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Synthesis

How important is it?

Learning to talk is one of the most visible and important achievements of early childhood. New language tools mean new opportunities for social understanding, for learning about the world, for sharing experience, pleasures, and needs. Then, in the first three years of school, children take another big step in language development as they learn to read. Although these two domains are distinct, they are also related. Early-language skills have been linked to later successful reading. As well, pre-literacy and literacy activities can help further children's language competencies in both the preschool years and later schooling.

Children with poor listening and speaking skills are referred to as having language impairment. An estimated 8 to 12% of preschool children and 12% of children entering school in Canada and the U.S. have some form of language impairment. As an example, speech sound disorders affect 3 to 5% of preschool aged children, 11% of kindergarten aged children and 18% of 8-year-old children. Children with language impairment experience reading disorder, usually defined as poor reading achievement occurring after sufficient opportunity to learn to read. Reading disorder among school-aged children is estimated to be between 10 and 18%.

When children have difficulty understanding others and expressing themselves, it is not surprising that psychosocial and emotional adjustment problems ensue. Children with delayed or disordered language are therefore at increased risk for social, emotional, and behavioural problems. As well, research shows that most children who have poor reading skills at the end of Grade One will continue to experience difficulties reading later on.

What do we know?

While the nature of the mental activity that underlies language learning is widely debated, there is considerable agreement that the course of language development is influenced by determining factors in at least five fields: social, perceptual, cognitive processing, conceptual and linguistic. As well, although individual differences among children do exist, language development has predictable sequences. Most children begin speaking during their second year, and by 21 months are likely to know about 100 words and are able to combine them in short phrases. By age of four

to six, most children are speaking in grammatically complete and fully intelligible sentences. Their first sentences are made of content words and are often missing grammatical function words (e.g., articles and prepositions) and word endings (e.g., plurals and tense markers). Although there is a predictable sequence, the rate of language development among children varies substantially primarily due to the complex interaction between genetic and environmental factors.

The amount and kind of language stimulation at home and family stresses such as child abuse contribute to children's language development. As well, the quality of interaction between a caregiver and a child – such as when playing word games or reading books (which helps increase vocabulary size and phonological awareness) – plays an important role in literacy outcomes. Children's skills progress more quickly and readily in instructional interactions characterized by sensitive, responsive and non-controlling adult input. Other aspects of parental behaviours, such as frequent and regular participation to learning activities and the provision of age-appropriate learning materials, favour the child's literacy outcomes. In addition, parents with more resources (e.g., education, income) are more likely to provide positive learning experiences for their young child. Although child characteristics (e.g., birth order) also play a key role in their own learning experiences with firstborn children having in average a larger vocabulary than their later-born siblings.

Play is an authentic context for young children's overall literacy development. Indeed, play offers children opportunities to learn cognitive skills, such as literacy and numeracy concepts. To be more specific, children are developing the kinds of thinking that are foundational to reading and writing when engaged in dramatic play. As well, peer play has the potential to contribute to language learning.

Children with limited expressive vocabulary (less than 40-50 words) and who use no word combinations at the age of 24 months are identified as having slow expressive language development (SELD). These children are at higher risk for language impairment persisting into late preschool to elementary school years. In addition, children with impaired language development are at greater risk for later academic difficulties, learning disabilities, anxiety disorders, social difficulties, and behaviour problems. The most common behavioural problem is Hyperactivity Disorder (ADHD); studies also show high rates of internalizing problems such as shyness and anxiety. Children with speech impairments are more likely to have difficulty with

phonological processing, phonological learning and literacy.

Phonemic awareness refers to the ability to identify, compare and manipulate the smallest units of spoken words, phonemes. During the first year, children are more sensitive to phonemes in their native language and are less sensitive to acoustic differences not relevant to their language. At the age of 7.5 months, the increased children's brain response to their native language contrasts predicts later language skills. Phonemic awareness and vocabulary skills are, respectively, the best predictors of reading and reading comprehension. Some children are sufficiently competent in listening and talking but have poor phonological processing abilities. At school entry, these children may be viewed as being at risk for reading disorder. There is a markedly disproportionate representation of children who are poor and who belong to ethnic or racial minorities among those who struggle with reading.

Finally, bilingual children's language development and age onset for word combinations are comparable to monolingual children.

What can be done?

Early language interventions during infancy or the preschool years can have a significant impact on child outcomes. There are at least four general contexts in which language intervention can be provided: individual, small group, classroom and caregiver training. Five language-teaching strategies have been demonstrated to improve children's language abilities. These are: *prelinguistic milieu teaching*, to help children make the transition from pre-intentional to intentional communication; *milieu teaching*, which consists of specific techniques embedded within a child's ongoing activities and interactions; *responsive interaction*, which involves teaching caregivers to be highly responsive to the child's communication attempts; *direct teaching*, characterized by prompting, reinforcing and giving immediate feedback on grammar or vocabulary within highly structured sessions; and *augmentative and alternative communication*, which refers to non-speech modes of communicating (e.g., sign language, speech-generating devices) used to enhance children's language, vocabulary, communicative turns and functions, and oral speech. In all cases, it is important to set the stage for language learning by creating opportunities for communication, following the child's lead, and building and establishing social routines.

In parent-administered language interventions, parents are trained by speech-language pathologists to become the primary intervention agents, learning how to facilitate their children's language development in daily, naturalistic contexts. (This differs from parent involvement, in which children receive direct attention from the speech-language pathologist and parents play a secondary but supportive role.) Parent-administered interventions have yielded short-term developmental progress in communication and language skills in a wide range of preschool-aged children with delayed or disordered language. However, little is known about the long-term effects of this cost-effective intervention model.

Adults can encourage children's language development through conversations, which include modeling language to build children's knowledge about language, asking open-ended questions to prompt children's talk, and posing follow-up questions to keep children's ideas and words flowing.
High-intensity training is an intervention strategy that aims to increase the attention of children diagnosed with specific language impairment (e.g., parents can increase conversational turn-taking with their children.) Considering that attention deficit is associated with language impairment in young children, and especially boys, high-intensity training involving the parents and the child should be encouraged Based on recent studies, this intervention has been found to improve both children's language proficiency and attention skills.

Social-policy initiatives should focus on early identification with a speech pathologist, comprehensive assessments and providing highly responsive environments early on. As well, appropriate training and continuing education should be provided to everyone who works with children and their families, such as speech-language pathologists, early interventionists, early childhood educators and child-care providers. Yet there are still several barriers to overcome. These include developing more sensitive screening measures to identify the various kinds of impairments, achieving consensus on case definition, and enhancing parent recognition of children's potential problems and the need to seek help.

Preschoolers’ play at home and school as a natural contributor to early literacy and language development

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Introduction

Children of all ages play and through play, naturally engage in child-initiated activities that foster learning. Interactive peer play, a spontaneous, joyful and fun activity that children engage in with peers, is a salient developmental task of the preschool period that fosters developmental skills, like language and literacy. For children growing up in low-income families, research suggests that peer play experiences offer opportunities to promote a positive path forward for children disproportionately experiencing early risks to school success. Here, we provide an overview of research on preschool play in home and school settings in relation to children's language and literacy skills.

Subject

Developmental theorists[1] and early childhood researchers[2,3,4] articulate two key ideas when studying play and preschool language and literacy development. First, it is important to take a holistic, strength-based perspective when studying development within relevant family, community, and socio-cultural contexts. Secondly, researchers must recall that children construct their own learning experiences through active exploration and extend their learning through interactions with peers and more knowledgeable adults.

Problems

Early education systems increasingly prioritize academic instruction because of accountability pressures[5]. In fact, once viewed as an opportunity for socialization and free play, kindergarten is now viewed as the “new first grade”[6]. Teachers must balance time for free play and play-based learning while meeting demands for didactic academic instruction; and children from low-income

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families attending under-resourced early childhood programs are more likely to experience didactic instruction versus opportunities for play-based learning[7]. In addition, parents from diverse cultural and socioeconomic backgrounds hold varied beliefs in the value of children's play.

Research Context

In the past decade, there has been a movement by developmental scholars away from a comparative and deficit-model approach, toward a strength-based within-group approach[2,3,8,9] that acknowledges the culturally relevant ways in which families and teachers support children's engagement in play and learning. Parent and teacher observations within home and school settings[10] identifies three dimensions of peer play: interactive peer play, which describes prosocial, cooperative and creative behaviors, disruptive peer play, such as aggressive behaviors, and disconnected peer play which includes withdrawn behaviors that may interfere with productive peer interactions.

Key Research Questions

How do preschool positive peer play interactions at home and at school relate to language and literacy skills? What perspectives do parents from diverse language and cultural backgrounds bring to their parenting on play? What can parents and teachers do to promote preschoolers' play and learning at home and in school settings?

Recent Research Results

Preschool positive peer play interactions include collaboration and communication – opportunities for children to practice negotiating roles, use creativity and imagination, and problem-solve conflicts. Through activities such as story-telling, make believe play, song play, puppet play, and picture book reading, children develop greater vocabularies and oral narrative skills[11]. Cooperative play with peers is associated with higher receptive vocabulary skills[12].

Conversely, negative peer play interactions such as disruptive or disconnected play behaviors are associated with lower language and literacy outcomes. Children who display disconnected play (shy or withdrawn behaviors) within the classroom, engage less with peers in conversations, and rarely directly engage with their peer play group; subsequently these children score lower on measures of receptive and expressive vocabulary[12]. Children who display aggressive or

disruptive behaviors during play also score lower on measures of vocabulary[13] and letter sounds and knowledge[14]. This, along with the positive association between positive peer play and vocabulary skill development, would suggest peer play's potential to contribute to language learning[15]. However, it is also likely that peer play and language skills develop in a transactional and complementary way during the preschool years. Given that these findings derive from correlational studies, it would be important for future research to examine their potential bidirectional relationship more closely.

It is important to examine how the context of cultural, language, and socioeconomic backgrounds influences how adults value and encourage play as a learning opportunity for children. Children of parents who endorse beliefs about the positive value of play display higher socially competent interactions in play with their peers at school[16-18]. In interviews of predominantly Black mothers of children enrolled in Head Start, parents described all the different ways they observed their children play (inside the house, running, playing independently or with others) and the opportunities in play for children to learn cognitive skills, such as literacy and numeracy concepts (shapes, colors, numbers)[19]. In a study conducted in early Head Start, Latine parents' positive feelings about play as a support for learning was associated with greater parental involvement with children's learning at home and school[20]. Parental involvement during play allows opportunities for children to receive guidance, quality feedback, and support to promote language learning. Similar to parents' perspectives, some preschool teachers see play and learning as distinct, with play negatively influencing children's learning, while other teachers see play as a means of supporting children's learning[21].

Parents and teachers both play a critical role in providing everyday play-based opportunities for children to expand their language and literacy skills[22]. At home, even small changes in how parents promote and engage in play with their children can positively influence children's language and literacy skills. Colliver studied parents who embedded language and literacy activities during everyday child-led activities.[23] Parents intentionally embedded code-related skills (letter sounds) when writing a letter with their child to a family member. As parents wrote the letter with the child, they talked about the sounds of the letters and identified letters they used; as a result, children gained language and literacy skills[23]. This is an example of ways parents can incorporate opportunities to learn during everyday play situations.

In preschool classrooms, teachers can also encourage learning through play, "inside and outside the flow"[24]. Teachers can create language-rich child-directed learning opportunities by setting

up free play areas and materials that elicit conversations, peer sharing and problem solving, creativity, storytelling and imaginative play. Teachers can participate actively as play partners or by asking questions about what children are doing, modeling advanced language, and facilitating opportunities for children to exchange ideas with peers in play, which can foster communication skills[25]. In programs serving low-income children, guided play is associated with higher expressive and receptive vocabulary development than just free play[26] and higher instructional support augments benefits of positive play interactions on academic skills[27].

