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Evidence-Based Speech and Language Intervention Techniques for the Birth-to-3 Population

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Structured Abstract

Clinical Question: Which current speech and language interventions or techniques are effective for improving speech and language outcomes for children with speech and language delays in the birth-to-3 population?

Method: Scenario Review

Study Sources: Cumulative Index of Nursing and Allied Health Literatures (CINAHL), Education Resources Information Center (ERIC), Language and Linguistics Behavior Abstracts (LLBA), Medline, PsycINFO, ProQuest Digital Dissertations (PQDD), Cochrane Central Register of Controlled Trials, Google Scholar, Scirus, SCOPUS, Science Direct, and the American Speech-Language-Hearing Association Conference Proceedings

Search Terms: Intervention OR Treatment AND child language, child speech, late talkers, language delay, language impairment, gestures, modeling, focused stimulation, parent training, prelinguistic milieu teaching, responsivity education and Hanen.

Number of Included Studies: 8

Number of Participants: Total = 276; Treatment total = 143; Control total = 133

Primary Results:

(1) Of the included interventions, The Hanen Program in combination with focused stimulation conclusively improved speech and language outcomes, specifically increasing vocabulary size, expanding phonetic inventories, and increasing syllable structure repertoires.

(2) Of the included intervention techniques, expansion, recasting, parallel talk, child-directed speech, visual cues, feedback, and increasing interaction opportunities showed large effects on increasing the mean length of utterances, the total number of words, the number of different words, and the percentage of intelligible utterances.

Conclusions: There is conclusive evidence that the Hanen Program with focused stimulation improves outcomes for children with speech and language delays in the birth-to-3 population. Additionally, the intervention strategies of expansion, recasting, parallel talk, child-directed speech, visual cues, feedback, and increasing interaction opportunities were also highly likely to improve speech and language outcomes. Because the overall effectiveness of responsivity education/prelinguistic milieu teaching and modeling alone as an intervention technique could not be derived from the current studies, further research is recommended.

Scenario

Amanda was concerned about the speech and language development of her 2-year-old son, Johnny. He did not have a hearing loss, cognitive disability, or motor disability, yet he seemed to be delayed in reaching critical speech and language developmental milestones. For example, he was only saying a few words reliably, and he was not combining any words to make short phrases. She expressed her concerns to one of her friends who also had a 2-year-old son that was developing speech and language at a delayed rate. Amanda discovered that her friend had been working with a speech-language pathologist (SLP) on learning techniques to use at home that would facilitate her son's speech and language growth. Amanda contacted her local university's speech and language clinic to find out if the techniques her friend told her about were research-based, or if there were alternative intervention options for her son. A speech and language assessment of Johnny's current communication skills was completed at the university clinic and it was determined that he would benefit from early intervention. Carrie, the SLP in charge, told Amanda she would research the literature and identify which intervention techniques have the best empirical evidence of success and then recommend intervention activities for Johnny. Carrie's primary research question was "Which current speech and language interventions or techniques are effective for improving speech and language outcomes for children with speech and language delays in the birth-to-3 population?"

Introduction

A systematic review of speech and language delay prevalence studies indicated that approximately 2.63%–16% of 2- and 3-year-old children have language delays and 5.0%–6.9% have speech and language delays (Law, Boyle, Harris, Harkness, & Nye, 2000). Children with speech and language delays face serious communicative, academic, and social consequences because of their limited speech and language performance (Young, Beitchman, Johnson, Douglas, Atkinson, Escobar, & Wilson, 2002). A large variety of speech and language interventions and techniques are used to improve communication skills in the birth-to-3 population. A speech or language intervention technique is a specific strategy used by a speech-language pathologist or parent to facilitate a response from a child. Some examples of techniques include: *expanding* on the child's utterance by adding appropriate grammatical markers or semantic details, *recasting* the child's utterance by changing the originally intended message into a different yet adult-like utterance, adding *gestures*, providing numerous *repetitions* of the speech or language targets, using *self talk* to pair the language with what the adult is doing, using *parallel talk* to provide the language for what the child is doing, adding *melodic intonation* to the voice to add interest to the adult's speech or language productions, adding *pause time* for the child to respond, *modeling* the desired speech or language targets, providing *visual cues*, and *reducing environmental distractions*, such as reducing background noise (see Paul, 2007, for more detailed descriptions and examples of intervention techniques).

