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The Center for Evidence-based Policy (Center) is recognized as a national leader in evidence-based decision making and policy design. The Center understands the needs of policymakers and supports public organizations by providing reliable information to guide decisions, maximize existing resources, improve health outcomes, and reduce unnecessary costs. The Center specializes in ensuring diverse and relevant perspectives are considered, and appropriate resources are leveraged to strategically address complex policy issues with high-quality evidence and collaboration. The Center is based at Oregon Health & Science University in Portland, Oregon.
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Introduction

The Washington State Legislature instructed the Washington State Institute for Public Policy (WSIPP) to assess the potential costs and benefits of implementing the American Academy of Pediatrics' Bright Futures recommended schedule of well-child visits, developmental, and autism screenings in state medical assistance programs.

In order to adopt Bright Futures recommendations, Washington Medicaid would need to pay for additional well visits (moving to annual visits for children over age six) and formal developmental and autism screens during early childhood. WSIPP is examining the potential benefits and costs of these additional services using Medicaid enrollment and claims data. WSIPP is contracting with the Center for Evidence-based Policy (CEbP) at Oregon Health & Science University to examine the potential benefits through an analysis of the literature. At the direction of WSIPP, CEbP conducted a literature search to update the Agency for Healthcare Research and Quality (AHRQ) report titled Screening for Speech and Language Delay in Preschool Children (Nelson 2006). More specifically, WSIPP requested an updated literature search for only for Key Questions #5, #6, #7, and #9 of the AHRQ report. The relevant Key Questions (with numbers corresponding to those used in the Nelson [AHRQ] 2006 report) are listed below.

1. Key Question #5 – “Do interventions for speech and language delay improve speech & language outcomes?”
2. Key Question #6 – “Do interventions for speech and language delay improve other non speech & language outcomes?”
3. Key Question #7 – “Does improvement in speech and language outcomes lead to improved additional outcomes?”
4. Key Question #9 – “What are cost effectiveness issues?”

For Key Questions #5, #6, #7, and #9, Nelson and colleagues (Nelson [AHRQ] 2006) conducted a systematic review of the literature to determine the strengths and limits of the evidence about the effectiveness and cost effectiveness of interventions for children identified with speech and language delay. A search of the MEDLINE® database was completed from 1966 to November 19, 2006. In the structured abstract, Nelson concluded that based on fourteen fair to good quality randomized controlled trials, “… interventions reported significantly improved speech and language outcomes compared to control groups. Improvement was demonstrated in several domains including articulation, phonology, expressive language, receptive language, lexical acquisition, and syntax among children in all age groups studied and across multiple therapeutic settings. Improvement in other functional outcomes, such as socialization skills, self-esteem, and improved play themes, were demonstrated in some, but not all, of the 4 studies measuring them. In general, studies of interventions were small, heterogeneous, may be subject to plateau effects, and reported short-term outcomes based on various instruments and
measures. As a result, long-term outcomes are not known, interventions could not be directly compared, and generalizability is questionable (Nelson [AHRQ] 2006, pp. vii). No studies were identified for Key Question #9.

Methods

The Nelson (2006) search methods and inclusion/exclusion criteria (pp. 7) were replicated with the exception of study design. At the direction of WSIPP, all comparative study designs, including both RCTs and observational designs, were included as outlined below. For all Key Questions, a MEDLINE® search was completed from September 2004 to October 2012. The detailed search strategy is available in Appendix A.

One reviewer screened each abstract. If the reviewer concluded that the article could possibly be eligible, we retained it. Two reviewers independently read the full text of each included article to determine final inclusion. Disagreements were resolved with a third senior reviewer.

Study Inclusion Criteria

- SRs, TAs, randomized controlled trials, and observational comparative study designs (prospective and retrospective cohort, and controlled clinical trials)
- All relevant economic evaluations, cost-effectiveness analyses, and economic simulation models

Results

A total of 1,150 unique citations were retrieved. Thirty one articles met inclusion criteria. The 31 articles are listed below in alphabetical order, by first author’s last name, under each relevant Key Question. Study abstracts are directly from the MEDLINE® database and are in italics below each citation. Many abstracts do not clearly delineate study methodology. For example, some abstracts do not appear to be from comparative studies. However, all of the full text articles in this report were reviewed to confirm that a comparative methodology was used. Brackets with gray text appear under full references for those abstracts that were unclear or nondescriptive of study design. In addition, the SRs listed below included comparative as well as noncomparative study designs. Appendix B lists excluded articles alphabetically by first author’s last name, followed by the reason for exclusion in italics.
Key Question #5 - Do interventions for speech and language delay improve speech & language outcomes?

Bailet, L.L., Repper, K.K., Piasta, S.B., & Murphy, S.P. (2009). Emergent literacy intervention for prekindergarteners at risk for reading failure. *Journal of Learning Disabilities, 42*(4), 336-355. [Study had an immediate study group that was compared to a delayed intervention control group. Outcomes were measured and compared at each time interval.]

This study examined the effectiveness of an assessment and intervention study targeting prekindergarten children at risk for reading failure. Across 38 child care sites, 220 children were identified as "at risk" for reading failure due to their performance on a screening measure of early literacy skills and randomly assigned to receive immediate or delayed intervention. The intervention consisted of eighteen 30-minute lessons delivered twice weekly for 9 weeks and focused on teaching critical emergent literacy skills within small groups. Hierarchical linear models were used to nest children within center and measure treatment and dosage effects for students' residualized gains in rhyming, alliteration, picture naming, and print and letter knowledge skills. Results indicated significant treatment effects on two of four outcome variables (rhyming and alliteration) and significant dosage effects on all four variables. The study demonstrated a significant positive impact of this intervention for prekindergartners at risk for reading failure.


BACKGROUND: This study compares the efficacy of two school-based intervention programmes (Phonology with Reading (P + R) and Oral Language (OL)) for children with poor oral language at school entry.

METHODS: Following screening of 960 children, 152 children (mean age 4;09) were selected from 19 schools on the basis of poor vocabulary and verbal reasoning skills and randomly allocated to either the P + R programme or the OL programme. Both groups of children received 20 weeks of daily intervention alternating between small group and individual sessions, delivered by trained teaching assistants. Children in the P + R group received training in letter-sound knowledge, phonological awareness and book level reading skills. Children in the OL group received instruction in vocabulary,
comprehension, inference generation and narrative skills. The children's progress was monitored at four time points: pre-, mid- and post-intervention, and after a 5-month delay, using measures of literacy, language and phonological awareness.

RESULTS: The data are clustered (children within schools) and robust confidence intervals are reported. At the end of the 20-week intervention programme, children in the P + R group showed an advantage over the OL group on literacy and phonological measures, while children in the OL group showed an advantage over the P + R group on measures of vocabulary and grammatical skills. These gains were maintained over a 5-month period.

CONCLUSIONS: Intervention programmes designed to develop oral language skills can be delivered successfully by trained teaching assistants to children at school entry. Training using P + R fostered decoding ability whereas the OL programme improved vocabulary and grammatical skills that are foundations for reading comprehension. However, at the end of the intervention, more than 50% of at-risk children remain in need of literacy support.


OBJECTIVE: The aim of this randomised controlled trial was to evaluate the effectiveness of a short, highly structured parent based language intervention group programme for 2-year-old children with specific expressive language delay (SELD, without deficits in receptive language).

METHODS: 61 children with SELD (mean age 24.7 months, SD 0.9) were selected between October 2003 and February 2006 during routine developmental check-ups in general paediatric practices, using a German parent-report screening questionnaire (adapted from the MacArthur Communicative Development Inventories). Standardised instruments were used to assess the language and non-verbal cognitive abilities of these children and of 36 other children with normal language development (reference group; mean age 24.6 months, SD 0.8). 58 children with SELD were sequentially randomly assigned to an intervention group (n = 29) or a 12-month waiting group (n = 29). In the intervention group, mothers participated in the 3-month Heidelberg Parent-based Language Intervention (HPLI). All children were reassessed 6 and 12 months after pretest. Assessors were blind to allocation and previous results.

