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Children's communication and the developing mind: a challenge for Australia

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Communication is central to all people and societies. Our ability to communicate impacts our identity, relationships, education, employment, self-determination, and engagement in community, social, and civic life. Our nation's prosperity, health, wellbeing, and security requires successful communication. Communication is enshrined by the United Nations as a human right (McLeod, 2018; United Nations, 1948). Communication mediates children's behaviour, learning, and socialisation. There is a strong link between children's communication ability and their educational, social and occupational outcomes, behaviour, mental health issues, and involvement with criminal justice (Cronin et al., 2020; McCormack et al., 2011; McGregor, 2020; McLeod, 2018; McLeod, Harrison et al., 2019).

Communication typically involves a sound or word travelling between speakers and listeners, moving from the brain → mouth → ear → brain. In the case of sign languages, gesture, and facial expressions, this pathway is brain → hand/face → eye → brain (McLeod & Baker, 2017). The brain controls speech, language, and communication (Bui & Das, 2023). The temporal lobe controls language comprehension, hearing, and memory. The frontal lobe controls both motor and executive functions essential for communication that include planning, processing, problem-solving, and judgement. The parietal lobe controls sensory perception and integration, including hearing. The occipital lobe interprets vision, including facial recognition; more skills required for successful communication. During speech production and perception, left-lateralised brain activation occurs (Indefrey & Levelt, 2004). Broca's and Wernicke's areas are responsible for expressive and receptive speech and language and are typically found in the left hemisphere. The brain processes more sensory and motor information involving the face, lips, tongue and hands than any other body part (as demonstrated in the homunculus model). Of the twelve cranial nerves, five are essential for speech and hearing: trigeminal nerve (V), facial nerve (VII), acoustic nerve (VIII), vagus nerve (X), and the hypoglossal nerve (XII) (Zemlin, 1998). Communication is hardwired into our brains and bodies.

Speech, language and communication development

Foundations of speech, language, and communication are established in early childhood. Even before birth, children can identify their mothers' voice(s) and their mothers' home language(s) from other languages (Kisilevsky et al., 2009). Children's first cry is eagerly anticipated; they are born communicating. Children typically say their first words around 1 year of age, begin to put two words together around 2 years, and use grammatical forms by 3 years. By 4 to 5 years of age most children can be understood by everyone — even strangers, regardless

of the language(s) spoken (McLeod, 2020). Additionally, a review of 64 studies of 27 languages demonstrated that by 4 to 5 years of age most children can correctly pronounce (almost) every consonant, vowel, and tone in their home language(s) (McLeod & Crowe, 2018). By 5 years, children also can understand and produce sentences, stories, and conversations. Communicative capacity continues to develop throughout school and across the lifespan, but the foundations are established prior to school. For example, a longitudinal study of 3,547 infants (1–2 years) whose parents read with them for 11 minutes or more per day identified that they had stronger reading, spelling, and grammar skills in Grades 3 and 5 (Brown et al., 2022).

While most children's communication development is straightforward, a number of children have speech, language and communication needs. For some, this can be associated with hearing loss, cleft palate, cerebral palsy, or another identifiable cause; however, for most children, there is no known cause (i.e., speech sound disorder, developmental language disorder, stuttering, voice disorder) (McLeod & Baker, 2017).

Longitudinal population research has been used to demonstrate the impact of communication ability on children's outcomes. The Australian Government's Longitudinal Study of Australian Children (LSAC, n ~10,000) and the Longitudinal Study of Indigenous Children (LSIC, n ~1,600) have provided data that have been analysed to examine communication outcomes for three groups of children.

Communication concern: First, communication outcomes have been examined for 4- to 5-year-old children whose parents were concerned about how their child spoke and made speech sounds (i.e., had *communication concern*) (25.2% of LSAC McLeod & Harrison, 2009; 24.3% of LSIC McLeod et al., 2014). Children with communication concern self-reported they experienced significantly "more bullying, poorer peer relationships, and less enjoyment of school than peers" (McCormack et al., 2011: 1328). They had slower progress in reading, writing, numeracy, and overall school achievement at 8–9 years (Harrison et al., 2009; McCormack et al., 2011); significantly lower academic achievement on reading, writing, spelling, grammar, and numeracy in years 1, 3, and 5 (McLeod, Harrison et al., 2019); and poorer school achievement with less positive trajectories at 12–13 years (Wang et al., 2018). This link between communication and reading has long been acknowledged (Tambyraja et al., 2022); "to crack the alphabetic code, children must be able to abstract the relevant phonemic units from the stream of the speech" (Castles et al., 2018: 11).

