Evidence-Based Systematic Review: Effects of Service Delivery on the Speech and Language Skills of Children From Birth to 5 Years of Age

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Speech-language pathologists (SLPs) providing services to young children (i.e., birth–5 years) with communication disorders face a myriad of decisions and responsibilities. These responsibilities range from the prevention and identification of communication disorders to the development, execution, and monitoring of treatment plans. Decisions regarding treatment not only include selecting an appropriate intervention but also identifying and conscientiously addressing any other variables that may play a role in augmenting treatment effects. One such variable is the appropriate framework or service delivery model for implementing an intervention.
Because service delivery is complex and multidimensional, choosing the best format in which to deliver speech and language treatment can be a daunting task. Variables to consider include determining the location of service (e.g., home, clinic, classroom, or pull-out), the service provider (e.g., SLP, parent, or paraprofessional), the format of the service provision (e.g., group vs. individual), and the dosage (e.g., frequency, intensity, and duration) of services (Cirrin et al., 2010). The complexity of this issue is further confounded by federal mandates SLPs must adhere to that outline important considerations when providing service to this population.

According to Part C of the Individuals with Disabilities Education Act (IDEA), services to children from birth up to age 3 are to be family-centered and provided in natural environments to the greatest extent appropriate to meet the individual needs of the child. Natural environments include home and community settings that are typical or common for same-age children without disabilities. Similar provisions are provided under Part B of IDEA for preschool and school-age students that require that children with disabilities be educated in the least restrictive environment. This includes being educated with nondisabled children “to the maximum extent appropriate” to meet the specific educational needs of the student (U.S. Congress, 2004). Although these mandates highlight the importance of service delivery and attempt to ensure that children with speech and language needs receive the most appropriate services, they do not provide sufficient guidance to clinicians who must consider all aspects of service delivery in order to develop a comprehensive treatment plan. Given all of the challenges SLPs face when developing treatment plans and choosing service delivery models, it is essential that clinicians are up to date regarding the state of the evidence for young children with speech and language needs.
To remain current with the research SLPs are, more often, looking to evidence-based systematic reviews (EBSRs) for a concise view and analysis of the scientific literature. EBSRs present a comprehensive synthesis of the scientific research on a given topic, and their findings can be a useful tool to guide clinicians making evidence-based decisions about treatment and the optimal framework in which it is best delivered. Within the past 25 years, several systematic reviews have been published specifically addressing the effectiveness of different service delivery models. These reviews have examined dosage, parent-implemented versus clinician-administered therapy, inclusive versus segregated settings, classroom-based versus pull-out treatment, and school versus clinic setting. Although findings from these reviews provide some insight into various dimensions of service delivery and their effect on the treatment outcomes of young children with speech or language impairments, the mixed findings along with a number of methodological shortcomings restrict their overall clinical utility.

The primary aim of this evidence-based review was to further examine service delivery models for children from birth through 5 years of age with communication disorders. Moreover, this review attempted to address some of the limitations noted in previous systematic reviews such as the comparability of interventions across service delivery aspects, consistency in outcome, and sufficiency of treatment description and service delivery definitions. These considerations are illuminated below along with the rationale for targeting the following aspects of service delivery used to develop our clinical questions: frequency, intensity, and duration of service; direct and indirect service; individual and group treatment; and treatment setting.

**Dosage**

Examining the effect of treatment dosage in speech-language pathology has been an important aspect of service delivery. However, it has been difficult to determine the effects of
dosage due to its several distinct elements. These elements include the total amount of treatment and how that treatment is distributed and, more specifically, the number and length of treatment sessions over a given amount of time. Recent definitions of treatment dosage have been expanded to include not only the amount of treatment sessions but also the actual number of teaching episodes implemented during a single treatment session (Warren, Fey, & Yoder, 2007). Because different aspects of treatment dosage have been examined, comparing results across studies has been further complicated by the lack of common terminology or definitions for each aspect. For example, definitions for treatment intensity alone vary substantially from study to study and have included such features as the quality and quantity of service, the number of hours, the level of participation, the proportion of adults to children during treatment, and the number of specific therapeutic episodes of service over time (Warren et al., 2007).

Previous systematic reviews have differed in their conclusions as to the effect of dosage on treatment outcomes. An early meta-analysis by Nye, Foster, and Seaman (1987) found no significant differences in effect sizes relative to treatment duration or length of individual treatment sessions in children with language disorders. Conversely, a later meta-analysis by Law, Garrett, and Nye (2004) found that longer treatment durations (over 8 weeks) were associated with better clinical outcomes compared to those of shorter duration for this same population. However, poor description of study design and combination of different outcomes and interventions severely limited the conclusions that could be drawn. Reichow and Wolery (2009) found similar support for early intensive behavioral intervention in a subpopulation of young children with autism spectrum disorder (ASD). An analysis of the 13 included studies revealed that increased treatment dosage had a positive effect on cognitive outcomes with longer duration
and more total hours of therapy associated with a higher probability of achieving large gains in IQ scores.

Given the mixed findings of previous literature, a further examination of the treatment effect of frequency, intensity, and duration of SLP services was justified (see Table 1, Clinical Question 1). For this EBSR, we defined intensity as the amount of time spent in each treatment session, frequency as the number of treatment sessions over a set period of time (usually 1 week), duration as the length of treatment received, and total dosage as the overall amount of treatment received.

**Service Provider**

The selection of a service provider is another aspect of service delivery that bears further investigation. Although speech and language services have traditionally been delivered by SLPs, young children may receive treatment from a variety of alternative service providers including speech-language therapy assistants, parents, caregivers, teachers, peers, or others (Blosser & Kratcoski, 1997). Considering the distinct and essential role that parents and caregivers play in a young child’s development, intervention provided by these individuals may provide unique opportunities to maximize treatment outcomes. For example, parents and caregivers can consistently implement an intervention throughout the course of a day in a variety of settings that are important to the child and family thereby enhancing skill development, generalization, and maintenance. Additionally, given that many early intervention programs have adopted a primary service provider or transdisciplinary model (National Early Childhood Technical Assistance Center, 2009), other professionals (e.g., early interventionists) are likely to be involved in implementing speech and language programs.
The effect of service provider has been studied in various systematic reviews. In Law et al. (2004), no significant differences were shown between clinician-administered interventions and those implemented by trained parents to children with speech-language disorders. Other reviews examining parent-mediated or parent-managed interventions in children with ASD found inconclusive results. One review (Diggle, McConachie, & Randle, 2003) noted mixed results across the two included trials, one favoring the parent-training group over community day care for child language and maternal outcomes and the other favoring intensive intervention delivered by professionals over parent-mediated services for child outcomes. Doughty (2004) investigated the primary and secondary evidence on the effectiveness of behavioral interventions and skill-based interventions for young children with ASD. In two studies, parent-managed intensive behavioral intervention was found to be less effective than clinic-based programs. One study noted that parent training in behavioral intervention was more effective for improving communication outcomes over usual care. A systematic review of six studies of parents as primary intervention providers revealed that parental involvement was associated with positive outcomes in speech, language, and play skills (Levy, Kim, & Olive, 2006). Brunner and Seung (2009) examined communication-based treatments and noted that the findings supported the efficacy of parent-based developmental interventions. A final review by McConachie and Diggle (2007) found that parent training may lead to improved communication, increased maternal communication, and increased parent–child interaction. The variability among the studies included in these reviews did not allow for comparison of the effect of the treatment administered by a parent versus clinician or alternative service provider. It is also important to note that because most of these reviews focused solely on children with ASD, the findings may not generalize to the broader population of young children in need of SLP services.
Table 1 outlines the second clinical question pertaining to service provider. Services provided by an SLP are considered *direct treatments* in this review, whereas *indirect treatments* are those delivered by any other individual, typically under the direction of an SLP.

**Format of Treatment**

A third aspect of service delivery addressed in our review targeted the format of the treatment (see Table 1, Clinical Question 3). This is an important question as the selection of individual or group treatment is often influenced by a number of extraneous factors unrelated to the child’s individual needs such as caseload size (Dowden et al., 2006) or SLP shortages (American Speech-Language-Hearing Association [ASHA], 2008). The effects of treatment format were investigated in a single systematic review (Law, Garrett, & Nye, 2003), which found no significant difference between group and individual treatment in children with primary speech-language delay or disorder.

**Treatment Setting**

Lastly, federal mandates directing clinicians to provide treatment in naturalistic settings and the least restrictive environment prompted our final question detailed in Table 1. The influence of these settings on speech and language outcomes in young children is unclear and has yet to be fully explored. Treatment setting ranges from home, clinic, school, or community, to integrated classrooms, segregated classrooms, pull-out settings, and classroom settings.

Two previous reviews were found pertaining to treatment setting; however, the results were mixed and limited by the number of treatment settings compared (i.e., classroom vs. pull-out services and integrated vs. segregated settings). McGinty and Justice (2006) examined the experimental evidence concerning the relative effectiveness of classroom-based service versus pull-out service for preschool or early-elementary children with language impairments. Two
studies reported better outcomes for collaborative, classroom-based services over pull-out services on vocabulary outcomes, whereas a third study reported no significant differences between classroom and pull-out services on total language and expressive scores and an advantage for pull-out services on receptive language measures. Buysse and Bailey (1993) also found no significant differences between integrated and segregated placements on developmental outcomes for young children with disabilities but reported potential benefits of integrated settings on social and behavioral outcomes.

The primary aim of these clinical questions and this review was to examine the effects of each service delivery dimension as well as the characteristics of the children and treatments to provide clinicians with the necessary information to make sound clinical decisions.

**Method**

A systematic literature search was conducted from September 2009 through January 2010. A broad set of key words related to early intervention, communication disorders, speech-language pathology, dosage, and service delivery was generated by the author panel. These key words were then mapped to the medical subject headings from the National Library of Medicine or to the controlled vocabulary specific to each of the searched databases (see Appendix A for a complete list of databases, search dates, and corresponding search terms). Truncated search terms were used to capture spelling or suffix variations. To identify as many relevant citations as possible, the systematic search combined a pearl growing strategy (Hawkins & Wagers, 1982) and plain text searching. Additional citations were identified through hand searches of references from all full-text articles and narrative reviews and through forward citation tracking of relevant articles.
Studies were considered for review if they were published in a peer-reviewed journal (including “in-press” studies) between 1975 and December 2009, were written in English, and contained original data addressing one or more of the four clinical questions. Additionally, studies had to examine infants, toddlers, or preschoolers from birth through 5 years of age with speech-language impairment as either a primary disorder or secondary to other conditions (e.g., developmental delay, cognitive disabilities, or hearing impairment). We excluded studies if the participants were within the target age range but enrolled in kindergarten (as these children were included in a different review; Cirrin et al., 2010) or if the participants were considered “at-risk” but were not identified with speech-language impairment. To examine the effects of service delivery, included studies had to incorporate an experimental, quasi-experimental, or multiple baseline single-subject design in which the type of intervention was held constant and only the service delivery model or dosage of the intervention varied. An additional inclusion criterion applied only to Clinical Question 2 (What is the effect of indirect versus direct service on speech and language outcomes for children birth-to-5 years of age with a speech or language disorder?). Because direct treatment was defined as intervention provided by an SLP, studies addressing this clinical question had to include service provision by an SLP.

Figure 1 displays the findings from the systematic search. Two authors independently reviewed 801 abstracts for inclusion. Of these, 110 were preliminarily accepted, and the full text of these articles was reviewed. This resulted in an additional 93 studies being excluded because they did not meet one or more of the inclusion criteria. A total of 17 citations were included in the final analysis. Study eligibility agreement between reviewers was 89%, and all disagreements were resolved by consensus. A log of excluded studies and the reason for exclusion is included in Appendix B.
All included articles were assessed for methodological quality by two independent evaluators using ASHA’s level of evidence scheme (Mullen, 2007). This structured system was used to identify areas of possible bias or methodological weaknesses across eight domains including study protocol description, blinding, sampling/ allocation, participant comparability/ description, treatment fidelity (of the service delivery model), statistical significance, precision, and intention to treat. A study received 1 point for each quality indicator meeting the highest criteria in a corresponding category (see Table 2). For controlled trials, all eight quality markers were applicable leading to a maximum quality score of 8. Other study designs in which an intention to treat analysis was not relevant could receive a maximum quality score of 7. Agreement between the two evaluators was 81%, and all scoring discrepancies were resolved through consensus. All studies, regardless of quality marker score, were included in the analysis.

The same two evaluators also completed the data extraction for each of the studies. The data extraction process was used to summarize the important characteristics of each study and included key elements concerning the participants, interventions, service delivery characteristics, outcomes, major findings, and study limitations. Disagreements regarding the summaries were also resolved through discussion and consensus.

Effect sizes were included if they were reported by the authors in the article. When not reported, effect sizes and 95% confidence intervals (CIs) were calculated for outcome measures when possible. For group studies, Cohen’s $d$ was calculated from group posttest means and standard deviations or estimated from results of analyses of variance or $t$ tests (Cohen, 1988). For single-subject designs with adequate data, a weighted effect size was calculated for targeted outcome measures (Beeson & Robey, 2006; Busk & Serlin, 1992). Clinical significance of an
effect size was determined by analyzing the range included in the corresponding 95% CI. If the CI did not contain the null value \((d = 0)\), the effect was considered clinically significant. Given that each included study compared one or more aspects of service delivery and that there was no control condition, direction of effect size (i.e., positive or negative) was simply assigned for each clinical question. A synthesis of study results is presented below by clinical question.

**Results**

Table 3 summarizes the clinical questions addressed, study design, and quality markers of the 17 studies meeting the inclusion criteria for this EBSR. Ten of the studies examined the effects of treatment dosage (Question 1), four studies compared direct treatment to indirect treatment (Question 2), six studies compared individual treatment to group treatment (Question 3), and nine studies investigated the effects of treatment setting on speech and language outcomes in young children (Question 4). This total exceeds 17 because many of the studies (6/17) varied across multiple aspects of service delivery and therefore addressed more than one clinical question. Included studies were either controlled trials (14/17) or single-subject design investigations (3/17). Methodological quality ratings varied across the 17 studies. Most of the controlled trials (10/14) achieved a quality-marker score of 5 or below. Smith, Groen, and Wynn (2000) received the highest quality marker score (7/8) of the controlled trials included in this review. Scores for the three single-subject design investigations ranged from 2 (Chiara, Schuster, Bell, & Wolery, 1995) to 3 (Colozzi, Ward, & Crotty, 2008; Venn, Wolery, & Greco, 1996) out of a possible score of 7. Most of the studies reported statistical significance (14/17), group comparability at baseline (14/17), descriptions of the study protocol (12/17), evidence of treatment fidelity (11/17), or sufficient data to compute effect sizes and CIs (10/17). However, studies were lacking in other areas. Fewer than half of the studies reported assessor blinding...
(6/17) or random allocation of participants with an adequate description of the randomization procedures (4/17). Additionally, none of the controlled trials reported using an intention-to-treat standard in data analysis.