RESULTS: 47 children were included in the analysis. At the age of 3 years, 75% of the
children in the intervention group showed normal expressive language abilities in contrast to 44% in the waiting group. Only 8% of the children in the intervention group versus 26% in the waiting group met the criteria for specific language impairment (t score < or =35).

CONCLUSIONS: By applying the short, highly structured HPLI in children with SELD, the rate of treatment for language impairment at the age of 3 years can be significantly reduced.


PURPOSE: This study investigated the phonological awareness and early literacy development of 12 children who presented at 3 years of age with moderate or severe speech impairment. The children's response to early intervention that included specific activities to facilitate phoneme awareness and letter knowledge, in addition to improving speech intelligibility, was examined.

METHOD: Using a 3-year longitudinal design, the children's development in phonological awareness was monitored and compared to that of a group of 19 children without speech impairment. During the monitoring period from 3 to 5 years of age, the children with speech impairment received, on average, 25.5 intervention sessions. At 6 years of age, the children's performance on phonological awareness, reading, and spelling measures was also compared to that of the 19 children without impairment as well as to a matched control group of children with speech impairment who had not received any specific instruction in phonological awareness.

RESULTS: The results indicated that (a) phoneme awareness can be stimulated in children with speech impairment as young as 3 and 4 years of age, (b) facilitating phoneme awareness development can be achieved concurrently with improvement in speech intelligibility, and (c) enhancing phoneme awareness and letter knowledge during the preschool years is associated with successful early reading and spelling experiences for children with speech impairment.

CLINICAL IMPLICATIONS: The data provide evidence to support the clinical practice of integrating activities to develop phoneme awareness and letter knowledge into therapy for 3- and 4-year-old children with moderate or severe speech impairment.

The aim of this study was to follow-up prospectively a cohort of preschool children originally recruited from successive referrals to speech and language therapy community clinics and to investigate their linguistic, literacy, and social outcomes at 7 to 10 years of age. Three hundred and fifty children aged 84 to 113 months (mean age 99.9mo [SD 5.4mo]) were singletons from monolingual backgrounds where there was concern about their speech and language development. Children who had severe learning difficulties, autism, oromotor deficits, dysfluency, or dysphonia were excluded. Altogether 196 (56%), 134 males and 62 females, were seen at follow-up. A control group of children who had never been referred for speech and language therapy, 57% of whom were males, was also recruited (n=94; mean age 104.4mo [SD 6.8mo]). All children were assessed on standardized measures of speech, language, and literacy. Teachers and parents completed questionnaires on educational and social outcomes. In total, 139 children in the cohort were within the normal range on standardized language assessments. About 30% of the original cohort of children continue to struggle with language, literacy, and social difficulties. The study demonstrates the long-term nature of language impairment and reinforces the need for awareness among professionals in child development and education of the ongoing needs of this population of children.


**BACKGROUND:** Along with the severity of the disorder, the motivation of the children and their parents is an important element in explaining the extensive variance in therapeutic success. There is consensus that parental cooperation and homework are important for successful therapy. Systematic investigation into the effects of including homework in therapy is lacking, as are methodological approaches to increasing parental involvement.

**AIMS:** The aim was to determine whether the efficiency of traditional articulation therapy for children with speech-sound disorders can be improved by adding a behavioural treatment approach (contingency management) to treatment in order to increase the time that patients spend doing homework.

**METHODS & PROCEDURES:** A total of 91 children between the ages of four and six with
articulation impairments participated in the study. They were divided into three groups: 32 children were treated with traditional articulation therapy (eight sessions of 45 minutes each), 33 children received a combination of contingency management and traditional therapy, and 26 children received no therapy at all. A picture-labelling test measuring the treated target sound at different levels was used before and after therapy to quantify therapy-induced improvement.

OUTCOMES & RESULTS: The results confirm the fact that the traditional articulation therapy approach is effective for children with articulation impairments. However, adding contingency management significantly increased the frequency of homework sessions and improved the efficiency of treatment by decreasing the variance in therapeutic success.

CONCLUSIONS & IMPLICATIONS: Contingency management has a positive impact on therapeutic success and leads to an increase in the number of homework sessions.


BACKGROUND: This study evaluated the effectiveness of an intervention for reading-delayed children in Year-1 classes.

METHODS: A sample (N = 77) of children drawn from 14 schools representing those with the weakest reading skills were randomly allocated to one of two groups. A 20-week intervention group received the intervention for two consecutive 10-week periods, while a 10-week intervention group only received the intervention for the second 10 weeks of the study. The programme was delivered in daily 20-minute sessions that alternated between small group (N = 3) and individual teaching. The programme combined phoneme awareness training, word and text reading, and phonological linkage exercises.

RESULTS: The children receiving the intervention during the first 10-week period made significantly more progress on measures of letter knowledge, single word reading, and phoneme awareness than children not receiving the intervention. However, the children who only received the intervention during the second 10-week period made rapid progress and appeared to catch up with the children who had been given the more prolonged intervention. Failure to respond to the intervention was predicted by poor initial literacy skills and being in receipt of free school meals.
CONCLUSION: A reading intervention programme delivered on a daily basis by trained teaching assistants is an effective intervention for children who show reading delays at the end of their first year in school. However, around one-quarter of the children did not respond to this intervention and these children would appear to need more intensive or more prolonged help to improve their reading skills.


Researchers have hypothesized four levels of instructional dialogue and claimed that teachers can improve children's language development by incorporating these dialogue levels in their classrooms. It has also been hypothesized that enhancing children's early language development enhances children's later reading development. This quasi-experimental research study investigated both of these hypotheses using a collaborative service delivery model for Grade 1 children with language difficulties from a socially and economically disadvantaged urban community in Australia. Comparing the end-of-year reading achievement scores for the 57 children who received the language intervention with those of the 59 children in the comparison group, the findings from this research are supportive of both hypotheses. The interrelationships between learning difficulties, reading difficulties, and language difficulties are discussed along with children's development in vocabulary, use of memory strategies and verbal reasoning, and the need for multidimensional programming.


BACKGROUND: Awareness of individual phonemes in words is a late-acquired level of phonological awareness that usually develops in the early school years. It is generally agreed to have a close relationship with early literacy development, but its role in speech change is less well understood. Speech and language therapy for children with speech disorder involves tasks that appear, either implicitly or explicitly, to require a phonemic level of awareness. However, children typically attend for intervention at a pre-school, pre-literate stage, i.e. before they would be expected to have developed the relevant phoneme segmentation and manipulation skills.

AIMS: To investigate whether it is possible to teach phoneme awareness skills to pre-literate children with speech disorder.
METHODS & PROCEDURES: In a randomized controlled trial design 42 children with speech disorder, aged 4;0-4;6, were allocated to either a phonological awareness or a language stimulation programme. Children were assessed on four measures of phoneme awareness (alliteration awareness, phoneme isolation, word segmentation and phoneme addition/deletion) immediately before and after the programme and categorized as 'improved' or 'not improved' according to predetermined criteria. Fisher's Exact test was used to compare outcome in the two groups.

OUTCOMES & RESULTS: Significantly more children improved in the phonological awareness group than in the language stimulation group for three out of the four measures (all except alliteration awareness). However, for the two most advanced tasks (segmentation and addition/deletion) only a small minority of children showed improvement. A marked improvement in Phoneme Isolation was made by the majority of children in the phonological awareness group.