Speech, language and communication needs (SLCN): The second group of Australian children who have been studied longitudinally were identified with speech, language and communication needs (8.3% LSAC, Cronin et al., 2020). Again, these children were found to have lower academic achievement and poorer socialisation. They were also found to have increased healthcare costs, productivity loss (Cronin et al., 2020), and increased representation in the criminal justice system (Dowse et al., 2020). Similar findings have been reported across the world (McGregor, 2020; Ziegenfusz et al., 2022; Zubrick et al., 2015).

Multilingual children: The third group of Australian children who have been studied longitudinally has demonstrated that multilingualism does not impact young children's educational outcomes. In a longi-

tudinal study of 4,983 Australian children from LSAC, there there was no difference between speaking one or more language(s) on children's language and literacy, mathematical thinking, and socio-emotional skills (McLeod et al., 2016). Children learn to communicate in more than one of the 7,000 world languages and it has been estimated that the majority of the world's population is multilingual (i.e., understand and speak more than one language). Multilingualism is a strength, and many Australians are multilingual (Australian Bureau of Statistics, 2021; McLeod, Verdon et al., 2019). In a study of Australian census data, it was found that multilingual adults who spoke English well were more likely to have a higher education, employment, and a higher salary than monolingual Australian adults (Blake et al., 2018).

A challenge for Australia: support children to become competent communicators

One of the most foundational issues impacting Australia's social and economic future is the need to support children with speech, language and communication needs to become competent communicators, thus reducing the lifetime productivity cost, estimated to be $21.7 billion in lost wages (Cronin et al., 2020). Equitable and early access to communication services enables children to achieve their fullest potential at school, at home, and in society; however, the majority of Australian children with speech, language and communication needs are "underserved." Over 50% of Australian children with speech, language and communication needs receive no/insufficient communication support due to long speech-pathology waiting lists, fragmented services, linguistic and geographical barriers, and cost (Commonwealth of Australia, 2014; Henry, 2019; McCormack & Verdon, 2015; McGill et al., 2020). For example, the NSW Health Henry Review (2019) described "The long waiting times to access speech pathology services for children with speech delay, when there is strong evidence for the cost benefit of early intervention" (p. 69). Early identification of speech, language and communication needs and provision of communication services in early childhood are essential for changing children's trajectories and more cost effective than remediation later in life (Law et al., 2012; Westerveld et al., 2015; Whitehouse et al., 2009). While there are many successful evidence-based interventions to support children with speech, language and communication needs (e.g., Goldfeld et al., 2022; Jones et al., 2005; Williams et al., 2021), the critical window for early intervention and support is often missed due to insufficient access, resources, and funding. In Australia and the UK, many communication professionals are not funded to provide the required intensity of evidence-based early intervention for it to be maximally effective (Hegarty et al., 2018; McGill et al., 2021). Importantly, receiving less than the defined intensity is equivalent to receiving no intervention (Law et al., 2012; McLeod et al., 2020).

The way nations formally describe and count communication impacts service provision, and Australia lags behind the UK and US in defining communication as a disability. A comprehensive review of Australian health, education, and disability legislation and policies found children's communication was "invisible" (McLeod et al., 2010), and unlike the US and UK "communication" is not included as a disability

in the Disability Discrimination Act 1992 (DDA) or the Nationally Consistent Collection of Data on School Students with Disability.

Conclusion

While the ability to communicate is innate, communicative competence is established in early childhood and impacts participation in society, economic potential, social and cultural cohesion. The Australian Government Education Council's goals outlined in the *Alice Springs (Mparntwe) Education Declaration* (2019) include to support all young Australians "to reach their potential and achieve their highest educational outcomes" (p. 11) enhancing "communication skills" (p. 8) and providing "effective early intervention and support strategies to ensure each young person has the necessary skills, knowledge and confidence to thrive as they move through school" (p. 8). We need to prioritise children's communication, to enhance the future of individuals, communities, and our society.

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