Speech and language interventions incorporate a set of techniques to facilitate speech and language development. There are three categories of interventions: clinician-directed, child-directed, or a hybrid approach (Paul, 2007). The current review included all three types of interventions within its analysis. Though numerous speech and language interventions are available, the three Carrie found most frequently mentioned in the literature reviews are the Hanen Program, focused stimulation, and responsivity education/prelinguistic milieu teaching.

The Hanen Program follows a child-directed intervention approach. This program is also known as "It Takes Two to Talk." It is an indirect therapy approach that requires the SLP to provide instruction and feedback to parents in groups, and then the parents implement the intervention with their child. The Hanen Program has three main objectives; 1) to empower and educate the parents, 2) to facilitate child communication development, and 3) to provide social support for families. This program incorporates several techniques, such as expanding, repetitions, parallel talk, and self talk (Girolametto, Pearce, & Weitzman, 1996).

Focused stimulation can be a clinician-directed intervention approach or a parent-implemented approach and has often been used in conjunction with the Hanen Program. The main component behind focused stimulation is for the adult to provide numerous repetitions and models of a language target (Leonard, 1981). Techniques incorporated into this approach include modeling, repetitions, melodic intonation or emphatic stress, among several others.

Responsivity education/prelinguistic milieu teaching follows a hybrid approach and is based on the idea that communication develops through reciprocal interactions between children and their environment. The key components of this intervention require the adult to 1) arrange the environment in a manner that maximizes the opportunities for communication, 2) follow the child's lead, and 3) establish social routines through play (Warren, 1991).

The American Speech-Language Hearing Association (ASHA) has put forth several guiding principles regarding the best practice for early intervention, including services that are 1) family centered and culturally and linguistically responsive, 2) developmentally supportive and promote children's participation in their natural environments, 3) comprehensive, coordinated, and team based, and 4) based on the highest quality evidence that is available (2008). Though researchers have investigated the efficacy of treatment compared with the absence of treatment for older children with developmental speech and language delays (Law, Garrett, & Nye, 2004), less is known about speech and language interventions specifically designed for the birth-to-3 population, and their comparative effectiveness. The primary purpose of this investigation was to compare the effectiveness of interventions and techniques in the birth-to-3 population for improving speech and language development.

Method

Inclusion Criteria

To be included in this review, a study had to meet the following criteria: 1) employed an experimental or quasi-experimental design for evaluating the effectiveness or efficiency of an intervention, 2) focused on an intervention related to remediating speech or language delay, 3) graphic symbols were not used as the sole means of communication, 4) included participants between the ages of 0 and 36 months, 5) included participants who exhibited a delay of at least 1 standard deviation below the mean on a standardized test of speech or language skills or presented with an official history of speech or language delay, 6) included participants who did not have a diagnosis of cognitive, sensory or motor disorders, 7) included participants whose hearing was within normal limits, 8) included participants who were not characterized as bilingual learners of language, 9) was dated between 1980 and March 2009, and 10) was written in English, French, or German as an article in a refereed journal, a book chapter, or a document made available through ERIC or appeared in published conference proceedings or as an unpublished Master's thesis or doctoral dissertation.

Search Strategy

The following electronic, general-purpose databases were searched: Cumulative Index of Nursing and Allied Health Literatures (CINAHL), Education Resources Information Center (ERIC), Language and Linguistics Behavior Abstracts (LLBA), Medline, PsycINFO, and ProQuest Digital Dissertations (PQDD). The following Web search tools were also consulted: Cochrane Central Register of Controlled Trials, Google Scholar, Scirus, SCOPUS, Publisher-specific-maintained websites such as Science Direct, and the American Speech-Language-Hearing Association Conference Proceedings. The following key words and word combinations were searched based on the thesauri of the specific sites: Intervention OR Treatment AND child language, child speech, late talkers, language delay, and language impairment. Secondary key words included gestures, modeling, focused stimulation, parent training, prelinguistic milieu teaching, responsivity education, and Hanen.

Data Extraction

Using the search terms, a total of 7,708 articles were found. After removing non-relevant and duplicate studies, 217 articles remained. Consequently, one of three investigators reviewed the title and abstract of each potential study to see if it merited a full-text evaluation, based on the inclusion criteria. The inclusion checklist was used in the full-text evaluation. Any disagreements among investigators were resolved through a consensus-building process. The percentage of interrater agreement prior to consensus building was 96%, Cohen's kappa $\kappa = .71$.