Research Gaps

Technology is changing the way that children play. Children increasingly interact digitally on screens which influences literacy and language development, in both positive and negative ways. The National Association for the Education of Young Children recommended that technology be used to enhance literacy through applications designed to teach letters, phonics, and vocabulary in engaging ways[28]. However, the American Academy of Pediatrics cautions parents to manage digital media use of young children effectively.[29] Adult-child relationships are crucial for the educational benefits of technology; tools like computers can aid learning but cannot replace face-to-face interactions in children's language development[29].

More research is needed to understand the unique strengths of culturally diverse families as they support play and language development. Research shows that play beliefs and practices vary by immigration, education level, socioeconomic status, and cultural experiences[16,18,30]. More studies are needed to examine familial values and funds of knowledge to understand how play beliefs and practices support language and literacy development, especially for dual language learners.

Conclusions

In summary, most children naturally engage in play with peers during the preschool years and play is fun, intrinsically motivating, and fosters language and literacy skills. Home and school are important contexts affording unique opportunities for children to learn through play. Parents and teachers can engage in guided play experiences and encourage peer play that extends children’s language development during everyday activities at home, and within preschool classrooms. It is important to consider cultural and socioeconomic differences in how play is valued and promoted by adults as key contributors to children’s learning.

Implications for Parents, Services, and Policy

Ultimately, preparing children for kindergarten is not just about academics. For young children to learn in a developmentally appropriate way-- a whole child approach is needed –all children need time to play. Home-school partnerships are critical, particularly for families from low-income and minoritized backgrounds where there may be structural or systemic barriers to shared communication across home and school settings[31]. Early childhood programs and schools can provide professional development support to teachers and strategies to families, regarding ways to facilitate learning in play. Research shows promise in the efficacy of implementing professional development on guided play principles in the classroom to promote children's engagement and communication[32].

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Let Children Talk: Strategies to Foster Early Language and Vocabulary Development through Conversation

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Introduction

Children need opportunities to talk with and receive feedback from adults to develop their language skills. Conversations can boost this talk throughout early learning settings, especially during interactive book reading and play.

Subject

Young children's early oral language skills lay the foundation for learning to read, and ultimately for success in school.[1] Children primarily learn language by engaging in purposeful, back-and-forth conversations with adults. Yet, observational research has shown that extended conversations with ample child talk are not common in early and elementary classrooms[2]; instead, adult talk, often focused on giving directions, generally predominates.[3] Here we describe adult-child conversations that best equip children with the language skills they need to learn to read.

Problems

Although many young children love to share their ideas about the world, eliciting focused and extended child talk and adult-child conversations in classrooms and other settings can be very difficult. One classroom constraint involves the high ratio of children to adults – often in the realm of 20 to 2. A second is that teachers often need individualized, ongoing support, especially personalized coaching, to implement conversations with children.[4]

Research Context

Several bodies of research, including basic science on word learning[5], observational work in homes and classrooms, and intervention studies with both typically developing children[6,7] and those with special needs,[8] elucidate how high-quality conversations build children's early language skills.

Key Research Questions

How can educators and caregivers engage children in effective conversations to increase their language skills, and especially their vocabulary?

Recent Research Results

Extended conversations rest on three pillars: adults' (1) modeling of rich language for children,[2] (2) asking children open-ended prompts,[9] and (3) providing meaningful feedback on what children have said, resulting in multiple conversational turns.[6,10-12] These three components of conversation can be used in a variety of contexts and settings but have often been studied in interactive book reading, where an adult reads a text aloud and poses questions to involve children,[13] and in play, where an adult supports children in acting out a life experience (e.g., pretending to be in a restaurant), building a structure, playing a game,[14] or other activity.

Modeling rich language. Children who hear more words in their environment build larger vocabularies, as early as 3 years.[15,16] Further, when those words include sophisticated and varied vocabulary, as well as complex syntax, children demonstrate stronger language outcomes over time[17]. Children benefit when adults vividly describe the world, narrate their own actions, and detail what children are doing when they work or play. In addition, reading books with children exposes them to syntactically complex prose[18] and new words and ideas, often with pictures to share their meaning.[19] For example, the classic book *The Name Jar*[20] contains rare words such as groove, wrinkled, and cabbage, all embedded in sophisticated, multi-phrase sentences.

Open-ended prompts. While hearing language is important, children also need to use language for themselves. Adults can ask open-ended prompts, which have more than one correct answer and generally require a multiple-word response.[9] These prompts often begin with question words such as "why" and "how," or statements inviting children to "describe" or "tell me more." Open-ended questions are powerful scaffolds during interactive book reading, as they encourage children's discourse about narrative and informational texts, and during play, when they invite child thought and talk. For example, while children pretend to work in a grocery store like the

one in *The Name Jar*, a teacher could ask, “Tell me what kinds of foods you sell here!”

Meaningful feedback. While open-ended prompts serve as the opening volley in a back-and-forth exchange, the adult must provide meaningful feedback to the child to create a full conversation. Ideally, a conversation includes five or more rounds of adult-child exchanges.[6] Feedback can take myriad forms,[21] but two have particularly strong evidence of effectiveness for child language. First, *linguistic expansions* affirm the gist of a child’s response while restating the child’s response with more sophisticated language structures.[22,23] When reading *The Name Jar*, for example, a teacher might ask about how Unhei, the main character, feels as friends mispronounce her Korean name, to which a child might respond, “Sad.” The adult could affirm and extend the child’s remark with an extension such as, “That’s right; she’s feeling very sad as she sits on the bus.” Here the adult models a grammatically complete sentence for the young speaker. Second, *conceptual expansions* involve adding a new idea, such as a vocabulary word or fact, to a child’s response, helping children connect concepts.[10] For example, the teacher might augment her linguistic expansion by adding, “She’s realizing that she’s unique or different from her new friends.” Here the teacher adds several new ideas, including the vocabulary term *unique* .

Follow-up question. Follow-up questions ask the same child, or another child in the group, to build on a previous response in the conversation. For example, when reading *The Name Jar*, the teacher might ask, “Ahmad just told us about how Unhei fills a whole page with marks from her special name stamp from her grandmother. Why does this name stamp change the way she feels about her name?” Resonant with the second point above, *open-ended* follow-up prompts can be particularly beneficial.

Research Gaps

Although basic research around adult-child linguistic interaction is strong, relatively less work has explored the nuts-and-bolts application issues of how best to bring conversations into classrooms and other group contexts. One research gap concerns the uncertain dosage of high-quality conversations children need to engage in throughout the day. Back-and-forth conversations take a significant amount of teachers’ time and generally cannot be accomplished with each child every day. Precision around ideal dosage would greatly help teachers plan. A second research gap involves uncertainty around which types of feedback are best suited for different conversations and learners. For example, determining what type(s) of feedback best

support children with limited language skills without overwhelming them would support effective instructional individualization.

Conclusions

Adults can scaffold children's language development through conversations, which include modeling language to build children's knowledge about language, asking open-ended questions to prompt children's talk, and posing follow-up questions to keep children's ideas and words flowing. Book reading is one fruitful context for conversation, because books expose children to complex language and sophisticated vocabulary that they may not encounter in everyday experience. Play is another valuable arena for conversation, because adults can listen to children's talk, understand what most interests them, and support them in talking about their world. Importantly, though, many early learning contexts demonstrate limited adult-child conversation, partly because of the logistical constraints on conversations in large classrooms or groups. Research urgently needs to determine how best to help teachers foster children's conversational engagement, because language represents a powerful lever for academic and social development over time.

Implications for Parents, Services and Policy

As they prepare for reading instruction, young children need well-developed language skills to understand the words they will soon begin to decode. These opportunities can occur in more structured settings such as book reading and school activities, as well as in more informal settings such as play and transitions from one activity to another. All that is needed is an invested adult willing to support children in expressing their ideas.

One implication of this work is that both teachers' and families' efforts are needed. Families occupy a unique niche in this work, offering children one-on-one conversational partners with whom to extensively practice language. Second, policymakers can explore how teachers could be better supported in classrooms so that conversations are easier to conduct, including examining class sizes and the availability of support personnel to oversee small groups. Third, given the high stakes of early language and vocabulary, educators need effective and ongoing support around teaching this outcome.

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Writing as Part of Culturally Relevant Play Supports Overall Literacy

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Introduction

Young children's literacy learning is enhanced when formal instruction about phonics and letter formation goes hand-in-hand with opportunities for children to write texts as part of play that reflects local cultures and worldviews. Reflective of children's efforts to communicate with others and accomplish social purposes, texts that are considered to be early writing could include drawings, scribbles and lines, as well as letters, words, phrases and sentences.

Subject

Over a number of decades, research examining young children's writing has been underpinned by a view of writing as a social practice,[1,2] where children create and communicate meaning using the symbols of a culture's written system. As such, learning to write involves more than learning spelling, grammar and punctuation. Children must also develop understandings about cultural expectations for communicating through written texts, such as the characteristics of particular types of texts (e.g., emails to friends have a less formal tone and may use emotional symbols such as emojis, that would not be appropriate in letters accompanying a job application).[3,4]

To learn these concepts about written text, children need opportunities to write in authentic, culturally respectful contexts[5] that reflect the local culture and worldview of the places where children live.[6]

Problems

Problems arise from disconnects between research and practice in the teaching of writing in early childhood settings. Two commonly-identified disconnects are as follows:

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1. Despite research showing that early writing contributes to foundational knowledge for reading,[7] teachers in early years settings devote far more classroom hours to teaching reading than writing,[8,9] and
2. Approaches to early years writing instruction often emphasize teaching discrete skills and concepts, detaching writing from its meaningfulness in children's and adults' literate lives.[10]

Research Context

Given the problems identified above, it is important for policy makers, teachers and parents to have access to a wide corpus of research that examines culturally relevant teaching for diverse populations of children.

An important body of research, developed over decades, has involved observations of young children creating texts by scribbling, drawing, making marks and letter-like forms, as well as by writing letters and words.[11,12,13] In the process of creating written texts, children test out hypotheses about various aspects of texts, such as:

- how meaning can be communicated symbolically on a page or screen;
- letter-sound relationships;
- how words go together in sentences; and
- the direction that words go on a page.

Broader application of this research in early learning settings would deter educators and parents from the all-too-common practice of asking children to copy words and messages from adult-created models. Instead, there would be abundant opportunities for children to create their own texts. The act of composing is far more cognitively demanding, requiring children to draw on print knowledge than does the act of copying.[7] When creating their own texts, children must generate content to communicate, drawing on background knowledge about the intended audience's interests and needs as well as what they know about the topic and appropriate words to convey the intended meaning. All of this cognitive activity accompanies their thinking about how many and which sounds are in words that children want to write.[3,4] Children are more motivated to do this thinking and the physical work involved in writing or typing letters if they are writing in authentic contexts, such as play.[14]

Key Research Questions

How does play support young children's writing development? Why should place be given consideration when creating literacy learning experiences for young children?

Recent Research Results

The abstract thought required to read and write is also a requirement of participation in dramatic play.[15,16] In a similar manner to the representation of meaning in printed words, children assign meaning to objects in play (e.g., a block may be designated as a car for a child to move about as if the "car" were driving on a road). In other words, dramatic play and writing involve similar kinds of symbolic thinking. Children are developing the kinds of thinking that are foundational to reading and writing when engaged in dramatic play.

In play settings, children can draw inspiration from a wide range of print they've seen in their environment, such as labels in stores, or road signs, which they can recreate in a sandbox when playing with trucks, for example. Children also expand their vocabulary and ways of putting words together in sentences (syntax) as they encounter language used in context by peers and adults in play.

