



RCSLT RESOURCE MANUAL FOR COMMISSIONING AND PLANNING SERVICES FOR SLCN

Speech & Language
Impairment

Speech and Language Impairment

1. Key Points for Speech and Language Impairment

1. Speech and language therapists play a unique role in identification and assessment of children with speech and language disorders. The ability to diagnose the specific speech and language disorder as well as retained communication abilities are unique skills of speech and language therapists
2. Improved communication has an impact on literacy, social skills, peer relationships, self-confidence and behaviour
3. Difficulties with communication are a predominant feature in reducing access to education, employment and social integration
4. Programs simulating sound, vocabulary and language development should be tailored for the child and shared with parents, nursery nurses, teachers and others.
5. Children with speech and language disorders need regular review and their management , which should be integrated into their educational programme
6. Advisory and educational programs for parents, teachers and carers should be part of speech and language therapy services
7. Intensive therapy is associated with better outcomes for children with predominantly expressive speech and language disorders
8. The provision of speech and language therapy, supported by speech and language therapy assistants/teaching assistants has been found to be cost-effective
9. Parent based therapy and group therapy involving parents have been demonstrated to be more effective (but more costly) than conventional therapy
10. There is evidence that early and more intensive speech and language therapy interventions are more effective
11. As part of all service delivery there is emerging practice and developing roles. Within SLI this might include
 - working with young offenders and the prison population
 - increasing role within the Child and Adolescent Mental Health Service (CAMHS)
 - team working with children and young people with mental health difficulties
 - exploring service provision for young adults and the transition from education to employment

Speech & Language Impairment Synthesis

Speech and language impairments can present as a delay or a disorder, impairments can occur as a primary condition or with secondary conditions, such as, cognitive, autistic, learning, hearing, behaviour and emotional impairments. A developmental delay or impairment may result in a speech and language disorder out of line with cognitive ability. There may be a disruption in one or more parameters of language: sound system (phonology), signalling word endings (morphology), grammar (syntax), meaning (semantics), and/or intended meaning (pragmatics). Speech and Language Disorder is usually described in terms of 'speech' referring to phonetic or phonological impairments and 'language' referring to specific language impairments there is delay or disorder. Speech and Language Therapists (SLTs) use a number of terms to describe the term speech and language impairments. 'Speech and language impairments' frequently co-occur, often one aspect will present as the primary impairment. The primary impairment is usually one relating to 'Speech impairment' and 'Language impairment'. In this synthesis, although inter-linked the occurrence of speech and language impairment will be considered in relation to its occurrence as the primary impairment as Topic 1 – speech impairment and Topic 2 – language impairment.

Speech Impairment/Speech Sound Disorders Synthesis 1A

2. What is speech impairment?

Diagnostic terms for specific speech difficulties vary in the literature depending on the theoretical model adopted. In this synthesis speech impairment is used as a top level term, although Speech Sound Disorder (SSD) is frequently used in the literature. Speech impairment or 'Speech Sound Disorders' are generic diagnostic labels. It refers to articulation and phonological impairment that arises from development rather than congenital or syndromic conditions. Children can present with either a *developmental* speech delay where development is behind but following a normal developmental pattern or *disorder* of speech if the pattern is very delayed or different from the norm (Stackhouse & Wells, 1997). Speech difficulties are defined by phonemic (sound) or phonological (sound system) descriptors. Clinical terms include articulation, phonemic and phonological delay/disorder and these terms are included in this synthesis.

Speech comprises of phonemes (individual sounds) and the phonological system (sound patterns of a language). In order to produce speech, an individual has to have an intact articulatory system and be able to articulate the phonemes and access the phonological system of their language. A distinction is made between phonological disorders (with problems in acquiring the language rules that underlie speech) and articulation disorders (with problems producing or perceiving speech).

In children with normal speech development, sounds are learned in a developmental order as a child develops mastery of their neuromusculature. Children acquire the majority of their phonological system by 4 - 4.6 years of age (Grunwell in Fletcher and Hall, 1992), sufficient for their speech to be intelligible to those outwith their immediate social circle.

Structural or physiological factors affecting either the articulators (cleft palate, malocclusions) or the production of phonemes (hearing loss, dyspraxia) impact on the ability to produce intelligible speech. These speech disorders are distinct from the functional disorder of phonological impairment which may occur as a primary disorder or comorbid with language impairment (Shriberg et al, 1986). An

articulation impairment/disorder refers to difficulty in producing the sound itself. Phonological impairment refers to children who have delayed or disordered acquisition of phonological processes with an abnormal development of the sound system of language and the rules that govern those sound combinations.

Prosody, the rhythm, intonation and rate of speech delivery, can be affected in children with speech impairment.

Table 1: Classification of phonological impairment by Holm, Farrier & Dodd 2008 & Dodd 2005

| Phonological impairment | Holm, Farrier, Dodd 2008 | Dodd 2005 |
|-------------------------|--|--|
| delayed | developmental phonological processing system | the child is using only a few contrasts in their phonological system, resulting in the use of a few sounds in the place of non-developed sounds. |
| consistent | non-developmental phonological processing system | speech which contains unusual sound patterns along with some delayed sound patterns which are used in a consistent manner. |
| inconsistent | phonological processing system | speech has a high degree of variability (40% or more). The child will therefore often produce the same word in different ways. |

Developmental verbal dyspraxia (DVD) is a term used to distinguish those children with a severe speech disorder resulting from an underlying impairment of motor planning who have a persistent phonological impairment, characterised by inconsistency which is frequently resistant to traditional therapy approaches (Stackhouse 1992, Davis & Velleman 2000). There is an impairment or immaturity in organisation of movement related to motor planning. DVD can manifest itself in early infancy with difficulty with feeding, sucking, chewing followed by delay in expressive language, difficulty in producing speech, reduced intelligibility of speech, and inconsistent production of sounds in familiar words.

3. How many people have speech impairment?

Studies reporting on the epidemiology of speech impairment provide different information to depending on the definitions used. Hence, the figures shown in table 2 need to be interpreted accordingly.

In 2007, the number of children recorded as having speech, language and communication needs in school recorded as having either special educational needs or at school action plus, were 4.5% in special schools, 23.8% in maintained primary schools, and 6.9% in secondary schools. In Scotland the figures reported for 2006 for pupils in the public sector with additional support needs shows by gender special school 71.9/1000 female and 74.3/1000 male with significant speech and language support needs while in primary school 2/1000 female and 4.6 male, secondary school 0.6/1000 female and 1.6/1000 male.



Table 2: Prevalence of speech impairment

| Incidence | Prevalence | Country | Sex | Source |
|--|--|---------|-----------------|-------------------------------------|
| 6.4% delayed or disordered live births | | UK | 2:1 male/female | Broomfield and Dodd, 2004 |
| | 1.3% (excluding learning difficulty and developmental delay) of these, males peaked in prevalence at 5 years (6.5%); females peaked at 3–4 year-olds (1.8%). | UK | | Keating, Turrell, Ozanne, 2001 |
| | Estimated 1.5% at 3-5 years 4.6% at 5–7 years 12.6% at 6-12 years 7.3% at 12-14 years Figures for speech delay were highly variable, ranging from 2.3% to 24.6% | UK | | Law, Boyle, Harris, Harkness, 2000 |
| | 14% of 3 year olds have speech delay. Prevalence was higher in children with otitis media, male, low socioeconomic group, low parental education, minority group, urban dwelling. 3.8% in 6 year olds | US | | Shriberg, Tomblin, & McSweeny, 1999 |
| | Approximately 10–15% of preschoolers have an articulation and phonological disorders. Approximately 6% of school-age children (K to 12th grade) have an articulation and phonological disorder (Office of Scientific and Health Reports 1988). | US | | Bleile, 2003 |

4. What causes speech impairment?

Speech impairment is a heterogeneous condition. Studies have identified risk factors as hearing loss caused by recurrent ear infections, poor sensory or linguistic environment, a positive family history of speech and language difficulties, general immaturity (Law et al 2000, Enderby & Emerson, 2005). While the majority of speech impairments have no known cause, some impairment is a result of specific syndrome, for example, isolated sagittal synostosis (Shripster et al, 2003). DVD has been linked to the biochemical mechanisms which underlie the development of normal speech. A study by Webb et al 2003 identified that approximately half of children with galactosemia, an autosomal recessive disorder, developed verbal dyspraxia. There is no known medical cause of phonological impairment. Studies by Stackhouse & Snowling (1992), Elbro (1993) and Holm et al (2008) suggest specific developmental delays affect the child's psycholinguistic ability, affecting sound preception, phonological awareness,

segmentation skills, mental representation of words in the lexicon, processing skills for sound perception and production.

