the independence of the child to complete the task or the percentage of on-task behavior throughout the activity.

This current study aims to examine the effectiveness of the interaction between visual prompts, auditory consequences, and guided compliance (multimodal) for an elementary aged boy with autism spectrum disorder. Building on previous behavioral research that supports the use of visual schedules, antecedent interventions, and guided compliance, this study aims to increase independence of transitions and compliance while decreasing problem behaviors during transitions. This study will also observe how on-task behavior was broken down into specific problem behaviors. Data will be collected on individual problem behaviors to track throughout interventions. The current study will focus on the child’s independence because of the integral role independence plays in functioning across settings. The isolation of the physical guidance component of the multimodal intervention will test the effectiveness of the individual components during transitions.
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Method

Participants

The participant of this study was a six-year-old boy with Autism Spectrum Disorder (ASD) who received treatment sessions weekly from an autism clinic, which is where the current study took place. The participant showed significant difficulties with transitioning from one task to the next and change in routines, which is consistent with criterion of ASD. The experimenter, an undergraduate student in Psychology at James Madison University, under the supervision of a licensed behavior analyst and licensed clinical psychologist, facilitated transitions in both the baseline and the intervention conditions. This clinician had two years of experience working with children in the clinical setting. Data for this study were collected during clinic sessions of four hours with sessions distributed over the fall and spring semesters.

Procedure

Setting. This study was conducted at the Inter-Professional Autism Clinic (IPAC), which is located at the Occupational Therapy Clinical Education Services on James Madison University’s campus. This clinic is a training, research, and service center operated through the Alvin V. Baird Attention and Learning Disabilities Center which is located at the Institute for Innovation in Health and Human Services, in the College of Health and Behavioral Studies. IPAC houses a multitude of services and professionals, specifically a licensed occupational therapist, speech-language pathologist, and a behavior analyst. The clinic consists of a sensorimotor gym complete with swings, a ball pit, gymnastic mats, and other occupational therapy resources that serves as a play center for the children that measures 9m-by-5m. Outside
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of the sensorimotor gym is a large, multi-purpose room with a tent, table, and indoor track to work on gross motor skills along with life skills that measures 7.36m-by-4.19m. There is also a space created by temporary wall dividers and filing cabinets containing a small square table in chairs, which is denoted as the speech area that measures 4m-by-5m. Adjacent to the speech area is a room with a small, circular table surrounded by chairs which is used by the licensed behavior analyst and graduate Applied Behavior Analysis students to work on life, social, and academic skills that measures 4.55m-by-6m.

This study focused on the child’s transitions as follows:

1. Transition 1: Sensorimotor to Parenting. The child transitions from the sensorimotor gym into a time of therapy with his parent.

2. Transition 2: Parenting to Craft/ Motor Activity. The child spends a period of time in the room denoted for ABA skills with a behavior analyst, graduate ABA students, and his parents. The child is then instructed to transition to a time of crafts or motor activities, which is led by the occupational therapy graduate students.

3. Transition 3: Snack to Skills. The child gets a break designed for snack and social interaction with another child at the clinic. When this time ends, the child transitions into the room assigned to skills, where behavioral therapy occurs.

4. Transition 4: Skills to Play. The child takes a break from behavior therapy and transitions into a time of play with different clinicians.

5. Transition 5: Play to Skills. After a short break, the child returns to behavior therapy from a time of play.
6. Transition 6: Speech to Movement. The child finishes speech therapy and transitions into a time of occupational therapy.

Behaviors. The child engages in a multitude of problem behaviors that prohibit him from effectively transitioning from one activity to the next. These problem behaviors include, but are not limited to, escape, verbal disruption, aggression, noncompliance, and tantrum behaviors. Escape was recorded when the child ran at least half of a meter away from the clinician or moved in a direction that was not consistent with the location of the next activity. Verbal disruption was recorded when the child screamed or cried. Screaming was recorded as any vocalization exceeding that of conversational level for any period of time. Also noted as a verbal disruption was crying, which was recorded as any vocalization above that of conversational level that co-occurs with the presence of tears. Aggression was recorded as any instance of hitting, scratching, kicking, biting, or movement toward another person with an aggressive gesture. While all variations were recorded as an instance of aggression, these behaviors can be broken down into their own definitions. Hitting was any occurrence of making contact with any part of another person’s body with an open or closed hand from more than fifteen centimeters away. Scratching was any occurrence of digging one’s fingernails into another person’s skin or clothing. Kicking was any occurrence of one’s foot making contact with any part of another’s body from more than fifteen centimeters away. Biting was defined as any occurrence of the opening and closing of one’s mouth where the teeth make contact with any part of another person’s body. Aside from these contact oriented forms of aggression, observers recorded aggressive gestures as a form of aggression, which was defined as any movement consistent with aggression behaviors but without contact. Noncompliance was recorded as any occurrence of a child not initiating the
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performance of the request or demand within five seconds of the delivered instruction. Finally, tantrum behavior was defined as any occurrence of dropping to the ground or refusing to move in combination with at least one of the following: screaming, crying, hitting, scratching, kicking, biting, or noncompliance.