Play-based writing is very motivational, as children come to see what they can do with print in everyday life. In the process, children develop a strong identity as writers. As others respond to the texts they create in play settings, children develop confidence that they have something worthwhile to communicate. Additionally, children have a reason for improving their spelling, punctuation and grammar when they write texts in play, as they want their readers to be able to make sense of what they write.[17]

Play-based writing also provides contexts for children to write about what they know—what is important to them in their local environments. Young children's writing development is supported when the activities, interactions, texts, and worldviews of their families and communities are valued by being part of the curriculum. Taking up Indigenous worldviews, for example, typically involves highlighting for children the interconnectedness and interdependence of all life. Making these connections is viewed as foundational to children's meaning-making in all areas, including literacy.[18]

Research Gaps

Much of the research on young children's literacy learning is conducted in urban and suburban communities. Results are generalized to rural Indigenous and non-Indigenous communities without consideration of the ways in which place influences the types of interactions, values, worldviews, and experiences that shape children's identities and their learning.[19]

This research gap is particularly noticeable in research examining culturally relevant practices for Indigenous children. Given that schools have a long history of failing to support Indigenous children's learning and overall well-being, research that takes up local Indigenous worldviews within participating Indigenous communities is needed.[20,21] Researchers must carry out research with humility and with respect for the local cultures, consulting frequently with Elders, Knowledge Keepers and other community members to ensure that local perspectives are reflected in data collection and interpretations of the data.[22]

Conclusions

Dramatic play provides opportunities for children to draw upon knowledge and experience of their local communities to create meaningful texts. Children learn about the social uses of written text in everyday life and test out hypotheses about print through having multiple opportunities to create texts. In addition, children encounter vocabulary used in context that can later be accessed in their writing and reading. In this way, play is an authentic context for young children's overall literacy development.

Views of cultural relevance in literacy teaching should be expanded to include the places where children live. Children are more likely to create literate identities when they feel a strong sense of pride in who they are as children from a particular place.[23,21] Within Indigenous communities, this means taking up Indigenous knowledges, typically about relationships with the land, and honouring the languages and land-based teachings of the children's communities.[24]

Implications for Parents, Services, and Policy

A starting point for applying the research is for adults to invite children to create texts and then to respond to whatever texts children create to communicate meaning, accepting them as legitimate written texts. By doing this, adults support children's creations of literate identities.[25]

Providing authentic contexts for writing is especially important to support children's understanding of the meaningfulness of print in everyday life. Along with creating types of texts

that are used in particular contexts, adults can model writing processes that children can imitate when creating their own texts (e.g., saying words slowly to emphasize sounds that must be represented by letters).

A final implication is to broaden understandings of relevant literacy instruction to include the local cultures and worldviews of places where children live. Policy and literacy teaching in an early learning setting should start with an assumption of heterogeneity across urban, rural and suburban children's and families' ways of being and interacting in their worlds. An important first step in acting on this assumption will be to develop policies and practices after consulting with educators and educational leaders within and beyond the large urban centers that house research and training institutions, and government curriculum development offices.

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Computer-Assisted Word Recognition Interventions

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Introduction

Children in Kindergarten (Reception) through Grade 2 must develop word recognition skills—the ability to read individual words quickly and accurately—to support reading comprehension. *Computer- or tablet-based applications* (apps) include computer-assisted instruction (CAI) tools used in schools and educational technology used at home. These apps are designed to enhance skills through interactive activities.

Subject

Many app-based word recognition programs exist, but little is known about their effectiveness or best use. These apps gradually introduce literacy concepts based on current reading performance, starting with letter sounds, then simple words (e.g., *bat*), common spelling patterns (e.g., *EE*), and eventually polysyllabic words (e.g., *robot, replacement*). Most use *receptive* exercises where children listen and select the correct word (see Figure 1), while few currently use speech recognition for spoken responses – though more are being developed.

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Figure 1. This child is practicing reading using a receptive learning modality. The child hears the word bat through headphones and selects the printed words that matches what is heard.

Problems

Despite the large and expanding market (approximately $6 billion in 2023)[1], it remains unclear whether time spent on word recognition apps yields educational benefits or which features make them effective. Research has yet to determine which children will benefit most or the ideal conditions for use.

Research Context

Many studies test whether specific apps improve reading. Small efficacy studies focus on app-specific skills, while larger effectiveness trials provide a gold standard for measuring impact. Meta-analyses combine these studies to assess overall benefits and factors (e.g., moderators) that influence effectiveness. This article draws on both small and large studies, as well as meta-analyses to identify the benefits of word recognition apps.

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Key Research Questions

Do word recognition apps have a positive effect on word recognition skills in Kindergarten through Grade 2? What child characteristics and app features lead to the greatest improvement?

Recent Research Results

Overall, apps can have a small positive impact on literacy outcomes for elementary-age children [2,3]. Studies evaluating factors that influence effectiveness have considered dosage, supervision, cultural and language context, child characteristics, and app features.

Dosage

Evidence on dosage for traditional reading intervention is mixed, ranging from no effects[4] to positive effects of increased dosage mainly for at risk or reading disabled readers[5]. When it comes to app-assisted learning for reading, total time spent using the app didn't change reading outcomes in some studies[6]. This aligns with an earlier study of educational apps, which found that more than one session was better than just one, but the length of the sessions didn't make a difference[7]. In summary, massed practice (a lot of instruction in a short time) is unlikely to result in better reading outcomes than repeated practice over time, but there isn't enough evidence yet to make a clear recommendation.

Supervision

Some studies have examined the effect of adult supervision (i.e., facilitation) during app use on reading outcomes as opposed to those in which children engage in independent practice (e.g., child working on laptop alone).[7,8,9,10] Examples of adult supervision include working 1:1 with a child; small group, teacher-led instruction that supplements other instruction; and providing motivation. One particularly effective strategy is incorporating a positive reinforcement system paired with performance feedback (i.e., explaining why an answer was right or wrong[7]). In addition, prompts (e.g., hints) facilitate app-based learning[7]. For parents, this may be especially effective when apps include real-time prompts and suggestions, while teachers use their expertise to provide scaffolds and targeted support. Approaches which integrated apps into an existing curriculum are also found to be more effective for beginning readers relative to those which used them as an isolated activity[3]. While there is a general assumption that app-based instruction is child-led, findings suggest that adult facilitation is still needed to achieve the

greatest academic benefits.

Cultural and Language Context

Apps for literacy have been studied across the world[11] (e.g., India[12]; Switzerland[13]; The Netherlands[14], and many international studies have shown positive effects. When it comes to different languages, the way a language is written (i.e., orthography) doesn't affect the success of technology-based early literacy programs[15]. These programs can be effective in any language as they tend to focus on generalizable reading skills. However, apps may not outperform teacher-led instruction without technology in Kenya[16] and Zimbabwe[17] and may not be the best means to improve literacy in low-resource environments.[18]

Child Characteristics

When it comes to typical reading instruction, many studies will examine how child characteristics such as grade and risk of reading difficulty change its effectiveness. Currently there are inconsistent findings pertaining to how grade and reading skills impact the effectiveness of app use. Generally, children at all grades and levels of reading ability can benefit from app-based word-recognition instruction.[2,3,15] There is one notable difference that shows that it may be particularly effective in secondary grades[8], but more research is needed to examine this difference.

App Features

Some studies have examined features of apps that might make them more effective, including whether they are adaptive, have a reinforcement system, or use certain design features. Table 1 provides a summary.

Table 1. App Features and the Relation with Child Academic Performance

App Design Feature	Definition	Examples	Level of Evidence

Adaptivity[19,20,21]	Changing the difficulty of lessons in response to performance.	• Child moves on to more complex sound-spellings after 80% accuracy on easier ones. • Child does additional practice reading for fluency after giving a number of accurate but slow responses.	Moderate favoring adaptivity Negative if adaptivity is based on completing tasks, not performance[7]
Reinforcement[7]	A way to maintain engagement while using app that includes performance feedback and/or performance- or effort-contingent rewards.	• Child earns a badge after reaching a new level in a game. • Child receives a number of points after correcting a mistake in an activity.	Limited favoring reinforcement including performance feedback

Schematic design[7]	Type of visuals used to present the game: • Simple interfaces with few elements outside the learning content • Interfaces with cartoons for photo-realistic characters or environments that take attention away from content	• Simple: App uses icons to show how to move to the next activity or ask for a word to be repeated. • Cartoon: App has cartoon characters that perform acrobatic tricks after every correct answer. • Photo-realistic: App has a virtual host who “talks” to the child at length.	Weak favoring simple interfaces

Table 1. *Summary of design features that may be associated with child success using apps—based on studies including children in elementary schools that come from multiple content areas—not literacy specifically.*

Research Gaps

Despite significant research, gaps remain in studies on app-based instruction. There is limited systematic analysis of app features, making it difficult to provide clear recommendations. For example, research on dosage is limited, so we do not fully understand how much time should be spent on app-based instruction. Additionally, few studies compare effectiveness in different settings, like at home versus at school. Some research suggests supervision improves outcomes[7,9]

but there has not yet been a comparison of what this should look like among education professionals versus parents/guardians. Finally, most research has focused on high-income countries, with less attention to socioeconomic factors or studies in developing regions. These gaps highlight the need for more inclusive and targeted research to better understand the effectiveness of word recognition apps.

Conclusions

While use of word recognition apps for early readers holds promise for supplementing teacher-led instruction, current research gaps limit conclusions about optimal use conditions. Overall, extant studies find small positive effects with minimal differences in outcomes as a function of child characteristics (e.g., reading disability or at-risk status, grade, culture or language of instruction). With limited systematic examination of app features, setting, or dosage and most meta-analyses combining data from multiple apps, strong recommendations for development or use are premature.

Implications for Parents, Services and Policy

To build word recognition skills, most children need direct, explicit reading instruction and an adequate number of practice opportunities. Apps can be used as a tool to increase the number of practice opportunities and supplement formal reading instruction. Apps are not a replacement for teacher-provided instruction, particularly among beginning readers learning phonological awareness and the alphabetic principle.[15] There is not sufficient evidence to recommend or discourage use of apps at home as the majority of use has been within school settings. Overall, current studies have demonstrated that using apps for academic learning has promising benefits, but there is limited understanding about the best way to use it. Future studies should focus on developing explicit guides for use that are linked to maximizing reading outcomes.

Note

* All asterisked references are meta-analyses or research syntheses.

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Speech Development and Literacy

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Introduction

Literacy is essential to success in modern life. Literacy levels predict school completion,[1] vocational outcomes,[2] mental[3] and physical health,[4,5] and quality of life.[2] Ensuring optimum literacy levels requires a focus on young children because oral language skills are the foundation of literacy.[6] According to the "simple view of reading"[7] the ability to comprehend text is determined by oral language comprehension and decoding skills. Decoding, or sounding out letters to recover words from print, is founded on the ability to perceive speech accurately, pronounce speech clearly and understand how speech sounds are combined to form words. These are all aspects of phonology. For most children, phonological development begins before birth, when the fetus hears the melody of maternal speech in the womb, and continues through 9 years of age when the child has learned to accurately pronounce all sounds in the native language.[8]

Subject

Speaking and reading are related because these skills are dependent upon phonological processing.[9,10] Phonological processing includes perceiving speech sounds in speech input ('bin' and 'pin' sound different), recognizing patterns in speech input ('hat', 'mat', and 'sat' share a similar ending), and holding phonological information in memory long enough to use it ('b'–'a'–'t', that makes 'bat').[11,12] Within the first year the normal-hearing infant has learned which speech sounds are important in the native language and which speech rhythms are commonly used in words and phrases.[13] This knowledge supports the onset of babbling as well as word learning.[14] Over time the young child learns how speech sounds are combined to form words and gradually speech accuracy improves.[15,16] The older child combines an explicit awareness of the sound structure of words with the alphabetic principle to acquire reading.[17,18]

Problem

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Children vary greatly in phonological processing skills[19] and in the rate and typology of speech development.[20] Children with the slowest speech development are at risk for reading disability (dyslexia) when they are school-age. However, some children with unclear speech have no difficulty learning to read and many children with dyslexia had no prior speech difficulties. The challenge of identifying and intervening to prevent reading difficulties is even greater when the child speaks more than one language or does not speak the school language at school entry. Another complication is that the relationship between accurate speech production and reading acquisition is not direct: it is mediated by phonological processing which is a relatively hidden ability. If the child has poor phonological processing but reasonably clear speech the child may not be referred for intervention. When a child with unclear speech is referred to a speech-language pathologist, the intervention may focus on producing accurate speech sounds while ignoring the underlying deficit in phonological processing.