**Participant and Intervention Characteristics**

A total of 491 participants age 20–66 months were examined with individual study sample size ranging from one to 96 participants (see Table 4). Of the studies reporting gender, 67% of the participants were male, and 33% were female. Medical or SLP diagnoses of participants varied and included speech-language delay/disorder (68%), developmental delay (20%), and ASD (12%). A range of treatment approaches and techniques were employed in the various studies including but not limited to interactive modeling, dialogic reading, discrete trial instruction, constant time delay, incidental learning, phonological awareness, and sound discrimination.

**Clinical Question 1: What is the effect of frequency, intensity, or duration of service on speech and language outcomes for children birth-to-5 years of age with a speech or language disorder?**

Table 5 provides a description of the treatment schedules, outcomes, and relevant findings included in the 10 studies. Half of the studies (5/10) compared more than one aspect of service delivery (e.g., dosage and treatment setting). Two of the studies were single-subject designs (Chiara et al., 1995; Venn et al., 1996), and the remaining eight were controlled trials. Thirty-five effect sizes (with corresponding CIs) were reported or calculable from six studies (Eiserman, Weber, & McCoun, 1990, 1992; Lonigan & Whitehurst, 1998; Smith et al., 2000; Whitehurst et al., 1994; Wilcox, Kouri, & Caswell, 1991) and ranged from –1.17 to 1.77. For this clinical question, a positive effect size reflects results favoring a more intensive or higher amount
of treatment, and a negative effect size reflects gains favoring a less intensive or lower amount of

treatment. Twenty-eight of the 35 effect sizes (80%) had CIs that included the null value and

were not considered clinically significant. Of the seven clinically significant effect sizes, six

favored a more intensive or greater amount of treatment.

Lonigan and Whitehurst (1998) compared three groups of children with receptive and

expressive vocabulary delays. One group received dialogic reading instruction daily at school, a

second group received this instruction daily at home, and the third group received daily

instruction at home and school. Compared to the school only group, the group receiving home

and school instruction showed greater gains, \(d = 1.07, 95\% \text{ CI } [0.08, 1.97]\), on the verbal

expression subtest of the Illinois Test of Psycholinguistic Abilities (ITPA; Kirk, McCarthy, &

Kirk, 1968) and on mean length of utterance (MLU), \(d = 1.61, 95\% \text{ CI } [0.5, 2.58]\). The school

plus home instruction group also showed larger gains than the home instruction only group on

the verbal expression subtest of the ITPA, \(d = 1.25, 95\% \text{ CI } [0.03, 2.3]\), as well as on the number

of different words used in a language sample, \(d = 1.77, 95\% \text{ CI } [0.44, 2.86]\). In another study

(Eiserman et al., 1990), preschoolers receiving intervention four times weekly showed greater

gains than those receiving treatment once weekly on responding to requests during a parent–

child language sample, \(d = 0.82, 95\% \text{ CI } [0.15, 1.46]\), and on the number of unintelligible child

utterances in an SLP–child language sample, \(d = 0.74, 95\% \text{ CI } [0.09, 1.37]\). However, children

receiving less intensive intervention produced more spontaneous utterances in a parent–child

language sample, \(d = -1.17, 95\% \text{ CI } [-1.82, -0.47]\). In a second-year follow-up study (Eiserman

et al., 1992), five children from the intensive treatment group and seven children from the once-

weekly group continued to receive intervention, but no language sample results were reported.
Other studies (Barrat, Littlejohns, & Thompson, 1992; Chiara et al., 1995; Eiserman et al., 1990; Luiselli, Cannon, Ellis, & Sisson, 2000; Venn et al., 1996) provided information to address this clinical question but did not report sufficient information to calculate effect sizes or CIs. In Barrat et al. (1992), preschoolers who received SLP treatment four times per week for 24 sessions showed significant gains ($p = .02$) on the expression subtest of the Reynell Developmental Language Scales (RDLS; Reynell, 1977) compared to those who received the same number of sessions distributed one time per week. However, no significant differences were noted between the two groups on the comprehension subtest of the RDLS. The single participant in Chiara et al. (1995) required fewer trials to reach criterion in a picture-naming activity in an individual distributed trial format (42 trials) compared to the small group massed trial format (140 trials). Maintenance and generalization were similar across both conditions. Luiselli et al. (2000) compared children with ASD who began discrete trial training prior to age 3 to a group who started after age 3. The two groups differed significantly on the average amount of weekly treatment but not on total amount or duration of treatment. No significant differences in the communication domain of the Early Learning Accomplishments Profile (ELAP; Glover, Priminger, & Sanford, 1988) or Learning Accomplishments Profile (LAP; Sanford & Zelman, 1981) were noted. However, additional analyses of the different aspects of treatment dosage (e.g., hours of treatment per week and total amount of treatment) revealed that duration of treatment was a significant predictor of change ($p < .002$) for the communication domain of the ELAP or LAP. Another study (Venn et al., 1996) compared the effects of instruction provided every day versus every other day on the letter- or number-naming abilities of two children with ASD. Both children required fewer sessions, trials, and minutes of instruction to reach criterion in the every other day condition. However, maintenance and generalization of naming abilities
were the same for both treatment conditions. Three outcome measures from Eiserman et al. (1990) had effect sizes that were not analyzable because CIs could not be calculated. Reported $p$ values for these measures (i.e., Preschool Language Scale [PLS] Total Developmental Quotient, Test for Auditory Comprehension of Language—Revised [TACL–R] Total Developmental Quotient, and developmental sentence score from the parent–child language sample) were all nonsignificant ($p > .05$).

**Clinical Question 2: What is the effect of direct versus indirect service on speech and language outcomes for children birth-to-5 years of age with a speech or language disorder?**

Table 6 details the results of the four studies. All four studies were controlled trials that compared treatment provided by an SLP (direct treatment) to intervention provided by trained parents (indirect treatment). All of the investigations examined language or vocabulary outcomes, and three of the studies (Barnett, Escobar, & Ravsten, 1998; Eiserman et al., 1990, 1992) examined articulation outcomes as well. Twenty-three effect sizes and CIs from three of the studies were reported or calculable. Effect sizes ranged from $-1.17$ to $1.24$. Most of the CIs (19/23, or 83%) of the effect sizes included the null value, indicating no clinically significant differences in outcomes between direct and indirect treatment. For studies addressing this clinical question, a negative effect size indicates greater gains for the children receiving direct treatment, and a positive effect size indicates greater gains for the children receiving indirect treatment. Mixed results were noted across the four significant effect sizes, which examined outcomes from child language samples. Three of the four came from one investigation (Eiserman et al., 1990), described previously, which addressed all four clinical questions. Indirect treatment by parents who had been trained by an SLP demonstrated significant effects for two outcomes (i.e., child responding to requests during a parent–child language sample and the number of
unintelligible child utterances in an SLP–child language sample), and direct treatment produced a significant effect for one outcome (i.e., percentage of spontaneous child utterances during a parent–child language sample). These same outcomes were not assessed in a follow-up (Eiserman et al., 1992) of 12 children who continued to receive treatment in their original groups. In Gibbard (1994), children with an expressive language delay receiving indirect treatment showed greater gains on MLU than those receiving treatment by an SLP, $d = 1.24$, 95% CI [0.14, 2.2].

Barnett et al. (1988) also examined the effects of direct and indirect treatment, but no effect sizes were calculable. In this study, preschoolers who received indirect treatment showed significant pre- to posttreatment improvement on the PLS (Zimmerman, Steiner, & Pond, 1979; $p < .01$) and on the Arizona Articulation Proficiency Scale (AAPS; Fudala, 1974; $p < .05$). The group receiving direct treatment did not demonstrate significant improvement on either measure. In Eiserman et al. (1990), no significant differences ($p > .05$) were reported between direct and indirect treatment on the PLS, TACL–R, or the developmental sentence score from a parent–child language sample.

**Clinical Question 3: What is the effect of individual versus group treatment on speech and language outcomes for children birth-to-5 years of age with a speech or language disorder?**

Table 7 provides a description of the outcomes and relevant findings for the six studies addressing this question. Four of the studies were controlled trials and two were single-subject design investigations. Across the four controlled trials, 20 effect sizes with CIs were calculable and ranged from −1.17 to 0.83. Again, most of these (17/20, or 85%) had a CI that included the null value, indicating effects that were not considered clinically significant. Negative effect sizes represent outcomes favoring group treatment, and positive effect sizes reflect outcomes favoring
individual treatment. The same three effect sizes from Eiserman et al. (1990) were the only significant findings for this clinical question. In this study, children receiving individual treatment had fewer unintelligible utterances in an SLP–child language sample and more responses to parent requests in a parent–child language sample, whereas those receiving group treatment demonstrated a greater percentage of spontaneous utterances in a parent–child language sample.

Additional studies addressed this question, but effect sizes or CIs were not reported or calculable. In Chiara et al. (1995), the participant needed fewer trials to achieve picture-naming skills in individual treatment using a distributed trial format (42 trials) compared to small group treatment using a massed trial format (140 trials). However, maintenance and generalization of skills were similar across both conditions. Another study (Colozzi et al., 2008) investigated the use of a simultaneous prompting procedure in individual and small group settings. Children required roughly the same amount of treatment sessions and trials to reach criterion under both conditions. However, more targets were acquired in the group treatment setting, leading the authors to conclude that some observational learning had occurred in the small group setting. There were no differences noted between the two treatment conditions in generalization of skills.

Another study (Eiserman et al., 1990) reported no significant differences ($p > .05$) between individual and group treatment on the PLS, TACL–R, or the developmental sentence score from a parent–child language sample.

**Clinical Question 4: What is the effect of treatment setting (home vs. clinic, classroom vs. pull-out, etc.) on speech and language outcomes for children birth-to-5 years of age with a speech or language disorder?**
The nine controlled trials targeting this clinical question compared a variety of treatment settings (see Table 8). Five studies (Barnett et al., 1988; Crain-Thoreenson & Dale, 1999, Eiserman et al., 1990, 1992; Lonigan & Whitehurst, 1998) compared the effects of clinic or school-based treatment to home-based treatment; two studies (Harris, Handelman, Kristoff, Bass, & Gordon, 1990; Rafferty, Piscitelli, & Boettcher, 2003) compared integrated and segregated classrooms; and two studies (Valdez & Montgomery, 1996; Wilcox et al., 1991) investigated the effects of classroom-based versus pull-out intervention. For this question, direction of effect size was assigned as follows: Treatments favoring clinic or school-based (negative effect size) compared to home-based (positive effect size); treatments favoring segregated classrooms (negative effect size) compared to integrated or inclusive classrooms (positive effect size); and treatments favoring individual pull-out (negative effect size) compared to classroom-based or collaborative models (positive effect size).

From the five studies comparing clinic or school-based treatment to home treatment, 22 effect sizes and corresponding CIs were reported or calculable and ranged from –1.17 to 0.83. Nineteen of the 22 effect sizes (86%) had CIs that included the null value and were not considered clinically significant. All three of the clinically significant effect sizes were from a study (Eiserman et al., 1990) that compared multiple aspects of service delivery including clinic and home-based treatments. Children receiving home-based treatment were more responsive to requests during a parent–child language sample, \( d = 0.82, 95\% \text{ CI} [0.15, 1.46] \), and had fewer unintelligible utterances in an SLP–child language sample, \( d = 0.74, 95\% \text{ CI} [0.09, 1.37] \), than children receiving clinic-based treatment from SLPs. However, clinic-based treatment yielded greater spontaneous utterance production in a parent–child language sample, \( d = –1.17, 95\% \text{ CI} [–1.82, –0.47] \). Other studies provided further evidence, although effect sizes and CIs were not
reported or calculable. In one investigation (Eiserman et al., 1990), no significant differences were noted between clinic and home-based treatment on various language measures (i.e., PLS, TACL–R, and developmental sentence score). In another study comparing clinic and home-based treatment (Barnett et al., 1988), children receiving home-based treatment exhibited significant gains on the PLS—Revised Edition (PLS–R; Zimmerman et al., 1979; \( p < .01 \)) and the AAPS \( (p < .05) \), whereas the clinic-based group did not.

The two studies comparing segregated and integrated classrooms yielded six effect sizes ranging from \(-0.05\) to \(0.84\). Four of the six effect sizes (67%) had CIs containing the null value, indicating no clinically significant difference in outcomes. Rafferty et al. (2003) evaluated the effects of inclusive and segregated preschool programs on the language abilities of children with disabilities. Among participants classified as having severe disabilities, greater gains were made from inclusive programs on the auditory comprehension subscale, \( d = 0.81, 95\% \) CI [0.19, 1.38], and expressive language subscale, \( d = 0.84, 95\% \) CI [0.22, 1.42], of the PLS—Third Edition (PLS–3; Zimmerman, Steiner, & Pond, 1992) than children in segregated classrooms. For children with less severe disabilities, inclusive and segregated classes did not have a differential impact, and language gains were similar across both settings.

Three effect sizes were calculable from studies comparing individual pull-out treatment to classroom-based or collaborative models. These effect sizes ranged from 0.24 to 0.56. All three had a CI that included the null value, indicating effects that were not considered clinically significant. Another study provided additional information, but effect sizes or CIs were not reported or calculable. Valdez and Montgomery (1996) compared the effects of pull-out and classroom-based intervention and reported no significant differences in Clinical Evaluation of
Culturally and Linguistically Diverse Populations

In an attempt to understand the extent to which the findings from this review can be generalized to diverse populations, the cultural and linguistic characteristics of the participants were examined to determine if the results of the studies varied across any of these characteristics (see Table 9). Two of the studies (Barratt et al., 1992; Gibbard, 1994) were conducted in England, and the remaining 15 were conducted in the United States. Two studies (Eiserman et al., 1990; Lonigan & Whitehurst, 1998) reported that English was the primary home language for all participants, and a third (Whitehurst et al., 1994) indicated that 90% of mothers spoke English as their primary home language. The remaining studies did not report linguality. Race or ethnicity information was indicated in seven studies (Barratt et al., 1992; Eiserman et al., 1990; Lonigan & Whitehurst, 1998; Rafferty et al., 2003; Smith et al., 2000; Valdez & Montgomery, 1996; Whitehurst et al., 1994) and varied widely. For example, all of the participants in Eiserman et al. (1990) were Caucasian, whereas all of the participants in Valdez and Montgomery (1996) were African American. Overall, the disparity in race/ethnicity among the studies did not appear to influence the findings. However, one investigation (Barratt et al., 1992) analyzed the results of Whites and non-Whites separately and found that Whites made significantly greater gains in language expression but not in language comprehension.