Target behaviors that the clinician targeted to see increase were on-task behaviors, which include compliance and continuous movement toward the next activity. Compliance was observed as any occurrence of a child initiating the performance of the request or demand within five seconds of the delivered instruction. Continuous walking toward next activity was observed when the child independently walks, and does not run, in the direction of the next activity, as signaled by the visual or verbal instruction. Additionally, clinicians aimed to see independence during transitions, which was defined as any transition consisting of zero instances of guided compliance. Guided compliance was defined as the physical guidance by the clinician to complete the correct behavior.

Observation Procedures. Behaviors were recorded using a ten-second interval schedule, where the observer recorded if the child was on-task (denoted by a plus sign in that interval box) or off-task (denoted by a minus sign in the interval box), which would indicate he was engaging in problem behaviors. If the observer marked that the child was off-task during an interval, she also recorded which problem behaviors he was engaged in and took interval data in the corresponding problem behavior chart (see Appendix A for a copy of the data sheet).

The transition period started immediately after the verbal prompt of “It’s time to go to (activity)” was spoken to the child by the clinician. Observers stopped recording data and considered the transition period complete when the child was either in his seat at the next
activity, or in the desired area of the next activity, whichever was more appropriate given the specific task that he was transitioning into. Because whole interval recording was used, if a transition finished in the middle of an interval, the behavior observed for the existing part of the interval was recorded. This also provided the duration of the transition to the nearest ten seconds. The number of on-task intervals was divided by the total number of intervals necessary for that transition. This result was then multiplied by 100 to determine what percent of the transition the child spends moving toward the next activity and complying. The on-task percentages for the six transitions for a given session were then added together and divided by six to determine the average on-task percentage for the session. The interval data of problem behaviors escape, noncompliance, aggression, tantrums, and verbal disruptions were also recorded and calculated in the same way. Independence during transitions was recorded when no guided compliance was necessary from the clinician. During the baseline and multimodal intervention condition, independence was recorded for a transition when zero instances of noncompliance were observed. Because these conditions resulted in a clinician’s guided compliance upon an instance of noncompliance, any instance of noncompliance resulted in a loss of independent transitioning. In the multimodal intervention without guided compliance condition, independence was recorded for the transition if the transition lasted less than three minutes because of the supervisor’s necessary guided compliance at that point. If the transition occurred in less than three minutes, the child was recorded as having transitioned independently because no clinician assistance was necessary. After recording independence for all transitions during a session, the number of independent transitions for the session was divided by six, the total number of transitions for the session and multiplied by 100 to determine the percentage of independent transitions for the day.
Interobserver agreement (IOA) was assessed by having two observers take data simultaneously throughout 46 of the 96 transitions, which provided IOA data for 48% of the transitions. This measure ensures that recorded behaviors are reliable across trained observers. IOA was then calculated for each variable measured, including the percentage of independence, on-task, escape, compliance, aggression, tantrum, and verbal disruptive behaviors. For IOA of independent transitions, the number of agreements regarding the independence of the transition (based on the definitions of how to score independence) were added together and then divided by the total number of transitions. This number was then multiplied by 100 to obtain an IOA percentage. The IOA for independence of transitions was 100%. On-task percentage across sessions was calculated by looking at the on-task interval data and taking the number of intervals agreed on and dividing this by the total number of intervals for that transition. This number was then multiplied by 100 to get a percentage. When the on-task IOA for each transition was calculated, all on-task IOA percentages were added together and divided by the 46 transitions in which IOA data was recorded. The IOA for on-task percentage was 99.3%. IOA for specific behaviors was calculated by dividing the total agreements regarding the behaviors by the greater amount of behaviors observed during a given transition and multiplying by 100. Once the IOA was determined for each behavior, all IOA percentages were added together and divided by the 46 transitions where IOA was obtained. The IOA for each behavior was: escape 95.3%, compliance 96.3%, tantrums 100%, aggression 100%, and verbal disruptions 97.8%.

