Down's syndrome: language development and intervention

Dr Kelly Burgoyne summarises the evidence base around language intervention for children with Down's syndrome

ILLUSTRATIONS BY **Ricky Butcher**

Between 700 and 800 babies each year are born with Down's syndrome (DS) in the UK (Wu & Morris, 2013). DS is a genetic disorder, causing intellectual disability. While all individuals with DS develop more slowly than in typical development (TD), there is considerable variability. Similarly, not all aspects of development are equally affected, with some areas being less delayed than others. Speech and language development is frequently considered the greatest challenge for individuals with DS. Language weaknesses affect all aspects of life, including social functioning, learning and cognitive development, mental health, and independence and inclusion in the community.

How is language affected?

At the group level, DS is associated with a distinct language profile characterised by relative strengths in receptive vocabulary and significant impairments in expressive language, phonology and grammatical skills (eg Næss et al, 2011). Pragmatic communication skills are typically stronger than linguistic skills but there are pragmatic difficulties nonetheless (Smith et al, 2017). Problems with speech intelligibility (Kent and Vorperian, 2013) and hearing loss are also common and impact on language learning and use (Abbeduto et al, 2007).

Delays in the emergence of language are seen from an early age, with first words spoken around 10 months later than in TD. Development continues to be slower but largely appears to follow the typical course: children learn the same types of words, in the same order as TD children, and as they learn more words they slowly begin to put them together (eg Polisenska and Kapalkova, 2014). Vocabulary and grammar continue to develop throughout school and early adolescence, though improvements in grammar are slower (eg Connors et al, 2018; Naess et al, 2015). Grammar does appear to be a particular challenge, and many older individuals remain 'telegraphic' talkers, using mainly key words and ommitting grammatical markers.

There is some evidence of a decline in vocabulary and grammar during late adolescence and early adulthood (Connors et al, 2018; Cuskelly et al, 2016; Laws and Gunn, 2004). However, other studies show that language is stable at this time, and indeed can continue to improve when individuals have access to appropriate ↘

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speech and language therapy (Berry et al, 1984; Carr, 2000; Chapman et al, 2002).

There are wide individual differences in DS, which emerge from an early age and persist into adulthood. Some individuals will have significant and complex needs and may remain largely non-verbal, while others are able to learn to read and speak in more than one language (eg Burgoyne et al, 2016). This requires an individualised approach to intervention, though general principles for effective intervention can be applied across the range of ability.

What are the implications for language intervention?

High-quality, evidence-based language intervention is imperative for individuals with DS. All individuals with DS will need support for language development in order to reach their full potential. Obtaining this much-needed support can be challenging: difficulties accessing speech and language services, and dissatisfaction with the frequency and intensity of provision for children with DS are common (eg DSA, 2004; Meyer et al, 2017; van Bysterveldt et al, 2018). Importantly, a recent systematic review and meta-analysis of studies of language intervention for children and young people with DS shows that targeted language interventions can improve language outcomes in this population (Smith et al, 2020). This evidence clearly supports provision of language intervention for this group.

Language intervention should be in place from the first year of life. Given that DS is diagnosed prenatally or shortly after birth, and that language and communication difficulties are a known feature, support for language learning should be in place from the outset, and well before children learn to speak. It is worth noting that some deficits that are characteristic of the DS phenotype may not be present in the very early stages of development, but rather appear to emerge over time (Mason-Apps et al, 2020; Roberts and Richmond, 2015). The early years could therefore be a particularly critical period for intervention.

Language intervention needs to be frequent, intensive, and sustained over time. The amount of intervention matters: children with DS who receive more frequent intervention make greater gains in learning (Burgoyne et al, 2012; Yoder et al, 2014). It is therefore vital that SLTs deliver direct therapy regularly, complemented by daily support for language learning at home and in school. Therapists should provide parents and educators with training so that they understand children's learning needs, and model teaching activities with the child. It is clear that with high-quality training and support, educators (including teaching assistants and special education teachers) can effectively deliver structured language intervention to children with DS (Burgoyne et al, 2012; Baxter et al, 2019; Næss et al, 2019). Speech and language therapy should be sustained into adolescence and adulthood given evidence of continuing gains (Chapman and Hesketh, 2001).

Clear targets should be set for all language domains. Given the broad and significant language impairments seen in DS, support for all language domains including speech, vocabulary, grammar and communication should be in place. As receptive language skills are often better than expressive language skills, separate targets for comprehension and production may be needed (Chapman and Hesketh, 2001). Therapists should review speech and language targets regularly and share them with parents and educators.

What does the evidence tell us about how best to support language development?