5. How does speech impairment affect individuals?

Young children with a delay early in their speech development are at risk of acquiring speech impairment which affects the intelligibility of their speech, ability to be understood by those in their communicative environment, and may cause concern in parents and upset in the child. It is important at this early developmental stage to assess need in order to promote speech development to ensure the sounds and sound system are acquired in the right way at the right time. If these early difficulties in acquiring speech are not resolved, the child may develop long term sound learning and literacy difficulties. Studies show that speech impairments involving phonological impairments and developmental verbal dyspraxia have long lasting sequelae (Hesketh 2004, Conti-Ramsden et al 2001, Law et al 1998, Stackhouse 1992).

Difficulties are in: -

- Acquisition of sounds
- Development of sound system
- Phonological awareness
- Phonological processing
- Development of literacy skills

These difficulties impact on the individual's ability to access the curriculum. Literacy is affected by problems in early sound learning difficulties, particularly when those difficulties relate to phonological awareness (Holm, Farrier & Dodd, 2008, Raitano et al, 2004). Hesketh (2004) found that phonological awareness difficulties at 3.6-5.0 years were a strong predictor for later literacy difficulties. Long-term studies have shown a risk for behavioural and social difficulties at school age and early adolescence (Conti-Ramsden & Botting 2004, Campbell et al 2003, Fujiki, Brinton, & Todd 1996). Individuals with a history of sound impairment did not perform as well as adults with no history on measures of articulation, and receptive and expressive language. These adults received more remedial services during their schooling and completed fewer years of formal education (Felsenfeld, Broen & McGue, 1994, 1992; Clegg, Hollis, Mawhood & Rutter, 2005; Cantwell & Baker, 1987).

Table 3: International Classification of Functioning: levels of impact

| ICF dimension | Impact |
|---------------|---|
| Impairment | Sound production abnormalities. Disordered phonological awareness, phonological processing, phonological template, segmentation skills, mental representation of words in the lexicon, and disturbed prosody. |
| Activity | Reduced intelligibility of speech, reading and writing skills. |
| Participation | Reduced communication skills can affect self-esteem, self-identity, relationships, educational attainment and work attainment. |
| Well-being | Frustration, withdrawal, upset. |

6. What are the aims/objectives of Speech and Language Therapy interventions for speech impairment?

SLT aims to identify the nature of the delay or disorder by assessing the pattern of the articulation and phonological template used by the child. This involves assessment of the phonemes present in the sound system and their pattern of use, assessment of the child’s phonological awareness, and auditory discrimination according to age. SLTs will ascertain the effect any sound impairment will have on the individual’s ability to access the curriculum and advise accordingly.

The type of speech pattern will influence the intervention. Studies have shown that those children with phonological planning and those with cognitive-linguistic deficit benefit from different therapeutic approaches (Crosbie, Holm, & Dodd, 2005).

Table 4: Aims and objectives of Speech and Language Therapy Intervention in Speech Impairment

| | Age | Purpose | Source |
|------------|--------------------|--|-------------------------|
| Pre-school | Infants to 2 years | Assess, advise and provide intervention and training as required. SLT may provide input to young children perceived to be at risk. This may be through providing an auditory awareness programme. Children’s Centres’ input Educating/training parents/carers Training relevant staff e.g. nursery/voluntary sector staff Children’s Centres’ Sure Start– development of auditory awareness, listening skills, sound production. Chatterbox – listening and perceptual skills, sound processing and production Advice on transition. | Sure Start I-Can |
| | 3-4 years | Assessment, advice and training on sounds/phonology development Individual/Groups SLT Phonological awareness Phonological processing (input/output) Sound production Core Vocabulary Advice on transition | SLT programmes |

| | Age | Purpose | Source |
|------------|----------------|--|----------------|
| School age | 5-11 years | Assessment, advice and training on sounds/phonology development Individual/Groups SLT Phonological awareness Phonological processing (input/output) Sound production Literacy skills Core Vocabulary Advice on transition | SLT programmes |
| | 11-16/18 years | Assessment, advice and training on sounds/phonology development Individual SLT Phonological awareness Phonological processing (input/output) Sound production Literacy skills Advice on transition | SLT programmes |
| Adults | 17/19 + years | Assessment, advice and training on sounds/phonology development Individual SLT Phonological awareness Phonological processing (input/output) Sound production Literacy skills Advice on transition | SLT programmes |

7. What is the management for speech impairment?

Speech and Language Therapists carry out work which is preventative, aiming to prevent specific speech impairments developing. SLTs also undertake intervention, and work with children with speech impairments to resolve their difficulties.

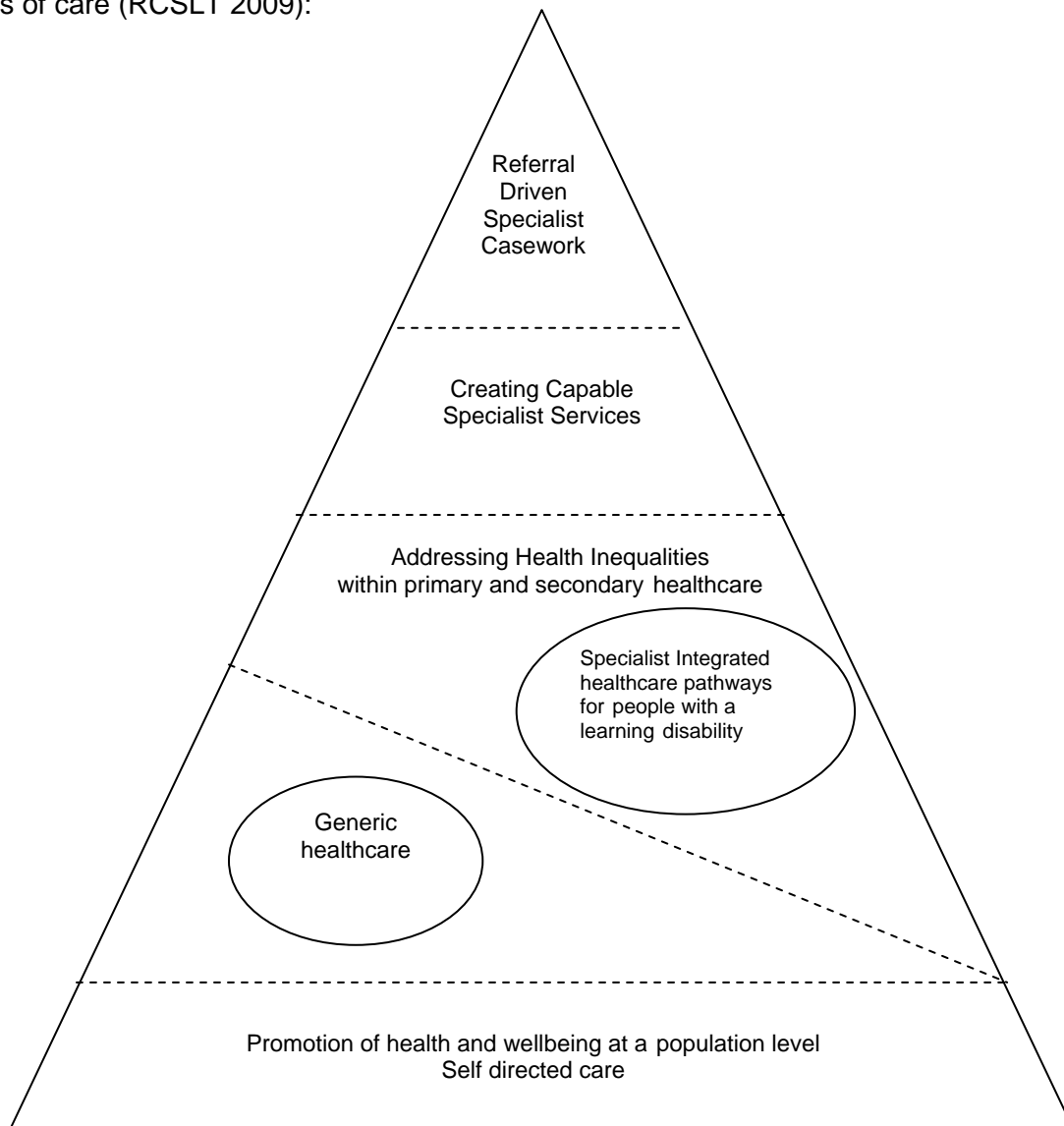
It is recognised that some groups of children are ‘at risk’ in developing their speech and language. Children need good speech and language models to develop speech. If this is not provided the children are ‘at risk’ of poor speech development, for example, in areas of deprivation or where English is not the first language. Preventative measures aid speech development and facilitate appropriate speech development. Speech and Language Therapists contribute to this preventative work through various strategies. The aim of this work being to identify children who may progress to developing a speech impairment and providing training and advice to parents and child workers. This may include work to develop attention, listening, sound discrimination and good models of production.