Other parent and family factors were also reported. The percentage of families with both parents in the home was noted in five studies (Barnett et al., 1988; Eiserman et al., 1990; Rafferty et al., 2003; Smith et al., 2000; Whitehurst et al., 1994) and ranged from 58% to 95%. The education level of parents was reported in five studies. The mean years of education ranged
from 12.32 to 14.5 years. One study (Barnett et al., 1988) reported that most parents had attended college, and another (Rafferty et al., 2003) indicated that 48% of mothers and 40% of fathers had some level of education beyond high school. Three studies (Eiserman et al., 1990; Rafferty et al., 2003; Whitehurst et al., 1994) specified the employment level of the parents. The percentage of mothers working outside of the home ranged from 37% to 91%, and the percentage of fathers/partners working outside the home ranged from 70% to 92%. Eiserman et al. (1990) reported that 67.5% of the fathers held technical/managerial positions or above and worked an average of 40.75 hr per week. Seven studies reported data on the socioeconomic status of the participants. Two studies (Lonigan & Whitehurst, 1998; Whitehurst et al., 1994) described the participants as “low income;” one (Valdez & Montgomery, 1996) noted that all participants were eligible for Head Start, and one (Barnett et al., 1988) indicated that all families were middle income. The mean household income of participants in Eiserman et al. (1990) was $27,449, and the median family income in Smith et al. (2000) was $40,000–$50,000. One investigation from England (Gibbard, 1994) used a social class scale (Office of Population Censuses and Surveys, 1980) in which most of the participants ranged from Level 2–3N. Despite the diversity in cultural, family, and linguistic factors of the study populations, there was little variation in study results. Therefore, it does not appear that any of these factors consistently influenced the findings.

Discussion

The purpose of this systematic review was to determine the effects of service delivery characteristics on the speech and language skills of infants, toddlers, and preschoolers with communication disorders. Four clinical questions were developed to differentiate the various aspects of service delivery including treatment dosage, service provider, treatment format, and
treatment setting. A total of 17 studies were found that examined one or more of these aspects. A consistent trend was noted across the included studies. The overwhelming majority of results reported for each of the four questions showed that the various aspects of service delivery did not have a significant effect on speech and language outcomes. However, the interpretation and clinical implication of these findings is unclear due to a number of limitations and factors involved in examining service delivery.

One of the confounders of previous systematic reviews examining some aspect of service delivery was that in many of the included studies both the intervention and the service delivery model varied. Because of this, it is not known if it was the service delivery model or the active ingredients of the various interventions that brought about any of the resulting changes. In this EBSR, we tried to control for this variable by only including studies in which the intervention was reportedly held constant. However, it was not always clear if a treatment was truly held constant or if the treatments provided under each service delivery condition were simply near-equivalents of one another. For example, some of the studies suggested that participants received the same intervention or curriculum but provided limited descriptions of the treatment procedures or noted that the treatments were individualized (e.g., structured teaching methods and games to increase linguistic complexity; language development through play in addition to structured work on individual child's language needs; individualized pragmatic approach focusing on social interaction, language stimulation, and speech development; treatment targeting concept development; developmentally organized and language-focused preschool combining incidental learning and structured teaching). These vague descriptions provide little insight into the key components of the intervention. Clinically, individualization and flexibility in treatment implementation are important components of providing intervention. However,
when investigating the impact of service delivery, these factors introduce variability that may undermine the findings.

Another factor to consider when interpreting these results is the interrelated and multidimensional nature of service delivery. Many of the included studies (6/17) examined more than one aspect of service delivery. Furthermore, one study (Eiserman et al., 1990) and its follow-up investigation (Eiserman et al., 1992) examined all four aspects of service delivery targeted in this review (i.e., dosage, treatment provider, treatment format, and treatment setting). Because many of the significant effect sizes reported for each clinical question were from Eiserman et al. (1990), it is unclear which service delivery characteristic or combination of characteristics may have affected these outcomes. Even the studies that only addressed one clinical question often varied across more than just a single aspect of service delivery. For example, in Crain-Thoreson and Dale (1999), one group received parent instruction at home and the other received staff instruction at school. Because the instruction at school was not provided by an SLP, it did not address Clinical Question 2 (direct vs. indirect treatment), but it still differed in multiple aspects of service delivery (i.e., treatment provider and treatment setting).

The interdependent and complex factors of service delivery do not lend themselves to easy investigation. For example, studies that compare treatment providers (SLP vs. parent) may, understandably, also vary across treatment setting (clinic vs. home). Likewise, study participants receiving different treatment intensities may also receive different amounts of treatment. Findings from these types of studies (i.e., those assessing more than one aspect of service delivery) do not allow for accurate interpretation of the results to ascertain which service delivery component or combination of components may augment (or inhibit) treatment effects.
Future Research

In 1993, Casto and White stated that “knowledge about what type of early intervention is best for which children under which conditions is a gradual, cumulative process that requires hundreds of studies by dozens of researchers over a substantial period of time” (Casto & White, 1993, p. 234). Given these criteria, the current science of SLP service delivery to young children remains woefully understudied. Future studies examining service delivery should systematically examine discrete aspects of service delivery in children using well-designed and highly controlled methodologies. These investigations should consider and control for confounding variables such as intervention type, age at initiation of intervention, and parental participation and involvement. To determine the clinical applicability of different models, studies should incorporate children with various types of disabilities and severity levels. Similar types of investigations should be conducted on combinations of different service delivery variables as well.

Conclusion

Based on the studies included in this EBSR, service delivery factors do not appear to have a significant effect on speech and language outcomes in young children. At this time, however, the existing research is inadequate and too compromised by qualitative and methodological limitations. Therefore, the results of this EBSR offer little direction to SLPs seeking to understand the implications of service delivery on treatment outcomes. Clinicians, however, should not consider a lack of considerable and compelling evidence as a reason for inaction (Petticrew, 2003). Instead, SLPs must consistently and conscientiously evaluate not only the effects of the intervention they provide but also the framework in which it is delivered. Failure to do so may result in decisions regarding service delivery being made based on external
factors such as time and resource constraints instead of the individual needs of the child.

Through the coordinated accumulation of high-quality evidence by both clinicians and researchers, we can gather insight into the key variables that contribute to maximizing the speech and language skills of young children with communication disorders.

Acknowledgments

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References

References marked with an asterisk indicate studies included in the systematic review.


preliminary evaluation of outcome in relation to child age and intensity of service

with autism spectrum disorder: A systematic review. *Journal of Evaluation in Clinical
Practice, 13*, 120–129.


Mullen, R. (2007, March 6). The state of the evidence: ASHA develops levels of evidence for


England: Her Majesty’s Stationery Office.


development and social competence among preschoolers with disabilities. *Exceptional
Children, 69*, 467–479. 


Table 1. Clinical questions.

<table>
<thead>
<tr>
<th>Number</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>What is the effect of frequency, intensity, or duration of service on speech and language outcomes for children birth-to-5 years of age with a speech or language disorder?</td>
</tr>
<tr>
<td>2</td>
<td>What is the effect of indirect versus direct service on speech and language outcomes for children birth-to-5 years of age with a speech or language disorder?</td>
</tr>
<tr>
<td>3</td>
<td>What is the effect of individual versus group treatment on speech and language outcomes for children birth-to-5 years of age with a speech or language disorder?</td>
</tr>
<tr>
<td>4</td>
<td>What is the effect of treatment setting on speech and language outcomes for children birth-to-5 years of age with a speech or language disorder?</td>
</tr>
</tbody>
</table>
**Table 2. Quality indicators.**

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Quality marker</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study design</td>
<td>• Controlled trial*</td>
</tr>
<tr>
<td></td>
<td>• Cohort study</td>
</tr>
<tr>
<td></td>
<td>• Retrospective case control or single-subject design</td>
</tr>
<tr>
<td></td>
<td>• Case series</td>
</tr>
<tr>
<td></td>
<td>• Case study</td>
</tr>
<tr>
<td>Blinding</td>
<td>• Assessors blinded*</td>
</tr>
<tr>
<td></td>
<td>• Assessors not blinded or not stated</td>
</tr>
<tr>
<td>Sampling/Allocation</td>
<td>• Random sample adequately described*</td>
</tr>
<tr>
<td></td>
<td>• Random sample inadequately described</td>
</tr>
<tr>
<td></td>
<td>• Convenience sample adequately described</td>
</tr>
<tr>
<td></td>
<td>• Convenience sample inadequately described, hand-picked sample, or not stated</td>
</tr>
<tr>
<td>Group/participant comparability</td>
<td>• Groups/participants comparable at baseline on important factors</td>
</tr>
<tr>
<td></td>
<td>(between-subjects design) or participant(s) adequately described (within-</td>
</tr>
<tr>
<td></td>
<td>subject design)*</td>
</tr>
<tr>
<td></td>
<td>• Groups/participants not comparable at baseline, comparability not</td>
</tr>
<tr>
<td></td>
<td>reported, or participant(s) not adequately described</td>
</tr>
<tr>
<td>Outcomes</td>
<td>• At least one primary outcome measure is valid and reliable*</td>
</tr>
<tr>
<td></td>
<td>• Validity unknown but appears reasonable; measure is reliable</td>
</tr>
<tr>
<td></td>
<td>• Invalid and/or unreliable</td>
</tr>
<tr>
<td>Significance</td>
<td>• p value reported or calculable*</td>
</tr>
<tr>
<td></td>
<td>• p value neither reported nor calculable</td>
</tr>
<tr>
<td>Precision</td>
<td>• Effect size and confidence interval reported or calculable*</td>
</tr>
<tr>
<td></td>
<td>• Effect size or confidence interval, but not both, reported or calculable</td>
</tr>
<tr>
<td></td>
<td>• Neither effect size nor confidence interval reported or calculable</td>
</tr>
<tr>
<td>Intention to treat (</td>
<td>• Analyzed by intention to treat*</td>
</tr>
<tr>
<td>controlled trials only)</td>
<td>• Not analyzed by intention to treat or not stated</td>
</tr>
</tbody>
</table>

*Indicates highest level of quality in each category.
Table 3. Quality appraisal indicators for included studies.

<table>
<thead>
<tr>
<th>Citation</th>
<th>Clinical questions</th>
<th>Design</th>
<th>Adequate description of study protocol</th>
<th>Assessor blinding</th>
<th>Random sampling or allocation described</th>
<th>Participants comparable/described</th>
<th>Evidence of treatment fidelity</th>
<th>Significance</th>
<th>Precision</th>
<th>Intention to treat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barnett et al. (1988)</td>
<td>X</td>
<td>Controlled</td>
<td>Yes</td>
<td>NR</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Barratt et al. (1992)</td>
<td>X</td>
<td>Controlled</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Chiara et al. (1995)</td>
<td>X</td>
<td>Single-subject design</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>NA</td>
</tr>
<tr>
<td>Colozzi et al. (2008)</td>
<td>X</td>
<td>Single-subject design</td>
<td>Yes</td>
<td>No</td>
<td>NR</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>NA</td>
</tr>
<tr>
<td>Crain-Thoreson &amp; Dale (1999)</td>
<td>X</td>
<td>Controlled</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Eiserman et al. (1990)</td>
<td>X</td>
<td>Controlled</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>NR</td>
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<tr>
<td>Eiserman et al. (1992)</td>
<td>X</td>
<td>Controlled</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>NR</td>
</tr>
<tr>
<td>Gibbard (1994): Experiment 2</td>
<td>X</td>
<td>Controlled</td>
<td>No</td>
<td>NR</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>NR</td>
</tr>
<tr>
<td>Harris et al. (1990)</td>
<td>X</td>
<td>Controlled</td>
<td>No</td>
<td>NR</td>
<td>NR</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>NR</td>
</tr>
<tr>
<td>Study</td>
<td>Design</td>
<td>Methodology</td>
<td>Effectiveness</td>
<td>Transferability</td>
<td>Clinical Relevance</td>
<td>Generalizability</td>
<td>Results</td>
<td>NA</td>
<td>NR</td>
<td></td>
</tr>
<tr>
<td>-----------------------------</td>
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<td>----</td>
<td>----</td>
<td></td>
</tr>
<tr>
<td>Lonigan &amp; Whitehurst (1998)</td>
<td>X X X</td>
<td>Controlled trial</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Luiselli et al. (2000)</td>
<td>X</td>
<td>Controlled trial</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>NR</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Rafferty et al. (2003)</td>
<td>X</td>
<td>Controlled trial</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>NR</td>
<td></td>
</tr>
<tr>
<td>Smith et al. (2000)</td>
<td>X</td>
<td>Controlled trial</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>NR</td>
<td></td>
</tr>
<tr>
<td>Valdez &amp; Montgomery (1996)</td>
<td>X</td>
<td>Controlled trial</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>NR</td>
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</tr>
<tr>
<td>Venn et al. (1996)</td>
<td>X</td>
<td>Single-subject design</td>
<td>Yes</td>
<td>No</td>
<td>NR</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Whitehurst et al. (1994)</td>
<td>X</td>
<td>Controlled trial</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>NR</td>
<td></td>
</tr>
<tr>
<td>Wilcox et al. (1991)</td>
<td>X X X</td>
<td>Controlled trial</td>
<td>Yes</td>
<td>NR</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>NR</td>
<td></td>
</tr>
</tbody>
</table>

*Note.* NA = not applicable; NR = not reported or calculable.
Table 4. Participant and intervention characteristics of included studies.