Research Context

Longitudinal studies have revealed how earlier developing skills (speech accuracy, word learning, emergent literacy) predict later developing skills (decoding, reading comprehension). These studies might follow large samples of children drawn from the general population[21-23] or clinic-referred samples with known delays in speech and language development.[24-26] Other longitudinal studies have examined the relative contributions of genetic and environmental factors to language and literacy outcomes by following twins[27] or children born to dyslexic parents.[28,29] Other studies have examined family characteristics and parent behaviours that are associated with the development of emergent literacy skills during the preschool period.[30,31] Finally, some studies have tried to determine best practices for speech-language pathologists and preschool teachers when providing services to children who are at-risk for reading difficulties.[32-35]

Key Research Questions

What can parents do to help their children be ready to learn to read at school entry? Which children with speech problems are most likely to have difficulties learning to read? What are the implications of this research literature for speech-language pathology practice when treating preschoolers with speech sound disorders?

Recent Research Results

Children with delayed or disordered speech development are at increased risk for dyslexia. It is important for parents and professionals to monitor the child's achievement of important milestones in speech development, specifically:

- 7 to 11 months: onset of babbling, that is, repetitive strings of speech-like syllables like "baba" and "deedee;"[36]
- 3 to 4 years: intelligible speech, that is, even strangers can understand almost all or all of the child's speech;[37,38]
- 4 to 6 years: implicit awareness of alliteration and rhyme and sounds in words;
- 7 to 9 years: accurate speech sound production, that is, all speech sounds are produced correctly although slight distortion of some sounds might occur but decline during this period.

The ages at which these milestones are achieved are roughly similar regardless of the language(s) that the child is learning even though the details of speech development vary by language group.[39,40] A useful tool has been developed for measuring speech intelligibility in different languages (see http://www.csu.edu.au/research/multilingual-speech/ics).[41] Not all children with unclear speech are at equal risk of dyslexia however. Referral to a speech-language pathologist is most important when there are additional risk factors, specifically concomitant delay in language skills and a family history of speech, language or reading problems.[42] Note that multilingualism is not a specific risk factor for delayed acquisition of decoding skills.[43]

Parents can teach their child phonological awareness which is the knowledge that words are made up of smaller parts.[44] Spoken language is a continuous stream of sound that does not map easily onto the letters or words that we see in print. Word games that involve breaking up words into parts and recombining them get the point across (football, tee-ball, teacup, buttercup). Matching words that share the same beginning (sun, soup, sand) to the appropriate letter (s) is an important activity that 4-year-olds can learn.[45] Most children know some of the alphabet before they begin kindergarten.[46] Phonological awareness skills are heritable because there is a strong genetic component to the neurodevelopmental underpinnings of phonological processing.[27,47-50] When phonological processing is poor, a large vocabulary helps the child acquire better phonological awareness than they might otherwise[9] as well as supporting future reading comprehension.[18,51] High quality parental language input is essential to language development and shared reading is an excellent context for vocabulary teaching.[52-54]

These kinds of parental inputs will be especially important if the child is struggling to speak clearly. Speech sound disorders affect 3 to 5% of preschool aged children,[23] 11% of kindergarten aged children[55] (with at least a third of these also having a language disorder)[56] and 18% of 8-year-old children.[57] Children with unclear speech should be referred to a speech-language pathologist. Early intervention is desired because persistence of the speech problem past the point at which reading instruction begins is another risk factor for dyslexia.[58-60] The speech-language pathologist must organize resources to address the child's challenges in the areas of speech accuracy, phonological processing and oral language development.[61-66]

Research Gaps

Children with speech sound disorders are a heterogeneous population made up of different subgroups with varied risk of future reading difficulty.[59] The development of effective interventions for these specific subgroups is in the beginning stages. Furthermore, little is known about optimum intensity and scheduling of treatment.[64,67] Boys are at greater risk of speech disorders[68,69] and often score worse than girls on measures of emergent literacy and reading.[70,71] More research to understand these gender differences and to develop gender-sensitive responses to speech and reading difficulties is required.

Conclusions

Phonological development begins before birth and continues throughout childhood with parallel and gradual improvements in speech perception, speech production accuracy and phonological awareness. Phonological development is closely linked to reading development and the ability to decode words in print is built upon these earlier developing oral language skills.

Implications for Parents, Services and Policy

Parents, educators and health care workers should monitor the child's achievement of certain easily observable milestones in speech production development—babbling by 11 months, speech intelligibility by 4 years and speech accuracy by 7 to 9 years. Parents and teachers can use direct teaching and shared reading to increase vocabulary size and phonological awareness, thus preparing the child for success when reading instruction begins in school.

For children with delayed speech development, the speech-language pathologist must attend to speech accuracy and underlying deficits in phonological processing that put the child at risk for

dyslexia. Service providers should ensure that speech therapy services are sufficiently intense and multidisciplinary, engaging families, educators, and other professionals when necessary, to ensure that children achieve normalized speech, language and emergent literacy skills before the onset of formal reading instruction.

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Language Development at an Early Age: Learning Mechanisms and Outcomes from Birth to Five Years

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Introduction

The acquisition of language is one of the more remarkable achievements of early childhood. By age 5, children essentially master the sound system and grammar of their language and acquire a vocabulary of thousands of words. This report describes the major milestones of language development that typically-developing, monolingual children achieve in their first 5 years of life and the mechanisms that have been proposed to explain these achievements.

Subject

Young children's language skills are important to their interpersonal and academic success.[1,2] It is therefore crucial to have descriptions of normative development that allow identification of children with language impairment and to have an understanding of the mechanisms of language acquisition that can provide a basis for optimizing all children's development.

Problem

Although all normal children in normal environments acquire the language (or languages) they hear, children's rates of development– and thus skill levels at any age– vary enormously. One goal of research in the field is to understand the roles of innate abilities and environmental circumstances in explaining both the universal fact of language acquisition and the variability in language development.[3]

Research context

Children's language development has been a topic of interest since antiquity and the focus of substantial scientific research since the 1960s.[4] Although the field has broadened its scope of inquiry in recent years, there is still more research that describes middle-class, monolingual

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children acquiring English than other groups and other languages.

Recent Research Results

The course of language development and its underlying mechanisms are usually described separately for the subdomains of phonological development (the sound system), lexical development (the words), and morpho-syntactic development (grammar), although these domains are interrelated both in language development and in language use.

Phonological development. Newborns have the ability to hear and discriminate speech sounds.[5] During the first year, they become better at hearing the contrasts their language uses, and they become insensitive to acoustic differences that are not relevant to their language. This tuning of speech perception to the ambient language is the result of a learning process in which infants form mental speech sound categories around clusters of frequently-occurring acoustic signals. These categories then guide perception such that within category variation is ignored and between category variation is attended to.[6,7]

The first sounds infants produce are cries and noises that are not speech-like. The major milestones of pre-speech vocal development are the production of canonical syllables (well-formed consonant + vowel combinations), which appear between 6 and 10 months, followed shortly by reduplicated babbling (repetitions of syllables). When first words appear, they make use of the same sounds, and they contain the same numbers of sounds and syllables, as the preceding babbling sequences.[8] One process that contributes to early phonological development appears to be infants' active efforts to reproduce the sounds they hear. In babbling, infants may be discovering the correspondence between what they do with their vocal apparatus and the sounds that come out. The important role of feedback is suggested by findings that children with hearing impairment are delayed in achieving canonical babbling. At approximately 18 months, children appear to have achieved a mental system for representing the sounds of their language and producing them within the constraints of their articulatory abilities. At this point children's production of speech sounds becomes consistent across different words – in contrast to the earlier period when the sound form for each word was a separate mental entity.[9] The processes underlying this development are not well understood.

Lexical development. Infants understand their first word as young as 5 months, produce their first words between 10 and 15 months of age, reach the 50-word milestone in productive vocabularies around 18 months of age, and the 100-word milestone between 20 and 21 months.[10] After that, vocabulary development proceeds so rapidly that tracking the how many words children know becomes unwieldy. The vocabulary size of an average 6-year-old has been

estimated at 14,000 words.[11]

The task of word learning has multiple components and recruits multiple mechanisms.[12] Infants make use of statistical learning procedures, tracking the probability that sounds appear together, and thereby segmenting the continuous stream of speech into separate words.[13] The capacity to store those speech sound sequences, known as phonological memory, comes into play as entries in the mental lexicon are created.[14] In the task of mapping a newly-encountered word onto its intended referent, children are guided by their abilities to make use of socially-based inferencing mechanisms (i.e., speakers are likely to be talking about the things they are looking at),[15] by their cognitive understandings of the world (some word learning involved mapping new words onto pre-existing concepts),[16] and by their prior linguistic knowledge (i.e., the structure of the sentence in which a new word appears provides clues to word meaning).[17] Full mastery of the meanings of words may require new conceptual developments as well.[18]

Morpho-syntactic development. Children begin to put two, then three and more words together into short sentences at approximately 24 months of age. Children's first sentences are combinations of content words and are often missing grammatical function words (e.g., articles and prepositions) and word endings (e.g., plural and tense markers). As children gradually master the grammar of their language, they become able to produce increasingly long and grammatically complete utterances. The development of complex (i.e., multi-clause) sentences usually begins some time before the child's second birthday and is largely complete by age 4. In general, comprehension precedes production.[4]

The mechanism responsible for grammatical development is one of the mostly hotly-debated topics in the study of child language. It is argued that children come to the language-learning task equipped with innate knowledge of language structure and that language could not be achieved otherwise. It is also clear, however, that children have the ability, even in infancy, to detect abstract patterns in the speech they hear,[19] and there is very strong evidence that children who hear more speech and who hear structurally more complex speech acquire grammar more rapidly than do children with less experience[3,20] – which suggests that language experience plays a substantial role in language development.

Research Gaps

One gap or disconnect in the field is between the theoretically-driven quest to account for the universal fact of language acquisition and the applied need to understand the causes of individual differences in language development. Relatedly, there is less research on minority populations and on bilingual development than on monolingual development in middle-class

samples. This is a serious gap because most standardized assessment tools are not suited to identifying organically-caused delay in minority children, in children from low socioeconomic strata, or in children acquiring more than one language.

Conclusions

The course of language development is very similar across children and even across languages, suggesting a universal biological basis to this human capacity. The rate of development varies widely, however, depending both on the amount and nature of children's language experience and on children's capacities to make use of that experience.

Implications

Normally-endowed children need only to experience conversational interaction in order to acquire language. Many children, however, may not experience enough conversational interaction to maximize their language development. Parents should be encouraged to treat their young children as conversational partners from infancy. Educators and policy makers should realize that children's language skills reflect not only their cognitive abilities but also the opportunities to hear and use language their environments have provided.