Speech and Language Therapy services for children with a speech impairment are usually delivered according to age group, preschool and school age children, and parental preferences. The SLT will assess the child, give advice, write detailed reports, review progress, educate, train child key workers, provide programmes of work to meet the child’s needs, provide direct and indirect therapy. Most initial referrals are at the foundation stage of schooling/ early years and at 5-6 years of age with SLT

involvement continuing through school. There are fewer Speech and Language Therapy interventions in secondary school children with speech impairment in part because earlier difficulties have resolved, though studies have shown children with early speech impairment tend to show weakness on tests of both literacy and phonological processing (Lewis et al 2003, 2000, 1992), and in part because of organisation and funding of services. Studies have highlighted unresolved speech impairments in young offenders (Bryan 2004, Hamilton 1999). Speech and Language Therapists' work with adults with developmental speech impairment is relatively unusual, not because of a lack of need but because of funding streams.

The Children's workforce works across different health, education, social and voluntary sectors to provide the right input at the right time. Speech and Language Therapists work closely as a part of the Children's Team from early years, working with various agencies e.g. the Preschool Inclusion teams to provide appropriate input and training, for example, facilitating activities to develop attention, listening skills and sound (phonological development). Training parents/carers and staff to provide regular input to children is a key part of providing the right approaches at the right dose. Management is based on the needs of the child and family.

The model shown below describes, by national consensus, what a SLT service can offer at the different levels of care (RCSLT 2009):



Speech and Language Therapists work as a member of multidisciplinary teams, these may include the following:-

Table 5: Speech and Language Therapist work as a member of multidisciplinary teams

| Age Group | Teams |
|-----------------------|--|
| 0 - 2 years | Parents/carers, Children’s Services e.g. Health Visitors and Sure Start Centre Teams, Health and Mental Health Teams, Social Services, Pre-School Inclusion Teams, Early Years Support settings, Voluntary/Charity Sector e.g. I-Can, Afasic |
| 3 – 4 years | Parents/carers, Children’s Services e.g. Health and Social Services, Education teams e.g. Nursery Staff, Reception Staff, Psychology staff, and Voluntary/Charity Sector e.g. I-Can, Afasic |
| 5 and 16/18 years | Parents/carers, Children’s Services, Education teams and Voluntary/Charity Sector e.g. I-Can, Afasic |
| 17/19 + years upwards | Parents/carers, Health and Mental Health Team, Further education, Higher Education Teams, Adult Literacy Team, Social Services, Prison/Young Offenders Staff, Voluntary/Charity Sector |

Speech and Language Therapists will promote methods of speech and language encouragements to facilitate development and to prevent future difficulties. This includes training and advice to referral agencies, parents and carers; produce and disseminate input to health promotion; working with colleagues on developing appropriate individual education plans; providing care plans and programmes appropriate to areas and levels of difficulty.

The communication difficulties and problems of social interaction encountered in childhood can continue into adulthood and vulnerable individuals need care and support to cope in society.

Augmentative and Alternative Communication

Augmentative and Alternative Communication (AAC) refers to any system of communication that is used to supplement or replace speech, to help people with speech, language and communication impairments to communicate and develop speech and language. While AAC covers a range of high technology (such as computer and voice output communication aids), there are low technology systems (such as, those involving no equipment signing and picture systems) which are used in aiding communication and speech development. AAC methods often include Makaton sign system, Paget Gorman sign system, Picture Exchange Cards (PECS) and Boardmaker pictures.

Cultural diversity

Individuals who are bilingual and have a speech impairment may need help to access services and once seen it will be important to ascertain a full speech and language profile. An interpreter may be required to conduct the SLT assessment to ensure it is both accurate and reliable and to facilitate understanding of therapy and implementation of treatment strategies. There are time and cost implications when working with interpreters/co-workers for example, in taking a case history, completing a full assessment in all languages spoken by the child and family. Timings of services need to be culturally sensitive, for example, not offering appointment times which coincide with religious observations (Communicating Quality 3).



Speech and Language Therapists as part of a multidisciplinary team

The Speech and Language Therapist will be working as part of multidisciplinary team, including people from health, education, social and voluntary organisations. They will also be including within the management process the individual's family members and others in their communication environment. There are time implications for the education and training that SLT's provide to other professionals and family members. Working as part of a multidisciplinary team necessitates taking on team roles and attending meetings which also have time implications. The paper 'Healthy Lives, Brighter Futures: The Strategy for Children and Young People's Health ' (DoH 2009) is a cross government strategy for bringing together the Department of Health and the Department for Children, Schools and Families. The paper establishes the responsibility for the provision of care as a priority in Health Services and clarifies how to implement the intentions stated within the Bercow Review (2008) by strengthening the need for joint commissioning of children's services.

8. What is the evidence for Speech and Language Therapy interventions?

Evidence for interventions is discussed at section 8 of the following synthesis on language impairment, as the evidence needs to be viewed together.

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Synthesis 1B – Language Impairment

10. What is Language Impairment?

Language Impairment is a developmental disorder affecting the development of expressive and receptive ability resulting in functional communication impairment. There are various definitions of language impairment based on linguistic, medical or statistical models. Specific language impairment (SLI) is considered to be on a spectrum where cognitive ability is within the normal range (performance IQ greater than 85), where verbal difficulties are greater than non-verbal difficulties and the composite language measure falls more than 1.25 SD below the mean (equivalent to <10th percentile) (Tomblin et al 1997). The International Classification of Diseases -10 (ICD -10) defines SLI as occurring when a child's language skills fall more than 2 SD below the mean and are at least 1 SD below non-verbal skills. The impairment may involve the **form** (sounds (phonology)), grammar (syntax) & word endings (morphology), **content** (meaning (semantics)), and **use** of language (intended meaning (pragmatics)) to differing degrees. Language initially presents as a delay in the child's developmental language milestones. This delay can resolve with maturation, respond to intervention or the impairment can be evident in the emerging pattern of involvement in respect of form, content or use and these can change with age and development.

