

Title: *Delivering Enhanced Milieu Teaching to Children with Down Syndrome via Telepractice*

Authors: Emily Quinn¹, Ph.D. CCC-SLP, Kim Kurin¹, B.S., Alexandria Cook¹, B.A.

Introduction: Few language intervention studies have adapted evidenced-based practices to address the specific learning characteristics of children with Down syndrome (DS). Phenotypic adaptations of early language interventions are critically needed to optimize outcomes for children with DS because language and communication are core abilities that impact social relationships, academic performance, and reading across the lifespan. To address this critical need, the proposed study examines the telepractice service delivery of Enhanced Milieu Teaching (EMT), an evidence-based, naturalistic language intervention that has been optimized to address the phenotypic specific language and communication deficits associated with DS (Kaiser & Hampton, 2016). EMT is a parent-implemented intervention that involves home-visits during which clinicians teach parents to support their children's language and learning during typical parent-child interactions at home (play with toys, music, book reading, and snack time). Clinicians follow an evidence-based instructional framework called Teach-Model-Coach-Review (TMCR; Roberts et al., 2014) to teach parents language support strategies. Parents receive instruction on four EMT strategies: matched turns, language expansions, time delays, and milieu teaching episodes. This study examined whether the Enhanced Milieu Teaching Telepractice Program (EMT-TP) was effective for teaching caregivers of children with DS to implement language support strategies and whether changes in caregiver behavior were associated with increases in child communication. Research questions were: (RQ1) Is there a functional relation between the delivery of the EMT-TP and caregiver use of EMT strategies? (RQ2) Does caregiver use of EMT strategies during caregiver instruction lead to increases in number of children's communication acts? (RQ3) Does caregiver use of EMT strategies during caregiver instruction lead to increases in children's number of different words?

Method: Three caregivers and their children with DS aged 19 to 38 months participated in EMT-TP. A multiple baseline across behaviors design, replicated across caregiver-child dyads, was used to evaluate the efficacy of EMT-TP. A speech-language pathologist provided EMT-TP using a hybrid service delivery model with approximately 33% of sessions delivered in-person and 66% delivered via video-teleconferencing. The speech-language pathologist used the TMCR instructional framework to teach caregivers EMT strategies. To examine the effects of the EMT-TP on caregiver strategy use, we used a structured visual analysis protocol (Ledford et al., 2018). Caregiver performance of the specific EMT strategy was evaluated through visual analysis with an expectation of an immediate increase in level (number of EMT strategies use) and an accelerating (therapeutic) trend to criterion. An intervention effect was determined by (a) examining the number of data points, level, trend, stability, and overlap of data (Ledford et al., 2018), (b) reviewing the data to determine whether caregiver use of EMT strategies increased when the intervention was implemented, and (c) evaluating the patterns of change to determine if the pattern of change was consistent across EMT language support strategies and caregiver-child dyads. Statistical analyses were conducted to complement and quantify results of visual analysis across participants. Non-overlap metrics and parametric effect sizes were calculated in R studio using the SingleCaseES R package (Pustejovsky, 2016).

Results: There was a functional relation between EMT-TP and EMT strategy use for all three caregiver-child dyads. Increases in the number of child communication acts were demonstrated for one child and number of different words were associated with caregiver strategy use for two children. Non-overlap and parametric effect size estimates indicated that the change from the baseline to the intervention phase was statistically significant for percentage and number of EMT strategy uses. Caregiver use of EMT strategies maintained several weeks (2- 6) after the intervention was completed. EMT-TP had relative cost savings in personnel, travel time, and mileage when compared to the anticipated costs of providing all intervention sessions to families in-person.

Discussion: Results from this study demonstrated that delivering EMT-TP and using the TMCR framework increased caregivers' use of four EMT strategies: matched turns, expansions, time delays, and milieu teaching episodes. Visual analysis suggested a functional relation between the introduction of EMT-TP and increases in percentage of caregiver strategy use for all three dyads and increases in number of correct EMT strategies for three dyads. Caregivers continued to use EMT strategies with fidelity several weeks after the intervention was completed. Increases in child communication during caregiver-child interactions were modest and variable across children. One child demonstrated an increase in number of communication acts and two children demonstrated an increase in number of different words. However, the study design did not permit assessment of a functional relation between caregiver training and child outcomes. Findings demonstrate the efficacy and feasibility of using video-teleconferencing to teach caregivers language support strategies. Knowledge gained from this study has the potential to

translate to broader telepractice advances for early intervention and early childhood education across domains (e.g., cognitive, adaptive, gross motor). Findings from the current research have the potential to help early intervention providers maximize resources and expand access to services to children with DS, especially for children and families who are significantly underserved.

References:

Kaiser, A.P., & Hampton, L.H. (2016). Enhanced milieu teaching. In R. J. McCauley, M.E. Fey, & R.B. Gillam (Eds.), *Treatment of language disorders in children* (2nd ed., pp. 87–120). Baltimore: Brookes Publishing.

Ledford, J. R., Lane, J. D., & Severini, K. E. (2018). Systematic Use of Visual Analysis for Assessing Outcomes in Single Case Design Studies. *Brain Impairment*, 19(1), 4–17. <https://doi.org/10.1017/Brlmp.2017.16>

Roberts, M. Y., Kaiser, A. P., Wolfe, C. E., Bryant, J. D., & Spidalieri, A. M. (2014). Effects of the teach-model-coach-review instructional approach on caregiver use of language support strategies and children's expressive language skills. *Journal of Speech, Language, and Hearing Research : JSLHR*, 57(5), 1851–1869. https://doi.org/10.1044/2014_JSLHR-L-13-0113

Pustejovsky, J. E. (2016) *SCD-effect-sizes: A web application for calculating effect size indices for single-case designs* (Version 0.1). <https://jepusto.shinyapps.io/SCD-effect-sizes> . 2016.

¹ Oregon Health and Science University, Portland, OR.