Of the 21 articles that underwent the full-text evaluation, eight articles met all of the inclusion criteria. Four other studies also met the inclusion criteria, but were excluded from further analysis because they did not provide sufficient information to calculate effect sizes necessary for a meaningful interpretation of reported

intervention effects. The included eight articles were coded for significant information to be extracted, according to a coding manual. The coding manual was pilot tested prior to initial use. The study characteristics coded included: author, year, participant number, participant ages, participant speech and language skills, goals of intervention, intervention method, intervention outcomes, research design, inter-observer agreement, and treatment integrity.

Interrater Reliability

To estimate interrater reliability for data coding, 25% of the articles were randomly selected and reviewed by a second rater who was either a Master's degree student or PhD-level researcher in speech-language pathology. Raters were required to apply the inclusion checklist to two sample articles before actual use. Interrater reliability for all continuous variables was $r = 1.00$ ($p < .001$) and for all categorical variables percentage agreement exceeded 80%.

Data Analysis and Interpretation

Of the eight articles, seven followed group designs and one was a single-subject experimental design. Effect sizes were calculated and used to compare the effectiveness of the interventions for improving speech and language outcomes. Effect sizes were calculated using Cohen's *d* (Cohen, 1988) or Hedges' *g* for studies with fewer than 20 participants to prevent small sample bias (Littell, Corcoran, & Pillai, 2008). Effect-size measures for *d* and *g* may range from –3.00 to 0 to +3.00. Interpretation of effect sizes followed Cohen's 1988 standards: an effect size less than .20 was considered small, an effect size between .20 and .50 was considered medium, an effect size between .50 and .80 was considered important, and anything greater than .80 was considered a large effect. The Percentage of Nonoverlapping Data (PND) was obtained to estimate the effect size of the single-subject experiment. This was done by selecting the highest baseline point, then counting the number of points in the intervention above the highest baseline point, and finally calculating the proportion of non-overlapping, high points to the total number of intervention points. An effect size less than .50 was considered ineffective, an effect size between .50 and .70 was considered minimally effective, an effect size between .70 and .90 was considered moderately effective, and anything greater than .90 was considered highly effective (Scruggs, Mastropieri, Cook, & Escobar, 1986).

Guidelines for Study Evaluation

The eight experimental studies of the speech and language interventions used with toddlers that met the inclusion criteria for this review are summarized in Table 1. All studies were assessed in terms of their methodological quality by applying the Certainty of Evidence Framework (Simeonsson & Bailey, 1991). This framework classifies the certainty of evidence into four groupings: *conclusive, preponderant, suggestive, and inconclusive*. Classification was based on three dimensions: research design, inter-observer agreement of the dependent variable (IOA), and treatment integrity (TI), or the fidelity of the interventionists following the outlined intervention procedure. In general, an IOA of 80% or higher is sufficient, with independent and blind observers ranking highest. TI measures should be taken across 20%–40% of the intervention sessions, and TI measures of 80% or higher are considered adequate, again with independent and blind observers preferred. In order to be classified as *conclusive,* a clearly stated, sound design must be implemented and sufficient IOA and TI are reported. Studies ranked as *conclusive* show that speech and language outcomes were undoubtedly the result of the intervention. Studies classified as *preponderant* indicate that outcomes are likely to have occurred as a result of the intervention. To be considered preponderant, either the design was strong, but minor flaws in the TI or IOA were observed, or the IOA and TI were strong, but minor design flaws were present. Studies classified as *suggestive* may contain either minor flaws in the design and either missing or flawed IOA or TI. Within *suggestive* studies, it is plausible that the outcomes are a result of the intervention. Finally, studies considered *inconclusive* contain fatal flaws in the design or are missing TI and IOA, and therefore no conclusions about the intervention outcomes are possible. Table 1 presents all the included studies and their levels of appraisal. Articles are ordered first by quality classification, then by alphabetical order within each group.

Results

Participant Characteristics

Participants exhibited a delay of at least 1 standard deviation below the mean on a standardized test of speech or language skills or presented with an official history of speech or language delay. As such, this study included, but was not limited to, children labeled as "late talkers" or with a diagnosis of specific language impairment (SLI). A total of 276 (143 treatment; 133 control) children between the ages of 8 and 33 months participated in the included studies. All participants presented with expressive language delays and 215 also had receptive language delays.