Table 6: Type of language delay/impairment and difficulty experienced

| Type of Language Impairment | Description of language impairment |
|-----------------------------|---|
| Comprehension | Difficulties in understanding language (spoken, signed, gestural, reading) or in interpreting appropriately social situations |
| Expression | Difficulties in expression in formulating sentences for speech, writing, signing or using appropriate language in a social setting. |

11. How many people have language impairment?

There are various figures reported for different ages. Generally language impairment affects more boys than girls (prevalence estimate for boys was 8% and for girls 6% Tomblin 1997).

Table 7: Incidence and prevalence

| Incidence in UK | Prevalence in UK | Age | Sex | Source |
|--|---|-----------|--|--------------------------|
| 14.6% primary speech & language live births 4.5% receptive language 3.7% expressive language | 85000-90000 cases estimated as referred to SLT per year | 2-6 years | 3:1 male/female. Receptive language impairment 75% male/25% female Expressive language | (Broomfield & Dodd 2004) |

| Incidence in UK | Prevalence in UK | Age | Sex | Source |
|-----------------|---|---|---|------------------------------|
| | | | impairment 78% male/22% female Speech & Language 70.4% male/29.6% female | |
| | 5.9%, median prevalence estimate | Birth to 7 years | | (Law et al 1998) |
| | 968/ 100,000 aged 3-9 years estimated to need SLT | | | (Enderby, P. & Emerson 1995) |
| | 18 – 31% | 20 – 24 months in disadvantaged community | | (Pickstone 2004) |

12. What causes language impairment?

There are differing theories on the causes of Specific Language Impairment (SLI). Studies show a positive family history of language impairment and environmental factors (Conti-Ramsden 2001). Environmental factors and deprivation are associated with language delay.

Given its heterogeneity, it is hypothesised that different subtypes of SLI exist, with variable specificity and different underlying causes (van der Lely, 2005). There appear to be underlying deficits which affect the child’s ability to deal with abstract linguistic understanding across modalities (Marshall 2006), that is understanding at different levels. Additional studies have shown evidence that visuospatial skills are also impaired (Bishop 1992). Structural neuroimaging studies have indicated the presence of atypical patterns of asymmetry of the language cortex, white-matter abnormalities, along with evidence of cortical dysplasia. (Webster & Shevell 2004)

13. How does language impairment affect individuals?

Children with language impairment have specific difficulties in learning language form, content and use. The difficulties experienced can be in comprehension and or expression affecting all modalities – spoken language, reading, writing, signing, and social use of language. Deficits can be also evident in verbal short-term, in working memory and in visuospatial short-term memory (Archibald & Gathercole 2006). Each child is affected in different ways and to varying degrees depending on the combination of difficulties in language learning experienced (Bishop & Clarkson 2003). The pattern of language impairment alters with age. Initially, the impairment may be in the form of a delay with slow emergence of language milestones. As language skills are acquired throughout childhood so the type of presenting difficulty changes both with development of the child’s language skill and also with the demands and opportunities that schooling and society places on the child. If a delayed pattern of language development persists, it commonly affects the child’s ability to communicate or interact with those around them causing frustration and isolation.

Language impairment impacts on the child’s ability to reach their full potential. It affects the child’s ability to communicate effectively, access the school curriculum, and has emotional and social sequelae which affects participation and well-being. Research has shown children with language impairment under perform and under achieve on national assessments with lower exams results. Language impairment has a cost and implications for adults in later life in what they can achieve (ICAN Cost to the Nation 2006).

The communication difficulties and problems of social interaction encountered in childhood can continue into adulthood and vulnerable individuals need care and support to cope in society. Studies have shown that children with language impairment are at risk of long term learning difficulties with problems in accessing the curriculum, suffer low self-esteem and anxiety which have a negative impact on the quality of life of affected adults and substantial economic and health-care costs (Jerome et al 2002, Young et al 2002, Johnson et al 1999). There is an emotional cost to the individual and their families with the need for long term support (ICAN 2006).

Table 8: Description of language impairments

| Type of Language Impairment | Description of language impairment |
|------------------------------------|---|
| Phonology | Impaired development of phonological system for language and literacy. |
| Syntax | Impaired development of rules governing grammatical relations between words and other units within a sentence. |
| Morphology | Impaired development of the structure and construction of word forms. |
| Semantics | Impaired development of associating meanings to words and sentences. |
| Pragmatics | Impaired development of the ability to use the combination of language components (phonology, morphology, syntax, and semantics) in functional and socially appropriate ways. |

Table 9: International Classification of Functioning: impact of language impairment

| ICF Dimension | Impact |
|----------------------|--|
| Impairment | Functional comprehension and expression impaired. Reading and writing impaired |
| Activity | Ability to understand and express. Ability to communicate Ability to use symbolic and sequential play Behaviour may not be appropriate to social setting |
| Participation | Interaction with others affected by reduced ability to communicate. Self-esteem affected. Difficulty in forming friendships because of communication difficulties, may be rejected by peer group, may withdraw from communicative situations, |

