Title: Using Aided Augmentative and Alternative Communication (AAC) Modeling during Small Group Instruction for Young Children with Down Syndrome

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Introduction: Few studies have adapted empirically supported language and communication interventions to address the behavioral phenotype of children with Down syndrome (DS; Abbeduto, McDuffie, Thurman & Kover, 2016; Lemons et al., 2015; McDaniel & Yoder, 2016). Designing interventions to mitigate the language and communication deficits associated with DS may be critically important for improving long-term communication development. Aided augmentative and alternative communication (AAC) modeling interventions are recommended for children with DS, because these interventions leverage the phenotypic strengths of children with DS such as receptive language and social skills while addressing their phenotypic weaknesses including limited speech intelligibility and verbal working memory (Abbeduto et al., 2016; Abbeduto, Warren, & Conners, 2007; Chapman, & Hesketh, 2000; Fidler, 2007; Kent & Vorperian, 2013; Kumin, 1994). The purpose of this study was to evaluate the efficacy of an aided AAC modeling intervention on the communication skills of preschool-aged children with DS during small group instruction.

Method: Four preschoolers with DS between 3;1 and 5;3 years (Mean =4;5) and five typically developing peers between 3;5 and 5;9 years (Mean=4;3) participated in the small group instruction. A multiple probe across behaviors (target vocabulary) design replicated across four preschool aged-children with DS was used to evaluate the efficacy of an aided AAC modeling intervention. A systematic dialogic reading strategy called Read, Ask, Answer, Prompt (RAAP; Binger, Kent-Walsh, Ewing & Taylor, 2010) was applied during the baseline sessions to simulate typical dialogic reading routines in inclusive classrooms. During the intervention sessions, the interventionist used the RAAP strategy and provided aided AAC modeling. Child performance for all dependent variables including: (a) percentage of correctly identified symbols, (b) rate of symbolic communication, (c) number of different words, and (d) number of multiple word combinations were graphed and visually analyzed. Statistical analyses were conducted to complement visual analysis and to quantify the results of visual analysis across participants. Specifically, we calculated the non-overlap of all pairs (NAP; Parker & Vannest, 2009) to examine overlap between baseline and intervention phases and calculated the within-case standardized mean difference (WC-SMD) with a Hedges’s $g$ small sample correction to provide an estimate of the magnitude of aided AAC modeling intervention effects, (Pustejovsky, 2015; Pustejovsky & Ferron, 2017).

Results: For all children with DS the percentage of correctly identified symbols and rate of symbolic communication increased following the aided AAC modeling intervention. We observed 13 out of 16 potential demonstrations of effect regarding the percentage of correctly identified symbols and 11 out of 16 potential demonstrations of effect regarding the rate of symbolic communication. Visual analysis suggested a functional relation between the intervention and the percentage of correctly identified symbols for three of four participants with DS. Visual analysis also revealed a functional relation between the intervention and the rate of symbolic communication for two of four participants with DS. Effects for number of different words and number of multiple word combinations varied for children with different expressive communication skills prior to treatment. Visual analysis revealed there was a functional relation between the aided AAC modeling intervention and number of different words for two of four participants with DS and a functional relation between the intervention and number of multiple word combinations for one participant with DS. Conducting non-overlap and mean-based estimates of effect size complemented the results of the visual analysis and revealed that the change from the baseline to the intervention phase was statically significant for percentage of correctly identified symbols and rate of symbolic communication across metrics (e.g., NAP and WC-SMD) for three of the four participants with DS. All children maintained their percentage of correctly identified symbols from the intervention sessions during the maintenance probes. Increases in rate of symbolic communication did not generalize to thematic play contexts, a distal measure of response generalization.
**Discussion:** The results of this study indicate that an aided AAC modeling intervention which includes RAAP, a systematic dialogic reading strategy, is an effective intervention to teach target vocabulary and increase rate of symbolic communication to young children with DS. During the baseline and intervention sessions typically developing peers used AAC to respond to questions and share comments about the story. Children with DS increased their percentage of correctly identified symbols, and rate of symbolic communication. For some participants, changes in number of different words and number of multiple word combinations were also observed. Replications of this intervention are needed to determine if these effects are robust for children with DS. Future research is needed to explore the application of similar interventions by typical classroom teachers and school-based speech-language pathologists within inclusive classroom settings.

**References/Citations:**