CONCLUSIONS: It is possible to teach some advanced phoneme awareness skills to some pre-literate children. Phoneme Isolation was the most easily learned and is a skill that appears very relevant to speech and language therapy. However, phoneme addition, deletion and word segmentation showed relatively limited improvement and only in a small number of cognitively able and older children. Whereas isolation of word initial consonants appears to be a skill that can be triggered at 4;0-4;6 by relevant activities, most children in the study were not cognitively ready for more advanced, abstract phoneme manipulation tasks. This raises questions about how speech and language therapists should tackle many common errors and the age at which we should aim to develop or draw on phoneme awareness to stimulate speech change.


BACKGROUND: In the Lidcombe Program of Early Stuttering Intervention, parents present verbal contingencies for stutter-free and stuttered speech in everyday situations. A previous randomized controlled trial of the programme with preschool-age children from 2005, conducted in two public speech clinics in New Zealand, showed that the odds of attaining clinically minimal levels of stuttering 9 months after randomization were more than seven times greater for the treatment group than for the control group.

AIMS: To follow up the children in the trial to determine extended long-term outcomes of
METHODS & PROCEDURES: An experienced speech-language therapist who was not involved in the original trial talked with the children on the telephone, audio recording the conversations using a telephone recording jack. Parental reports were gathered in addition to the children's speech samples in order to obtain a balance of objective data and reports from a wide range of situations.

OUTCOMES & RESULTS: At the time of this follow-up, the children were aged 7-12 years, with a mean of 5 years post-randomization in the 2005 trial. Twenty of the 29 children in the treatment arm and eight of the 25 children in the control (no treatment) arm were able to be contacted. Of the children in the treatment group, one (5%) failed to complete treatment and 19 had completed treatment successfully and had zero or near-zero frequency of stuttering. Three of the children (16%) who had completed treatment successfully had relapsed after 2 or more years of speech that was below 1% syllables stuttered. Meaningful comparison with the control group was not possible because an insufficient number of control children were located and some of them received treatment after completing the trial.

CONCLUSIONS & IMPLICATIONS: The majority of preschool children are able to complete the Lidcombe Program successfully and remain below 1% syllables stuttered for a number of years. However, a minority of children do relapse and will require their parents to reinstate the treatment procedures.


OBJECTIVES: To evaluate the efficacy of the Lidcombe programme of early stuttering intervention by comparison to a control group.

DESIGN: A pragmatic, open plan, parallel group, randomised controlled trial with blinded outcome assessment.

SETTING: Two public speech clinics in New Zealand.

PARTICIPANTS: Stuttering preschool children who presented to the speech clinics for treatment. Inclusion criteria were age 3-6 years and frequency of stuttering of at least 2% syllables stuttered. Exclusion criteria were onset of stuttering during the six months before recruitment and treatment for stuttering during the previous 12 months. 54 participants were randomised: 29 to the Lidcombe programme arm and 25 to the control
arm. 12 of the participants were girls.

INTERVENTION: Lidcombe programme of early stuttering intervention.

MAIN OUTCOME MEASURES: Frequency of stuttering was measured as the proportion of syllables stuttered, from audiotaped recordings of participants' conversational speech outside the clinic. Parents in both arms of the trial collected speech samples in three different speaking situations before randomisation and at three, six, and nine months after randomisation.

RESULTS: Analysis showed a highly significant difference (P = 0.003) at nine months after randomisation. The mean proportion of syllables stuttered at nine months after randomisation was 1.5% (SD 1.4) for the treatment arm and 3.9% (SD 3.5) for the control arm, giving an effect size of 2.3% of syllables stuttered (95% confidence interval 0.8 to 3.9). This effect size was more than double the minimum clinically worthwhile difference specified in the trial protocol.

CONCLUSIONS: The results provide evidence from a randomised controlled trial to support early intervention for stuttering. The Lidcombe programme is an efficacious treatment for stuttering in children of preschool age.


PURPOSE: The potential benefit that a low-cost scripted language and literacy supplemental curriculum titled Read It Again! (RIA; L. M. Justice, A. S. McGinty, A. R. Beckman, & C. R. Kilday, 2006) may have on preschool-age children's skills was explored. RIA was developed to meet the needs of preschool educators who may not have access to current commercially available high-cost language and literacy curricula, which often require ongoing intensive professional development. RIA involves implementing 60 large-group lessons over a 30-week period that feature repeated use of 15 commercial storybooks.

METHOD: Using a quasi-experimental pre-post research design, 11 preschool teachers implemented RIA in their classrooms for an academic year, and 9 teachers working in comparable preschool programs served as comparisons. Language and literacy measures were collected in the fall and spring of the year.

RESULTS: Children whose teachers implemented RIA had higher scores in the spring on
measures of language (i.e., grammar and vocabulary) and measures of literacy (i.e., rhyme, alliteration, and print). Effect-size estimates were consistent with medium- to large-size effects.

CONCLUSIONS: RIA may be a viable means of enhancing the language and literacy instruction that is delivered within preschool classrooms and, therefore, a means of enhancing children's language and literacy learning. Future directions for continued evaluation of RIA are discussed.


OBJECTIVE AND METHODS: In a prospective study 218 preschool children were enrolled (stratified in 2 training programs, one specialized for phonologic awareness in order to prevent dyslexia, the other consisting in training of general perception) during the last year of kindergarten. After finishing the first grade 131 children were compared in their reading and writing abilities.

RESULTS: In the whole group only a slight difference was found between both training modalities concerning their writing abilities. However, children with a history of hearing loss, actual hearing loss or pathologic middle ear findings profited most from the specialized training program compared to the control in their reading abilities.

CONCLUSION: A specialized training program to improve phonologic awareness as a basis for reading and writing in every kindergarten and preschool child seems to be unnecessary. However, children with temporary hearing deficits benefit from such a program. For all other children general perception training may be sufficient.


Late talkers with specific language impairment and developmental delay make up a large portion of our early childhood caseloads; therefore, an understanding of best clinical practices for these populations is essential. Early lexical learning was examined in 2 interactive treatment approaches with 29 late-talking preschoolers with language and developmental disabilities. Children were randomly assigned to either a mand-elicited imitation (MEI) condition in which elicitations and imitative prompts were used or to a modeling with auditory bombardment (Mod-AB) condition in which auditory
bombardment and play modeling were incorporated with no response demands on participants. Lexical production of target vocabulary words already comprehended was measured during a 10-session training period and then during two 50-min play interactions with a parent/caretaker in the home after treatment was completed. Results indicated that the MEI procedure was relatively more effective in facilitating frequency and rate of target word learning in the treatment setting, but no significant differences were found between conditions in the number or percentage of target words generalized to the home setting. Mod-AB children produced more target words that were limited to the home setting than did MEI children, whose productivity was more balanced across settings. Treatment by aptitude regression analyses indicated that none of the preintervention language, cognitive, or total development aptitude scores were predictive of child performance in 1 treatment condition or the other, although Battelle Developmental Inventory communication scores and sizes of preintervention lexicons were predictive of child performance across conditions. Empirical and clinical issues pertaining to the efficacy of modeling- and elicitation-based procedures for late-talking preschoolers are discussed.

Laing, S.P., & Espeland, W. (2005). Low intensity phonological awareness training in a preschool classroom for children with communication impairments. *Journal of Communication Disorders, 38*(1), 65-82. [Laing compared children developing typically to those with language and/or expressive phonological impairments in a preschool program. Laing administered a phonological awareness intervention with the language and/or expressive phonological impairment group and no phonological intervention in the developing typically group. The outcomes measured include rhyme production, rhyme identification, and sound categorization.]