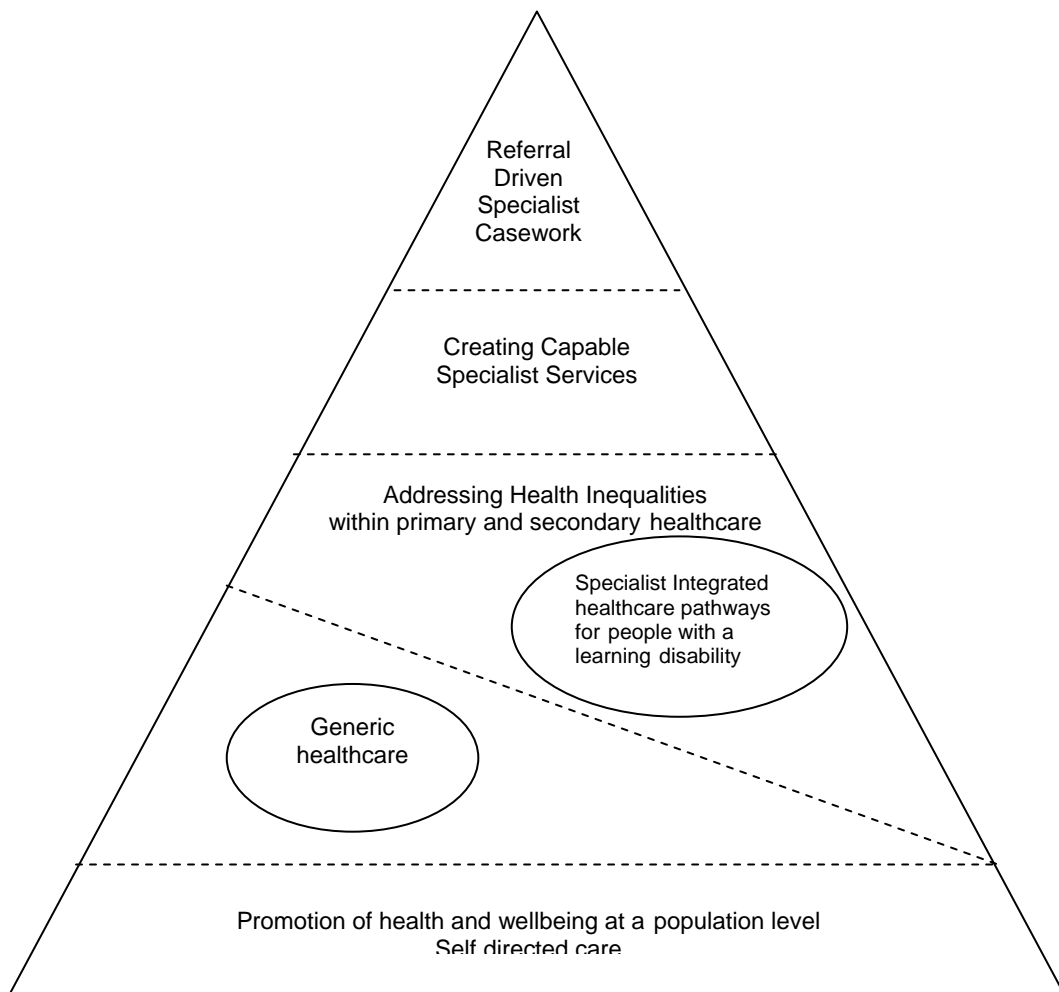


| | |
|--|---|
| | <p>inappropriate behaviour in certain social settings. Behaviour may not be appropriate to social setting and affect ability to interact and participate with peers</p> |
|--|---|

14. What are the aims/objectives of Speech and Language Therapy interventions for language impairment?

Speech and language intervention is targeted both at preventing language impairment developing and in working to develop language skills appropriate to age in those with a delay or impairment. Full and comprehensive assessments are needed to identify language development and areas of impairment and how this has affected communication, social participation and well-being. Early screening forms part of the process (Klee et al 1998, Klee et al 1995) as well as identifying need at each stage in development and particularly at transition points from home to nursery, to primary school, secondary school, higher education, life needs.

The model of intervention described in speech impairment applies equally to language impairment. The model exemplifies the different levels of care (RCSLT 2009):



It is recognised that some groups of children are ‘at risk’ in developing their speech and language. Children need good language models to develop language as a paucity of good models affects language development. Preventative measures facilitate language development. The Children’s workforce works across different health, education, social and voluntary sectors to provide the right input at the right time. SLT contributes to this work through various strategies. Speech and Language Therapists work closely as a part of the Children’s Team from early years, working with various agencies e.g. the Preschool Inclusion teams to provide appropriate input and training, for example, facilitating activities to develop cognition, language and communication skills. Training parents/carers and staff to provide regular input to children is a key part of providing the right approaches at the right dose. Management is based on the needs of the child and family.

Interventions can be through those in most contact with the individual (indirect intervention) or by the Speech and Language Therapist (direct intervention).

Table 10: Aims and objects in interventions

| |
|---|
| <input type="checkbox"/> To provide appropriate input to ‘at risk’ groups to develop language skills |
| <input type="checkbox"/> To advise on bilingual matters related to language development |
| <input type="checkbox"/> To train relevant staff on language development, strategies to develop language, timing of interventions |
| <input type="checkbox"/> To identify early communication difficulties. |
| <input type="checkbox"/> To evaluate language abilities |
| <input type="checkbox"/> To counsel and advise parents and carers about speech and language development |
| <input type="checkbox"/> To plan a programme of work to promote development of language |
| <input type="checkbox"/> To identify target areas for work – directly by SLT, by SLT assistant, by others |
| <input type="checkbox"/> To work with other professionals to identify work areas |
| <input type="checkbox"/> To provide input to the individual education plan for the child |
| <input type="checkbox"/> To work with and through others to raise the competencies, knowledge and skill of the children’s workforce. |
| <input type="checkbox"/> To provide monitor and report progress to parents/carers and interested professionals |
| <input type="checkbox"/> To write advice for statutory assessments, annual reviews, Statements of Need and Co-ordinated Support Plans |
| <input type="checkbox"/> To provide assessment, advice and detailed reports |
| <input type="checkbox"/> To training parents/carers in approaches to develop language |
| <input type="checkbox"/> To train education staff working with individuals in approaches to developing language |
| <input type="checkbox"/> To develop augmentative and assistive (AAC) methods of communication in those with severe difficulties |

The speech and language therapist will provide programmes/interventions packages which are aimed at developing specific dimensions. For example, in school age children the packages of care aim to help the child better access the curriculum and develop appropriate social skills and provide advice and support on social interaction in different settings in and out of school.

Table 11: International Classification of Functioning: aims/objectives by dimension

| | |
|---------------|--|
| Impairment | <input type="checkbox"/> Develop comprehension ability for language – phonological, syntactic, semantic, pragmatic abilities |
| | <input type="checkbox"/> Develop expressive ability for language – phonological, syntactic, semantic, pragmatic abilities |
| Activity | <input type="checkbox"/> Develop ability to communicate |
| | <input type="checkbox"/> Develop ability to understand and use language appropriate to the communicative situation |
| | <input type="checkbox"/> Develop effective communicative interactions with others |
| Participation | <input type="checkbox"/> Develop ability to integrate socially with others |
| | <input type="checkbox"/> Develop ability to behave appropriately in social settings |
| | <input type="checkbox"/> Develop self-esteem as a communicator |
| | <input type="checkbox"/> Develop appropriate social behaviour |
| | <input type="checkbox"/> Develop social skills |

15. What is the management for language impairment?

Speech and Language Therapists work closely with the families and carers of children to ensure that the communication needs of the child are met. As the child develops, the team members will include a number of different professionals. Children’s Centre teams incorporate Health, Local authority and Voluntary /Charity Sectors. SLTs work with differing team members at different times including those in the private, voluntary and independent sectors (PVI).

Table12: Speech and Language Therapists as members of multidisciplinary teams may include

| Age Group | Teams |
|----------------------|--|
| 0 - 2 years | Parents/carers, child minders, Children’s Services’ teams e.g. Health Visitors and Sure Start Centre Teams, Health and Mental Health Teams, Social Services, Pre-School Inclusion Teams, Early Years Support settings, Voluntary/Charity Sector e.g. I-Can, Afasic |
| 3 – 4 years | Parents/carers, child minders, Children’s Services’ teams e.g. Health and Social Services, Education teams e.g. Nursery Staff, Reception Staff, Psychology staff, and Voluntary/Charity Sector e.g. I-Can, Afasic |
| 5 and 16/18 years | Parents/carers, child minders, Children’s Services’ teams, Education teams and Voluntary/Charity Sector |
| 17/19 + years Adults | Parents/carers/partners, Health and Mental Health Team, Higher Education Teams, Adult Literacy Team, Social Services, Prison/Young Offenders Staff, Voluntary/Charity Sector |

Within Speech and Language Therapy Services there are specialist services providing second opinions or assessment, intervention and intensive courses, e.g. The Nuffield Speech and Language Centre, specialist Speech and Language Therapist in language units, providing intensive therapy and out reach services to schools and specialist Speech and Language Therapist working with parents and education within mainstream schools. In the Voluntary/Charity sector, specialist Speech and Language Therapist work in Specialist Schools (such as Dawn House and Moor House) providing intensive intervention. Programmes of intervention are run by Speech and Language Therapists to facilitate language learning working with and through others e.g. Nuffield, Derbyshire Language. Results of interventions are best



when the timing, duration and intensity of input match the child's needs (Hart et al 1995, Rescorla et al 1997).

Adults with language impairment difficulties may be seen for individual work. Studies have highlighted language impairments in young offenders who have responded to targeted language work (Bryan 2004, Hamilton 1999).

Augmentative and Alternative Communication

Augmentative and Alternative Communication (AAC) refers to any system of communication that is used to supplement or replace speech, to help people with speech, language and communication impairments to communicate and develop speech and language. While AAC covers a range of high technology (such as computer and voice output communication aids), there are low technology systems (such as, those involving no equipment signing and picture systems) which are used in aiding communication and speech development. AAC methods often include Makaton sign system, Paget Gorman sign system, Picture Exchange Cards (PECS) and Boardmaker pictures.