Experimental Conditions.

Baseline. The clinician presented the transition statement to the child, stating where he was to go next. For the baseline condition, the clinician did not provide physical or verbal
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guidance and did not block routes of escape. If the child did not move in the direction of the next activity or if he escaped, the problem behavior was recorded. The clinician then gave the same transitional statement to the child. After waiting five seconds, if the child did not comply with the command, this was counted as an instance of noncompliance and the clinician then provided the transitional statement again along with physical guidance to the next activity. Unlike guided compliance, the child did not have the opportunity to learn from noncompliance, but was instead physically guided to his next activity, not the path where he was supposed to be. The stimuli needed in the subsequent intervention condition was presented during the baseline condition, but was not explained. Therefore, the auditory cue was played, and the visual schedules were in the area of the transition, but they did not have meaning to the child until intervention condition A. Their presence during the baseline condition, even though they were not understood, ensured that any behavior change in subsequent conditions could not be due to the introduction of a novel stimulus (McGonigle, Rojahn, Dixon, & Strain, 1987).

Errorless Learning. On the first day of the multimodal intervention, an errorless learning procedure was introduced to the child. Errorless learning is a “discrimination learning technique that eliminates or minimizes responding to incorrect choices” (Mueller, Palkovic, & Maynard, 2007, p. 691). Upon the participant’s arrival at the clinic, the clinician conducting the rest of the transitions provided the visual prompt, auditory cue, and guided compliance to the child a short distance of two meters to the first activity of the day. Because of the guided compliance procedure, the child had no opportunities to engage in problem behavior, and therefore completed a successful transition. This was important because it exposed the child to the contingency of an auditory reward for no problem behaviors during the transition. This added
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procedure ensured that the child had experienced the multimodal intervention and behavioral contingency. Because the transition was conducted with every component of the multimodal intervention except for access to escape, errorless learning provided the necessary exposure to the contingency to begin intervention. This procedure was replicated on the last day of the multimodal intervention procedure.

Multimodal Intervention. During the first intervention condition, the same clinician who conducted the transition period during baseline conducted the transition during the intervention condition. During this condition, the integration of auditory cues and visual cues into one intervention was tested to see if these cues increased the quality of the transition. For this intervention, when it was time to transition, a five second audio clip that was a recommendation from a clinic therapist was presented to the child, accompanied by a verbal prompt, “It’s time to switch to the next activity”. While the transition visual support was present during the baseline condition, the transition schedule was now explained to the child by the clinician saying “We are going to walk quietly to the next activity. If you can do that, we will listen to music when we get there”. Having this visual representation of a successful transition was part of the multimodal intervention. This visual support existed as a sequence of four pictures of a child making a successful, appropriate transition. This served as a model that was continuously available for the child to refer to during the transition from one area to the next.

Throughout the transition, the clinician again left opportunity for escape, but this time used guided compliance when the child engaged in noncompliance. Guided compliance was only used after an instance of noncompliance, and was immediately removed once the child was back on-task, or on the path to the next activity. Guided compliance was used to increase
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independence of the child once he began to comply, allowing him to finish the transition after receiving guidance to the correct path. If the child made a transition worthy of positive consequences, with the reinforcement criteria being set at no problem behaviors occurring during the transition, he gained access to 30 more seconds of the auditory clip that was previously exposed as the signal that it was time to transition. If the child engaged in any problem behaviors during the transition, he did not gain access to the auditory consequence. The auditory consequence was only be present in the intervention conditions.