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Factors that Influence Language Development

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Introduction

Learning to talk is one of the most visible and important achievements of early childhood. In a matter of months, and without explicit teaching, toddlers move from hesitant single words to fluent sentences, and from a small vocabulary to one that is growing by six new words a day. New language tools mean new opportunities for social understanding, for learning about the world, and for sharing experiences, pleasures and needs.

Subject

The nature of language knowledge

Language development is even more impressive when we consider the nature of what is learned. It may seem that children merely need to remember what they hear and repeat it at some later time. But as Chomsky[1] pointed out so many years ago, if this were the essence of language learning, we would not be successful communicators. Verbal communication requires productivity, i.e. the ability to create an infinite number of utterances we have never heard before. This endless novelty requires that some aspects of language knowledge be abstract. Ultimately, “rules” for combining words cannot be rules about particular words, but must be rules about *classes* of words such as nouns, verbs or prepositions. Once these abstract blueprints are available, the speaker can fill the “slots” in a sentence with the words that best convey the message of the moment. Chomsky’s key point was that since abstractions cannot ever be directly experienced, they must emerge from the child’s own mental activity while listening to speech.

Problems and Context

The debate

The nature of the mental activity that underlies language learning is widely debated among child language experts. One group of theorists argues that language input merely triggers

grammatical knowledge that is already genetically available.[2] The opposition argues that grammatical knowledge results from the way the human mind analyzes and organizes information and is not innate.[3] This debate reflects fundamentally different beliefs about human development and is not likely to be resolved. However, there are at least two areas in which there is a substantial consensus that can guide educators and policy-makers: (a) the predictability of the course of language acquisition; and (b) its multi-determinate nature.

Research Results

Predictable language sequences

In broad strokes, the observable "facts" of language development are not in dispute. Most children begin speaking during their second year and by age two are likely to know at least 50 words and to be combining them in short phrases.[4] Once vocabulary size reaches about 200 words, the rate of word learning increases dramatically and grammatical function words such as articles and prepositions begin to appear with some consistency.[5] During the preschool years, sentence patterns become increasingly complex and vocabulary diversifies to include relational terms that express notions of size, location, quantity and time.[6] By the age of four to six or so, most children have acquired the basic grammar of the sentence.[7] From that point onward, children learn to use language more efficiently and more effectively. They also learn how to create, and maintain, larger language units such as conversation or narrative.[8] Although there are individual differences in rate of development, the sequence in which various forms appear is highly predictable both within and across stages.[9]

Determining factors

There is also considerable agreement that the course of language development reflects the interplay of factors in at least five domains: social, perceptual, cognitive processing, conceptual and linguistic. Theorists differ in the emphasis and degree of determination posited for a given domain, but most would agree that each is relevant. There is a large body of research supporting the view that language learning is influenced by many aspects of human experience and capability. I will mention two findings in each area that capture the flavour of the available evidence.

Social

1. Toddlers infer a speaker's communicative intent and use that information to guide their language learning. For example, as early as 24 months, they are able to infer solely from an adult's excited tone of voice and from the physical setting that a new word must refer to an object that has been placed on the table while the adult was away.[10]
2. The verbal environment influences language learning. From ages one to three, children from highly verbal "professional" families heard nearly three times as many words per week as children from low verbal "welfare" families. Longitudinal data show that aspects of this early *parental* language predict language scores at age nine.[11]

Perceptual

1. Infant perception sets the stage. Auditory perceptual skills at six or 12 months of age can predict vocabulary size and syntactic complexity at 23 months of age.[12]
2. Perceptibility matters. In English, the forms that are challenging for impaired learners are forms with reduced perceptual salience, e.g. those that are unstressed or lie united within a consonant cluster.[13]

Cognitive processes

1. Frequency affects rate of learning. Children who hear an unusually high proportion of examples of a language form learn that form faster than children who receive ordinary input.[14]
2. "Trade-offs" among the different domains of language can occur when the total targeted sentence requires more mental resources than the child has available. For example, children make more errors on small grammatical forms such as verb endings and prepositions in sentences with complex syntax than in sentences with simple syntax.[15]

Conceptual

1. Relational terms are linked to mental age. Words that express notions of time, causality, location, size and order are correlated with mental age much more than words that simply refer to objects and events.[16] Moreover, children learning different languages learn to talk about spatial locations such as *in* or *next to* in much the same order, regardless of the grammatical devices of their particular language.[17]

2. Language skills are affected by world knowledge. Children who have difficulty recalling a word also know less about the objects to which the word refers.[18]

Linguistic

1. Verb endings are cues to verb meaning. If a verb ends in –ing, three-year-olds will decide that it refers to an *activity,* such as *swim*, rather than to a *completed change of state,* such as *push off*.[19]

2. Current vocabulary influences new learning. Toddlers usually decide that a new word refers to the object for which they do not already have a label.[6]

Conclusions

Nature and nurture

These are just some of the findings that, taken together, speak convincingly of the interactive nature of development. Children come to the task of language learning with perceptual mechanisms that function in a certain way and with finite attention and memory capacities. These cognitive systems will, at the least, influence what is noticed in the language input, and may well be central to the learning process. Similarly, children's prior experience with the material and social world provides the early bases for interpreting the language they hear. Later, they will also make use of language cues. The course of language acquisition is not, however, driven exclusively from within. The structure of the language to be learned, and the frequency with which various forms are heard, will also have an effect. Despite the theoretical debates, it seems clear that language skills reflect knowledge and capabilities in virtually every domain and should not be viewed in an insular fashion.

Educational and Policy Implications

Educators and policy-makers have often ignored preschoolers whose language seems to be lagging behind development in other areas, arguing that such children are "just a bit late" in talking. The research evidence suggests instead that language acquisition should be treated as an important barometer of success in complex integrative tasks. As we have just seen, whenever language "fails" other domains are implicated as well – as either causes or consequences. Indeed, major epidemiological studies have now demonstrated that children diagnosed with specific language disorders at age four (i.e. delays in language acquisition *without* sensori-motor

impairment, affective disorder or retardation) are at high risk for academic failure and mental-health problems well into young adulthood.[20,21] Fortunately, the research evidence also indicates that it is possible to accelerate language learning.[22] Even though the child must be the one to create the abstract patterns from the language data, we can facilitate this learning (a) by presenting language examples that are in accord with the child's perceptual, social and cognitive resources; and (b) by choosing learning goals that are in harmony with the common course of development.

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Biological Bases of Language Development

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Introduction and Subject

Advances in neuroimaging allow for the investigation of the neurobiological bases of language and the effects of environmental and genetic factors on neural organization for language in children. An understanding of the neurobiology of language has important implications for those seeking to optimize language development. Insights from this research may support practical, evidence-based advice for parents as well as the development of language and literacy curricula for first and second language learners.

Problems

A complex interaction between genetic and environmental factors produces substantial variation in rates of language development among children. Many behavioural studies illuminate the effects of environmental factors on language development; however, less is known about the neurobiological underpinnings of these effects. Most neurobiological research concerns individuals from middle and higher socioeconomic status (SES) backgrounds.

Research Context

Research on the neurobiology of language uses neuroimaging techniques with exquisite temporal resolution (e.g., event-related potentials; ERPs) and complementary techniques with exquisite spatial resolution (e.g., functional magnetic resonance imaging; fMRI). ERPs are better suited for use with infants and children, although fMRI is also used with younger populations. Increasingly, these methods are being used to characterize the developmental timecourse of different language subsystems and to more precisely examine the effects of language experience, and the timing of these effects, on the development of different language functions and on the neural mechanisms which mediate these subsystems.

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Key Research Questions

Key research questions involve the use of neuroimaging techniques to characterize:

1. the timecourse of the development of neural substrates of different subsystems of language,
2. the effects of environmental and genetic factors on the development of these neural substrates, and
3. the time periods during which the effects of environmental and genetic factors are maximal (i.e., sensitive periods) for each subsystem.

Recent Research Results

The neurobiological bases of three linguistic subsystems have been studied, specifically phonology (sound system of the language), semantics (vocabulary and word meanings), and syntax (grammar). This research shows that brain responses to language at early ages are predictive of later language proficiency.

Within the first year of life infants become increasingly sensitive to speech sound contrasts important to their native language(s) and insensitive to unimportant phonetic contrasts.[1] This sensitivity to native language contrasts is reflected in a brain response which has been shown in adults to be a neural index of phonetic discrimination: in 7.5-month-old infants the brain response to native language contrasts correlated with behavioural perception of these contrasts.[2] Furthermore, an increased neural response at 7.5 months predicts word production and sentence complexity at 24 months and mean length of utterance at 30 months. The inverse relationship was noted for discrimination of non-native contrasts.[2]

ERP methodology has also been used to examine early word learning and associated changes in neural specialization. In 13-month-olds the brain response to known words differs from that to unknown words, with this effect broadly distributed over both the left and right hemispheres.[3] By 20 months of age this effect was limited to the left hemisphere, a pattern more like that seen in adults and one associated with increased specialization for language processing. In addition, such increased brain specialization is also associated with greater language ability in children of the same chronological age.[4]

Developmental increases in neural specialization for language are associated with differences in SES. For example, differences in the structure of left frontal brain areas important for language processing were found in five-year old children as a function of SES.[5] Another study found that SES predicted brain volume in left frontal and posterior brain areas important for language; furthermore, these SES differences may increase with age.[6] Lower SES was also associated with reduced surface area in multiple brain regions, including frontal regions supporting language.[7] These relationships may endure into adulthood: in adults, socioeconomic deprivation predicts the degree of thinning in the cortex in posterior language areas.[8] Retrospective childhood SES also predicts language proficiency and early neural response to syntax over left frontal brain areas in adults.[9]

Neuroimaging studies of young children show increasingly adult-like brain activation patterns to printed letters and cortical thickening in language-relevant areas with differences in parental language input and following reading interventions with children at-risk for reading disorders and with children from lower SES backgrounds.[10,11,12]

Numerous ERP sentence processing studies of adults have shown that semantic and syntactic subsystems are processed by different brain systems across spoken, written and signed languages, which share these different subsystems.[13] Studies of bilinguals of both spoken and signed languages show that these distinct subsystems display different degrees of plasticity with different sensitive periods.[14,15,16] In these studies, a comparison is made between the brain responses to correct sentences versus sentences that violate semantic or syntactic expectations (e.g., “My uncle will blow the movie” or “My uncle will watching the movie”). In adults, specialized and efficient brain function is indexed by neural responses that originate from relatively focal brain areas whereas such responses in children may be more widespread in the brain.[17-23]

The few ERP studies of sentence processing in children suggest that this specialization of different brain systems occurs early in development. A brain response similar to that elicited by semantic violations in adults has been reported reliably in five-year old children, and even in children as young as 19 months.[17,20] This brain response predicted expressive language proficiency at 30 months of age and becomes faster and more specialized with age.[18,19] ERP responses to syntactic violations in children are qualitatively different than the response to semantic violations. Though slower and more widely distributed, the response to syntactic violations found in children is similar to that found in adults.[22-24] The neural response to semantic

and syntactic violations in 3- to 8 year-old children has also been found to vary as a function of language proficiency, other cognitive skills, and SES.[25] Longitudinal ERP studies suggest that, between ages four and five years, children from higher SES backgrounds exhibit more rapid maturation of ERP indices of both semantic and syntactic processing than peers from lower SES backgrounds.[26]

Recent ERP research has also examined a cognitive system shown to be important for the development of language skills: specifically selective attention to one auditory stimulus while ignoring a competing auditory stimulus. Selective attention is indexed by a larger brain response (ERP) to the attended auditory event compared with the competing auditory event. This attention effect is reduced in children diagnosed with specific language impairment[27] and in typically developing children from lower SES environments.[28,29,30] Differences in the effects of attention on neural processes in children from lower SES backgrounds have been found to be associated with genetic allelic differences, specifically in the serotonin system (i.e., 5-HTTLPR[31]).