Cultural diversity

Individuals who are bilingual and have a language impairment may need help to access services and once seen it will be important to ascertain a full speech and language profile. An interpreter may be required to conduct the SLT assessment to ensure it is both accurate and reliable and to facilitate understanding of therapy and implementation of treatment strategies. There are time and cost implications when working with interpreters/co-workers for example, in taking a case history, completing a full assessment in all languages spoken by the child and family. Timings of services need to be culturally sensitive, for example, not offering appointment times which coincide with religious observations (Communicating Quality 3).

Speech and Language Therapy as part of a Multidisciplinary Team

The paper 'Healthy Lives, Brighter Futures: The Strategy for Children and Young People's Health ' (DoH 2009) is a cross government strategy for bringing together the Department of Health and the Department for Children, Schools and Families. The paper establishes the responsibility for the provision of care as a priority in Health Services and clarifies how to implement the intentions stated within the Bercow Review (2008) by strengthening the need for joint commissioning of children's services.

Bercow's key themes included:

Communication is crucial as a key life skill at the heart of every social interaction and vital to children's successful development;

Early identification and intervention is essential to maximise each child's chance of overcoming their communication need and succeeding;

A continuum of services designed around the family is needed for children with SLCN;

Joint working is critical to deliver services that provide effective support;

The current system is characterised by high variability and a lack of equity

The papers emphasise that there will have to be demonstrable stronger and joined up support for early years of life care. For example, close working between Health Visitors and Speech and Language

Therapists. Speech and Language Therapists will be working as part of multidisciplinary team, including people from health, education, social and voluntary organisations. They will also be including within the management process, the individual's family members and others in their communication environment. There are time implications for the education and training that Speech and Language Therapists provide to other professionals and family members and the work undertaken as part of a multidisciplinary team, taking on team roles and attending meetings.

Commissioners will also be aware of their responsibilities under 'Every Child a Talker ' programme which characterised the importance of language needs of all children. That, along with, the child health strategy, reminds all providers about the complexity of the needs of disabled children and the need to reduce barriers between commissioners and providers.

16. What is the evidence for Speech and Language Therapy interventions for language impairment?

A comprehensive literature search was undertaken on key health and social care databases. Twenty key papers were identified and summarised in the table below followed by the synthesis of individual papers which are summarised in more detail.

All of these studies consider speech and language interventions or practices for children aged 0-11 years. The majority of studies consider pre-school age children. Studies were excluded that examined autistic spectrum disorders, fluency/stuttering, hearing problems/deafness, cerebral palsy, attention deficit hyperactivity disorder (ADHD), traumatic brain injury, specific speech disorder and cleft palate. Studies relating to some of these conditions will be discussed in other briefings.

Details of studies

All studies were published in English, with the earliest being published in 1986. Nine studies were conducted in the UK, five in the USA, two in New Zealand and one in Canada. Two studies were systematic reviews and synthesised results from studies worldwide (Law, J (2003, 2004). The number of children who took part in the studies ranged from 20 to 216 children. The studies covered a range of interventions and associated factors including type of speech/language impairment, timing of interventions, delivery of interventions, acceptability of treatment and computer-based interventions.

Study quality

Generally, the quality of the 20 studies was good. The two systematic reviews (Law, J (2003, 2004) were of excellent quality. Cochrane reviews are generally considered to be high quality examples of the systematic review methodology. The randomised controlled trials (RCTs) were of good/excellent quality. Common errors in the RCTs were failure to disclose methods of randomisation and small numbers of children taking part in the studies. The clinical trials were of fair quality. The results from these studies need to be interpreted with caution due to the limitations of all clinical trials i.e. lack of randomisation introducing bias.

It is worth noting that the findings from the non-UK papers need to be interpreted cautiously due to generalisability of findings to the UK population.

Considerations of Speech Language Therapy interventions

The studies examined a range of components of Speech and Language Therapy (SLT) interventions and their effect on outcomes. This included intensity of intervention, timing of intervention, watch and wait vs. intervention, whom to deliver interventions and computer-based interventions

Intensity of intervention

All studies gave specific details of the intensity of SLT interventions which generally appeared well-organised and consistently delivered. Two studies (Barrett, J 1992, Boyle, J, 2007) focused on how increasing the intensity of therapy programmes can influence speech and language outcomes.

Barrett, J (1992) compared the benefits of intensive individual SLT with more traditional once weekly sessions in a group of forty-two 2-5 years old demonstrating speech delay. The intense programme of therapy consisted of 40 minute sessions, 4 days per week for 3 weeks in each 3 month period (maximum of 24 sessions over 6 months). The comparison group in this study received the same number of sessions but once weekly over a 6 month period. Therapy took place in the child's nursery. Both groups demonstrated similar improvements in comprehension, whilst the intense therapy group showed significantly greater gains in expression scores.

Boyle et al (2007) investigated four treatment modalities for 6-11 year old children with primary language impairment; to determine whether outcomes were affected by who delivered therapy and whether this was done so in group or individual sessions. Whilst no differences were found between the four treatment modalities, their intense nature compared very favourably against standard treatment on standardised scores for expressive language. The four different treatment modalities involved 3 sessions per week as opposed to standard weekly sessions.

Timing of intervention and intervention vs. "watch and wait"

Two studies (Robertson, S B, 1999, Almost, D, 1998) examined the benefits of carrying out SLT interventions earlier in children with speech delay and severe phonological disorder, respectively. Glogowska (2000) investigated whether a watch and wait approach is indicated for toddlers presenting with speech delay.

Robertson, S B et al (1999) carried out a small scale study in which 11 late-talking toddlers were given 12 weeks of two weekly appointments, each lasting 75 minutes. The same speech language therapist saw the child at each appointment and used techniques to encourage use of language. A comparison group of 10 children received no therapy. The children receiving the therapy made significant gains in both language and social skills.

Almost, D (1998) examined the effect of early treatment on thirty children less than six years old with severe phonological disorder. Children were randomly split into two groups, one receiving the intervention (twice weekly half hour one-to-one sessions with a speech language therapist) for four months, the other receiving no treatment. After the initial four month period, the children swapped groups i.e. those who had not received the intervention now did so and the children who had initially received the intervention received no further therapy. At the four month half way point, children receiving therapy had made significant language gains in comparison to the non-therapy children. Once both groups of children had received therapy, the groups were examined again. The children who had

received therapy earlier made greater gains in conversational speech intelligibility and expressive language skills than the later treatment group.

Glogowska (2000) carried out a RCT to determine whether the provision of community speech and language therapy for early speech language delay in 159 children aged less than 3.5 years is necessary. The children were randomised to receive either immediate SLT or assigned to a 12 month “watchful waiting” period before therapy. At the end of the trial, 70% of children still had substantial speech and language deficits. SLT appears not to have had an effect. However, the failure for speech delay to resolve naturally in this time period indicates these children do need some kind of therapy. This raises questions about the appropriateness, timing, nature and intensity of SLT in the preschool population.

Delivery of SLT interventions?

A number of studies have looked at the appropriateness of who should administer SLT. This includes speech language therapists (SLTs), speech language therapy assistants (SLTAs), parents and teachers.

Boyle, J (2007) conducted a study examining the treatment efficacy and cost effectiveness of providing SLT via SLTs or SLTAs. In addition, the study investigated the relative merits of providing this therapy as group or individual sessions. The intervention was intense incorporating 2-3 sessions per week over a 15 week period. All four therapies proved to be equally effective with no therapy modality resulting in greater gains. When taking costs into account, provision of treatment via group sessions administered by SLTAs was least costly. Individual treatment provided by SLTs proved the most costly option.