Multimodal Intervention without Guided Compliance. The second intervention condition consisted of identical procedures to the previous intervention with regard to the use of multimodal interventions, but instead provided a different clinician response to the occurrence of problem behaviors. During the transition, the transition schedule was accompanied by the auditory cue, followed by the verbal prompt that it was time to transition to the next activity. He continued to have access to the transition schedule throughout the entire transition as he did in all previous conditions. If the child transitioned with no problem behaviors, the auditory consequence of listening to 30 seconds of music was presented. Instead of using guided compliance to get him back to on-task behavior after the occurrence of noncompliance, the clinician withheld physical touch and attention, potential reinforcers, and required an independent transition to the next activity. If the child failed to transition to the next activity within three minutes, or 180 seconds, the clinician’s supervisor implemented guided compliance to the next activity to avoid a loss of educational time. This condition was aimed to remove the reinforcement of physical touch for problem behaviors and isolate a successful transition as the only way to acquire a reinforcer, in the form of the auditory consequence.
After three sessions of this intervention, an adjustment was made on the recommendation of the speech language pathologist at the clinic which resulted in an added visual support. This activity schedule served as an additional visual prompt to assist the child in the transition. All components of the intervention remained the same after the addition of the visual activity schedule, including the visual transition schedule and the auditory cue and consequence.

Experimental Design. A single-subject A-B-C design was used to examine the effectiveness of a multimodal intervention in increasing the quality and independence of the child’s transition from one activity to the next. The first condition was baseline, which served as a control condition in the single-case experimental design. After this control condition, interventions could be introduced by changing one variable at a time. Baseline was followed by the multimodal intervention condition, which introduced visual, auditory, and physical cues and consequences to aid the transition. The third condition, multimodal intervention without guided compliance, introduced another intervention that withheld guided compliance and instead provided differential reinforcement while maintaining the same visual and auditory intervention as the previous condition. Despite the single-case experimental design, the use of baseline data collection provided a control condition that the behaviors observed in the intervention conditions could then be compared to. At each condition change, experimenters were cautious to only change one variable at a time to ensure that any perceived change could be attributed to the change in independent variable (Smith & Davis, 2013).

Multiple line graphs were created based on the collected data. The first shows the percentage of independent transitions per session across baseline and intervention conditions. The second shows the percentage of on-task behavior per session across baseline and intervention conditions.
The other five line graphs displayed show the percentage of problem behaviors per session across conditions, including escape, aggression, tantrums, and verbal disruptions. After collecting noncompliance data, the inverse was graphed to examine compliance per session across conditions. This study examined 16 sessions over the course of six months, each consisting of 6 transitions for a total of 96 transitions for the single subject. For each graph, researchers were interested in comparing the level of independence, on-task behaviors, and frequency of problem behaviors across conditions. Analysis of the graphs was conducted through the use of visual analysis, which focuses on the visual examination of trends, stability, and levels of the data within and between conditions (Parsonson, 1999). By visually analyzing trends, stability, and levels, conclusions were drawn regarding the effectiveness of the intervention conditions.

**Results**

Baseline data was collected for three sessions, followed by six sessions of multimodal intervention, followed by seven sessions of multimodal intervention without guided compliance. This study examined the percentage of independence and on-task behavior during transitions across the 16 sessions, along with the behaviors of escape, compliance, aggression, tantrums, and verbal disruptions. All data collected were represented by the mean percentage of the six transitions per session. Data were visually analyzed focusing on the changes in variability or stability of the data path while also considering changes in trends and levels of data within and between groups (Parsonson, 1999). Data analysis occurred systematically for each behavior represented in the figures.
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Figure 1 presents the baseline and intervention data recorded when looking at the percentage of independent transitions and the percentage of on-task behaviors during transitions. The data are presented as average percentages of individual transitions and on-task behavior throughout six transitions and recorded for the session. For independence of transitions, baseline data revealed low, stable levels of independence (M= 22.4%). The child was not transitioning independently frequently, serving as a control condition for the child. When the multimodal intervention was introduced, researchers examined an initial reinforcement effect that was not maintained (M= 41.8%). Independent transitioning returned back to baseline levels after the initial effect. This transitory effect reveals high variability in the intervention data because of the initial high levels of independence followed by the decreasing trend that stabilized back at baseline levels of performance. An adjustment was made to this intervention by implementing the same multimodal intervention but removing the guided compliance component of the intervention. This adjustment shows an improvement in independent transitioning, resulting in high levels of independence, low variability, and independent transitions ranging from 83% independent to 100% independent (M= 95%). This condition revealed a stable trend of percentage of independent transitions across sessions. These results show the effectiveness of multimodal intervention without guided compliance in promoting independence during transitions. On-task behavior during transitions show similar patterns of responding, starting with a baseline condition that has low variability, no trend, and low levels of independent transitioning (M= 47.0%). Similarly to independence, the multimodal intervention condition showed an initial transitory effect, increasing levels of on-task behavior and then returning back to below baseline levels of on-task behavior (M= 52%). This condition showed a high variability
with a decreasing trend that stabilized across the last three sessions of the condition below baseline levels of on-task behaviors. When the adjustment was made to remove guided compliance from the intervention in the final condition, a gradual increasing trend was observed regarding on-task behaviors (M= 49.3%). The data showed low stability, and while the trend was increasing, levels of on-task behaviors were similar to those in baseline and the first intervention condition. Throughout all conditions, percentage of on-task behavior during transitions did not show a change in level.