Research Design

All but two of the included studies implemented randomized control group designs. These designs typically include two groups of participants formed by randomly assigning half of the subjects to the experimental group and the other half to the control group. Both groups are pretested and post-tested at the same times and in the same manner. One study implemented a non-randomized control group design (Möller, Probst, & Hess, 2008), which was identical to the randomized group design, but the participants were organized into groups using a non-randomized method. Finally, one study used an alternating treatment single-subject experimental design (Weismer, Murray-Branch, & Miller, 1993). This design typically is used to examine the relative effectiveness of two or more intervention conditions by rapidly alternating treatments within one or several individual subjects.

Treatment Integrity

Treatment integrity measures the overall fidelity or consistency of the interventionists at following the outlined intervention procedure. Because TI is an indicator of internal validity, it is essential to include when evaluating the quality of evidence for a particular intervention. Of the eight included studies, only four studies reported TI (Girolametto, Pearce, & Weitzman, 1996; Girolametto, Pearce, & Weitzman, 1997; Robertson & Weismer, 1999; Weismer, Murray-Branch, & Miller, 1993). Two of these studies did not measure TI across at least 20% of the intervention sessions (Robertson & Weismer, 1999, with TI across only 5% of sessions being measured; Weismer, Murray-Branch, & Miller, 1993, with TI across 15% of the sessions).

Interobserver Agreement

Interobserver agreement (IOA) is a percentage of agreement between two or more observers of the dependent variable, or target behavior. An IOA of 80% or higher is sufficient, with independent and blind observers ranking highest. Because IOA is an indicator of the reliability of the measured outcomes of a study, it also is an indicator of internal validity. Similarly to TI, only four studies reported IOA (Girolametto, Pearce, & Weitzman, 1996; Girolametto, Pearce, & Weitzman, 1997; Robertson & Weismer, 1999; Weismer, Murray-Branch, & Miller, 1993). All of the studies that reported IOA reached 80% agreement or higher.

Study Appraisal

Though only eight studies met all of the inclusion criteria and provided sufficient information for comparison, the individual quality of the studies varied. Two studies reported high IOA, sufficient TI, had strong research designs (Girolametto, Pearce, & Weitzman, 1996; Girolametto, Pearce, & Weitzman, 1997), so they were ranked as *conclusive.* Two studies were ranked as *preponderant* (Robertson & Weismer, 1999; Weismer, Murray-Branch, & Miller, 1993), because they reported TI for less than 20% of the intervention sessions, high IOA, and strong research designs. Finally, four studies failed to report TI and IOA or to provide sufficient details about their design implementation, so they were ranked as *inconclusive* (Buschmann, Jooss, Rupp, Feldhusen, Pietz, & Philippi, 2009; Gibbard, Coglan, & MacDonald, 2004; Möller, Probst, & Hess, 2008; Ward, 1999).

Treatment Effectiveness

Three specified interventions, Hanen, focused stimulation, and prelinguistic milieu teaching, and a few unspecified, parent-based interventions were compared in the current study. Among these, the Hanen Program combined with focused stimulation had *conclusive* evidence of improving speech and language outcomes (Girolametto, Pearce, & Weitzman, 1996; Girolametto, Pearce, & Weitzman, 1997). Hanen combined with focused stimulation had an important effect on increasing the vocabulary size (d = .76). For this young population, increasing vocabulary is critical for communication

development. This combined intervention program also had a large effect on expanding the phonetic inventories of children's speech productions (for early developing consonants *d* = 1.06, for middle developing consonants *d* = 1.22, and for late developing consonants *d* = 0.62.). Furthermore, the combined intervention program yielded a large effect on increasing syllable structure repertoires (*d* = 0.94). All of these effects may influence later vocabulary development (Whitehurst et al., 1991). The Hanen Program alone resulted in *inconclusive* evidence of an important effect of increasing productive vocabulary (*g* = .53) and syntax (*g* = .54) (Möller, Probst, & Hess, 2008).

There was inconclusive evidence that other parent-based training programs increased vocabulary, improved morphology and syntax (Buschmann, Jooss, Rupp, Feldhusen, Pietz, & Philippi, 2009; Gibbard, Coglan, & MacDonald, 2004), and in general, improved expressive and receptive language skills (Ward, 1999). Evidence from these inconclusive studies, however, must be used with caution. Due to the presence of significant design flaws, such evidence is not appropriate for clinical decision-making; it can, however, be valuable in identifying research gaps and pointing out how future research needs to improve (Schlosser & Wendt, 2008; Wendt, 2009).