Phonological awareness is a term that refers to one's knowledge of the sound structure of spoken language. Children who understand that sounds in language represent the letters used in reading and writing typically learn to read more easily than children who do not. Children with language and/or speech impairments often demonstrate a lack of phonological awareness. Thus, it is important to identify problems in phonological awareness and to implement intervention programs early. The purpose of this study was to determine if a low intensity, classroom phonological awareness program improved phonological awareness skills for preschool children with language and/or speech impairments. Results suggested that children made significant gains in phonological awareness after participating in the intervention. **LEARNING OUTCOMES:** As a result of this activity, the reader will be able to: (1) identify components of phonological
awareness program; (2) evaluate effectiveness of phonological awareness intervention.


**PURPOSE:** The purpose of this article is to help speech-language pathologists (SLPs) apply the principles of evidence-based practice (EBP) to nonspeech oral motor treatments (NSOMTs) in order to make valid, evidence-based decisions about NSOMTs and thus determine if they are viable treatment approaches for the management of communication disorders.

**METHOD:** A detailed description of EBP is provided, including levels of evidence for rating the quality of evidence. NSOMTs are described and a survey of the literature on NSOMTs is provided along with a determination of the level of evidence of each study reported. A systematic literature search was conducted using the electronic databases of MEDLINE and CINAHL (Cumulative Index to Nursing and Allied Health Literature) within an unrestricted time period. In addition, reference lists from identified articles were also reviewed. Ethical and fiscal issues related to EBP and NSOMTs, as well as clinical implications of EBP for the use of NSOMTs, are discussed.

**RESULTS:** A total of 45 articles/reports were published between 1981 and 2006 in peer-reviewed and non-peer-reviewed journals. Most of the sources (25) relied on weak anecdotal evidence and opinions. Moreover, studies that employed stronger designs reported negative results for NSOMTs (i.e., evidence against the use of NSOMTs for modifying speech).

**CONCLUSION:** Despite their use for many years and their popularity among some SLPs for the treatment of a wide variety of speech problems in children and adults, NSOMTs are controversial because sufficient evidence does not exist to support their effectiveness in improving speech. Moreover, limited evidence exists for the use of NSOMTs to facilitate nonspeech activities. Therefore, the available evidence does not support the continued use of NSOMTs as a standard treatment and they should be excluded from use as a mainstream treatment until there are further data. SLPs should consider the principles of EBP in making decisions about NSOMTs.

**PURPOSE:** The goals of this investigation were to determine whether gains in the use of tense and agreement morphemes by children with specific language impairment (SLI) during a 96-session intervention period would still be evident 1 month following treatment and whether these treatment effects would be greater than those seen in children with SLI receiving otherwise similar treatment that did not emphasize tense and agreement morphemes.

**METHOD:** Thirty-three children with SLI (age 3;0 to 4;8 [years;months]) served as participants. The children participated in 1 of 3 treatment conditions. The conditions emphasized 3rd person singular -s, auxiliary is/are/was, or general language stimulation. The children's use of 3rd person singular -s, auxiliary is/are/was, and past tense -ed was assessed through probes administered throughout treatment and 1 month later.

**RESULTS:** The children in the conditions that targeted 3rd person singular -s and auxiliary is/are/was showed significant gains on their respective target morphemes, and these gains were maintained 1 month later. These gains were significantly greater than the gains seen on the same morphemes by the children receiving general language stimulation. For most children, use of the target morphemes did not approach mastery levels by the end of the study.

**CONCLUSION:** Intervention that emphasizes morphemes that mark both tense and agreement can be relatively successful, with gains still apparent at least 1 month following intervention.


**PURPOSE:** The aims of this study were to evaluate the efficacy of telehealth delivery of the Lidcombe Program of Early Stuttering Intervention, compared with a control group, and to determine the number of children who could be regarded as "responders."

**METHOD:** A speech-language pathologist provided telehealth delivery of the Lidcombe Program during telephone consultations with parents in their homes, remote from the clinic. The study design was an open plan, parallel group, randomized controlled trial.
with blinded outcome assessment. Children in the no-treatment control group who were still stuttering after 9 months then received the same treatment. The primary outcome measure was frequency of stuttering, gathered from audiotape recordings of participants' conversational speech in everyday, nontreatment situations, before and after treatment.

RESULTS: Analysis of covariance showed a 73% decrease in frequency of stuttering at 9 months after randomization in the treatment group, as compared with the control group (95% confidence interval = 25%-90%, p = .02). Measures of treatment time showed that telehealth delivery of the Lidcombe Program requires around 3 times more resources than standard presentation.

CONCLUSIONS: Telehealth delivery of the Lidcombe Program is an efficacious treatment for preschool children who cannot receive the standard, clinic-based Lidcombe Program. Avenues for improving efficiency are considered.

Lunkenheimer, E.S., Dishion, T.J., Shaw, D.S., Connell, A.M., Gardner, F., Wilson, M.N., et al. (2008). Collateral benefits of the family check-up on early childhood school readiness: Indirect effects of parents' positive behavior support. Developmental Psychology, 44(6), 1737-1752. [Lunkenheimer evaluated whether random assignment to a Family Check-Up intervention at a Women, Infant, and Children program would result in improvements in children’s self regulation and language development. Lunkenheimer also developed an indirect effects model to measure improvements in positive behavior support and whether these would increase language skills, inhibitory control, and school readiness perspectives.]

The authors examined the longitudinal effects of the Family Check-Up (FCU) on parents' positive behavior support and children's school readiness competencies in early childhood. It was hypothesized that the FCU would promote language skills and inhibitory control in children at risk for behavior problems as an indirect outcome associated with targeted improvements in parents' positive behavior support. High-risk families in the Women, Infants, and Children Nutrition Program participated in a multisite preventive intervention study (N = 731) with 3 yearly assessments beginning at child age 2 years. Positive behavior support was measured using 4 indicators derived from at-home observations of parent-child interaction during semistructured tasks. Longitudinal structural equation models revealed that parents in families randomly assigned to the FCU showed improvements in positive behavior support from child age 2 to 3, which in turn promoted children's inhibitory control and language development.
from age 3 to 4, accounting for child gender, ethnicity, and parental education. Findings suggest that a brief, ecological preventive intervention supporting positive parenting practices can indirectly foster key facets of school readiness in children at risk.


The authors performed a randomized, controlled trial to assess the impact of the Video Interaction Project (VIP), a program based in pediatric primary care in which videotaped interactions are used by child development specialists to promote early child development. Ninety-three Latino children (51 VIP, 42 control) at risk of developmental delay on the basis of poverty and low maternal education (none had completed high school) were assessed for cognitive and language development at age 21 months. Results differed depending on the level of maternal education; the VIP was found to have a moderate impact on children whose mothers had between seventh and 11th grade education (approximately 0.75 SD for cognitive development, 0.5 SD for expressive language) but little impact on children whose mothers had sixth grade or lower education.


**BACKGROUND:** Phonological therapy in subjects with phonological disorders.

**AIM:** To compare the efficacy of three contrastive approach models in three different severities of phonological disorder.

**METHOD:** Participants of the study were nine subjects with phonological disorders, with ages ranging between 4:2 and 6:6 years. All subjects were evaluated prior to and after phonological therapy. Three groups, with three subjects each, were determined for treatment. Each group presented one individual with severe, one with moderate-severe and one with mild-moderate phonological disorder. Each group was treated using a different therapy model--Minimal Opposition, Maximal Oppositions/Empty Set and Multiple Opposition. Results were analyzed according to the Friedman Test, considering \( p < 0.05 \); a descriptive analysis was also performed among the models.

**RESULTS:** There was no statistical difference among the models considering the severity of phonological disorder. The Minimal and Maximal Oppositions/Empty Set approaches
favored a greater number of sound acquisitions in the phonetic inventory of subjects
with severe and moderate-severe disorder. On the other hand, the Multiple Opposotions
approach favored a better performance of sound acquisition in the phonological system
and a decrease in the impaired distinctive features in severe and moderate-severe
disorder.