<table>
<thead>
<tr>
<th>Citation</th>
<th>n</th>
<th>Reported age range (and/or mean) in months</th>
<th>Gender</th>
<th>Reported medical and/or SLP diagnosis</th>
<th>Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barnett et al. (1988)</td>
<td>39</td>
<td>35–59 (44)</td>
<td>Male: 11 Female: 28</td>
<td>Speech and/or language delay</td>
<td>Individualized pragmatic approach focusing on social interaction, language stimulation, and speech development</td>
</tr>
<tr>
<td>Barratt et al. (1992)</td>
<td>39</td>
<td>37–43 (40)</td>
<td>Male: 27 Female: 12</td>
<td>Developmental language delay</td>
<td>Language development through play in addition to structured work on individual child's language needs</td>
</tr>
<tr>
<td>Chiara et al. (1995)</td>
<td>1</td>
<td>59</td>
<td>Male: 1 Female: 0</td>
<td>Short gut syndrome and developmental delay</td>
<td>5-s constant time delay procedure</td>
</tr>
<tr>
<td>Colozzi et al. (2008)</td>
<td>4</td>
<td>43–52</td>
<td>Male: 3 Female: 1</td>
<td>ASD and/or moderate-severe developmental disabilities</td>
<td>A simultaneous physical and verbal prompting procedure</td>
</tr>
<tr>
<td>Eiserman et al. (1990)</td>
<td>40</td>
<td>37–58 (41)</td>
<td>Male: 33 Female: 7</td>
<td>Moderate speech and language disorder</td>
<td>Phonetic and phonological approaches including demonstration of sound placement, sound discrimination, sound practice, relationship between sounds and language</td>
</tr>
<tr>
<td>Eiserman et al. (1992a)</td>
<td>12</td>
<td>(64)</td>
<td>NR     NR</td>
<td>Moderate speech and language disorder</td>
<td>Phonetic and phonological approaches including demonstration of sound placement, sound discrimination, sound practice, relationship between sounds and language</td>
</tr>
<tr>
<td>Harris et al. (1990)</td>
<td>10</td>
<td>49–66 (57)</td>
<td>Male: 8 Female: 2</td>
<td>ASD</td>
<td>Developmentally organized and language focused preschool combining incidental learning and structured teaching</td>
</tr>
<tr>
<td>Study</td>
<td>N</td>
<td>Age Range</td>
<td>N of SLP</td>
<td>N of ASD</td>
<td>Group Description</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>------</td>
<td>-----------</td>
<td>----------</td>
<td>----------</td>
<td>-----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Lonigan &amp; Whitehurst (1998)&lt;sup&gt;b&lt;/sup&gt;</td>
<td>29</td>
<td>33–60 (45)</td>
<td>NR</td>
<td>NR</td>
<td>Receptive and expressive vocabulary delay</td>
</tr>
<tr>
<td>Luiselli et al. (2000)</td>
<td>16</td>
<td>26–57 (39)</td>
<td>15</td>
<td>1</td>
<td>ASD</td>
</tr>
<tr>
<td>Rafferty et al. (2003)</td>
<td>96</td>
<td>33–57 (48)</td>
<td>68</td>
<td>28</td>
<td>Preschoolers with disabilities</td>
</tr>
<tr>
<td>Smith et al. (2000)</td>
<td>28</td>
<td>NR (36)</td>
<td>23</td>
<td>5</td>
<td>ASD</td>
</tr>
<tr>
<td>Valdez &amp; Montgomery (1996)</td>
<td>40</td>
<td>36–60 (NR)</td>
<td>NR</td>
<td>NR</td>
<td>Speech and language disorder</td>
</tr>
<tr>
<td>Venn et al. (1996)</td>
<td>2</td>
<td>Participant 1: 66; Participant 2: 43</td>
<td>2</td>
<td>0</td>
<td>Participant 1: ASD; Participant 2: ASD and developmental deficits</td>
</tr>
<tr>
<td>Whitehurst et al. (1994)</td>
<td>70</td>
<td>NR (41)</td>
<td>39</td>
<td>31</td>
<td>Vocabulary and expressive language delays</td>
</tr>
<tr>
<td>Wilcox et al. (1991)</td>
<td>20</td>
<td>20–47 (26)</td>
<td>NR</td>
<td>NR</td>
<td>Language delays</td>
</tr>
</tbody>
</table>

<sup>Note.</sup> SLP = speech-language pathologist; ASD = autism spectrum disorder; NR = not reported.

<sup>a</sup>Follow-up to Eiserman et al. (1990); only continuing cohort included.

<sup>b</sup>High compliance group only.
### Table 5. Dosage comparison (Question 1) outcomes summary table.

<table>
<thead>
<tr>
<th>Citation</th>
<th>Intervention schedule</th>
<th>Service delivery models compared (assigned direction of effect size)</th>
<th>Outcome measures</th>
<th>Findings (condition favored)</th>
<th>Effect size [95% CI]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barratt et al. (1992)</td>
<td>More frequent treatment group: 40-min sessions, 4 sessions/week over 2 separate 3-month periods, for a maximum of 24 sessions Weekly group: 40-min sessions, 1 session/week for 6 months, for a maximum of 24 sessions</td>
<td>1 session/week (negative effect) versus 4 sessions/week (positive effect)</td>
<td>RDLS Comprehension subscale ns</td>
<td>NR</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>RDLS Expression subscale p = .02 (4 sessions/week treatment)</td>
<td>NR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chiara et al. (1995)</td>
<td>Small group massed trial: 10 trials/day presented in 1 session Individual distributed trial treatment: 10 trials/day distributed across 10 sessions</td>
<td>1 session/day (negative effect) versus 10 sessions/day (positive effect)</td>
<td>Picture-naming efficiency to meet criterion NR</td>
<td>NR</td>
<td></td>
</tr>
<tr>
<td>Eiserman et al. (1990)</td>
<td>Clinic-based direct group treatment: 1-hr sessions, 1 session/week for 7 months Home-based indirect individual treatment: 20–30-min sessions, 4 sessions/week for 7 months</td>
<td>1 session/week and less treatment (negative effect) versus 4 sessions/week and more treatment (positive effect)</td>
<td>GFTA—number of errors ns</td>
<td>0.61 [−0.04, 1.23]</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>GFTA—percentile rank ns</td>
<td>0.53 [−0.11, 1.15]</td>
<td>0.38</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>PLS ns</td>
<td>0.61</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>TACL–R ns</td>
<td>0.38</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Parent–child language sample: DSS ns</td>
<td>0.08</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Parent–child language sample: number of unintelligible utterances ns</td>
<td>0.5 [−0.15, 1.13]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Study</td>
<td>Treatment Description</td>
<td>Outcome Measures</td>
<td>Effect Size (95% CI)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------------------------------------</td>
<td>----------------------------------------------------------------------------------------</td>
<td>-------------------------------------------</td>
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<td></td>
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</tr>
<tr>
<td>Parent–child language sample</td>
<td>percentage of child utterances—responses to requests</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>$p = .03$ (4 sessions/week treatment)</td>
<td>0.82 [0.15, 1.46]</td>
<td></td>
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<td></td>
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<tr>
<td></td>
<td>percentage of child spontaneous utterances</td>
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<tr>
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<td>$p = .004$ (1 session/week treatment)</td>
<td>−1.17 [−1.82, 0.47]</td>
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<tr>
<td>SLP–child language sample: DSS</td>
<td>ns</td>
<td>0.29 [−0.34, 0.91]</td>
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<tr>
<td>SLP–child language sample: number of unintelligible utterances</td>
<td>$p = .04$ (4 sessions/week treatment)</td>
<td>0.74 [0.09, 1.37]</td>
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<tr>
<td>BDI Communication DQ</td>
<td>ns</td>
<td>−0.42 [−1.55, 0.77]</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>GFTA—number of errors</td>
<td>ns</td>
<td>0.42 [−0.74, 1.58]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GFTA—percentile rank</td>
<td>ns</td>
<td>0.83 [−0.43, 1.95]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TACL–R (Total DQ)</td>
<td>ns</td>
<td>0.07 [−1.08, 1.21]</td>
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<td></td>
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<tr>
<td>SPELT percentile rank</td>
<td>ns</td>
<td>−0.46 [−1.58, 0.74]</td>
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<td></td>
<td></td>
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<tr>
<td>PPVT</td>
<td>School versus school + home $ns$</td>
<td>−0.2 [−1.1, 0.7]</td>
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<tr>
<td></td>
<td>Home versus school + home $ns$</td>
<td>−0.34 [−1.37, 0.73]</td>
<td></td>
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</tr>
<tr>
<td>EOWPVT</td>
<td>School versus school + home $ns$</td>
<td>0.01 [−0.88, 0.91]</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Eiserman et al. (1992)<sup>a</sup>
- Clinic-based direct group treatment: 1–hr session, 1 session/week for 42 months
- Home-based indirect individual treatment: 20–30-min session, 4 sessions/week for 42 months
- 1 session/week and less treatment (negative effect) versus 4 sessions/week and more treatment (positive effect)

Lonigan & Whitehurst (1998)<sup>b</sup>
- School-based direct treatment: 10 min/day for 6 weeks
- Home group: daily for 6 weeks
- School + home group received both intervention schedules
- Once daily treatment (negative effect) versus twice daily treatment (positive effect)
### Luiselli et al. (2000)

<table>
<thead>
<tr>
<th>Measure</th>
<th>Group 1: on average received 11.8 hr/week over 11.6 months for a total 583.5 hr</th>
<th>Fewer hours/week (negative effect) versus more hours/week of treatment (positive effect)</th>
<th>Communication subscale of ELAP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of different words</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>Number of different words</td>
<td>0.79 [–0.19, 1.71]</td>
<td>1.77 [0.44, 2.86]</td>
<td>NR</td>
</tr>
<tr>
<td>Language MLU</td>
<td>1.61 [0.5, 2.58]</td>
<td>1.25 [0.03, 2.3]</td>
<td>1.07 [0.08, 1.97]</td>
</tr>
<tr>
<td>ITPA: Verbal expression subtest</td>
<td>p &lt; .05 (twice daily treatment)</td>
<td>p &lt; .05 (twice daily treatment)</td>
<td>p &lt; .05 (twice daily treatment)</td>
</tr>
<tr>
<td>Home versus school + home</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>School versus school + home</td>
<td>0.59 [–1.62, 0.52]</td>
<td>1.61 [0.5, 2.58]</td>
<td>1.07 [0.08, 1.97]</td>
</tr>
<tr>
<td>Home versus school + home</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>Study</td>
<td>Group 1: School-based direct</td>
<td>Group 2: Received school-based + home-based indirect</td>
<td>Intensive: 30 hr/week gradually reduced after 2–3 years. On average, group received 2,137.8 hr of treatment over 33.4 months</td>
</tr>
<tr>
<td>-----------------------</td>
<td>------------------------------</td>
<td>-----------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Smith et al. (2000)</td>
<td>Group 1: 10–min sessions, 5</td>
<td>Group 2: NR for 6 weeks</td>
<td>5–10 hr weekly and smaller dosage of treatment (negative effect) versus 30 hr weekly and greater dosage of treatment (positive effect)</td>
</tr>
<tr>
<td></td>
<td>sessions/week for 6 weeks</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Average number of sessions</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>= 16.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Venn et al. (1996)</td>
<td>Group 1: Number naming</td>
<td>Group 2: Letter naming</td>
<td>Every other day (negative effect) versus everyday (positive effect) treatment</td>
</tr>
<tr>
<td></td>
<td>Participant 1: number naming</td>
<td></td>
<td>Participant 2: letter naming</td>
</tr>
<tr>
<td>Whitehurst et al. (1994)</td>
<td>Group 1: School-based direct: 10–min sessions, 5 sessions/week for 6 weeks Average number of sessions = 16.3</td>
<td>Group 2: Received school-based + home-based indirect: NR for 6 weeks</td>
<td>Fewer total treatment sessions (negative effect) versus more total treatment sessions (positive effect)</td>
</tr>
<tr>
<td></td>
<td>PPVT: posttreatment</td>
<td></td>
<td>PPVT: posttreatment</td>
</tr>
<tr>
<td></td>
<td>EOWPVT–R: posttreatment</td>
<td></td>
<td>EOWPVT–R: posttreatment</td>
</tr>
<tr>
<td></td>
<td>PPVT: 6-month follow-up</td>
<td></td>
<td>PPVT: 6-month follow-up</td>
</tr>
<tr>
<td></td>
<td>EOWPVT–R: posttreatment</td>
<td></td>
<td>EOWPVT–R: posttreatment</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Study</th>
<th>Communication subscale of LAP</th>
<th>RDLS Comprehension subscale</th>
<th>RDLS Expression subscale</th>
<th>RDLS Total score</th>
<th>Vineland Communication subscale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smith et al. (2000)</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td>0.49 [–0.27, 1.23]</td>
<td>0.37 [–0.39, 1.11]</td>
<td>0.65 [–0.13, 1.39]</td>
<td>ns</td>
<td>0.28 [–0.47, 1.02]</td>
</tr>
<tr>
<td>Venn et al. (1996)</td>
<td>Participant 1: number naming</td>
<td>Participant 2: letter naming</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>Whitehurst et al. (1994)</td>
<td>PPVT: posttreatment</td>
<td>PPVT: 6-month follow-up</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td>EOWPVT–R: posttreatment</td>
<td>EOWPVT–R: posttreatment</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Study</th>
<th>PPVT: posttreatment</th>
<th>PPVT: 6-month follow-up</th>
<th>EOWPVT–R: posttreatment</th>
<th>ns</th>
<th>ns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smith et al. (2000)</td>
<td>0.13 [–0.47, 0.72]</td>
<td>0.26 [–0.39, 0.89]</td>
<td>0.31 [–0.29, 0.9]</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>Venn et al. (1996)</td>
<td>Participant 1: number naming</td>
<td>Participant 2: letter naming</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>Whitehurst et al. (1994)</td>
<td>PPVT: posttreatment</td>
<td>PPVT: 6-month follow-up</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
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</tbody>
</table>
Average number of sessions = 34.58 sessions

<table>
<thead>
<tr>
<th>Study</th>
<th>Treatment Type</th>
<th>Time Details</th>
<th>Effect Size</th>
<th>CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wilcox et al. (1991)</td>
<td>Classroom-based group treatment: 3-hr sessions twice weekly over 12–16 weeks for a total of 24 sessions</td>
<td>90 min/week (negative effect) versus 6 hr/week of treatment (positive effect)</td>
<td>Number of words used productively in spontaneous speech in the home and treatment setting</td>
<td>ns</td>
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<tr>
<td></td>
<td>Pull-out individual treatment: 45-min sessions twice weekly over 12–16 weeks for a total of 24 sessions</td>
<td></td>
<td>Number of words targeted</td>
<td>ns</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Productive use of target words (treatment and home)</td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Overall use of target words (treatment and home)</td>
<td>ns</td>
</tr>
</tbody>
</table>

EOWPVT–R: 6-month follow-up
Our Word (posttreatment only)-expressive test devised for study
ITPA: posttreatment

Note. CI = confidence interval; RDLS = Reynell Developmental Language Scales; NR = not reported or calculable; GFTA = Goldman Fristoe Test of Articulation; PLS = Preschool Language Scale; TACL–R = Test for Auditory Comprehension of Language—Revised; SLP = speech-language pathologist; DSS = developmental sentence score; BDI = Batelle Developmental Inventory; DQ = developmental quotient; SPELT = Structured Photographic Expressive Language Test; PPVT = Peabody Picture Vocabulary Test; EOWPVT–R = Expressive One-Word Picture Vocabulary Test—Revised; ITPA = Illinois Test of Psycholinguistic Abilities; MLU = mean length of utterance; ELAP = Early Learning Accomplishment Profile; LAP = Learning Accomplishment Profile.

aContinuing cohort only.
bHigh compliance only.
Table 6. Direct versus indirect treatment (Question 2) outcomes summary table.