In addition to speech and language interventions, numerous techniques were compared within the current study. One *preponderant* study using expansion, recasting, parallel talk, child-directed speech, visual cues, feedback, and increasing interaction opportunities showed large effects on increasing the mean length of utterances (*d* = 0.90), the total number of words (*d* = 1.08), the number of different words (*d* = 1.21), and the percentage of intelligible utterances (*d* =1.62; Robertson & Weismer, 1999).The second *preponderant* study used modeling or modeling with evoked productions, both techniques frequently implemented by SLPs. The overall effectiveness of these techniques could not be derived from this study due to inconsistent results for each participant (Weismer, Murray-Branch, & Miller, 1993).

Discussion

The purpose of the review was to investigate the effectiveness of interventions and techniques in the birth-to-3 population for improving speech and language outcomes, to answer the question for Carrie, Johnny's SLP, and to inform Johnny's mother, Amanda, of the available empirical support for speech and language interventions. Based on the research evidence, the answer to Carrie's question ("Which current speech and language interventions or techniques are effective for improving speech and language outcomes for children with speech and language delays in the birth-to-3 population?"), the Hanen Program in combination with focused stimulation has conclusive evidence of its effectiveness (Girolametto, Pearce, & Weitzman, 1996; Girolametto, Pearce, & Weitzman, 1997). As such, it is recommended that Johnny, who is less than 3 years old with speech and language delays, and his mother enroll in the Hanen Program for speech and language intervention in combination with focused stimulation.

Only one study included in the review used prelinguistic milieu teaching as an intervention approach. Though this study reported gains in expressive and receptive language skills, it did not sufficiently report TI and IOA design details, which led to an *inconclusive* ranking. Due to its *inconclusive* ranking, further research on the effectiveness of prelinguistic milieu teaching intervention is recommended before it is implemented by SLPs working with the birth-to-3 population.

There also is evidence that various intervention techniques are likely to improve speech and language skills, such as expansion, recasting, child-directed speech, parallel talk, visual cues, feedback, and increased interaction opportunities (Robertson & Weismer, 1999). Based on this evidence, it is recommended that SLPs include these intervention techniques in their repertoire for improving speech and language skills with clients in the birth-to-3 population. One *preponderant* study examined the effects of modeling and modeling with evoked productions (Weismer, Murray-Branch, & Miller, 1993), two techniques frequently used and familiar to practicing SLPs. Due to the mixed results of the effectiveness of using solely these techniques in this study, it is recommended that SLPs considering the exclusive use of these techniques with the birth-to-3 population do so with caution. Though the evidence of using modeling alone had mixed results, other interventions that utilized modeling (e.g., Hanen) demonstrated speech and language growth.

Conclusion With Amanda and Johnny

Carrie met again with Amanda and Johnny to discuss the findings from her literature review. She discussed the effectiveness of the Hanen Program in combination with focused stimulation with Amanda, and they determined that Johnny would likely benefit from participating in the parent-based program. Carrie helped Amanda enroll in a local Hanen Program led by a certified and trained Hanen SLP. Carrie also is working to become more familiar with the intervention techniques of modeling, expansion, recasting, child-directed speech, parallel talk, visual cues, feedback, and increased interaction opportunities. She is adding them to her repertoire while working clinically, thus building her skill set and clinical expertise.

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Included Studies

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Table 1. Birth-to-3 Speech and Language Intervention Studies in Order of Most to Least Convincing Evidence

TI = Treatment Integrity, IOA = Interobserver Agreement, TNW = Total Number of Words, MLU = Mean Length of Utterance, PIU = Percentage of Intelligible Utterances, NDW = Number of Different Words, SELD = Specific Expressive Language Delay, PND = Percentage of Non-Overlapping Data, LT = Late Talker, M = Modeling, MEP = Modeling with Evoked Productions, PLS (E) = Preschool Language Scale (Expressive)