Cole, K (1986) looked specifically at classroom SLT interventions to see whether direct language instruction or an interactive style of intervention was more appropriate. Direct teacher-led instruction was provided for 19 children (aged 3-6 years) and was characterised by predetermined language goals, specific reinforcement procedures and eliciting imitation. Interactive instruction (n=25) used specific individualised language goals, no structured reinforcement procedure and a natural style of language learning where children were encouraged to initiate language production. Whilst both types of intervention resulted in significant and substantial language gains at 8 months, there were no differences between the groups in any measure. However, this study demonstrates a teacher-led intervention can be successful.

Baxendale, J (2003) examined the effectiveness of directly involving parents in an intervention programme. The Hanen Parent Programme (HPP), a parent-based SLT intervention was compared with a traditional SLT clinic for thirty-seven 4-6 year olds. The HPP group received 8 weekly parent-only group sessions and 3 home visits, where the focus was on the parents’ language and interaction with their child. The traditional SLT group received 8-12 weekly individual sessions where the speech language therapist interacted directly with the child and demonstrated techniques for the parent to practice at home, consequently the emphasis was on the child’s language. The study results indicated that over a 12-month period, the majority of children demonstrated significant improvements in their language ability. No differences were detected between the HPP and traditional SLT clinical-based groups. Both therapies taught parents successful ways of interacting with their child, with the focus on being less talkative and letting the child do the talking. The HPP was more costly than the clinic-based therapy because it involved two therapists of greater experience than in the traditional clinic based therapy. However, the model of care provided in the HPP could be adjusted to increase the number of

families included per HPP session. Further research would be required to ascertain whether this would affect the efficacy of the HPP.

Gibbard, D (1994) investigated the use of parental-based therapy (PBT) in language delayed preschool children. The PBT intervention consisted of 11 group sessions over a 6 month period, each lasting 1 ¼ hours, with the objective being to increase children's linguistic complexity by transferring linguistic skills in daily life. At the end of the intervention period, all children had improved but children whose parents were involved in the PBT group had made larger gains in language ability. The same PBT intervention was compared with children who received direct SLT (weekly 30 minute one-to-one sessions with a speech language therapist over a 6 month period). The PBT group had the highest language scores, proving that this type of intervention could be as least as effective as direct SLT whilst being more cost effective. Interestingly, 93.3% of mothers assigned to the PBT group decided to stay in this group, indicating parents are willing to be involved in such an intervention and work and practice on their child's language development.

Gibbard carried out a similar study in 2004 with twenty-two 2-3 year olds, this time investigating the costs to both the health care provider and child's parents. This time the provision of eleven 90 minute fortnightly group PBT sessions was compared against 3 monthly review and advice visits (labelled as current practice). PBT children made much greater improvements in language skills than current practice. In terms of cost, Gibbard calculated that PBT was more costly per outcome gained than current practice, unsurprisingly since PBT require more of a therapist's time. The cost from switching from general care to PBT was estimated at £ 3.84 per outcome gained. However, changing a parameter of PBI (for example, increasing the number of children in a group) could significantly decrease the costs of PBI and could make it the more cost effective option (assuming a change in a parameter did not affect outcomes). However, Gibbard also notes that PBI does not just result in costs to the health care provided. Costs to the parents are increased, namely travel monetary and time costs for additional appointments.

Computer-based interventions

Two studies investigated the computer-based SLT intervention FastForWord (FFW) (Cohen, 2005, Gillam, 2008). FFW is an interactive computer-based programme for treating specific language impairment using acoustically enhanced speech stimuli. Children play games as part of the programme, the level of which is matched to the changing ability of the child over time. With no exception, the studies did not find any benefit in using FFW in comparison to other SLT computer-based interventions, other computer-based education (i.e. non-speech/language focused) and face-to-face SLT.

Cohen, W et al (2005) looked at the effect of adding FFW to children's regular school SLT and school regime. Seventy-seven 6-10 year olds took part in the study. Group A received FFW, Group B received other educational computer based activities (non-language focused) and Group C received no computer based intervention. Each group showed significant gains in language but no one group performed better than the other, indicating there are no additional benefits for adding a computer-based SLT intervention to standard care. Cohen et al (2005) hypothesised that this could be due, in part, to the fact the population being studied was made up of children with severe mixed-receptive SLI. Gillam (2008) carried out a study with 216 6-9 year olds with less severe language impairments in which FFW was compared with a) another computer-assisted language intervention b) individual language intervention with an SLT c) an educational computer-based programme (non-SLT). However, Gillam (2008) echoed Cohen's findings- all four interventions made similar language gains.

This is in contrast to several case reports and single case studies cited by Cohen, 2005 and Gillam, 2008 that document significant benefits of FFW.

Type of speech impairment

A small number of studies investigated factors relating to the type of speech or language impairment and their impact on treatment. This included the severity of impairment, the type of impairment and the existence of more than one speech or language impairment.

Law, J et al (2004) carried out a meta-analysis on 33 studies that investigated different types of SLT interventions. They found that phonological interventions appeared effective, especially if the therapy lasted longer than 8 weeks and was administered by an SLT. Expressive vocabulary and expressive syntax interventions also appeared effective, but more so for severe language impairments. There was no evidence demonstrating receptive language interventions were effective. Law's (2003) Cochrane systematic review backs up these findings. This review also discussed the effect of using trained parents or clinicians to deliver therapy, however no difference in effectiveness was found. Longer interventions were shown to be more effective and the use of normal language peers in interventions was supported. Group and individual interventions had no difference in terms of outcomes, but this was based on a limited number of studies.

There is evidence that interventions for children with phonological disorder and phoneme awareness are effective. (Gillon, 2000 and Hesketh, 2000). Hesketh, A et al (2000) compared a phonological awareness therapy for children with phonological disorder (aged 2-5, n=61) to another type of intervention in common use, articulatory therapy. Whilst little difference was found between the two types of intervention, SLT was clearly beneficial for these children, who improved significantly more than 59 normally speaking comparison children.

Tyler (2002, 2003) carried out two studies investigating the effect of SLT interventions on co-existing speech and language impairments. The 2002 study looked at the order in which to carry out therapy in a group of 3-6 year olds with both morphosyntax and phonology impairments. The results showed that carrying out a morphosyntax intervention first appears advisable since this intervention also achieved considerable changes in phonology. In contrast, no cross-domain effect was seen for the phonology first intervention. In 2003, Tyler carried out another study looking at "goal attack strategies" for co-occurring SLT impairments. The strategies were four-fold: 12 weeks of morphosyntax intervention followed by 12 weeks phonology therapy; 12 weeks phonology therapy followed by 12 weeks morphosyntax therapy; weekly alternating of the 2 therapies; simultaneous therapy focusing on the morphosyntax and phonology areas. In terms of morphosyntactic change, the alternating therapy goal attack strategy produced the greatest morphosyntactic change. No single goal attack strategy had better gains in phonological performance.

Acceptability of treatment

Viewpoints of parents, teachers and nursery staff were examined by the number of studies.

Boyle, J (2007) investigated the efficacy of four treatment modalities, SLTs or SLTAs delivery of therapy and group vs. individual therapy. Boyle et al (2007) looked at parental and teacher perceptions of treatment as well as treatment efficacy. Parents expressed benefits of all treatment modalities and no

type of therapy was preferred. However, parents consistently said it was important to cater for a child's individual needs by providing the most appropriate type of therapy. Several parents expressed concern that therapy had been 'cut off' i.e. not phased out, at the end of the study. This was particularly pertinent in group therapy where parents felt children may have forged friendships. There was also an expression of need for long term care and parents raised the idea of teachers carrying on the SLTs/SLTAs work.