In addition to observing the percentage of independence and on-task behavior during transitions, researchers aimed to observe five behaviors- escape, compliance, aggression, tantrums, and verbal disruptions for potential changes across conditions. Figure 2 represented percentage of escape and compliance across baseline and intervention conditions. Baseline revealed high levels of escape behavior (M= 53.2%) and low levels of compliance (M= 46.8%). For both behaviors, data showed low levels of variability and no trends. The introduction of the multimodal intervention showed a decrease in level of escape behavior (M= 31%), but toward the end of the condition, escape had returned to baseline levels. While compliance also showed an initial effect (M= 53.4%), this change proved to be transitory as compliance showed a decreasing trend back to baseline levels. The multimodal intervention without guided compliance again showed a gradual decreasing trend in escape behaviors, and in this condition the low levels of escape behavior were maintained across sessions (M= 43.11%). Similarly, compliance revealed an increasing trend that maintained above baseline levels (M= 56.5%). While the multimodal intervention decreased escape behaviors to lower levels, the multimodal intervention
without guided compliance shows a decrease in escape and increase in compliance that maintains across sessions.

In figure 3, percentage of aggressions, tantrums, and verbal disruptions were observed to analyze if the levels changed through the implementation of intervention conditions. For all three behaviors, baseline levels of problem behaviors were low (Aggression M= 2.2%, Tantrums M= 1.25%, Verbal disruptions 6.11%). In the multimodal intervention condition, these problem behaviors did not exceed baseline levels (Aggression M= 1.25%, Tantrums M= 0%, Verbal disruptions M= 2.08%). Similarly, in the multimodal intervention without guided compliance, behaviors remained at consistently low levels (Aggression M= 1.13%, Tantrums M= 0%, Verbal disruptions M= 4.77%). Both multimodal intervention and multimodal intervention without guided compliance maintained low levels of problem behaviors with very little variability and no trends. In no conditions did any of these problem behaviors occur more than in baseline data. These results show that throughout the implementation of both intervention conditions, no aversive effects were observed regarding aggressions, tantrums, and verbal disruptions.

**Discussion**

The ability for a child to transition from one activity to the next is a vital skill to be taught to elementary-aged children with Autism Spectrum Disorder. Transitioning independently and without problem behaviors can lead to more positive interactions with peers and teachers and increased time engaging in educational activities. The present study examined the effectiveness of multimodal intervention on a child’s ability to transition independently and without problem behaviors. Overall, researchers concluded that the use of multimodal intervention was effective in promoting independence of transitions and decreasing escape behavior when guided
compliance was removed from the intervention. While the multimodal intervention showed an initial effect, the guided compliance component provided reinforcement, decreasing the effectiveness of this intervention regarding all variables. After adjusting the multimodal intervention to exclude the guided compliance component, the intervention produced high levels of independent transitions, on-task behavior, and compliance while decreasing escape behaviors. When the activity schedule was added based on the recommendation of the speech-language pathologist in this condition, no changes were observed in the data point for any measured behaviors. While the effectiveness in those dimensions provides positive results, the absence of aversive effects regarding aggression, tantrums, and verbal disruptions further promote the implementation of the multimodal intervention without guided compliance. Overall, the independence and quality of the transition improved throughout the multimodal intervention without guided compliance condition.

The aim of the present study was to analyze the patterns of behavior for one child throughout intervention conditions to increase the independence and quality of transitions. However, because of the single-subject A-B-C design, the conclusions drawn from the study lack replication, which serves as a limitation to the current study regarding experimental control. This study’s inability to replicate the findings leads to a lack of experimental control given the time constraints of the present study. If time permitted, researchers could establish experimental control by turning this study into a reversal design and replicating the results. Using the same subject, researchers could return to baseline conditions and collect data, and then replicate the more effective intervention condition, which was the multimodal intervention without guided
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compliance. The replication of results in a reversal design using the effective intervention would establish greater experimental control in this study.