<table>
<thead>
<tr>
<th>Citation</th>
<th>Intervention schedule</th>
<th>Service delivery models compared (assigned direction of effect size)</th>
<th>Outcome measures</th>
<th>Findings</th>
<th>Effect size [95% CI]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barnett et al. (1988)</td>
<td>Center-based direct treatment: 2.5-hr sessions, 4 sessions/week for 13 weeks</td>
<td>SLP-delivered treatment (negative effect) versus parent-delivered treatment (positive effect)</td>
<td>Direct treatment group</td>
<td>PLS–R</td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td>Home-based indirect treatment group: 15-min sessions twice daily for 13 weeks</td>
<td></td>
<td></td>
<td>AAPS</td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td>Additionally, parents received 2.5-hr training sessions, 9 sessions total</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eiserman et al. (1990)</td>
<td>Clinic-based direct treatment group: 1 hr once weekly for 7 months</td>
<td>SLP-delivered treatment (negative effect) versus parent-delivered treatment (positive effect)</td>
<td>GFTA—number of errors</td>
<td>ns</td>
<td>0.61 [–0.04, 1.23]</td>
</tr>
<tr>
<td></td>
<td>Home-based indirect treatment group: 20–30-min sessions, 4 sessions/week for 7 months</td>
<td></td>
<td>GFTA—percentile rank</td>
<td>ns</td>
<td>0.53 [–0.11, 1.15]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>PLS (Total DQ)</td>
<td>ns</td>
<td>0.61</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>TACL–R (Total DQ)</td>
<td>ns</td>
<td>0.38</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Parent–child language sample: DSS</td>
<td>ns</td>
<td>0.08</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Parent–child language sample: number of unintelligible utterances</td>
<td>ns</td>
<td>0.5 [–0.15, 1.13]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Parent–child language sample: percentage of child utterances- responses to requests</td>
<td>( p = .03 ) (indirect)</td>
<td>0.82 [0.15, 1.46]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Parent–child language sample: percentage of child spontaneous utterances</td>
<td>( p = .004 ) (direct)</td>
<td>–1.17 [–1.82, -0.47]</td>
</tr>
<tr>
<td>Study</td>
<td>Treatment</td>
<td>Comparison</td>
<td>Outcome Measure</td>
<td>Effect Size</td>
<td>CI</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>------------------------------------------------</td>
<td>----------------------------------------------------------------------------</td>
<td>----------------------------------</td>
<td>------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>SLP–child language sample</td>
<td>DSS</td>
<td>SLP-delivered treatment (negative effect) versus parent-delivered treatment (positive effect)</td>
<td>ns</td>
<td>0.29 [-0.34, 0.91]</td>
<td></td>
</tr>
<tr>
<td>SLP–child language sample:</td>
<td>number of unintelligible utterances</td>
<td></td>
<td>ns</td>
<td>0.74 [0.09, 1.37]</td>
<td></td>
</tr>
<tr>
<td>BDI Communication DQ</td>
<td>P = .04 (indirect)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GFTA—number of errors</td>
<td>ns</td>
<td></td>
<td></td>
<td>0.42 [-0.74, 1.16]</td>
<td></td>
</tr>
<tr>
<td>GFTA—percentile rank</td>
<td>ns</td>
<td></td>
<td></td>
<td>0.83 [-0.43, 1.95]</td>
<td></td>
</tr>
<tr>
<td>TACL–R (Total DQ)</td>
<td>ns</td>
<td></td>
<td></td>
<td>0.07 [-1.08, 1.21]</td>
<td></td>
</tr>
<tr>
<td>SPELT percentile rank</td>
<td>ns</td>
<td></td>
<td></td>
<td>-0.46 [-1.58, 0.74]</td>
<td></td>
</tr>
<tr>
<td>RDLS Comprehension subscale</td>
<td>ns</td>
<td></td>
<td></td>
<td>0.8 [-0.23, 1.74]</td>
<td></td>
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<tr>
<td>RDLS Expressive subscale</td>
<td>ns</td>
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<td></td>
<td>0.33 [-0.64, 1.27]</td>
<td></td>
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<tr>
<td>DLSPT One Word scores</td>
<td>ns</td>
<td></td>
<td></td>
<td>0.79 [-0.23, 1.74]</td>
<td></td>
</tr>
<tr>
<td>DLSPT Total scores</td>
<td>ns</td>
<td></td>
<td></td>
<td>0.78 [-0.24, 1.73]</td>
<td></td>
</tr>
<tr>
<td>RAPT Grammatical ability</td>
<td>ns</td>
<td></td>
<td></td>
<td>0.74 [-0.28, 1.68]</td>
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<tr>
<td>RAPT Information</td>
<td>ns</td>
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<td></td>
<td>0.34 [-0.63, 1.29]</td>
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<tr>
<td>Language sample: One word</td>
<td>ns</td>
<td></td>
<td></td>
<td>-0.53 [-1.47, 0.46]</td>
<td></td>
</tr>
<tr>
<td>Language sample: Total scores</td>
<td>ns</td>
<td></td>
<td></td>
<td>0.45 [-0.54, 1.39]</td>
<td></td>
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<tr>
<td>MLU</td>
<td>P = .008 (indirect)</td>
<td></td>
<td></td>
<td>1.24 [0.14, 2.2]</td>
<td></td>
</tr>
<tr>
<td>Parental report of expressive vocabulary</td>
<td>ns</td>
<td></td>
<td></td>
<td>0.14 [-0.82, 1.08]</td>
<td></td>
</tr>
<tr>
<td>Parental report of phrase length</td>
<td>ns</td>
<td></td>
<td></td>
<td>0.44 [-0.54, 1.38]</td>
<td></td>
</tr>
</tbody>
</table>

Note. CI = confidence interval; SLP = speech-language pathologist; PLS–R = Preschool Language Scale—Revised; NR = not reported or calculable; AAPS = Arizona Articulation Proficiency Scale; GFTA = Goldman Fristoe Test of Articulation; PLS = Preschool Language Scale; DQ = developmental quotient; TACL–R = Test for Auditory Comprehension of Language—Revised; DSS = developmental sentence score; BDI = Batelle Developmental Inventory; SPELT =
Structured Photographic Expressive Language Test; RDL = Reynell Developmental Language Scales; DLSPT = Derbyshire Language Scheme Picture Test; RAPT = Renfrew Action Picture Test; MLU = mean length of utterance.

*Continuing cohort only.
**Table 7.** Individual versus group treatment (Question 3) outcomes summary table.

<table>
<thead>
<tr>
<th>Citation</th>
<th>Intervention schedule</th>
<th>Service delivery models compared (assigned direction of effect size)</th>
<th>Outcome measures</th>
<th>Findings</th>
<th>Effect size [95% CI]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chiara et al. (1995)</td>
<td>Small group massed trial: 10 trials/day presented in one session Individual distributed trial instruction: 10 trials/day distributed across 10 sessions</td>
<td>Small group of 2–3 children (negative effect) versus individual treatment (positive effect)</td>
<td>Picture-naming efficiency to meet criterion</td>
<td>NR</td>
<td>NR</td>
</tr>
<tr>
<td>Colozzi et al. (2008)</td>
<td>Individual: 6 min/day Small group: 24 min/day</td>
<td>Group of 4 children (negative effect) versus individual treatment (positive effect)</td>
<td>Verbal imitation</td>
<td>NR</td>
<td>NR</td>
</tr>
<tr>
<td>Eiserman et al. (1990)</td>
<td>Clinic-based direct treatment group: 1 hr weekly for 7 months Home-based indirect treatment group: 20–30-min sessions, 4 sessions/week for 7 months</td>
<td>Small group of 2 children (negative effect) versus individual treatment (positive effect)</td>
<td>GFTA—number of errors $ns$</td>
<td>0.61 [–0.04, 1.23]</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>GFTA—percentile rank $ns$</td>
<td>0.53 [–0.11, 1.15]</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>PLS (Total DQ) $ns$</td>
<td>0.61</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>TACL–R (Total DQ) $ns$</td>
<td>0.38</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Parent–child language sample: DSS $ns$</td>
<td>0.08</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Parent–child language sample: number of unintelligible utterances $ns$</td>
<td>0.5 [-0.15, 1.13]</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Parent–child language sample: percentage of child utterances—responses to requests $p = .03$ (individual)</td>
<td>0.82 [0.15, 1.46]</td>
<td></td>
</tr>
<tr>
<td>Study</td>
<td>Intervention Details</td>
<td>Outcome Measures</td>
<td>Effect Size</td>
<td>Confidence Interval</td>
<td></td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>-------------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------</td>
<td>-------------</td>
<td>---------------------</td>
<td></td>
</tr>
<tr>
<td><strong>Eiserman et al. (1992)</strong>&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Clinic-based direct group treatment: 1 hr eekly for 42 months</td>
<td>BDI Communication DQ</td>
<td>ns</td>
<td>–0.42 [–1.55, 0.77]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Home-based indirect individual treatment: 20–30 min sessions, 4 sessions/week for 42 months</td>
<td>GFTA—number of errors</td>
<td>ns</td>
<td>0.42 [–0.74, 1.16]</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>GFTA—percentile rank</td>
<td>ns</td>
<td>0.83 [–0.43, 1.95]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Small group of 2 children (negative effect) versus individual treatment (positive effect)</td>
<td>TACL–R (Total DQ)</td>
<td>ns</td>
<td>0.07 [–1.08, 1.21]</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>SPELT percentile rank</td>
<td>ns</td>
<td>0.46 [–1.58, 0.74]</td>
<td></td>
</tr>
<tr>
<td><strong>Lonigan &amp; Whitehurst (1998)</strong>&lt;sup&gt;b&lt;/sup&gt;</td>
<td>School-based direct treatment group: 10 min daily for 6 weeks</td>
<td>PPVT</td>
<td>ns</td>
<td>0.14 [–0.76, 1.04]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Home-based indirect individual treatment: daily for 6 weeks</td>
<td>EOWPVT–R</td>
<td>ns</td>
<td>0.53 [–0.4, 1.42]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Group of ≤5 children (negative effect) versus individual treatment (positive effect)</td>
<td>ITPA</td>
<td>ns</td>
<td>–0.12 [–1.01, 0.78]</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>MLU</td>
<td>ns</td>
<td>0.59 [–0.37, 1.5]</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Number of different words</td>
<td>ns</td>
<td>–0.48 [–1.39, 0.47]</td>
<td></td>
</tr>
<tr>
<td>Study</td>
<td>Intervention 1</td>
<td>Intervention 2</td>
<td>Outcome Measures</td>
<td>Effect Size</td>
<td></td>
</tr>
<tr>
<td>-------</td>
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<td>------------------</td>
<td>-------------</td>
<td></td>
</tr>
<tr>
<td>Wilcox et al. (1991)</td>
<td>Classroom-based group treatment: 3-hr sessions, 2 sessions/week over 12–16 weeks for a total of 24 sessions</td>
<td>Pull-out individual treatment: 45-min sessions, 2 sessions/week over 12–16 weeks for a total of 24 sessions</td>
<td>Classroom of 12–14 children (negative effect) versus individual treatment (positive effect)</td>
<td>Number of words used productively in spontaneous speech in the home and treatment setting</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Number of words targeted</td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Productive use of target words (treatment and home)</td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Overall use of target words (treatment and home)</td>
<td>ns</td>
</tr>
</tbody>
</table>

*Note. CI = confidence interval; NR = not reported or calculable; GFTA = Goldman Fristoe Test of Articulation; PLS = Preschool Language Scale; DQ = developmental quotient; TACL–R = Test of Auditory Comprehension of Language—Revised; DSS = developmental sentence score; SLP = speech-language pathologist; BDI = Batelle Developmental Inventory; SPELT = Structured Photographic Expressive Language Test; PPVT = Peabody Picture Vocabulary Test; EOWPVT–R = Expressive One-Word Picture Vocabulary Test—Revised; ITPA = Illinois Test of Psycholinguistic Abilities; MLU = mean length of utterance. |

aContinuing cohort only. 
bHigh compliance only.
Table 8. Treatment setting comparison (Question 4) outcomes summary table.

<table>
<thead>
<tr>
<th>Citation</th>
<th>Intervention schedule</th>
<th>Service delivery models compared (assigned direction of effect size)</th>
<th>Outcome measures</th>
<th>Findings</th>
<th>Effect size [95% CI]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barnett et al. (1988)</td>
<td>Center-based direct treatment: 2.5-hr sessions, 4 sessions/week for 13 weeks Home-based indirect treatment group: 15-min sessions, twice daily for 13 weeks Additionally, parents received 2.5-hr training sessions, 9 sessions total</td>
<td>Center-based (negative effect) versus home-based treatment (positive effect)</td>
<td>PLS–R ns</td>
<td>NR</td>
<td>–0.25 [–1.07, 0.59]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>AAPS ns</td>
<td>NR</td>
<td>–0.02 [–0.85, 0.8]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Home-based group</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>PLS–R p &lt; .01</td>
<td>NR</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>AAPS p &lt; .05</td>
<td>NR</td>
<td></td>
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<tr>
<td>Crain-Thoreson &amp; Dale (1999)</td>
<td>Clinic-based direct treatment group: 4 sessions weekly for 8 weeks Home-based indirect treatment group: at least 4 sessions weekly for 8 weeks</td>
<td>Clinic-based (negative effect) versus home-based treatment (positive effect)</td>
<td>MLU ns</td>
<td>NR</td>
<td>−0.43 [−1.24, 0.42]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Number of utterances ns</td>
<td></td>
<td>−0.02 [−0.85, 0.8]</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Lexical diversity ns</td>
<td></td>
<td>−0.25 [−1.07, 0.59]</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>PPVT ns</td>
<td></td>
<td>0.14 [−0.68, 0.97]</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>EOWPVT–R ns</td>
<td></td>
<td>0.4 [−0.44, 1.22]</td>
</tr>
<tr>
<td>Eiserman et al. (1990)</td>
<td>Clinic-based direct treatment group: 1 hr/week for 7 months Home-based indirect treatment group: 20–30-min sessions, 4</td>
<td>Clinic-based (negative effect versus home-based treatment (positive effect)</td>
<td>GFTA—number of errors ns</td>
<td></td>
<td>0.61 [−0.04, 1.23]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>GFTA—percentile rank ns</td>
<td></td>
<td>0.53 [−0.11, 1.15]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>PLS (Total DQ) ns</td>
<td></td>
<td>0.61</td>
</tr>
<tr>
<td>Study/Condition</td>
<td>Clinic-based direct group treatment: 1 hr/week for 42 months</td>
<td>Home-based indirect individual treatment: 20–30-min sessions, 4 sessions/week for 42 months</td>
<td>Clinic-based (negative effect) versus home-based treatment (positive effect)</td>
<td></td>
<td></td>
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<td>-------------------------------------------------------------</td>
<td>-------------------------------------------------</td>
<td>-------------------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eiserman et al. (1992)(^a)</td>
<td>TACL–R (Total DQ) (ns) 0.38</td>
<td>Parent–child language sample: DSS (ns) 0.08</td>
<td>BDI Communication DQ (ns) –0.42 [–1.55, 0.77]</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Parent–child language sample: number of unintelligible utterances (ns) 0.5 [–0.15, 1.13]</td>
<td>Parent–child language sample: percentage of child utterances—responses to requests (p = .03) (home) 0.82 [0.15, 1.46]</td>
<td>GFTA—number of errors (ns) 0.42 [–0.74, 1.16]</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Parent–child language sample: percentage of child spontaneous utterances (p = .004) (clinic) –1.17 [–1.82, –0.47]</td>
<td>SLP–child language sample: DSS (ns) 0.29 [–0.34, 0.91]</td>
<td>GFTA—percentile rank (ns) 0.83 [–0.43, 1.95]</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SLP–child language sample: number of unintelligible utterances (p = .04) (home) 0.74 [0.09, 1.37]</td>
<td>BDI Communication DQ (ns) 0.07 [–1.08, 1.21]</td>
<td>TACL–R (Total DQ) (ns) 0.07 [–1.08, 1.21]</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SLELT percentile rank (ns) 0.46 [–1.58, 0.74]</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