CONCLUSION: The models of therapy were effective in the treatment of different
severities of phonological disorders observing the best performance in children with
severe and moderate-severe disorder.

with SLI: Frequency and spacing effects. Journal of Speech Language & Hearing
Research, 48(6), 1397-411.

PURPOSE: This study explored the effect of frequency (number of presentations), and
spacing (period between presentations) on verb learning in children with specific
language impairment (SLI). Children learn words more efficiently when presentations are
frequent and appropriately spaced, and this study investigated whether children with SLI
likewise benefit. Given that these children demonstrate greater frequency dependence
and rapid forgetting of recently acquired words, an investigation of frequency and
spacing in this population is especially warranted.

METHOD: Twenty-four children with SLI (mean age 5;6 [years;months]) and 24
language-matched control children (mean age 3;4) were taught novel verbs during play
sessions. In a repeated measures design, 4 experimental conditions combined frequency
(12 or 18 presentations) and spacing (all presentations in 1 session, or spread over 4
days). Comprehension and production probes were administered after the final session
and 1 week later.

RESULTS: Although the children with SLI benefited significantly from frequent and widely
spaced presentations, there were no significant effect in the control group. The
language-impaired children showed rapid forgetting.

CONCLUSIONS: The frequency and spacing of presentations crucially affect the verb
learning of children with SLI. A training regimen characterized by appropriately spaced
intervals and moderate repetition will optimally benefit lexical learning.

**PURPOSE:** The purpose of this meta-analysis was to systematically evaluate the effects of parent-implemented language interventions on the language skills of children between 18 and 60 months of age with primary and secondary language impairments.

**METHOD:** A systematic literature search yielded 18 studies that met the predetermined inclusion and exclusion criteria. Effect sizes for each study were calculated for 7 language outcome variables and analyzed using a random effects model. Separate analyses were conducted for each language outcome and for each comparison group. Outcomes were compared for children with and without intellectual disabilities and for parent report and direct observational language measures.

**RESULTS:** The results indicate that parent-implemented language interventions have a significant, positive impact on receptive and expressive language skills of children with and without intellectual disabilities. Effect sizes (g) for child measures ranged from -0.15 to 0.82 depending on the outcome measure and comparison group.

**CONCLUSION:** The results of this review indicate that parent-implemented language interventions are an effective approach to early language intervention for young children with language impairments. Critical features of parent-implemented interventions are discussed in terms of implications for practice and future research.


**PURPOSE:** This study compared the language performance of young children with developmental delays who were randomly assigned to 1 of 3 parent-coached language interventions. Differences in performance on augmented and spoken word size and use, vocabulary size, and communication interaction skills were examined.

**METHOD:** Sixty-eight toddlers with fewer than 10 spoken words were randomly assigned to augmented communication input (AC-I), augmented communication output (AC-O), or spoken communication (SC) interventions; 62 children completed the intervention. This trial assessed the children’s symbolic language performance using communication
measures from the language transcripts of the 18th and 24th intervention sessions and coding of target vocabulary use.

RESULTS: All children in the AC-O and AC-I intervention groups used augmented and spoken words for the target vocabulary items, whereas children in the SC intervention produced a very small number of spoken words. Vocabulary size was substantially larger for AC-O and AC-I than for SC groups.

CONCLUSIONS: This study found that augmented language interventions that include parent coaching have a positive communication effect on young children with developmental delays who begin with fewer than 10 spoken words. Clinical implications suggest that augmented communication does not hinder, and actually aids, speech production abilities in young children with developmental delays.


Kindergarten children at risk of developing language problems were administered the Florida Kindergarten Screening Battery. A principal components analysis revealed a verbal and a visual-spatial component and subsequent discriminant function analyses a high verbal/low visual-spatial group (LAL: Latent L) and a high visual-spatial/low verbal group (LAP: Latent P). LAL- and LAP-children were considered at risk for developing an L- or P-type of dyslexia, respectively. As is common practice with children suffering from manifest L- or P- dyslexia, the LAL- and LAP-kindergartners received right and left hemisphere stimulation, respectively. The outcomes were compared with those of bilateral hemispheric stimulation and no intervention. Reading tests were administered in primary school Grades 1 and 5/6; teachers’ evaluation of reading took place in Grade 5/6. Overall, the LAL- and LAP- groups showed significant backwardness in word and text reading, both at early and late primary school. Types of intervention made a difference though: not significantly backward in early word, late word, and late text reading were the LAL-children who had received right hemisphere stimulation. Nonintervened LAP-children did not show significant backwardness in early word reading and late text reading, nor did LAP-children who had received left hemisphere or bilateral stimulation. Early text reading was not affected by any treatment. Teacher’s evaluations were in support of these findings.

This study examined the feasibility of using a dialogic book-reading intervention for 22-41-month-old bilingual preschool children with expressive vocabulary delays. The intervention was provided in English and Spanish concurrently to an experimental group of six children, while six other children were in a delayed treatment control group. Thirty 15-min sessions using dialogic book-reading strategies were provided in each language in the children's homes, in English by the primary investigator and in Spanish by the children's mothers, who were trained in the techniques of dialogic book-reading. Results showed that the children in the intervention group learned significantly more target words in each language following the intervention than the children in the control group. The children in the intervention group were also able to produce the acquired words at the time of a follow-up test 6 weeks after the end of the intervention. The gains in the overall vocabulary of the two groups of children did not differ significantly. The children's mothers expressed satisfaction with the program, and confirmed the benefits of dialogic book-reading for their children's learning of target words. Learning outcomes: The current paper describes a unique bilingual vocabulary intervention program for preschool children. Readers will gain an appreciation for the rationale for this intervention, and an insight in the implementation of dialogic book-reading. The main goal of the article is to provide the readers with the evaluation of the feasibility of this intervention.


PURPOSE: Preschoolers with language impairment have difficulties with both literal and inferential language, both of which are critical to later reading comprehension. Because these children are known to be at risk for later reading comprehension difficulties, it is important to design and test interventions that foster both literal and inferential language skills. Using a randomized pretest-posttest control group design, we investigated whether an 8-week, one-on-one book-sharing intervention would improve both the literal and inferential language skills of Head Start preschoolers with language impairments.
METHOD: Thirty children were randomly assigned to either a control group that received no intervention or to a treatment group that received twice-weekly 15-min sessions in which adults read books and asked both literal and inferential questions about the books using scripts that were embedded throughout the text. Treatment and control groups were compared using pre- and posttest scores on 2 measures of literal and 1 measure of inferential language skill.

RESULTS: Significant group differences, and medium to large effect sizes, were found between pre- and posttest scores for all 3 measures.

CONCLUSIONS: These findings suggest that book sharing with embedded questions that target both literal and inferential language skills can result in gains on both types of language in this population. Future studies with larger number of children are needed to corroborate these findings.


Children (5 and 6 years old, n = 30) at familial risk of dyslexia received a home-based intervention that focused on phoneme awareness and letter knowledge in the year prior to formal reading instruction. The children were compared to a no-training at-risk control group (n = 27), which was selected a year earlier. After training, we found a small effect on a composite score of phoneme awareness (d = 0.29) and a large effect on receptive letter knowledge (d = 0.88). In first grade, however, this did not result in beneficial effects for the experimental group in word reading and spelling. Results are compared to three former intervention studies in The Netherlands and comparable studies from Denmark and Australia.


OBJECTIVE: To determine the benefits of a low intensity parent-toddler language promotion programme delivered to toddlers identified as slow to talk on screening in universal services.

DESIGN: Cluster randomised trial nested in a population based survey.

SETTING: Three local government areas in Melbourne, Australia.
PARTICIPANTS: Parents attending 12 month well child checks over a six month period completed a baseline questionnaire. At 18 months, children at or below the 20th centile on an expressive vocabulary checklist entered the trial.