Parent-mediated interventions. Parents should be supported to provide a good communication environment at home; for example, to recognise and respond to their child's communication attempts, and model and prompt language in everyday activities. Parent-mediated interventions such as the Hanen Parent Programme, Enhanced Milieu Teaching and Responsive Teaching teach parents to use these types of strategies.

A recent systematic review of parent-mediated interventions for children with DS found effects of intervention on parental behaviour, but improvements on measures of child language and communication were inconsistent (O'Toole et al, 2018). It is worth noting that only three studies were included in this review, and two of these involved relatively low doses of intervention; as the authors suggest, more intensive intervention is likely necessary to see measurable changes in child language.

Early social communication skills including eye-contact, turn-taking,

requesting and shared attention should be supported from the first year of life as a foundation for language learning. A recent study developed and evaluated a 10-week intervention focusing on early social communication skills and specifically targeting shared attention in a group of 16 infants with DS (aged 17-23 months) (Seager et al, 2017). Findings suggest that this form of intervention supports early communication development and has benefits for children's language learning.

Phonological awareness is a particular area of difficulty for individuals with DS and should be a focus of intervention from an early age (Næss, 2016). Activities to support auditory discrimination for speech sounds can be introduced from the first year of life. Targeted practice of speech sound discrimination and production, supported with visual materials, including printed letters and sound books, will support automatisation of speech processes and free up cognitive resources for higher-order language processing (Silverman, 2007). Targets for phonological awareness and letter knowledge can be integrated with speech goals to support speech production accuracy (van Bysterveldt et al, 2010). Phonological awareness is also critical for reading (eg Hulme et al, 2012) and should form part of a comprehensive approach to reading instruction in the school years (eg Burgoyne et al, 2012).

Reading activities. Visual supports including pictures and print are an important language learning tool for individuals with DS (eg Jarrold et al, 1999). Experimental evidence shows that seeing a word in print helps children with DS to learn new spoken words (eg Mengoni et al, 2013) and acquire grammatical rules (eg Baxter et al, 2019). It is therefore important to work with educators and parents to use reading activities to support spoken language at all ages. This includes:

- **Shared (or 'dialogic') reading:** Shared reading activities promote joint attention and interest, expose children to rich and diverse language, and use concrete, visual supports for learning that can be revisited many times; as such they are an ideal environment for fostering language development in children with DS (Jordan, Miller and Riley, 2011). Shared reading activities can be used to support spoken language practice and facilitate high-quality parent-child verbal interactions (Burgoyne and Cain, 2020), and to develop letter knowledge and phonological awareness skills (van Bysterveldt et al, 2006).
- **Personal books:** Making personal books with and about the individual is a useful strategy that can be used at all ages. Personal books contain photographs matched to printed words and phrases that can be practised and shared with others. These can be developed to target keyword phrases, useful carrier phrases, and specific vocabulary and grammatical targets.
- **Early reading:** Reading abilities have been demonstrated in children with DS from an early age (around three years; eg Appleton et al, 2002). In the preschool years, reading can be used as an explicit language teaching activity, using an approach in which children are taught to recognise whole words in print and later to build sentences with those words (see: **bit.ly/3fOAhGy**).
- **Reading instruction in school:** All children with DS, regardless of their oral language abilities, should receive high-quality reading instruction in school alongside their peers. As for all children, a comprehensive approach to the teaching of reading is important, and should include explicit teaching of letter sounds, phonological awareness and phonics, alongside sight word instruction, with opportunities to practise and develop skills within book reading and writing/spelling work. Support for comprehension should be in place from the outset. This form of reading instruction is effective for many children with DS (eg Burgoyne et al, 2012). A published, evidence-based teaching programme (Reading and Language Intervention (RLI) for children with DS) is available to support this (see: **bit.ly/2WGCxs2**).

Augmentative and alternative means of communication (AAC), including sign language and picture-based communication systems, can be useful in supporting communication for individuals with DS (Barbosa et al, 2018). Encourage the use of gesture and sign to support understanding and facilitate the transition to spoken language. It is worth noting that by the age of five, most children have largely dropped signing in favour of spoken language (Kumin, 2003), but for some there will be continued benefits.

Technology. Many children with DS are familiar with and enjoy using tablets for recreational use and learning (Hokstad and Smith, 2015). A recent randomised controlled trial conducted by researchers at the University of Oslo demonstrates significant gains in children's language outcomes following a digital app-based oral language intervention programme delivered to six-year-old children with DS by special education teachers and teaching assistants in schools (Naess et al, 2019). Several apps designed to support language and communication for individuals with DS are available (see **www.specialiapps.org/en**). ■

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For a full list of references, visit bit.ly/3jQ9ege