ASHA’s National Center for Evidence-Based Practice in Communication Disorders • October 2010
Harris et al. (1990)  NR  Segregated preschool classrooms (negative effect) versus integrated preschool classrooms (positive effect)  PLS (language age)  ns  0.51 [–0.8, 1.71]
Rate of language development (language age/chronological age)  ns  0.2 [–1.06, 1.43]

Lonigan & Whitehurst (1998)b  School-based direct treatment group: 10 min daily for 6 weeks  Home group: daily for 6 weeks  School-based (negative effect) versus home-based treatment (positive effect)  PPVT  ns  0.14 [–0.76, 1.04]
EOWPVT  ns  0.53 [–0.4, 1.42]
ITPA: Verbal Expression subtest  ns  –0.12 [–1.01, 0.78]
MLU  ns  0.59 [–0.37, 1.5]
Number of different words  ns  –0.48 [–1.39, 0.47]

Rafferty et al. (2003)  NR for 7–8 months  Segregated preschool classroom (negative effect) versus inclusive preschool classroom (positive effect)  PLS–3 Auditory comprehension (inclusive class)  p < .01  0.81 [0.19, 1.38]
PLS–3 Expressive (inclusive class)  p < .01  0.84 [0.22, 1.42]

Less severe group
PLS–3 Auditory comprehension  ns  0.28 [–0.53, 1.08]
PLS–3 Expressive  ns  –0.05 [–0.85, 0.75]

Valdez & Montgomery (1996)  90-min session weekly for 6 months, 36 hr of total treatment  Pull-out (negative effect) versus classroom-based treatment (positive effect)  CELF–P Receptive  ns  NR
CELF–P Expressive  ns  NR
CELF–P Total  ns  NR
<table>
<thead>
<tr>
<th>Wilcox et al. (1991)</th>
<th>Classroom-based group treatment: 3-hr sessions twice weekly for 12–16 weeks for a total of 24 sessions</th>
<th>Pull-out (negative effect) versus classroom-based treatment (positive effect)</th>
<th>Number of words used productively in spontaneous speech in the home and treatment setting</th>
</tr>
</thead>
</table>
| Pull-out individual treatment: 45-min sessions twice weekly for 12–16 weeks for a total of 24 sessions | | | Number of words targeted
| | | | Productive use of target words (treatment and home)
| | | | Overall use of target words (treatment and home)

|  |  | ns | 0.56 [–0.36, 1.42] |
|  |  | ns | 0.66 [–0.27, 1.53] |
|  |  | ns | 0.24 [–0.65, 1.11] |

*Note. CI = confidence interval; PLS–R = Preschool Language Scale—Revised; NR = not reported or calculable; AAPS = Arizona Articulation Proficiency Scale; MLU = mean length of utterance; PPVT = Peabody Picture Vocabulary Test; EOWPVT–R = Expressive One-Word Picture Vocabulary Test—Revised; GFTA = Goldman Fristoe Test of Articulation; PLS = Preschool Language Scale; DQ = developmental quotient; TACL–R = Test of Auditory Comprehension of Language—Revised; DSS = developmental sentence score; SLP = speech-language pathologist; BDI = Batelle Developmental Inventory; SPELT = Structured Photographic Expressive Language Test; ITPA = Illinois Test of Psycholinguistic Abilities; PLS–3 = Preschool Language Scale, Third Edition; CELF–P = Clinical Evaluation of Language Fundamentals—Preschool.

aContinuing cohort only.
bHigh compliance only.
### Table 9. Cultural and linguistic characteristics of study participants.

<table>
<thead>
<tr>
<th>Citation</th>
<th>Study location</th>
<th>Socioeconomic status as reported in article</th>
<th>Parental education</th>
<th>Family status</th>
<th>Race/ethnicity as reported in article</th>
<th>English as primary language in home</th>
<th>Parental employment</th>
<th>Differences in results related to cultural or linguistic factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barnett et al. (1988)</td>
<td>USA</td>
<td>All families “middle income”</td>
<td>“Most of the parents had attended college”</td>
<td>95% both parents in home</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
</tr>
<tr>
<td>Barratt et al. (1992)</td>
<td>England</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>Afro-Caribbean: 64% White: 28% Other: 8%</td>
<td>NR</td>
<td>NR</td>
<td>Whites and non-Whites had similar scores in comprehension and expression at the outset of the study. Whites and non-Whites made similar gains in comprehension ($p = .28$), but Whites made significantly greater gains in expression ($p &lt; .01$).</td>
</tr>
<tr>
<td>Chiara et al. (1995)</td>
<td>USA</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
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<tr>
<td>Colozzi et al. (2008)</td>
<td>USA</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
</tr>
<tr>
<td>Crain-Thoreson &amp; Dale (1999)</td>
<td>USA</td>
<td>Mean HHI = $27,449</td>
<td>Mean years of schooling: mothers 14.25, fathers 14.5</td>
<td>95% both parents in home</td>
<td>Caucasian: 100%</td>
<td>100%</td>
<td>NR</td>
<td>NR</td>
</tr>
<tr>
<td>Eiserman et al. (1990)/Eiserman et al. (1992)</td>
<td>USA</td>
<td>Mean HHI = $27,449</td>
<td>Mean years of schooling: mothers 14.25, fathers 14.5</td>
<td>95% both parents in home</td>
<td>Caucasian: 100%</td>
<td>100%</td>
<td>Mothers: 37% employed; mean hr/week employed=</td>
<td>NR</td>
</tr>
</tbody>
</table>
Gibbard (1994): England Social class
1: N = 0
2: N = 5
3M: N = 3
3N: N = 5
4: N = 0
5: N = 0
Unemployed: N = 4
9.65; 17.5% employed as technical/
managerial or above
Fathers: mean hr/week
employed = 40.75; 67.5%
employed as technical
managerial or above

Harris et al. (1990) USA NR NR NR NR NR NR NR
Lonigan & Whitehurst (1998) USA “low income
families” NR NR African American:
91.2%
100% NR NR NR
Luiselli et al. (2000) USA NR NR NR NR NR NR NR
Rafferty et al. (2003) USA NR 48% of
mothers and 40% of
fathers beyond high
school level
education 80% both
parents in
caucasian: 87%
Mothers: 45%;
fathers: 92% NR NR
<table>
<thead>
<tr>
<th>Study</th>
<th>Country</th>
<th>Median HHI</th>
<th>Mean years of schooling: mothers, fathers</th>
<th>71% both parents in home</th>
<th>Children's race/ethnicity: White, Hispanic, African American, Asian</th>
<th>Mothers: 91%, partners: 70%</th>
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</thead>
<tbody>
<tr>
<td>Smith et al. (2000)</td>
<td>USA</td>
<td>$40,000–$50,000</td>
<td>mothers 13, fathers 14</td>
<td></td>
<td>50% White, 22% Hispanic, 14% African American, 14% Asian</td>
<td></td>
</tr>
<tr>
<td>Valdez &amp; Montgomery (1996)</td>
<td>USA</td>
<td>All eligible for placement in Head Start</td>
<td>NR</td>
<td></td>
<td>100% African American</td>
<td></td>
</tr>
<tr>
<td>Venn et al. (1996)</td>
<td>USA</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td></td>
</tr>
<tr>
<td>Whitehurst et al. (1994)</td>
<td>USA</td>
<td>“Low-income families”</td>
<td>Mean years of schooling: mothers 12.59, partners 12.32</td>
<td>46% married, 58% living with husband/partner</td>
<td>55% African American, 23% White</td>
<td></td>
</tr>
<tr>
<td>Wilcox et al. (1991)</td>
<td>USA</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
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</tr>
</tbody>
</table>

*Note. HHI = household income; NR = not reported.*
Figure 1. Flowchart of study identification process.

- Identification of clinical questions for review, search parameters, inclusion/exclusion criteria
- Search of 24 electronic databases
- Review of 801 citations, Exclusion of 691 citations not relevant to EBSR question(s)
- Review of 110 full-text articles preliminarily included, 93 citations further excluded upon review of full text for one or more of the following: treatment was not held constant; not experimental or quasi-experimental design; not peer-reviewed study; did not directly address question; not target population
- 17 citations included in the final analysis
## Appendix A

### Databases, Search Dates, and Expanded Search Terms Used in Systematic Search

<table>
<thead>
<tr>
<th>Date</th>
<th>Database</th>
<th>Search terms</th>
</tr>
</thead>
<tbody>
<tr>
<td>9/24/09–10/14/09</td>
<td>PubMed</td>
<td>(&quot;Rehabilitation of Speech and Language Disorders&quot;[Mesh] OR &quot;Communication Disorders/therapy&quot;[Mesh] OR &quot;Child Development Disorders, Pervasive/therapy&quot;[Mesh] OR &quot;Developmental Disabilities/therapy&quot;[Mesh] OR &quot;Learning Disorders/therapy&quot;[Mesh] OR &quot;Mental Retardation/therapy&quot;[Mesh] OR &quot;Speech-Language Pathology&quot;[Mesh] OR &quot;Hearing Loss/rehabilitation&quot;[Mesh] OR &quot;Hearing Loss/therapy&quot;[Mesh]) AND (mainstream OR home based OR small group OR service deliver* OR “individual therapy” OR “individual training” OR “individual teaching” OR “individual intervention” OR &quot;parent managed&quot; OR &quot;parent intervention&quot; OR &quot;parent directed&quot; OR ((Indirect OR direct OR intensity OR intensive) AND (train OR training OR instruction OR class OR classes OR classroom)) OR (&quot;one-to-one” OR integrated OR inclusive OR segregated OR “in-class” OR “out-of-class”) AND (therapy OR treatment OR model OR intervention OR train OR training OR instruction OR class OR classes OR classroom))) Limits: Humans, English, Newborn: birth–1 month, Infant: 1–23 months, Preschool Child: 2–5 years</td>
</tr>
<tr>
<td>Date</td>
<td>Database</td>
<td>Query</td>
</tr>
<tr>
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<tr>
<td>10/14/09</td>
<td>CINAHL</td>
<td>(intellectual* disab* OR ((cognitive OR phonological OR speech OR language OR learning OR reading OR communication) AND (impairment* OR disab* OR disorder* OR delay*))) OR Autis* OR Pervasive Development* Disorder OR Asperger* OR “Savant Syndrome” OR &quot;Developmental delay&quot; OR developmental disab* OR “Multiple disabilities” OR severe disab* OR Mental retard* OR Deaf OR “hard of hearing” OR hearing impair* OR hearing loss OR “Complex communication needs” OR stutter* OR fluency OR ((Speech OR language) AND (patholog* OR therapy OR therapist OR therapies))) AND (“classroom based” OR mainstream OR Hanen OR Pull-out OR clinic based OR home based OR small group OR service deliver* OR “individual therapy” OR “individual training” OR “individual teaching” OR “individual intervention” OR &quot;Parent Training&quot; OR &quot;parent managed&quot; OR &quot;parent intervention&quot; OR &quot;parent directed&quot; OR ((Indirect OR direct OR intensity OR intensive OR “one-to-one” OR integrated OR inclusive OR segregated OR “in-class” OR “out-of-class”) AND (therapy OR treatment OR model OR intervention OR train OR training OR instruction OR class OR classes OR classroom)))</td>
</tr>
</tbody>
</table>
| 10/15/09– 10/21/09 | Mass Media Complete | (intellectual* disab* OR ((cognitive OR phonological OR speech OR language OR learning OR reading OR communication) AND (impairment* OR disab* OR disorder* OR delay*))) OR Autis* OR Pervasive Development* Disorder OR Asperger* OR “Savant Syndrome” OR "Developmental delay" OR developmental disab* OR “Multiple disabilities” OR severe disab* OR Mental retard* OR Deaf OR “hard of hearing” OR hearing impair* OR hearing loss OR “Complex communication needs” OR stutter* OR fluency OR ((Speech OR language) AND (patholog* OR therapy OR therapist OR therapies))) AND (“classroom based” OR mainstream OR Hanen OR Pull-out OR clinic based OR home based OR small group OR service deliver* OR “individual therapy” OR “individual training” OR “individual teaching” OR “individual intervention” OR "Parent Training" OR "parent managed" OR "parent intervention" OR "parent directed" OR ((Indirect OR direct OR intensity OR intensive OR “one-to-one” OR integrated OR inclusive OR segregated OR “in-class” OR “out-of-class”) AND (therapy OR treatment OR model OR intervention OR train OR training OR instruction OR class OR classes OR classroom))) AND (infant* OR baby OR babies OR NICU OR neonat* OR toddler*)
### Scholarly (Peer Reviewed) Journals; Published Date: 19750101-20091231; Language: English

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Limits: Scholarly (Peer Reviewed) Journals; Published Date: 19750101-20091231; Language: English

11/12/09– 11/24/09 PsycINFO (handicap* OR “special education” OR intellectual* disab* OR ((cognitive OR phonological OR speech OR language OR learning OR reading OR communication) AND (impairment* OR disab* OR disorder* OR delay*)) OR Autis* OR Pervasive Development* Disorder OR Asperger* OR “Savant Syndrome” OR ”Developmental delay” OR developmental disab* OR “Multiple disabilities” OR severe disab* OR Mental* retard* OR Deaf OR “hard of hearing” OR hearing impair* OR hearing loss OR “Complex communication needs” OR stutter* OR fluency OR
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Publication Year: 1975-2009; Published Date: 19750101-20091231; Peer Reviewed; English; Age Groups: Neonatal (birth–1 mo), Infancy (2–23 mo), Preschool Age (2–5 yrs); Population Group: Human

11/13/09–11/18/09 Science Citation Index Expanded; Social Sciences Citation Index

TS = (handicap* OR "special education" OR intellectual* disab* OR ((cognitive OR phonological OR speech OR language OR learning OR reading OR communication) AND (impairment* OR disab* OR disorder* OR delay*)) OR Autis* OR Pervasive Development* Disorder OR Asperger* OR "Savant Syndrome" OR "Developmental delay" OR developmental disab* OR "Multiple disabilities” OR severe disab* OR Mental* retard* OR Deaf OR "hard of hearing" OR hearing impair* OR hearing loss OR "Complex communication needs” OR stutter* OR fluency OR ((Speech OR language) AND (patholog* OR therapy OR therapist OR therapies))) AND Language=(English) AND Document Type=(Article)
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Timespan=1975-2009. Databases=SCI-EXPANDED, SSCI.