Importantly, this cognitive system is changeable with experience in young children. For example, high-intensity training was found to increase both language proficiency as well as the effects of attention on neural processing in 6-8 year-olds.[32] Essentially, parents can change these cognitive systems: a two-generation intervention study found changes specific to families who received a more parent-focused model of the program. Parents increased conversational turn-taking with their children, and children improved language proficiency as well as brain function for selective attention.[33]

Research Gaps

Further research on the neurobiology of language development is required to better understand underlying environmental and genetic factors; for example, studies of typically developing children from a wider range of SES backgrounds. Additional studies with clinical populations will increase understanding of neurobiological changes that occur with different disorders. For example, see emerging research on neurobiology of stuttering.[34-36] Another important next step is to employ results from this research to design and implement evidence-based interventions which improve the skills necessary for the development of language and to determine the age(s) at which they are most effective.[11,12,33]

Conclusions

Modern neuroimaging techniques are powerful tools for investigating the effects of environmental and genetic factors on the neurobiology of language development. Research using these techniques with children from a wider range of SES backgrounds and other differences in early experience will lead to a more complete characterization of the developmental timecourse of language subsystems and effects of environmental factors on this development.

Implications for Parents, Services and Policy

This basic research can drive the development of evidence-based policies and services which improve language and other cognitive skills important for academic achievement.e.g.,[11,12,33] Such research can also provide specific, evidence-based suggestions for parents. This is the focus of a non-profit video program produced by the University of Oregon Brain Development Lab (changingbrains.org).

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Parents' Role in Fostering Young Children's Learning and Language Development

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Introduction

During the first years of life, children undergo major developmental changes across a range of domains. In particular, the entry into "formal language" is one of the most heralded achievements of early development. Language enables children to share meanings with others, and to participate in cultural learning in unprecedented ways. Moreover, language is foundational to children's school readiness and achievement. For these reasons, a vast body of research has been dedicated to understanding the social-contextual factors that support children's early language and learning. This work is also central to practitioners, educators and policy makers who seek to promote positive developmental outcomes in young children.

Subject

Developmental scholars have long been interested in documenting the social experiences that help explain within- and between-group variation in children's early language and learning.[1,2] This work is anchored in the writings of scholars such as Bruner[3,4] and Vygotsky,[5] who posited that learning occurs in a socio-cultural context in which adults and primary caregivers support or "scaffold" young children to higher levels of thinking and acting. According to this view, children who experience sensitive, cognitively stimulating home environments early in development are at an advantage in the learning process.

Problem

Research into the factors that promote positive language growth and learning in young children is central to addressing achievement gaps that exist in children from different ethnic, language, racial, and socioeconomic backgrounds. Children enter school with different levels of skill, and these initial differences often affect children's subsequent language growth, cognitive development, literacy and academic achievement.[6,7,8] Children who exhibit delays at the onset of

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schooling are at risk for early academic difficulties and are also more likely to experience grade retention, special education placement, and failure to complete high school.[9,10,11]

These delays are particularly evident in children living in poverty. Children from low-income households lag behind their peers in language skills from early on,[2,12] and have been shown to develop vocabularies at slower rates than their peers from more economically advantaged households.[7] Smaller receptive and productive vocabularies, in turn, predict children's later reading and spelling difficulties in school.[8,13]

Research Context

The demographic profiles of minority and immigrant populations in the U.S. and Canada have changed dramatically over the past decade– a shift that has generated research on the widespread disparities that exist in children's school readiness across ethnic, racial and socioeconomic lines.[14,15,16,17,18] Because group disparities in learning exist prior to kindergarten, researchers and practitioners alike seek to understand the role of children's early home environment in the learning process.[19,20,21,22,23]

Research Questions

Inquiry into the role of the home environment on young children's language and learning can be classified under two broad questions:

1. *Which aspects of parenting matter for children's early language and learning, and why?*
2. *What factors enable parents to provide a supportive environment to their young children?*

Recent Research Results

Which aspects of parenting matter, and why?

Three aspects of parenting have been highlighted as central to children's early language and learning: (1) the frequency of children's participation in routine *learning activities* (e.g., shared bookreading, storytelling); (2) the *quality of caregiver-child engagements* (e.g., parents' cognitive stimulation and sensitivity/responsiveness); and (3) the provision of age-appropriate *learning materials* (e.g., books and toys).[24]

Early and consistent participation in routine *learning activities*, such as shared book reading, storytelling, and teaching about the letters of the alphabet, provide children with a critical foundation for early learning, language growth and emergent literacy.[25,26,27,28] Routine activities provide young children with a familiar structure for interpreting others' behaviors and language, anticipating the temporal sequencing of events, and drawing inferences from new experiences.[29,30] Moreover, engagement in learning activities expands children's vocabularies and conceptual knowledge.[31] In particular, shared bookreading, as well as the sharing of oral stories, facilitate young children's vocabulary growth, phonemic skills, print concept knowledge, and positive attitudes toward literacy.[25,27,32,33,34,35]

A plethora of studies also indicate that the *quality of parent-caregiver interactions* plays a formative role in children's early language and learning. In fact, the amount and style of language that parents use when conversing with their children is one of the strongest predictors of children's early language. Children benefit from exposure to adult speech that is varied and rich in information about objects and events in the environment.[7,36,37] Additionally, parents who contingently respond to their young children's verbal and exploratory initiatives (through verbal descriptions and questions) tend to have children with more advanced receptive and productive language, phonological awareness, and story comprehension skills.[38,39,40,41]

Finally, the *provision of learning materials* (e.g., books, toys that facilitate learning) has been shown to support young children's language growth and learning.[42,43,44] Learning materials provide opportunities for caregiver-child exchanges about specific objects and actions, such as when a parent and child pretend to cook a meal. In such instances, materials serve as a vehicle for communicative exchanges around a shared topic of conversation. Specifically, exposure to toys that enable symbolic play and support the development of fine motor skills has been shown to relate to children's early receptive language skills, intrinsic motivation and positive approaches to learning.[45,46] In addition, children's familiarity with storybooks has been linked to their receptive and expressive vocabularies and early reading abilities.[26,27]

What factors predict positive parenting?

Researchers agree that parenting is multiply determined by characteristics of both parents and children. In terms of parent characteristics, parent age, education, income, and race/ethnicity (to name a few) have all been shown to relate to the three aspects of parenting discussed above. For example, compared to older mothers, teen mothers display lower levels of verbal stimulation and

involvement, higher levels of intrusiveness, and maternal speech that is less varied and complex.[47,48] Mothers with fewer years of education read to their children less frequently[25,49] and demonstrate less sophisticated language and literacy skills themselves,[50] which affects the quantity and quality of their verbal interactions with their children.[2] Parental education, in turn, relates to household income: poverty and persistent poverty are strongly associated with less stimulating home environments,[51] and parents living in poverty have children who are at risk for cognitive, academic, and social-emotional difficulties.[52,53] Finally, Hispanic and African American mothers are, on average, less likely to read to their children than White, non-Hispanic mothers;[54] and Spanish-speaking Hispanic families have fewer children's books available in the home as compared to their non-Hispanic counterparts.[25] These racial and ethnic findings are likely explained by differences in family resources across groups, as minority status is often associated with various social demographic risks.

Child characteristics, such as gender and birth order (as two of many examples), have also been linked to early measures of language and learning. For example, girls tend to have a slight advantage over boys in the early stages of vocabulary development,[55,56,57] and studies have documented that families spend substantially more time in literacy-related activities with girls than with boys.[58] Firstborn children have slightly larger vocabularies on average than their later-born peers.[59] Further, mothers differ in their language, engagement and responsiveness toward their first- and laterborn children, with input favoring firstborns.[60]

Research Gaps

In light of evidence that children from low-income and minority backgrounds are more likely to exhibit delays in language and learning at school entry, additional work is needed to understand why these differences exist, and how to best support parents in their provision of positive home environments for their children. Future research should investigate the ways in which multiple aspects of the home learning environment jointly contribute to developmental outcomes in children. Moreover, studies on "school readiness" should begin at the earliest stages of infancy, as this is the period when foundational language and knowledge develops. In this regard, research on the language development and school readiness of children from language minority households should focus on how in- and out-of-home language experiences jointly contribute to children's proficiency in both English and their native language. Finally, most research on the social context of children's language and learning is focused on children's interactions with

mothers. Given the rich social networks that comprise infants' and toddlers' environments, future studies should examine the literacy opportunities offered by multiple members of young children's social worlds, including fathers, siblings, extended family members, and childcare providers.

Conclusions

There exists irrefutable evidence for the importance of children's early language and learning for later school readiness, engagement and performance. Children's experiences at home are critical to early language growth and learning. In particular, three aspects of the home literacy environment promote children's learning and language: learning activities (e.g., daily book reading), parenting quality (e.g., responsiveness), and learning materials (e.g., age-appropriate toys and books). Additionally, parents with more resources (e.g., education, income) are better able to provide positive learning experiences for their young children. Finally, children also play a key role in their own learning experiences, as exemplified by links between child characteristics and parenting behaviors. Children affect parents just as parents affect children; it is therefore critical to acknowledge the transactional nature of children's early language and learning experiences.[61]

Implications

Research on children's early learning environments is relevant to policy makers, educators, and practitioners who seek to promote the positive language development and learning of young children. Intervention and preventive efforts should target multiple aspects of children's early language and learning environments, including supporting parents in their provision of literacy-promoting activities, sensitive and responsive engagements, and age-appropriate materials that facilitate learning. Moreover, these efforts should begin early in development, as children are likely to benefit most from supportive home environments during the formative years of rapid language growth and learning.[22,62,63] Finally, interventions with parents that aim to support children's learning should attend to the cultural context of early development when working with parents from different backgrounds, and also consider the broader social context of parenting by attending to the barriers created by poverty and low parental education.

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Literacy, Language and Emotional Development

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Introduction

Learning to read is the central achievement of early elementary schooling. Children bring with them experiences, knowledge and skills that facilitate their acquisition of efficient and accurate reading skills. The view adopted here is that children will spend their first three years of school learning to read, and then will start using reading to learn.[1] Moreover, accurate comprehension of written texts presupposes that children can read individual words effortlessly.[2] Early educators will want to understand what skills children need to ensure successful learning in grades one, two and three. This report will focus on early language skills that have been linked to efficient word reading and reading comprehension, namely children's awareness of the spoken language and their vocabulary. In addition, the report will present some of the limited evidence showing that the degree to which children learn to read successfully is linked to their self-concepts.

Subject

Successful and full participation in Western societies presupposes that individuals know how to derive meaning from written texts. Unfortunately, the latest statistics show that a substantial number of Canadians have poor reading abilities that can jeopardize their integration in the workplace.[3] Longitudinal studies have clearly shown that differences in reading performance are established early and remain relatively stable over time.[4,5] Most children who have poor reading skills at the end of grade one will continue to experience difficulties reading later on. It is therefore important to intervene early in the lives of children to prevent reading problems and their negative consequences.

Problem

Parents, educators and researchers share a common concern: how to ensure that every child can comprehend written texts efficiently and accurately.

Research Context

Researchers have adopted various methodologies to understand better how children learn to read. Although the choice of one particular methodology, its underlying assumptions and the findings it produces can lead to heated debates, practitioners are wise to examine the available research for converging evidence to develop sound practices. Converging evidence is obtained when observational, correlational, experimental and intervention studies point to the same conclusion.

Key Research Questions

A series of key questions continue to guide the research on reading that focuses on the transition from preschool to the early school years. Some of the most important questions are listed below:

1. What skills and knowledge do children bring with them that will facilitate the acquisition of reading?
2. What are the experiences that promote early literacy skills and knowledge as well as motivation to read?
3. How can we identify children who are at risk of having reading problems?
4. How can we intervene early in the lives of at-risk children to prevent reading problems?
5. What teaching methods are best suited to optimize the number of children who will learn to read successfully?