Study	Participants (*N*, age, initial communication levels)	Goals of Intervention	Type of Intervention Received	Outcome	Effect Size (95% Confidence Interval) (Corrected for Hedges' *g* when applicable)	Conclusions	Appraisal
Girolametto, Pearce, & Weitzman (1996)	*N* = 22; 23–33 months, expressive & receptive delays; greater than 10 words, word combinations	Increase parent participation and increase child's language output	Hanen with focused stimulation	Increased number of single words and word combinations; increased parental frequency of use of techniques	Vocabulary size: 0.76 (–.11, 1.63); words per minute (parent) 0.03 (–.81, .87)	Increased language and parental role reported.	*Conclusive.* TI reported, IOA reported, and treatment and design details present.
Girolametto, Pearce, & Weitzman (1997)	*N* = 25; 23–33 months; expressive & receptive delays; more than 10 words	Increase child's speech output	Hanen with focused stimulation	Increased phonetic (consonant) inventories, increased syllable structure levels	Phonetic inventories: early 1.06 (.22, 1.89), middle 1.22 (.37, 2.08), late 0.62 (–.19, 1.42); Syllable structure: .94 (.11, 1.76) (2 or more consonants per syllable)	Increased speech production, increased parental role.	*Conclusive.* Design details reported, TI reported, high IOA.
Robertson & Weismer (1999)	*N* = 21; 21–30 months; expressive & receptive delays	Increase speech and language output, social competence	Expansion, recasting, parallel talk, child-directed speech, visual cues, feedback, increasing interaction opportunities	Increased number of single words and word combinations; increased percentage of intelligible utterances and socialization	MLU: 0.90 (.01, 1.8); TNW: 1.08 (.17, 2.0); NDW: 1.21 (.28,2.14); PIU: 1.62 (.63, 2.61)	Increased speech and language output.	*Preponderant.* High IOA, however observer not blind, 5% TI calculated, however neither independent nor blind, design details reported.
Weismer, Murray-Branch, & Miller (1993)	*N* = 3; 27–28 months; receptive & expressive delays; more than 10 single words, word combinations	Increase child's speech and language output	Modeling or modeling and evoked production	Increased number of single words	(PND) LT1 M: 100% MEP: 63% LT2 M: 33%; MEP: 12% LT3 M: 38%, MEP: 100 %	Overall effectiveness unclear, mixed results.	*Preponderant.* IOA reported, 15% TI reported, design details reported, no treatment effect observed.

Table 1. Birth-to-3 Speech and Language Intervention Studies in Order of Most to Least Convincing Evidence, continued

Study	Participants (*N*, age, initial communication levels)	Goals of Intervention	Type of Intervention Received	Outcome	Effect Size (95% Confidence Interval) (Corrected for Hedges' *g* when applicable)	Conclusions	Appraisal
Buschmann, Jooss, Rupp, Feldhusen, Pietz, & Philippi (2009)	*N* = 47; 24–27 months; expressive language delays; fewer than 50 words	Increase child's language output	Parent training on the use of child-directed speech and modeling	Increased vocabulary, expressive syntax, sentence productions, and morphology.	Vocabulary Posttest: .72 (.12, 1.3); Syntax Posttest: 1.16 (.53, 1.76); Morphology Posttest: .72 (.12, 1.3); Word Production Posttest: .74 (.14, 1.32); Sentence Production Posttest: 1.03 (.4, 1.62); Vocabulary Follow-up: .74 (.13, 1.31); Syntax Follow-up: .56 (–.03, 1.14); Morphology Follow-up: .71 (.11, 1.29)	No conclusions possible.	*Inconclusive.* Intervention details vague, missing IOA, missing TI.
Gibbard, Coglan, & MacDonald (2004)	*N* = 22; 22–32 months; expressive and receptive language delays; single words (more than 10)	Increase language output	Non-specified, parent-based program	Increased single words and word combinations	Vocabulary: 0.84 (–.04, 1.72); Phrase length: 1.97 (.95, 2.99); MLU: 2.06 (1.02, 3.09); PLS(E): 1.39 (–.04, 1.72)	No conclusions can be made.	*Inconclusive.* Design details vague, missing TI, missing IOA.
Möller, Probst, & Hess (2008)	*N* = 17; 24–31 months; Expressive language delay; fewer than 50 words	Increase children's language skills	Hanen	Increased productive vocabulary, syntax, and morphology. Moderate to strong effect.	Productive Vocabulary: .52 (–.45, 1.49); Syntax: .54 (–.54, 1.61); Morphology: significant gain reported but no Effect Size.	Increased language output.	*Inconclusive.* Missing IOA, missing TI, design details provided.
Ward (1999)	*N* = 119; 8–21months; generalized listening difficulties, no functional speech and language skills	Increase child's language output	Prelinguistic milieu teaching	Increased scores on the Reynell Developmental Language Scales	Group 1: Exp: 2.1 (1.52, 2.64); Rec: 2.04 (1.46, 2.57) Group 2: Exp: 2.11 (.47, 3.75); Rec: 1.83 (.26, 3.4) Group 3: data inadequate	No conclusions possible.	*Inconclusive.* Missing design details, missing TI, missing IOA.