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(Indirect OR direct OR intensity OR intensive OR "one-to-one" OR integrated OR inclusive OR segregated OR "in-class" OR "out-of-class") AND (therapy OR treatment OR model OR intervention OR train OR training OR instruction OR class OR classes OR classroom)) \) AND Topic=((infant* OR baby OR babies OR NICU OR neonat* OR toddler* OR perinatal OR newborn* OR child* AND children OR girl OR girls OR boy OR boys OR preschool* OR pre-school* OR kids)) AND Subject Areas=( REHABILITATION OR PEDIATRICS OR EDUCATION, SPECIAL OR PSYCHOLOGY, DEVELOPMENTAL OR LANGUAGE & LINGUISTICS OR PSYCHOLOGY, EDUCATIONAL OR PSYCHOLOGY, CLINICAL OR PSYCHOLOGY, SOCIAL OR EDUCATION & EDUCATIONAL RESEARCH OR PSYCHOLOGY, EXPERIMENTAL OR PSYCHOLOGY OR BEHAVIORAL SCIENCES OR PSYCHOLOGY, MULTIDISCIPLINARY OR FAMILY STUDIES OR SOCIAL SCIENCES, INTERDISCIPLINARY OR PSYCHOLOGY, APPLIED )

Timespan=1975-2009. Databases=SCI-EXPANDED, SSCI.
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Appendix B

Excluded Studies and Reason for Exclusion


*Different treatments; Wrong population (too old)*


*No comparison of service delivery models; No clinical question*


*Different treatments; Both indirect*


*Wrong population (school-age); Not speech-language pathology*

*No comparison of service delivery models*


*No clinical question*


*Two different treatments*


*Wrong population*


*No clinical question*

Wrong population (school-age); No clinical question


No comparison of service delivery models or dosage


No comparison of service delivery models or dosage


Not a study


Not a study

Not a study


No original data; No references


Not a study


Not a study

No comparison of service delivery models


No comparison of service delivery models


Different treatments


No comparison of service delivery models


No speech-language outcomes

346–356.

*No comparison of service delivery models*


*No clinical question; No comparison of service delivery models*


*Not a study*


*Not speech-language disorders; "At risk" criteria to enter study*


*Not children with communication disorders*

*No clinical question; Service delivery model does not vary*


*Not a study*


*Not speech-language outcomes*


*No speech-language outcomes*


*No clinical question*

*Wrong population (too old)*


*No comparison of service delivery models*


*Not children with communication disorders*


*Not children with communication disorders*


*No clinical question; Not children with communication disorders*


*No comparison of service delivery models*


*Not a study*


*Not children with communication disorders*


*Mixed population data not separate.*

Not a study


*No clinical question; No data*


*Different treatments*


*No clinical question*


Unclear if *treatment held constant*


*ASHA’s National Center for Evidence-Based Practice in Communication Disorders • October 2010*
Schools, 34, 154–166.

No clinical question; Wrong population (Kindergarten grade)


Service Delivery Model does not vary; No clinical question


No data; Case study


Different treatments; Wrong population (too old); No clinical question


Different treatments (Distar vs. PAP)

*Erratum published; see Bibby et al. (2002)*


*No comparison of service delivery models; Erratum for Bibby et al. (2001)*


*Not speech language pathology; Unable to get a full text copy of article. Author no longer has a record. Rejected because author said, "No speech-language pathologist was directly involved, although members of my research team and I regularly met with the heads of speech pathology, physiotherapy, occupational therapy, and other departments at the center where the research was conducted" (Correspondence with J. J. Pear on 1/31/08)*


*Not a study*

*Treatment not constant across home and clinic*


*Wrong population (age 6–9)*


*No speech-language outcomes*


*Not a study*


*Different treatments*

*Not a study*


*Treatment not held constant; not all children with communication disorders; language intervention not necessarily provided*


*No data—review*


*Different treatments*


Not separated by age; no clinical question


No comparison of service delivery models


No comparison of service delivery models


Different treatments


No comparison of service delivery models

Boyle, J., McCartney, E., Forbes, J., & O’Hare, A. (2007). A randomised controlled trial and...
economic evaluation of direct versus indirect and individual versus group modes of speech and language therapy for children with primary language impairment. *Health Technology Assessment, 11*(25), 1-158.

*Wrong population (age 6–11)*


*Different treatments*


*Wrong population (too old)*


*No comparison of service delivery models; Article of interest*


*No comparison of service delivery models*

doi:10.1002/pits.20346

*No clinical question*


*No speech-language outcomes*


*No clinical question*


*No comparison of service delivery models or dosage*


*No comparison of service delivery models; No clinical question*

*No original data*


*No data – qualitative*


*No clinical question; No speech-language outcomes*


*No comparison of service delivery models*


doi:10.1177/027112149301300105

*No data to answer clinical question*


*Different treatments*


*No comparison of service delivery models*


*No comparison of service delivery models*


*Mixed population; "at risk" criteria to enter study, not speech-language disorders*

*Treatment vs. no treatment; No comparison of service delivery models*


*No original data*


*No clinical question*


*No comparison of service delivery models or dosage; No clinical question*

Different treatments


*Not speech-language outcomes; "at risk" criteria to enter study, not speech-language disorders*


*Treatment vs. no treatment*


*Not a study; no indication of comparison data*


*No comparison of service delivery models*

*Not a study*


*No clinical question*


*Wrong population (too old)*


*Not a study*


No original data; article of interest


No clinical question


No comparison of service delivery models


No comparison of service delivery models or dosage


Wrong population (school-age); No clinical question


No comparison of service delivery models; No clinical question


No original data; No comparison of service delivery models; review


Wrong population (school-age); No clinical question

Wrong population (school-age); No original data


*Not diagnosed with speech-language disorder*


Wrong population (school-age); No clinical question; Not experimental design or quasi-experimental design


Mixed population; Treatment vs. no treatment


No comparison of service delivery models


**Different treatments**


*No description of treatment for comparison group*


*Wrong population (age 6–11)*


**Different treatments**

Different treatments


Not children with communication disorders


Treatment not held constant


No clinical question; No data; Not a study


No clinical question

No comparison of service delivery models


Unclear if treatment held constant


Unclear if treatment held constant


No comparison of service delivery models


Not speech-language outcomes

*No clinical question*


*No clinical question*


*No comparison of service delivery models; No clinical question*


*Wrong population*


*No comparison of service delivery models*

*No comparison of service delivery models or dosage; No clinical question*


*No comparison of service delivery models*


*Not children with communication disorders*


*Different treatments*


*No comparison of service delivery models*


*No comparison of service delivery models*


*Not speech-language outcomes*


*Not a study*


*Different treatments*

*No comparison of service delivery models*


*Not speech-language outcomes*


*Observation under different conditions, not treatment; No speech-language outcomes*


*No comparison of service delivery models; Different treatments*


*No comparison of service delivery models or dosage; No clinical question*

*No clinical question*


*Not a study—review*


*Treatment vs. no treatment*


*No comparison of service delivery models*


*Wrong population (too old); Article of interest*


*Not specifically comparing two service delivery models*


*No clinical question*


*No comparison of service delivery models*


*No comparison of service delivery models*

*Different treatments*


*No comparison of service delivery models or dosage; No clinical question*


*No comparison of service delivery models*


*Not children with communication disorders*

Different treatments (unclear)


No speech-language outcomes


No comparison of service delivery models; No clinical question


Not a study; Not available through Longwood or HSL

No clinical question; No speech-language outcomes; Just information on programs


No clinical question


No speech-language outcomes


No speech-language outcomes


Different treatments


*Different treatments*


*No comparison of service delivery models*


*No comparison of service delivery models; No clinical question*


*No comparison of service delivery models*


*No treatments provided*


Different treatments, not different service delivery models


No speech-language outcomes


Wrong population (too old)


No data; Not a study—protocol

Wrong population (Kindergarten)


Wrong population (adults)


No speech-language outcomes; No clinical question


Cost analysis; No clinical question


No comparison of service delivery models

Disorders, 46, 13–23.

No comparison of service delivery models


Wrong population (school-age)


Wrong population (kindergarten–1st grade)


Different treatments


Wrong population

*No comparison of service delivery models*


*Different treatments*


*No comparison of service delivery models; One model with two parts*


*Mixed age population (too old)*


*Treatment not held constant*

Fey et al. (1997) states that this study should not be used to compare service delivery or treatment schedules.


*Treatment not held constant*


*No comparison of service delivery models; No clinical question*


*Play outcomes; condition study*

File, N., & Kontos, S. (1992). Indirect service delivery through consultation: Review and

*Not a study*


*No individual data presented; Insufficient data*


*No comparison of service delivery models*


*No comparison of service delivery models*


*Not a study*

Forness, S. R., & Kavale, K. A. (1985). Effects of class size on attention, communication, and

*Wrong population (too old)*


*Wrong population (too old)*


*Comparison of two treatments; Not service delivery models*


*Not a study*


*Wrong population (too old)*


*No original data—review*


*Different treatments*


*No comparison of service delivery models*


*Authors state different treatments provided*

No clinical question; Not a study


No comparison of service delivery models


Not a study; Wrong population (too old)


Children in the general care group do not receive direct service; General care treatment not well described


No comparison of service delivery models


*Not children with communication disorders; No comparison of service delivery models*


*No original data*


*No comparison of service delivery models or dosage; No clinical question*


*No comparison of service delivery models or dosage*


*No comparison of service delivery models or dosage*


*No comparison of service delivery models or dosage; No clinical question*


*No comparison of service delivery models or dosage*


*No comparison of service delivery models or dosage*


*No comparison of service delivery models or dosage*


*No comparison of service delivery models or dosage*

*No comparison of service delivery models*


*No comparison of service delivery models*


*No clinical question*


*No comparison of service delivery models*


*No comparison of service delivery models*
Medical Journal, 321(7266), 923–928.

No comparison of service delivery models or dosage; Treatments vs. no treatment


No comparison of service delivery models


No comparison of service delivery models


Treatment not held constant


No description of speech-language services; No comparison of speech-language service delivery models

*No comparison of service delivery models*


*Wrong population (too old)*


*No comparison of service delivery models*


doi:10.1016/j.rasd.2009.06.007.

*No speech-language outcomes*


*Wrong population (too old)*

*No comparison of service delivery models; No clinical question*


*No comparison of service delivery models*


*Different treatments*


*No comparison of service delivery models*


*Not a study; get for references*

*Not a study; article of interest*


*Observation under different conditions, not treatment*


*No speech-language outcomes*


*No comparison of service delivery models; No treatments*


*Treatment not constant; Observation under different conditions*

*No comparison of service delivery models*


*No clinical question*


*Not a study*


*Wrong population (too old)*


*Not a study; no original data; get for references*

*No comparison of service delivery models*


*No comparison of service delivery models or dosage*


*No comparison of service delivery models or dosage*


*No comparison of service delivery models or dosage*


*No comparison of service delivery models or dosage; For school-age systematic review:*
Rejected by committee—no speech-language pathology


No speech-language outcomes; Limited by mixed ages


No comparison of service delivery models; No clinical question


No comparison of service delivery models


No comparison of service delivery models

Wrong population (too old)


*No comparison of service delivery models or dosage*


*No comparison of service delivery models*


*Treatment vs. no treatment; No comparison of service delivery models or dosage*


*No comparison of service delivery models or dosage; No clinical question*


*No comparison of service delivery models*


*No comparison of service delivery models or dosage*


*No comparison of service delivery models*


*No original data; Reviews treatments not service delivery models*


*No comparison of service delivery models; No clinical question*

*Rejected by committee: No speech-language pathology, No communication disorder;*


*No clinical question*


*Treatment not provided in different settings, just general*


*No comparison of service delivery models*


No comparison of service delivery models


No clinical question


Wrong population (too old); Not speech-language pathology


Not speech-language disorder


No comparison of service delivery models

*No comparison of service delivery models*


*No comparison of service delivery models*


*No separate speech-language outcomes*


*Not a study; no indication of comparison data*


*No speech-language outcomes*


*Treatment vs. no treatment; No comparison of service delivery models*


*Treatments too dissimilar; AP vs. GP comparison groups*


*Wrong population (too old)*


*Wrong population (age 3–11)*

*No comparison of service delivery models*


*Treatment vs. no treatment*


*Not a study*


*Wrong population (Kindergarten)*


*No data to answer clinical question*

*No clinical question*


*No comparison of service delivery models*


*Classrooms not described*


*No comparison of service delivery models*

No comparison of service delivery models or dosage


No comparison of service delivery models


No clinical question


No comparison of service delivery models; No clinical question


No comparison of service delivery models or dosage

Disabilities, 28, 163–175.

*No comparison of service delivery models*


*No clinical question; Not a study*


*Not a study*


*Treatment not held constant*


*Not a study—review; Article of interest*

parenting program for parents of children with early-onset conduct problems.


doi:10.1017/S1352465803002017.

*No clinical question*


*Wrong population (too old)*


*No speech-language outcomes*


*No comparison of service delivery models or dosage; Different treatments; Article of interest*


*No data on two comparison groups*


*Wrong population (too old)*


*No clinical question; ordered for references*


*Wrong population (too old)*


*Mixed diagnosis; Data not separated; Not all children with speech-language disorder*

*Not speech-language disorder*


*Not all children with speech-language disorder; Data not separated*


*Treatment vs. no treatment; No comparison of service delivery models*


*Not speech-language outcomes*

No clinical question


*Different treatments; No speech-language outcomes; Final data excludes children with disabilities*


*No comparison of service delivery models*


*Not able to specifically answer clinical question; Article of interest*


*Different treatments; No clinical question*


*No comparison of service delivery models; Different treatments*


*Not speech-language disorder*


*Not a study*

*No comparison of service delivery models; Different treatments*


*No comparison of service delivery models; Different treatments*


*Wrong population (Kindergarten)*


*Not a study*


*No comparison of service delivery models or dosage*

No comparison of service delivery models or dosage


No comparison of service delivery models or dosage


Not published in a peer reviewed journal; initially accepted for Birth-5 but rejected because of peer-review status; keep as article of interest


Not a study

*Early Education and Development, 11*, 423–446.