An adequate presentation of recent findings on each of these questions is beyond the scope of the present chapter. Readers can obtain an excellent understanding of recent findings that address these issues by reading the article by Rayner et al.[6] as well as the 2008 report of the National Early Literacy Panel (US).[4]

Recent Research Findings

The view herein is that early language skills play an important role in the acquisition of reading, and that learning language and learning to read are related but distinct domains. Recent research findings pertaining to two language skills, phonemic awareness and vocabulary, are discussed below. In addition to these topics, some findings on the role of reading on children's developing self-concepts are discussed.

Phonemic awareness. Over the past 20 years, researchers have made important advances in understanding the role of children's awareness of the spoken language. The term phonemic awareness refers to the ability to identify, compare and manipulate the smallest units of spoken words — phonemes.[7] Most spoken words contain more than one phoneme; for example, *cat* has three phonemes and *spill* has four phonemes.

- There is some evidence that children first become aware of larger units of spoken language such as words within sentences and syllables within words; however, awareness of phonemes themselves is the best predictor of reading.[2,7,8]
- Awareness of phonemes measured in kindergarten is one of the best single predictors of reading at the end of grade one. Phoneme awareness is thought to help children learn to read because it allows children to understand that letters correspond to the sounds of spoken language.[7,8]
- Intervention studies clearly show that teaching phonemic awareness to young children benefits word reading as well as reading comprehension.[7,8] Intervention studies that included alphabet letters in activities on phonemic awareness were the most successful.[7]

Vocabulary. The ultimate goal of reading instruction is to ensure that children understand the texts they read. Comprehending written texts is a complex process that involves fluent word recognition as well as the activation of word and world knowledge, making inferences and integrating parts into a coherent whole.[2] Given this view of reading comprehension, children's vocabulary is one component of oral language that is necessary to reading comprehension.[9]

- Children's vocabulary, measured in kindergarten, is one of the best predictors of reading comprehension in grades three and four.[10]
- Intervention studies show that teaching words presented in a text improves children's understanding of the text.[11]
- It remains to be demonstrated that improving young children's vocabulary skills will have long-term consequences for their reading comprehension.

Self-concepts. There is limited longitudinal evidence on how children's reading skills might affect their self-perceptions. The research is correlational in nature, but it is consistent with the view that children who read poorly tend to perceive themselves as less able and to be less motivated to read.[12,13,14] The longitudinal results suggest that early reading skills predict the development of

self-perceptions and rather than the reverse.[14, 15] That is, all children tend to have positive self-perceptions as beginning readers, but these change over time. There is also some evidence showing that children who perceive themselves as less able tend to avoid reading or read less frequently.[15] In turn, reading less frequently further impedes the acquisition of efficient word reading and comprehension skills.[16] Although there is a need for converging evidence, these findings are in accord with the idea that it is crucial for young children to develop strong reading skills quickly.

Conclusions

The accumulated evidence suggests three things:

1. Children with stronger awareness of the structure of language will learn to read more easily than children who have weaker or no awareness of this structure. Most importantly, phonemic awareness can be fostered prior to grade one.
2. Children with stronger vocabulary skills tend to have better reading comprehension skills in grade three. Most importantly, vocabulary can be enhanced at home, in child-care centres and in kindergarten.
3. Children with weaker reading skills tend to have less developed self-concepts and tend to read less. This highlights the importance of early interventions to ensure that children start grade one with the necessary skills and knowledge to learn to read.

Implications

Parents and educators can promote the development of phonemic awareness and vocabulary in young children. They can do so by incorporating into their daily routines such activities as:

1. *Playing word games* that emphasize the structure of the language. There is evidence that introducing the alphabet along with word games can help children understand that words are made of individual sounds.[7,17] Finally, having young children explore the sound structure of words by encouraging them to capture the sounds they hear with their limited knowledge of the alphabet can also be beneficial.[18]
2. *Reading children's books*. There is sound evidence that young children can learn new words introduced by an adult while looking at pictures in books, or when the adult reads the text in the book. To ensure learning, it is important to read the same books more than

once. Parents and educators can borrow children's books from their neighbourhood libraries.[19, 20, 21,22]

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Language Development and its Impact on Children's Psychosocial and Emotional Development

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Introduction

Language is central to social life; speech and language development is a cornerstone for successful outcomes later in life. Speech and language competency does not progress normally for a sizeable number of children, however, and research shows that these children are at greater risk for later psychosocial problems than children who do not have speech or language impairments.

Studies have produced compelling evidence that the child and adolescent psychosocial outcomes of language impairment are disproportionately problematic; some disadvantages persist into adulthood. These outcomes include continued disadvantage in speech and language competence, intellectual functioning, and educational adjustment and achievement, psychosocial difficulties, and increased probability of psychiatric disorder. Key insights from the studies highlighted in this fact sheet imply a need for early identification of language problems and effective intervention addressing language problems and related cognitive, academic, behavioural and psychosocial concerns, and prevention of victimization in this population. Support for children and adolescents who have language impairment is particularly important in the school context.

Subject

There is strong evidence for the association between speech and language impairments and psychiatric disorders.[1,2,3] Children with speech and language impairments have increased rates of attention-deficit hyperactivity disorder and anxiety disorders through childhood and adolescence.[2,5,6,7] Poor verbal skills have been linked to juvenile delinquency and conduct problems particularly in boys.[8,9] Children with childhood language impairment are more likely to experience both concurrent and future behavioural problems than are children with typically

developing language.[10,11,12,13] Language impairment, rather than speech impairment alone, is most associated with persisting behaviour problems.[10,11] Language-impaired youth often have social difficulties and may be bullied or socially excluded by their peers.[10,14,15] Continued social problems in adulthood have been reported in studies following clinically-referred children with language impairment.[16]

Language impairment is consistently associated with poor academic performance in childhood and adolescence. Clinically-referred language-impaired children and youth have, on average, poorer academic performance than children in the general population;[17,18,19] these results have been corroborated by prospective epidemiological studies.[20,21,22,23] Children with language impairments at age five were about eight times more likely to have learning disabilities at age 19 than children without language impairments.[21] Recent research indicates that children with language impairment differ from typical language children in cognitive development and information processing, including short-term memory and auditory processing.[24,25,26]

Problems

Research on the outcomes of speech and language impairments is incomplete. First, many studies reporting long-term outcomes of speech and language impairments have used clinic-referred rather than community-based samples. These studies do not represent the spectrum of speech and language impairments. Individuals referred for treatment tend to be more severely impaired and/or have more noticeable impairments than those who are not referred. They are also more likely to have associated problems, especially behaviour problems, that attract attention and motivate referral,[27] while those with more subtle problems, often girls, may be overlooked.[27,28] Second, most studies of adult outcomes of childhood speech/language impairment are retrospective, and have had difficulty securing objective data on language history. Third, very few studies of non-referred samples have published outcomes beyond adolescence, into adulthood. Fourth, some studies on the adult outcomes of language-impaired samples have not employed matched control groups, severely limiting inferences that can be made. Fifth, available studies seldom include measurement of outcomes across multiple domains of functioning. This is a crucial shortcoming because problems in other domains of psychosocial function may persist even if speech and language difficulties resolve. Broad assessments can also identify areas of strength, and similarities between language-impaired and typical language individuals. Finally, greater attention to social contexts in relation to outcomes of speech/language impairment is

needed.[28,29] For instance, few studies have directly addressed gender in relation to the outcomes of language impairments; most that have done so focus on young children.[15,30]

Research Context

The Ottawa Language Study (OLS) is the first population study of children with speech/language impairment to be followed into adulthood.[31] A one-in-three random sample of all five-year-old English-speaking children in the Ottawa-Carleton region of Ontario, Canada was administered a speech and language screening procedure by qualified speech pathologists.[32] The procedure resulted in a sample of 142 children with speech and/or language impairments. A control sample of 142 children matched for age and sex and from the same classroom or school as the language-impaired children was recruited simultaneously. Both samples completed assessments of cognitive, developmental, emotional, behavioural and psychiatric functioning.[6] Three follow-up studies of original OLS participants were undertaken when the participants were ages 12, 19, and 25.[2,7,31] The retention rate for each of these follow-up studies exceeded 85% of the original sample. A fourth (age 31/32) follow-up is in progress.

Key Research Questions

Some of the key questions posed by the OLS have been: Do language impairments persist? Are language impairments associated with behavioural problems in childhood, adolescence or adulthood? Do language impairments predict academic achievement, educational attainment or vocational outcomes? Are childhood language impairments associated with greater frequency of psychiatric disorders across the lifespan? Are psychosocial outcomes of language impairment different for girls versus boys?

Recent Research Results

Language impairments often persist into adulthood.[33,34] Pure speech impairment often disappears as do most associated psychosocial problems.[2,33] In the OLS, children and adolescents with childhood language impairments had significantly elevated rates of behaviour problems and psychiatric disorders, especially anxiety, compared with typical language controls, at ages 5, 12 and 19.[2,6,7] Social phobia was more common among the speech/language cohort; communication difficulties may constitute a distinct pathway to social phobia.[35] Externalizing problems, particularly ADHD and delinquency were associated with language impairment in boys but not

girls;[11] rates of antisocial personality disorder among males were almost three times higher than for typical language controls.[2] Girls with language impairment were three times more likely to have experienced sexual abuse in childhood or adolescence than girls without language impairment;[28] this difference was not due to differences in socioeconomic status between the language impaired and typical language groups.

By age 25, rates of psychiatric disorder were lower among language-impaired and typical language participants than at age 19.[36] Further, quality of life, job satisfaction and perceived social support were as high in the language-impaired group as the typical language controls.[31] Participants with language impairment were less likely than controls to participate in or complete postsecondary education; three quarters had completed high school. Young adults with language impairment were just as likely to be employed as were typical language controls, often choosing jobs in trades that likely did not require strong verbal skills. Women with language impairment had children earlier than typical language women; half had children by age 25.[31] Earlier parenting may partly reflect the poorer employment opportunities for women without postsecondary education (excluding jobs traditionally held by men, such as construction).

Conclusions

The OLS has shown that outcomes in childhood and adolescence for children with a history of language impairment are distinctly more negative than outcomes for children with speech impairments only and non-impaired children. Children with language impairments showed prominent concurrent and long-term deficits in the language, cognitive and academic domains relative to peers without early language difficulties, and completed less education. Boys with language impairments were at risk of delinquent and antisocial behaviour; girls with language impairments were more likely to experience sexual abuse[28] and to embark on earlier parenting.[31] However, by age 25, youth with language impairments were equally likely to be employed as were the typical language controls, and the groups did not differ in quality of life or perceived social support.

Implications for the Policy and Services Perspective

Children with language impairments have relatively poor outcomes in childhood through to late adolescence. They are more likely to have anxiety disorders which have a negative impact on the quality of life of affected adults and have substantial economic and health-care costs.[37] Further,

childhood language impairments tend to persist, and their impact can be observed from childhood into young adulthood. Research supports the efficacy of early language intervention.[38] Speech and language professionals should continue to educate the public and other professionals on the importance of early language intervention.