INTERVENTION: Maternal and child health centres (clusters) were randomly allocated to intervention (modified "You Make the Difference" programme over six weekly sessions) or control ("usual care") arms.

MAIN OUTCOME MEASURES: The primary outcome was expressive language (Preschool Language Scale-4) at 2 and 3 years; secondary outcomes were receptive language at 2 and 3 years, vocabulary checklist raw score at 2 and 3 years, Expressive Vocabulary Test at 3 years, and Child Behavior Checklist/1.5-5 raw score at 2 and 3 years.

RESULTS: 1217 parents completed the baseline survey; 1138 (93.5%) completed the 18 month checklist, when 301 (26.4%) children had vocabulary scores at or below the 20th centile and were randomised (158 intervention, 143 control). 115 (73%) intervention parents attended at least one session (mean 4.5 sessions), and most reported high satisfaction with the programme. Interim outcomes at age 2 years were similar in the two groups. Similarly, at age 3 years, adjusted mean differences (intervention-control) were -2.4 (95% confidence interval -6.2 to 1.4; P=0.21) for expressive language; -0.3 (-4.2 to 3.7; P=0.90) for receptive language; 4.1 (-2.3 to 10.6; P=0.21) for vocabulary checklist; -0.5 (-4.4 to 3.4; P=0.80) for Expressive Vocabulary Test; -0.1 (-1.6 to 1.4; P=0.86) for externalising behaviour problems; and -0.1 (-1.3 to 1.2; P=0.92) for internalising behaviour problems.

CONCLUSION: This community based programme targeting slow to talk toddlers was feasible and acceptable, but little evidence was found that it improved language or behaviour either immediately or at age 3 years.


PURPOSE: The impact of a newly designed computer-assisted treatment (C-AT) program, My Sentence Builder, for the remediation of expressive-grammar deficits in children with specific language impairment (SLI) was explored. This program was specifically designed with features to directly address expressive-grammar difficulties, thought to be associated with hypothesized deficits in verbal working memory (VWM).
METHOD: Thirty-four preschoolers with deficits in expressive-grammar morphology participated. Using the randomization procedure of consecutive sampling, participants were recruited. Twenty-two participants were consecutively assigned to one of two treatment groups, C-AT or non C-AT (nC-AT). The nC-AT utilized conventional language stimulation procedures containing features which have been traditionally used to address expressive-grammar deficits. A group of equivalent children awaiting treatment and chosen from the same sample of children as the treatment participants served as a control group. Blind assessments of outcomes were completed pre-, post-, and 3-months post-treatment in a formal and informal context.

RESULTS: C-AT and nC-AT participants significantly outperformed controls pre-to-post to 3-months post-treatment in both assessment contexts. No significant differences in treatment gains were found between C-AT and nC-AT.

CONCLUSION: Results suggested that treatments designed to directly address expressive-grammar deficits were better than no treatment for preschool SLI. Further, use of a C-AT program may be another feasible treatment method for this disorder population.

LEARNING OUTCOMES: As a result of this activity, the reader will recognize that: (1) expressive-grammar treatment is better than no treatment for immediate and continued language growth, (2) use of a C-AT program containing specific features designed to directly address expressive-grammar deficits is another viable, but not necessarily a better treatment option for the remediation of expressive-grammar deficits in preschool children with SLI, and (3) different outcome contexts yield distinct yet equally important findings about growth in children's expressive-grammar skills with treatment.

Key Question #6 - Do interventions for speech and language delay improve other non speech & language outcomes?


The aim of this study was to follow-up prospectively a cohort of preschool children originally recruited from successive referrals to speech and language therapy community clinics and to investigate their linguistic, literacy, and social outcomes at 7 to 10 years of age. Three hundred and fifty children aged 84 to 113 months (mean age 99.9mo [SD 5.4mo]) were singletons from monolingual backgrounds where there was concern about
their speech and language development. Children who had severe learning difficulties, autism, oromotor deficits, dysfluency, or dysphonia were excluded. Altogether 196 (56%), 134 males and 62 females, were seen at follow-up. A control group of children who had never been referred for speech and language therapy, 57% of whom were males, was also recruited (n=94; mean age 104.4mo [SD 6.8mo]). All children were assessed on standardized measures of speech, language, and literacy. Teachers and parents completed questionnaires on educational and social outcomes. In total, 139 children in the cohort were within the normal range on standardized language assessments. About 30% of the original cohort of children continue to struggle with language, literacy, and social difficulties. The study demonstrates the long-term nature of language impairment and reinforces the need for awareness among professionals in child development and education of the ongoing needs of this population of children.

Lunkenheimer, E.S., Dishion, T.J., Shaw, D.S., Connell, A.M., Gardner, F., Wilson, M.N., et al. (2008). Collateral benefits of the family check-up on early childhood school readiness: Indirect effects of parents' positive behavior support. *Developmental Psychology, 44*(6), 1737-1752. [Lunkenheimer evaluated whether random assignment to a Family Check-Up intervention at a Women, Infant, and Children program would result in improvements in children's self regulation and language development. Lunkenheimer also developed an indirect effects model to measure improvements in positive behavior support and whether these would increase language skills, inhibitory control, and school readiness perspectives.]

The authors examined the longitudinal effects of the Family Check-Up (FCU) on parents' positive behavior support and children's school readiness competencies in early childhood. It was hypothesized that the FCU would promote language skills and inhibitory control in children at risk for behavior problems as an indirect outcome associated with targeted improvements in parents' positive behavior support. High-risk families in the Women, Infants, and Children Nutrition Program participated in a multisite preventive intervention study (N = 731) with 3 yearly assessments beginning at child age 2 years. Positive behavior support was measured using 4 indicators derived from at-home observations of parent-child interaction during semistructured tasks. Longitudinal structural equation models revealed that parents in families randomly assigned to the FCU showed improvements in positive behavior support from child age 2 to 3, which in turn promoted children's inhibitory control and language development from age 3 to 4, accounting for child gender, ethnicity, and parental education. Findings suggest that a brief, ecological preventive intervention supporting positive parenting
practices can indirectly foster key facets of school readiness in children at risk.


The authors performed a randomized, controlled trial to assess the impact of the Video Interaction Project (VIP), a program based in pediatric primary care in which videotaped interactions are used by child development specialists to promote early child development. Ninety-three Latino children (51 VIP, 42 control) at risk of developmental delay on the basis of poverty and low maternal education (none had completed high school) were assessed for cognitive and language development at age 21 months. Results differed depending on the level of maternal education; the VIP was found to have a moderate impact on children whose mothers had between seventh and 11th grade education (approximately 0.75 SD for cognitive development, 0.5 SD for expressive language) but little impact on children whose mothers had sixth grade or lower education.


OBJECTIVE: To determine the benefits of a low intensity parent-toddler language promotion programme delivered to toddlers identified as slow to talk on screening in universal services.

DESIGN: Cluster randomised trial nested in a population based survey.

SETTING: Three local government areas in Melbourne, Australia.

PARTICIPANTS: Parents attending 12 month well child checks over a six month period completed a baseline questionnaire. At 18 months, children at or below the 20th centile on an expressive vocabulary checklist entered the trial.

INTERVENTION: Maternal and child health centres (clusters) were randomly allocated to intervention (modified "You Make the Difference" programme over six weekly sessions) or control ("usual care") arms.

MAIN OUTCOME MEASURES: The primary outcome was expressive language (Preschool
Language Scale-4) at 2 and 3 years; secondary outcomes were receptive language at 2 and 3 years, vocabulary checklist raw score at 2 and 3 years, Expressive Vocabulary Test at 3 years, and Child Behavior Checklist/1.5-5 raw score at 2 and 3 years.