Generalizability is another limitation of this study because of the limited access to individuals in the target population. The single-subject design does not provide information regarding the generalizability of the findings from this study. For the individual subject, researchers would need to replicate the findings across settings with different clinicians to obtain generalizable results for the child in this study. To generalize findings to a greater population, researchers would need to replicate this study with other subjects to see how typical the results are.

Another aspect of this study that could be continued with further research is the relationship between independence of transition and duration of transition. This study revealed that the duration of the transition was longer when guided compliance was withheld from the intervention. However, this condition was the only intervention that maintained independence. Therefore, future research could focus on interventions that could decrease the duration of the transition while maintaining the independence.

Along with this research opportunity, future research could look at the individual transitions to examine the specific activities that the child has more difficulties transitioning to. Future research could group the data into the specific transition, for example sensorimotor to parenting, and compare the levels of problem behaviors and independence between transitions throughout the session. Researchers could then examine if the degree of preference of the next activity had an effect on the quality of the transition. By engineering the activities in different orders to alter transition types, researchers could determine if the transition is at all effected by
the preference of the next activity. These findings could then be used to help clinicians structure the schedule in a way that would promote the highest quality transitions, resulting in more educational time and positive peer, teacher, and parent relationships.

Because children spend such a large amount of time transitioning, children with Autism Spectrum Disorder may require additional supports and interventions to function independently through change of activities (Sainato & Lyon, 1983). This study has revealed the importance of transitional intervention for the child receiving treatment at IPAC. Clinicians should continue to provide visual and auditory supports and interventions while withholding guided compliance to promote greater independence and less reliance on clinician prompts. The implementation of differential attention during transitions is also recommended to put problem behaviors on extinction, with the goal of continuing to decrease the level of escape behavior during transitions. Another recommendation based on findings of this study is to increase the use of elements of guided compliance such as positive touch and attention as reinforcement in other settings in an attempt to decrease the need for guided compliance during transitions.

Overall, the multimodal intervention when modified to exclude guided compliance was effective in improving the transitions of a child with ASD. This intervention condition led to less problem behaviors and greater independence during transitional periods.
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Appendix

| 1 | 2 | 3 | 4 | 5 | 6 | 1 | 2 | 3 | 4 | 5 | 6 | 1 | 2 | 3 | 4 | 5 | 6 | 1 | 2 | 3 | 4 | 5 | 6 |
| E | A | E | A | E | A | E | A | E | A | E | A | E | A | E | A | E | A | E | A | E | A |
| V | NC| V | NC| V | NC| V | NC| V | NC| V | NC| V | NC| V | NC| V | NC| V | NC| V | NC| V | NC|  |
| T | T | T | T | T | T | T | T | T | T | T | T | T | T | T | T | T | T | T | T | T | T |

OBSERVER ID: _____ IOA? Y N %IOA: _____ Baseline Intervention

Transition __________ to _____________ DATE: 

**On-Task %**

# of on-task / total number of intervals used X100 = ___/___ X100 = _______

On-Task Behavior: Compliance and continuously walking in the direction of the next activity

**Problem Behaviors**

| 1 | 2 | 3 | 4 | 5 | 6 | 1 | 2 | 3 | 4 | 5 | 6 | 1 | 2 | 3 | 4 | 5 | 6 | 1 | 2 | 3 | 4 | 5 | 6 |
| E | A | E | A | E | A | E | A | E | A | E | A | E | A | E | A | E | A | E | A | E | A |
| V | NC| V | NC| V | NC| V | NC| V | NC| V | NC| V | NC| V | NC| V | NC| V | NC| V | NC| V | NC|  |
| T | T | T | T | T | T | T | T | T | T | T | T | T | T | T | T | T | T | T | T | T | T |

Appendix A. Data sheets used to track all measured behaviors
Appendix B. Visual transition schedule
Appendix C. Activity transition schedule
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References


http://dx.dio.org/10.1176/appi.books.9780890425596.dsm01


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Figures

Figure 1. Percentage of independent transitions and on-task behavior during transitions across sessions.
Figure 2. Percentage of escape and compliance during transitions across sessions.
Figure 3. Percentage of aggression, tantrums, and verbal disruptions during transitions across sessions.