Glogowska (2002) carried out a questionnaire and in depth qualitative interviews with parents involved in an RCT to determine if early SLT was more favourable than a "watchful waiting" approach. At the end of the study, the majority of parents expressed a desire for further therapy and that their child needed further therapy. Some parents whose children received SLT later (i.e. "watchful waiting" first) expressed anxiety and worry and believe that this may have stunted their child's progress. Half of these parents indicated receiving SLT initially would have made them worry less about their child's difficulties; whereas a third said it would have made no difference. In contrast, the majority of parents whose child had received SLT first were happy and satisfied with SLT. Further investigation in when and how treatment should be delivered must take parents into account.

Whilst Barrett's (1992) investigation into the benefits of intense therapy for speech delay demonstrated clinical benefits, some issues of acceptability of the intense mode of treatment were raised by nursery staff. Out of the six nurseries that took part, 3 nurseries considered the intensive therapy an improvement, 2 did not and 1 nursery was unsure. Nursery staff commented that the intensive therapy ensured a relationship was built up quickly and maintained between the therapist and child. However, the intensive nature made the therapy difficult to fit in with other care programmes. Clearly, despite the benefits of intensive treatment, some consideration needs to be given to practical factors.

Non-SLT benefits

Several studies discussed the benefits of SLT interventions on non language outcomes. It seems SLT interventions have implications beyond improving language gains.

Robertson, S B et al (1999) found that late talking toddlers who received an early SLT intervention showed improvements on a range of language measures and the children improved in their interpersonal relationships, play and leisure and coping skills. Parental stress also dramatically reduced and their perception of their child's behaviour and skills was also changed. Thus indicating, early intervention for speech delay not only improves language but increases social skills and decreases disruption to the parent-child relationship.

Boyle, J et al (2007) also sought views from parents and teachers on children's progress following one of four intense programmes of SLT (varied in who delivered therapy and whether group or individual sessions). Parents consistently expressed that their child's self-confidence and enthusiasm for learning had improved. Behaviour was reportedly better and children showed less frustration. Parents also reported tangible benefits were seen in literacy and other curriculum. Teachers backed up these views especially with regard to improvement in children's self-confidence.

Gillon, G (2000) investigated the effects of a phonological awareness (PA) programme on children's speech production and reading. The intervention was designed to improve children's awareness of the sound structure of spoken language and to develop knowledge of the connection between speech and print. The programme consisted of two 1 hour sessions per week with a total of 20 hours of intervention

being delivered. This was compared with a traditional phonological and language skills intervention, a minimal once monthly intervention with a speech language therapist and a group of normally developing children. Children receiving the PA intervention improved in both phonological awareness, speech production and reading development. Phonemic awareness skills for the PA group were comparable to 'normal development'. Gillon followed the progress of twenty children from the PA group in 2002. One year on following the intervention, children who had received the PA intervention were reading at, or above the level expected for their age. In contrast, those who did not receive the PA intervention remained poor readers.

Gillam (2008) investigated the use of computer-based SLT interventions. However, children who received non-language focused computer educational packages made very similar gains to those receiving the language-focused computer package, FastForWord. This was in part due to the nature of the therapy. As well as receiving computer-based therapy of some kind (language or non-language focused) children were given the opportunity to socialise with same-ability peers and a positive attentive environment. Several parents commented their children made friendships more easily in this setting. Socialisation appears to improve language outcome and a variety of educational activities could be important for language gains.

Summary

The benefits of SLT interventions extend beyond language gains. Improvements in social skills, peer relationships, self-confidence and literacy may be seen as a result of SLT interventions. Consideration needs to be given as to when and how SLT interventions are delivered. There is some evidence that early intervention and more intense interventions may produce greater speech and language gains. There appears to be little evidence at present for the use of computer-based SLT interventions. Successful delivery of SLT interventions can be achieved through training parents, via speech language therapists and speech language therapist assistants. However, there are cost and time implications according to who delivers treatment and the intensity of treatment. Further research is required to identify which types of children and/or parents may benefit from different types and delivery of therapy.

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Table 13: Literature

| Study | Country | Study design | Study quality | Subjects | Intervention |
|------------------|---------|----------------|---------------|--|--|
| Almost, D (1998) | Canada | RCT | Good | N=30 <6 yrs old Severe phonological disorders | Early treatment vs. late treatment |
| Barrett (1992) | UK | RCT | Good | N=37 4-6 year olds with expressive or expressive/receptive language impairment | Parent-based vs. SLT administered intervention |
| Baxendale (2003) | UK | Clinical trial | Good/average | N=42 2- 5 year olds with language delay | Intensive individual SLT vs. traditional 1x weekly sessions |
| Boyle (2007) | UK | RCT (HTA) | Good | N=152 6-11 year olds with persistent primary receptive and/or expressive language impairment | Direct (SLT) vs. indirect (SLTA) Group vs. individual therapy |
| Cohen (2005) | UK | RCT | Excellent | N= 77 6- 10 year olds with severe mixed receptive-expressive language impairment | FastForWord computer-based intervention vs. standard SLT vs. non-SLT computer-based activities |
| Cole (1986) | USA | RCT | Good | N=44 3-6 year olds with language delay | Direct SLT teacher led vs. interactive |

| Study | Country | Study design | Study quality | Subjects | Intervention |
|------------------|-------------|-------------------------------|---------------|---|--|
| | | | | | language instruction |
| Gibbard (1994) | UK | RCT | Good | N=36 2-3 year olds with little or no expressive language (<30 words) | Parental based SLT vs. no treatment or direct SLT (one-to-one basis between therapist and child) |
| Gibbard (2004) | UK | Cost effectiveness study | Good | N= 22 2- 3 year olds with little or no expressive language (<30 words) | Parental based SLT vs. 3 monthly review/advice appointments with an SLT |
| Gillam (2008) | USA | RCT | Excellent | N=216 6-9 year olds with language impairment | FastForWord vs. another language computer-based intervention vs. an educational non-SLT computer-based intervention vs. traditional SLT |
| Gillon (2000) | New Zealand | Clinical trial | Good | N= 91 5-7.5 year olds with spoken language impairment and early reading delay | Phonological awareness intervention vs. traditional intervention vs. minimal intervention (Additional comparison with 'normally' developing children) |
| Gillon (2002) | New Zealand | Clinical trial (longitudinal) | Good | 20 children from Gillon (2000) study reassessed | Longevity of effect of phonological awareness intervention |
| Glogowska (2000) | UK | RCT | Excellent | N= 159 children < 3.5 years with speech delay | Community speech and language therapy provision vs. "watchful waiting" |
| Glogowska (2002) | UK | Qualitative study | Good | N= 159 children < 3.5 years with speech delay | Community speech and language therapy provision vs. "watchful waiting" |
| Hesketh (2000) | UK | RCT | Good/ average | N= 61 3-5 year olds with phonological disorder | Phonological awareness therapy |
| Law (2004) | Worldwide | Systematic review/ Meta- | Excellent | 33 studies included in meta-analysis | Range of SLT interventions |

| Study | Country | Study design | Study quality | Subjects | Intervention |
|------------------|-----------|-------------------|---------------|--|--|
| | | analysis | | | |
| Law (2003) | Worldwide | Systematic review | Excellent | 25 studies | Range of SLT interventions |
| Robertson (1999) | USA | RCT | Good/average | 21 late-talking toddlers | Early intervention with SLT |
| Tyler (2002) | USA | RCT | Good/average | 27 3-6 year olds with impairments in both morphosyntax and phonology | Order of treatment |
| Tyler (2003) | USA | RCT | Good/average | 47 3-6 year olds with impairments in both morphosyntax and phonology | Goal attack strategies i.e. how to approach multiple goals |

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