RESULTS: 1217 parents completed the baseline survey; 1138 (93.5%) completed the 18 month checklist, when 301 (26.4%) children had vocabulary scores at or below the 20th centile and were randomised (158 intervention, 143 control). 115 (73%) intervention parents attended at least one session (mean 4.5 sessions), and most reported high satisfaction with the programme. Interim outcomes at age 2 years were similar in the two groups. Similarly, at age 3 years, adjusted mean differences (intervention-control) were -2.4 (95% confidence interval -6.2 to 1.4; P=0.21) for expressive language; -0.3 (-4.2 to 3.7; P=0.90) for receptive language; 4.1 (-2.3 to 10.6; P=0.21) for vocabulary checklist; -0.5 (-4.4 to 3.4; P=0.80) for Expressive Vocabulary Test; -0.1 (-1.6 to 1.4; P=0.86) for externalising behaviour problems; and -0.1 (-1.3 to 1.2; P=0.92) for internalising behaviour problems.

CONCLUSION: This community based programme targeting slow to talk toddlers was feasible and acceptable, but little evidence was found that it improved language or behaviour either immediately or at age 3 years.

Key Question #7 - Does improvement in speech and language outcomes lead to improved additional outcomes?


PURPOSE: The purpose of this article is to help speech-language pathologists (SLPs) apply the principles of evidence-based practice (EBP) to nonspeech oral motor treatments (NSOMTs) in order to make valid, evidence-based decisions about NSOMTs and thus determine if they are viable treatment approaches for the management of communication disorders.

METHOD: A detailed description of EBP is provided, including levels of evidence for rating the quality of evidence. NSOMTs are described and a survey of the literature on NSOMTs is provided along with a determination of the level of evidence of each study reported. A systematic literature search was conducted using the electronic databases of MEDLINE and CINAHL (Cumulative Index to Nursing and Allied Health Literature) within an unrestricted time period. In addition, reference lists from identified articles were also
reviewed. Ethical and fiscal issues related to EBP and NSOMTs, as well as clinical implications of EBP for the use of NSOMTs, are discussed.

RESULTS: A total of 45 articles/reports were published between 1981 and 2006 in peer-reviewed and non-peer-reviewed journals. Most of the sources (25) relied on weak anecdotal evidence and opinions. Moreover, studies that employed stronger designs reported negative results for NSOMTs (i.e., evidence against the use of NSOMTs for modifying speech).

CONCLUSION: Despite their use for many years and their popularity among some SLPs for the treatment of a wide variety of speech problems in children and adults, NSOMTs are controversial because sufficient evidence does not exist to support their effectiveness in improving speech. Moreover, limited evidence exists for the use of NSOMTs to facilitate nonspeech activities. Therefore, the available evidence does not support the continued use of NSOMTs as a standard treatment and they should be excluded from use as a mainstream treatment until there are further data. SLPs should consider the principles of EBP in making decisions about NSOMTs.

**Key Question #9 - What are cost effectiveness issues?**


**OBJECTIVE:** The aim of this randomised controlled trial was to evaluate the effectiveness of a short, highly structured parent based language intervention group programme for 2-year-old children with specific expressive language delay (SELD, without deficits in receptive language).

**METHODS:** 61 children with SELD (mean age 24.7 months, SD 0.9) were selected between October 2003 and February 2006 during routine developmental check-ups in general paediatric practices, using a German parent-report screening questionnaire (adapted from the MacArthur Communicative Development Inventories). Standardised instruments were used to assess the language and non-verbal cognitive abilities of these children and of 36 other children with normal language development (reference group; mean age 24.6 months, SD 0.8). 58 children with SELD were sequentially randomly assigned to an intervention group (n = 29) or a 12-month waiting group (n = 29). In the intervention group, mothers participated in the 3-month Heidelberg Parent-based Language Intervention (HPLI). All children were reassessed 6 and 12 months after pretest. Assessors were blind to allocation and previous results.
RESULTS: 47 children were included in the analysis. At the age of 3 years, 75% of the children in the intervention group showed normal expressive language abilities in contrast to 44% in the waiting group. Only 8% of the children in the intervention group versus 26% in the waiting group met the criteria for specific language impairment (t score ≤ 35).

CONCLUSIONS: By applying the short, highly structured HPLI in children with SELD, the rate of treatment for language impairment at the age of 3 years can be significantly reduced.


BACKGROUND: Although economic evaluation has been widely recognized as a key feature of both health services and educational research, for many years there has been a paucity of such studies relevant to services for children with speech, language and communication needs (SLCN), making the application of economic arguments to the development of services difficult.

AIMS: The study has two aims, namely to review systematically the cost-effectiveness literature related to services for children with SLCN and to highlight key issues that need to be included in future economic effectiveness studies.

METHODS & PROCEDURES: A comprehensive search of the international literature for the last 30 years was completed and the studies were evaluated against the ‘gold standard’ criteria developed by Drummond and colleagues in 1996 and 2005.

OUTCOMES & RESULTS: Five studies met the review inclusion criteria. All focused on young (2-11 years) children with SLCN and most compared clinic-based and parent-administered interventions. The studies provide variable levels of detail on the key elements needed, but few provided sufficient details of costs to draw comparisons across studies. Only two studies attempted to bring together costs and effectiveness data.

CONCLUSIONS & IMPLICATIONS: The studies point to the importance of home-based and indirect intervention and, in many cases, emphasize the parental perspective. There is a need for intervention studies to include a cost dimension based on readily comparable methods of establishing unit costs and for greater use to be made of cost-effectiveness analysis more generally.
Summary

A total of 31 studies met inclusion criteria. Several studies addressed more than one Key Question. The studies were a mix of SRs, RCTs, comparative cohort studies, and cost and cost-effectiveness studies. Nelson’s 2006 report conclusions and a signal about how the updated literature search impacts Nelson’s findings are provided by Key Question below.

Key Question #5 – Do interventions for speech and language delay improve speech & language outcomes?

Nelson identified 25 RCTs (one good, 13 fair, and 11 poor quality) that met inclusion criteria. Nelson (2006) concluded that there were RCTs of multiple interventions that reported significantly improved speech and language outcomes compared to control groups in several domains including: articulation, phonology, expressive language, receptive language, lexical acquisition, and syntax in multiple settings. Nelson also reported that the long term outcomes are unknown, the studies were heterogenous and small, and the generalizability is questionable.

The updated literature search identified 30 additional studies (Bailet 2009; Bowyer-Crane 2008; Buschmann 2009; Gillon 2005; Glogowska 2006; Gunther 2010; Hatcher 2006; Hay 2007; Hesketh 2007; Jones 2008; Jones 2005; Justice 2010; Keilmann 2008; Kouri 2005; Laing 2005; Lass 2008; Leonard 2008; Lewis 2008; Lunkenheimer 2008; Mendelsohn 2005; Pagliarin 2009; Riches 2005; Roberts 2011; Romski 2010; Smit-Glaude 2005; Tsybina 2010; van Kleeck 2006; van Otterloo 2009; Wake 2011; Washington 2011) that addressed this Key Question. The studies were heterogenous in terms of population (most studies were children three years of age and older), intervention (individual or group therapy, parent based, etc.), and outcomes; contained very small sample sizes; and had inadequate follow-up timeframes making it difficult to summarize the results. Overall, many studies reported positive findings in favor of interventions targeting speech and language outcomes and would generally support Nelson’s overall conclusions. However, given the methodological limitations and propensity of poorly designed studies to over estimate the treatment effect, these conclusions should be interpreted very cautiously. Furthermore, the clinical significance of these findings would need to be determined.
Key Question #6 – Do interventions for speech and language delay improve other non speech & language outcomes?