*No comparison of service delivery models or dosage*


*No comparison of service delivery models or dosage*


*No comparison of service delivery models or dosage*


*No comparison of service delivery models or dosage*

London.

Wrong population (too old)


No speech-language outcomes


Wrong population (school-age)


Wrong population (too old)


Mixed population

*No comparison of service delivery models or dosage*


*No comparison of service delivery models*


*Treatment vs. no treatment; Mixed age population*


*Wrong population (school-age)*

No comparison of service delivery models; No clinical question


Treatment not held constant; Speech-language outcomes unclear


No clinical question


Different treatment approaches—not different service delivery models


Different treatment approaches, not different service delivery models

Wrong population (school-age); No clinical question


Different service delivery models to parents, not to children


Wrong population (age 7–8)


No comparison of service delivery models


No clinical question

diverse preschool children: A focus on developing home language(s). *Language, Speech, and Hearing Services in Schools, 36*, 251–263.

*No comparison of service delivery models or dosage; No clinical question*


*Wrong population (Too old)*


*No comparison of service delivery models*


*No clinical question*


*Different treatments*

Kouri, T. A. (2005). Lexical training through modeling and elicitation procedures with late

**Different treatments**


*No comparison of service delivery models; No clinical question*


**Different treatments**


*Wrong population*


*No comparison of service delivery models*

*No comparison of service delivery models*


*Unpublished MSc thesis*


*No comparison of service delivery models*


*No comparison of service delivery models*


*No comparison of service delivery models*


*No original data*


*No clinical question; Cost data*


*No comparison of service delivery models*

with primary speech and language delay or disorder (Art. No. CD004110). Cochrane Database of Systematic Reviews.

Systematic review; No original data


Meta-analysis; no original data


Different treatments; Article of interest


No clinical question


ASHA’s National Center for Evidence-Based Practice in Communication Disorders • October 2010
Wrong population (too old)


No speech-language outcomes


Wrong population (1st grade)


No comparison of service delivery models or dosage


No comparison of service delivery models

Lee, S., & Kahn, J. V. (1998). Relationships of child progress with selected child, family, and

*Not speech-language outcomes*


*No comparison of service delivery models or dosage*


*No speech-language outcomes*


*Not speech-language outcomes*


*No comparison of service delivery models or dosage; No clinical question; Not children*

*No comparison of service delivery models*


*No original data*


*No data*


*No comparison of service delivery models*

27, 17–25.

No speech-language outcomes


No comparison of service delivery models or dosage; No clinical question


Not a study


No clinical question


No clinical question; Does not directly address

No speech-language outcomes


No speech-language outcomes; descriptive


No comparison of service delivery models; Different treatments


No clinical question


No comparison of service delivery models

*Only published abstract; Full text not available through Docline or HSL*

*Different treatments*

*Different treatments*

*Different treatments*

Lovaas, O. I. (1987). Behavioral treatment and normal educational and intellectual functioning in

*No speech-language outcomes*


*No comparison of service delivery models*


*Different treatments*


*Different treatments*


*No comparison of service delivery models; Different treatments*

involvement in parent training. Research on Social Work Practice, 18, 97–106.

Not speech-language disorder


No comparison of service delivery models


No comparison of service delivery models


Mixed population; No comparison of service delivery models


Different treatments

*Not a study*


*Different treatments*


*No clinical question*


*No comparison of service delivery models or dosage*

Different treatments; No speech-language outcomes


*No comparison of service delivery models*


*No comparison of service delivery models*


*Wrong population (elementary grades)*


*No clinical question*


*Wrong population; Not a study*


*No comparison of service delivery models*


*Different treatments*


*No data; not a study*


*Treatment vs. no treatment; No comparison of service delivery models*

*No clinical question*


*Wrong population (too old)*


*No speech-language outcomes; "At risk" criteria to enter study, not speech-language disorders*


*Not all children with communication disorders; No treatment*


*No treatment; Condition study*

*No comparison of service delivery models*


*No original data*


*No clinical question*


*No comparison of service delivery models*


*Thesis—not peer reviewed*

*No comparison of service delivery models*


*Not a study*


*Wrong population (too old); Not speech-language outcomes*


*No speech-language outcomes*

No comparison of service delivery models


No speech-language outcomes


Systematic review; excludes other populations, no birth through age 2


No speech-language outcomes


No comparison of service delivery models or dosage

Wrong population (too old)


*Treatment not held constant*


*Different treatments*


*No data; not a study*


*No comparison of service delivery models*

Wrong population (too old)


*No comparison of service delivery models*


*No comparison of service delivery models*


*No comparison of service delivery models*


*Not a study*


*No clinical question*

*Wrong population (too old)*


*Not a study*


*Different curricula*


*No comparison of service delivery models or dosage*


*Speech-language outcomes not separated*


*Not a study*


*Observation under different conditions, not treatment*


*Observation under different conditions, not treatment*


*No comparison of service delivery models*


No comparison of service delivery models or dosage


Wrong population (school-age)


Wrong population (4th and 5th grade); Not enough information for comparison of service delivery models


Not a study—protocol


No comparison of service delivery models


No comparison of service delivery models


No comparison of service delivery models; No clinical question

Not a study


Different treatments


Different treatments


No comparison of service delivery models; Different treatments


Different treatments


*Not experimental or quasi-experimental design; Not a study; No data*


*Different treatments*


*Dissertation; published as Mulligan et al. (1982); duplicate*


*Wrong population (too old)*


*Not a study*


*Not a study: Wrong population*


*No clinical question*


*No data—follow up report?*


*Different treatments*

*No original data*


*Wrong population (too old)*


*No clinical question*

Not peer reviewed—book


*No comparison of service delivery models*


*Different treatments*


*No original data*


*Cost analysis; No speech-language outcomes*


*Treatment vs. no treatment and different treatments*


*No speech-language outcomes; cost analysis*


*Not a study; Article of interest*


*Wrong population*


*Mixed age population*


Not a study


No comparison of service delivery models or dosage


Wrong population (age 10–41); No clinical question


No comparison of service delivery models


Treatment vs. no treatment; No comparison of service delivery models

Different treatments; No speech-language outcomes


Comparison of different treatments; Not service delivery models


No clinical question


No comparison of service delivery models


Not a study; no comparison of service delivery models

No child outcomes, only parent outcomes


Wrong population (too old)


No comparison of service delivery models


No comparison of service delivery models


No clinical question

Pelletier, J. (2008). *The role of parents, families and caregivers in young children’s literacy*

No speech-language outcomes


No clinical question


Only two studies have preschool children;


Duplicate of Cochrane review

Medicine and Child Neurology, 47, 57–63.

Included studies that do not compare service delivery models; In all but one study, population too old


No comparison of service delivery models


No comparison of service delivery models


No comparison of service delivery models


No speech-language outcomes

*No speech-language outcomes*


*No clinical question*


*No original data*


*Not children with communication disorders*


No comparison of service delivery models


No clinical question


No clinical question


Not speech-language outcomes


No original data

Wrong population (too old)


No children with disabilities


Not speech-language disorder


No comparison of service delivery models

No comparison of service delivery models


No speech-language outcomes


Not a study


Not a study


Different treatments

No comparison of service delivery models


No clinical question


No comparison of service delivery models


No speech-language outcomes


Different treatments

No comparison of service delivery models


Rate of feedback not treatment


Studies comparing intensities did not examine speech or language outcomes.


Different treatments


No comparison of service delivery models; More treatments vs. no treatment

*Mixed population*


*No comparison of service delivery models*


*No speech-language outcomes*


*No speech-language outcomes*


*No comparison of service delivery models; Wrong population*


*No clinical question*


*No comparison of service delivery models*


*No data*

Wrong population (too old)


No original data; Wrong population (too old)


Not children with communication disorders


Article states that you cannot discern the efficacy of the two different models


No comparison of service delivery models; Treatment comparison

*No comparison of service delivery models*


*No comparison of service delivery models; Not children with communication disorders*


*No comparison of service delivery models*


*No comparison of service delivery models*

No comparison of service delivery models


No comparison of service delivery models or dosage


Not a study


Information provided cannot answer clinical question; Article of interest


No indication that treatments were consistent

*Seems like different treatments through Speech Viewer*


*No comparison of service delivery models*


*Wrong population*


*No clinical question; Wrong population*


*Wrong population (too old)*

*Cannot make comparison of dosage because children not separated by duration, total amount of treatment, etc. Authors indicated that both groups (unexpectedly) received similar amounts of treatment.*


*Not a study*


*Not a study*


*No comparison of service delivery models or dosage*


*No speech-language outcomes*


*Not experimental*


*No comparison of service delivery models*


*No clinical question*

Treatment not held constant


*No comparison of service delivery models*


*Wrong population (kindergarten)*


*No comparison of service delivery models*


*No comparison of service delivery models; No clinical question*


*Not children with communication disorders*

*Wrong population (too old)*


*Wrong population (1st through 5th grade); No speech-language pathology*


*Wrong population (age 8.1–9.5); No clinical question*


*No comparison of service delivery models*


No clinical question


Not children with communication disorders


No comparison of service delivery models or dosage


No comparison of service delivery models


Wrong population (adolescents); In school-age systematic review, rejected by committee:
No clinical question; Age


No comparison of service delivery models


No clinical question


No speech-language outcomes


Wrong population (too old)

*No speech-language outcomes*


*No comparison of service delivery models; Different treatments*


*Treatment not held constant; Mixed age population; Speech-language outcomes not separated*


*Treatment vs. no treatment*


*Treatment not held constant*


*No comparison of service delivery models*


*Not a study*


*No clinical question*


*No comparison of service delivery models*


*No comparison of service delivery models*


*No data comparing service delivery models*


*Insufficient data to determine duration/intensity*


Erratum


*Mixed age population (age 0–21)*


*Not a study*


*No clinical question*


*No clinical question; Not children with communication disorders*


*No comparison of service delivery models*


*Not a study*


*Not a study*


*No speech-language outcomes*

*Not a study*


*No comparison of service delivery models*


*No comparison of service delivery models*


*Not a study—protocol*


*Not a study—protocol*

*No comparison of service delivery models*


*Treatment vs. no treatment; No comparison of service delivery models*


*Wrong population (too old); No clinical question*


*No clinical question*

No clinical question


*No clinical question; Not a study*


*No comparison of service delivery models*


*No clinical question; No speech-language outcomes*


*No clinical question; No speech-language outcomes*

Swanson, H. L. (1999). Reading research for students with LD: A meta-analysis of intervention
Wrong population (too old); No clinical question


Wrong population (too old); No clinical question


No speech-language outcomes


No comparison of service delivery models; Mixed ages; Not children with communication disorders


Mixed age population; No explanation of treatment; Indirect vs. direct invention, indirect

*Treatment vs. no treatment*


*No comparison of service delivery models*


*Different amounts of treatment not indicated and not reflective of half-day vs. full day*


*Treatment not held constant*

Effectiveness of parenting groups with professional involvement in improving parent and child outcomes. Hamilton, ON, Canada: Ontario Ministry of Health, Region of Hamilton-Wentworth, Social and Public Health Services Division.

No comparison of service delivery models; Not children with communication disorders


Wrong population (kindergarten–3rd grade)


Wrong population (school-age)


Mixed population; Discussion dictates communication should also be studied

No clinical question


No comparison of service delivery models


No comparison of service delivery models or dosage


No comparison of service delivery models or dosage

No comparison of service delivery models


Different treatments


No comparison of service delivery models


No comparison of service delivery models or dosage


No comparison of service delivery models

No comparison of service delivery models


No comparison of service delivery models


Different interventions


Treatment vs. no treatment


*Not a study*


*No comparison of service delivery models*


*No clinical question*


*No speech-language outcomes*


*Wrong population (too old)*

intensive method of treatment for children with pervasive developmental disorder.


*No comparison of service delivery models*


*No speech-language outcomes*


A systematic review of the effectiveness of peer/paraprofessional 1: Interventions targeted toward mothers (parents) of 0-6 year old children in promoting positive maternal (parental) and/or child health/developmental outcomes. Effective Public Health Practice Project. Ontario Public Health Research, Education & Development Program, Ontario Ministry of Health, Region of Hamilton-Wentworth, Social and Public Health Services Division.

*No comparison of service delivery models*


*No comparison of service delivery models; "At risk" criteria to enter study, not speech-language disorders*

*No comparison of service delivery models; Diagnosis not treatment*


*No comparison of service delivery models; Different treatments*


*Treatment vs. no treatment*


*Treatment vs. no treatment*

No speech-language outcomes


No comparison of service delivery models or dosage


No comparison of service delivery models


Not a study


No comparison of service delivery models or dosage

No comparison of service delivery models


No comparison of service delivery models or dosage


Not peer reviewed


No comparison of service delivery models or dosage


No comparison of service delivery models


*Different treatments*


*No speech-language outcomes*


*No comparison of service delivery models or dosage*


*No data; Only summary statements*


*No comparison of service delivery models*


*No comparison of service delivery models*

*No comparison of service delivery models*


*No comparison of service delivery models*


*No speech-language outcomes*


*No original data*

Not a study


No original data


Different treatments


Different treatments


No comparison of service delivery models


*No comparison of service delivery models*


*No speech-language outcomes*


*No real difference in service delivery, only in materials*


*Not a study*


*No comparison of service delivery models*

*No comparison of service delivery models or dosage*


*No comparison of service delivery models; No clinical question*


*Not all treatment computer delivered*


*Wrong population (school-age); Not frequency/intensity*

Not a study


*Treatment vs. no treatment*


*No comparison of service delivery models*


*No comparison of service delivery models or dosage*


*No comparison of service delivery models or dosage*


*No comparison of service delivery models or dosage; Different treatments*

*No comparison of service delivery models or dosage*


*No comparison of service delivery models or dosage; Different treatments*


*No comparison of service delivery models or dosage; Different treatments*


*Different treatments*

Intervention, 22, 337–354.

No comparison of service delivery models or dosage; Different treatments


No comparison of service delivery models or dosage; Different treatments


No comparison of service delivery models or dosage; Different treatments


No comparison of service delivery models or dosage


No clinical question

*Not a study*


*Treatment not held constant*


*Wrong population (school-age)*


*No comparison of service delivery models*


*Wrong population; For school-age systematic review: rejected by committee (No clinical
question; Efficacy of treatment not service delivery model or intensity)