Nelson identified four good and four fair quality RCTs that evaluated functional outcomes other than speech and language. Three studies reported improvements for the following outcomes: toddler socialization skills, individual self esteem, play themes, and many parent related functional outcomes. No significant effects were reported by one study for well being, levels of play and attention, and socialization.

Four (Glogowska 2006; Lunkenheimer 2008; Mendelsohn 2005; Wake 2011) of the 31 identified studies from Key Question #5 also addressed Key Question #6. Glogowska (2006) reported that the intervention group of speech and language impaired children had a higher rate of social difficulties compared to the control group but the statistical significance was not reported. Lunkenheimer (2008) reported improvements in increasing self regulation from age two to four but the difference was not statistically significant. Mendelsohn (2005) evaluated impact on cognitive development using a video interaction project. Mendelsohn concluded “a moderate and significant impact on children whose mothers had between a seventh and eleventh grade education and there was little impact on mothers with a sixth grade or lower education.” Wake (2011) evaluated a community based program for slow to talk toddlers in which behavior outcomes did not improve.

A small number of studies that were limited by heterogeneity, small sample sizes, and methodological limitations reported outcomes relevant to this Key Question. As a result, no conclusions can be drawn and the generalizability of the findings is questionable.

Key Question #7 – Does improvement in speech and language outcomes lead to improved additional outcomes?

Nelson (2006) did not identify any studies that met inclusion criteria for this Key Question.

The updated literature search identified one systematic review (Lass 2008) that met inclusion criteria. Lass (2008) identified 45 articles (peer and non peer reviewed) that evaluated nonspeech oral motor treatments for the management of communication disorders. For nonspeech outcomes relevant to this Key Question, Lass (2008) reported improvements in respiratory and lip, tongue, and jaw function. There were mixed results for oral feeding improvements. Lass (2008) concluded that there is limited evidence for the use of non-speech oral motor treatments to facilitate nonspeech activities. Lass (2008) reported several limitations
to the evidence base including: significant differences between and within studies; heterogenous populations with a broad range of etiologies; a number of methodological issues that confound the results; and failure to specify outcome measures and types of treatments.

**Key Question #9 – What are cost effectiveness issues?**

Nelson (2006) did not identify any studies that met inclusion criteria for this Key Question.

The updated literature search identified two articles (Buschmann 2009; Law 2012) that met inclusion criteria. Buschmann is an RCT (n=61) that evaluated the Heidelberg parent-based language intervention in two year olds with language delay compared to a control group. Buschmann concluded that “by applying the short, highly structured Parent-based Language Intervention in children with specific expressive language delay, the rate of treatment for language impairment at the age of three years can be significantly reduced.” Buschmann also reported the costs associated with the whole intervention (£13,704) and the waiting group (£15,652). Of note, the whole intervention was less expensive than the waiting group.

Law (2012) systematically reviewed the literature for services of speech, language, and communication needs. Five studies met inclusion criteria. None of the five studies were included in this updated literature search because they were published before our search dates or the study design and population did not meet inclusion criteria. Law concluded “The studies point to the importance of home-based and indirect intervention and, in many cases, emphasize the parental perspective. There is a need for intervention studies to include a cost dimension based on readily comparable methods of establishing unit costs and for greater use to be made of cost-effectiveness analysis more generally (Law 2012, pp. 1).” Only two articles met inclusion criteria and therefore no conclusions can be drawn and the generalizability of the findings is questionable.

**Overall Summary**

In summary, the findings from the updated literature search generally concur with Nelson’s 2006 conclusions. For Key Question #5, many studies reported findings in favor of interventions targeting speech and language outcomes. Only a small number of heterogenous studies were identified by both Nelson and the updated literature search for Key Questions #6, #7, and #9. Therefore, the generalizability of the findings is questionable. The results from this report should be interpreted with caution as the overall literature base had significant methodological limitations and it is unknown if the findings are clinically meaningful to children, their caregivers, and society.
Appendix A. Search Strategy for Intervention/Outcomes Studies

Database: Ovid MEDLINE(R) and Ovid OLDMEDLINE(R) <1946 to October Week 2 2012>

Search Strategy:

--------------------------------------------------------------------------------
1 exp communication disorders/nu, dt, pc, rh, su, th
2 cost of illness/
3 exp quality of life/
4 exp employment/
5 exp psychology, industrial/
6 exp family relations/
7 esp family/ or exp interpersonal relations/
8 exp educational status/ or exp education measurement/
9 exp motivation/
10 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (612341)
11 1 and 10
12 limit 11 to (english language and all child <0 to 18 years>)
13 exp "Outcome and Process Assessment (Health Care)/"
14 1 and 13
15 limit 14 to (english language and all child <0 to 18 years>)
16 Comparative Study/
17 exp evaluation studies/
18 exp epidemiologic studies/
19 16 or 17 or 18
20 1 and 19
21 limit 20 to (english language and all child <0 to 18 years>)
22 limit 1 to (english language and all child <0 to 18 years> and (clinical trial or guideline or meta
analysis or multicenter study or practice guideline or review))
23 12 or 15 or 21 or 22
24 limit 23 to yr="2004 -Current"
Appendix B. Excluded References with Reason for Exclusion


Akamatsu, T., Tanino, R., Osada, M., & Sakuma, Y. (2004). Influences of different palatoplasties on palatal growth and speech development: Comparison between osada's two-stage palatoplasty and one-stage mucosal flap procedure. Tokai Journal of Experimental & Clinical Medicine, 29(3), 111-122. Date


Brinton, B., Robinson, L. A., & Fujiki, M. (2004). Description of a program for social language intervention: "If you can have a conversation, you can have a relationship". *Language, Speech & Hearing Services in the Schools, 35*(3), 283-290. Date


Busari, J. O., & Weggelaar, N. M. (2004). How to investigate and manage the child who is slow to speak. *BMJ, 328*(7434), 272-276. Date


extent of neocortical resection in patients with mesial temporal sclerosis submitted to cortico-
amygdalo-hippocampectomy (CAH). Seizure, 20(8), 612-615. Population


Erickson, K., & Sachse, S. (2010). Reading acquisition, AAC and the transferability of English research to languages with more consistent or transparent orthographies. *Aac: Augmentative & Alternative Communication, 26*(3), 177-190. *Study Design*


Hodge, T., & Downie, J. (2004). Together we are heard: Effectiveness of daily 'language' groups in a community preschool. *Nursing & Health Sciences, 6*(2), 101-107. Date


Study Design


Intervention


Study Design


Study Design


Date


Population


Population


Population


Study Design


Study Design


Population


Population


Population


Population


McDonald, R., Harris, E., Price, K., & Jolleff, N. (2008). Elation or frustration? outcomes following the provision of equipment during the communication aids project: Data from one CAP partner centre. *Child: Care, Health & Development, 34*(2), 223-229. *Population*


Mishna, F., & Muskat, B. (2004). "I'm not the only one!" group therapy with older children and adolescents who have learning disabilities. *International Journal of Group Psychotherapy, 54*(4), 455-476. *Date*


O’Hare, A. E. (2009). Wayward words and watchful waiting: Should clinicians be more proactive for the preschooler with uncomplicated expressive language delay? *Archives of Disease in Childhood, 94*(2), 80-82. *Study Design*


Palikara, O., Lindsay, G., & Dockrell, J. E. (2009). Voices of young people with a history of specific language impairment (SLI) in the first year of post-16 education. *International Journal of Language & Communication Disorders, 44*(1), 56-78. *Population*


Pennington, L., Goldbart, J., & Marshall, J. (2004). Speech and language therapy to improve the communication skills of children with cerebral palsy. *Cochrane Database of Systematic Reviews, (2), 003466. Date*


*Intervention*

*Study Design*

*Intervention*

*Population*

*Date*

*Study Design*

*Population*

*Population*

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**Population**


References