At the same time, increases in well-being from age 19 to age 25, despite continuing language deficits, suggests that differences in social contexts may play an important role in the psychosocial difficulties of language impaired youth. In particular, the demands of school environments may constitute stressors that exacerbate the problems of youth with language impairments. For example, children with language impairment may experience bullying in school,[14] and many youth with language impairment report fear of speaking in front of others.[35] Unlike youth completing compulsory education, adults with language impairment are able to select vocations consistent with their strengths that rely less on verbal skills.[16,31] These results suggest the need for strong support systems for language- impaired youth in school and attention to all aspects of their school environments. Gender also needs to be taken into account in interventions for youth with language impairment. In particular, prevention of victimization needs to be incorporated into work with language-impaired youth, particularly girls. Children with a history of speech and language impairments are more likely to have multiple problems than their non-impaired counterparts, and as such may benefit most from early intervention. This demonstrates the urgency of early identification of language impairments and the development and maintenance of proven treatment programs that address the multiplicity of adversity facing these at-risk children, while supporting their resilience and adaptation.

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The Impact of Language Development on the Psychosocial and Emotional Development of Young Children

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Introduction

Language and communicative competence provide critical tools for learning, engaging in social relationships, and behaviour and emotion regulation from infancy onward. This report describes the evolution of language development in the first five years of life and its interrelationship with psychosocial and emotional development and disorder across the life span. Implications for prevention, intervention, education and public policy will also be discussed.

Subject Relevance

Two domains are considered under the rubric of language: structural language and pragmatic communication. *Structural language* skills encompass the sounds of language (phonology), vocabulary (semantics), grammar (syntax and morphosyntax), narrative discourse, and auditory verbal information processing. *Pragmatic language* skills include behaviours such as conversational or other communicative turn-taking, making good use of gestures and maintaining eye contact. As well as these specific aspects of language and communication, children must be able to both express their thoughts (expressive language) and understand those of others (receptive language) in both social and learning situations.

When children have difficulty understanding others and expressing themselves, it is not surprising that psychosocial and emotional adjustment problems ensue. Conversely, a relatively large proportion of school-aged children who have psychosocial and emotional disorders often have problems with language and communication.[1]

Problems

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It can be difficult to separate psychosocial and emotional problems from problems with language and communication. Language impairments can be subtle and go undetected unless a formal assessment is done.[2] For instance, Kaler and Kopp[3] showed that toddlers' compliance with adult commands was related to how well they understood language. In another study, Evans[4] found that many preschoolers described as shy, reticent or inhibited had language impairments that interfered with forming and maintaining friendships. Children with language impairments had difficulty entering into peer group conversations and were then excluded, giving them less opportunity to learn and practice the social skills they needed for peer interaction. Failure to identify and treat such problems can have serious consequences.

Research Context

Language development and impairment and their association with psychosocial and emotional development and disorder have been examined in cross-sectional and longitudinal studies of community and clinic (both speech-language clinic and mental- health clinic) samples ranging from infancy through adolescence. In these studies, aspects of language and skills with which language and communication are associated have been examined.

Key Research Questions

Key research questions include: (1) What is the pattern of development of communication and language in the first five years of life? (2) What is the prevalence of language and communicative impairment in the general population between birth and age five? (3) With which psychosocial and emotional disorders are language impairments associated? (4) Are there other developmental functions associated with language impairment other than psychosocial and emotional disorders? (5) What is the outcome for children with communication and language impairments? (6) What causal factors contribute to an association of language impairment with psychosocial and emotional development? (7) Is there something specific about language as a focus for study? (8) What are the best ways of treating language impairments?

Recent Research Results

In the first five years of life, the evolution of communication can be divided into three periods.[5] The first period begins at birth when infants communicate through their cries, gazes, vocalizations and early gestures. These early communicative behaviours are not intentional, but set the stage for later intentional communication. In the second period, from six to 18 months,

infants' communicative engagement with adults becomes intentional. A major turning point is the appearance of *joint* attention,[6] which involves infants coordinating visual attention with that of another person regarding objects and events.[7] In the third period, from 18 months onward, language overtakes action as children's primary means of learning and communication. For instance, preschoolers can engage in conversations about emotions that take into account another's affective state,[8] can use language for self-control[9] and have the capacity to negotiate verbally.[10]

It is estimated that 8 to 12% of preschool children have some form of language impairment.[11] Most children are not identified until two to three years of age when they fail to speak. Further, approximately half of preschool- and school-aged children referred to mental-health services or placed in special classes have language impairments or language-related learning disabilities.[2] There are no data on the prevalence of preverbal communication problems in infants, although the availability of new screening tools now makes this possible.[12]

A range of psychosocial and emotional disorders has been associated with language impairment. In infants, problems with emotion and behaviour regulation (e.g. difficulty being soothed, eating and sleeping) are most common.[13] Physical and expressive vocabulary are associated with spoken vocabulary as early as 19 months of age.[14] From the preschool years, the most common diagnosis among children with language impairments in the community who are referred to speech-language and mental-health clinics is Attention Deficit (Hyperactivity) Disorder.[15,16,17] Language impairments do not exist in isolation and from early childhood, language development is also linked with cognition, social cognition and motor skills.[2,17]

Longitudinal studies yield sobering findings for children with language impairments.[18] Language and communication impairments are consistently related to learning and psychosocial and emotional disorder from infancy to adolescence.[16,19,20,21] The prognosis is poorest for children who have difficulties in understanding language or in multiple areas of language that continue beyond the age of five years.[19,22]

Both genetic and environmental factors contribute to language and psychosocial and emotional development.[23] Children who are poor communicators do not send clear messages and therefore may be difficult to read and respond to appropriately. The amount and kind of language stimulation at home[24] and family stresses such as child abuse[25] also contribute to children's language development.

The question still remains as to whether there is something specific about language as a focus for study. On the one hand, language may be just one of a range of developmental functions caused by a common underlying factor.[26] On the other hand, language may have a central role to play in the development of psychosocial and emotional disorders in that internalized language and verbally mediated rules play an important role in both self-control and achievement across domains.[27]

Conclusions

From infancy onward, language and psychosocial and emotional development are interrelated. Communication begins in the very first days of life. Potential problems that begin in relationships with parents can ultimately spiral as children enter school and have difficulty learning and getting along with teachers and peers. Even mild language impairments can have an impact on the course of development. Outcomes are worsened by the presence of co-occurring environmental stresses. Because language competence is critical for both school readiness and psychosocial and emotional adjustment, problems with language and communication can set a child on a maladaptive trajectory throughout life.[28] Language problems can be subtle and may be overlooked in learning and therapeutic situations.[1] Therefore, identification and assessment of language disorders, and intervention, are important in the early years, setting the stage for later competence in a broad range of areas.

Implications for Policy and Services

Starting from infancy, routine assessment of language and communication skills and provision of interventions are essential preventive undertakings. This is important because interventions during infancy or the preschool years can have a significant impact on child outcomes.[29] Once identified, creating a comprehensive profile of communication, language, cognitive and psychosocial and emotional abilities is crucial to planning such preventive interventions. There has been a move away from one-to-one clinic-based therapy to a focus on functional language in naturalistic environments.[30] Interministerial and multidisciplinary integration is required because of the implications that undiagnosed language impairments have for health, mental health, child care, education and the youth justice system. Information on the nature of language impairments, and their impact on academic and psychosocial and emotional functioning, should be available to parents and be part of the curriculum for professionals working with children. This includes pediatricians, family practitioners, speech/language pathologists, educators, early

childhood educators and mental-health practitioners.

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Language Development and Literacy: Comments on Beitchman and Cohen

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Introduction

Beitchman and Cohen both address the issues of language development and its impact on academic, psychosocial and emotional development, by focusing on the poor outcomes of children with primary difficulties in speech and language impairments (i.e. problems that cannot be accounted for by any other condition, known as specific language impairments or SLI). Both also focus on impairments in structural aspects of receptive and expressive language skills (phonology, semantics, syntax, morphosyntax, narrative discourse, auditory verbal information processing) and accord little attention to the outcome of impairments in pragmatic aspects (the appropriate use of language within social, situational and communicative contexts). Nonetheless, it is important to understand that speech and language impairments may also occur as secondary difficulties to a primary condition such as autism, hearing impairment, neurological impairment, general developmental difficulties, behavioural or emotional difficulties, psychosocial adversity (e.g. adverse rearing conditions associated with growing up in poverty, orphanages, refugee camps or war zones) or immigration (English language learners).

Beitchman approaches the topic from the research context of his 20-year prospective longitudinal epidemiological study of five-year-old English-speaking children from one geographic region of Canada. By contrast, Cohen situates the topic more broadly, calling upon evidence from national and international studies of clinical and epidemiological populations, using cross-sectional and longitudinal designs. Thus, while Beitchman's study provides a rich source of data on the outcomes of SLI in an English-speaking context for Canadian policy and service perspectives, the results presented by Cohen provide an opportunity to look for independent replication of findings across studies and English-speaking cultures.

Research Results and Conclusions

Both authors concur that preschool SLI increases the risk for negative sequelae in terms of subsequent language and literacy abilities, poor social and emotional competency in terms of internalizing difficulties (e.g. social isolation, withdrawn social interaction styles or anxiety disorders) and externalizing difficulties (e.g. aggression, attention-deficit/hyperactivity disorder [ADHD], antisocial personality disorder). In addition, recent research highlights the increased risk of victimization (e.g. being teased, ridiculed, threatened, bullied), which in turn may contribute to subsequent antisocial personality disorder.[1] One relatively minor point is the potentially misleading conclusion about mental health outcomes in young adulthood, which are listed by Beitchman as anxiety disorders and antisocial personality disorder. This could be misinterpreted as indicating that the relationship between SLI and ADHD, which is evident in childhood, dissipates by adulthood, whereas the problem is that ADHD and other Axis I and Axis II disorders were not investigated in the 19-year-old follow-up study.

Both Cohen and Beitchman conclude that the risk resides with language impairment (with and without accompanying speech impairments), rather than with speech impairment per se. In contrast, recent evidence indicates that speech impairment may be a risk factor for phonological processing, phonological learning and literacy.[2,3] Not only are persistent speech impairments (beyond age six) associated with poor literacy outcome, but also even children with apparently resolved speech impairments manifest marked problems in spelling despite relatively intact language abilities.[4] One critical distinction that needs to be made is between inaccurate production of speech sounds and difficulties in phonological processing.[5] The latter is a circumscribed component of language that is well established as a risk factor for reading disorder (dyslexia). The problem is that phonological processing skills may be overlooked and not investigated in the presence of severe articulatory problems without concurrent oral language impairments.

Cohen and Beitchman also conclude that preschool SLI is associated with poor academic functioning, but do not specify the nature of this problem. Robust evidence indicates that SLI is a major cause of problems in both reading (particularly reading comprehension) and written language.[3,6,7] Moreover, recent evidence highlights the sensitivity of written language indices to the longer-term outcome of oral language impairments.[5] Specifically, written language deficits are evident even in those children whose earlier language impairments appear to have resolved, including purportedly unaffected monozygotic twins of children with language impairments.[5] Moreover, one index of expressive language (non-word repetition), which has been proposed as an effective marker of the heritable form of language impairments,[8,9] predicted written language impairments.[5]

One critical and non-trivial issue briefly alluded to by Cohen is the extent to which SLI constitutes a specific disorder that is unique from other neurodevelopmental disorders such as dyslexia. This issue, which remains unresolved and controversial,[10] has important implications for policy and service delivery perspectives and requires in-depth investigation.

The primary limitations of both of these summary texts from the point of view of policy and service delivery perspectives are: 1) the absence of prevalence data for the various subtypes of SLI, and at different ages/developmental stages; and 2) the apparent accordance of equal weighting to findings from studies that vary in methodological rigour. Moreover, the conclusions are based on a non-systematic review of the literature. Importantly, however, the conclusions are largely consistent with those reported in recent meta-reviews.[11,12,13]

Implications for Policy and Services Perspectives

Both authors argue for the need for routine assessment of language and communication skills, starting from infancy, with the rationale that intervention during infancy or preschool years can have a significant impact on child outcomes. Moreover, both argue the need for professionals to educate parents about the significance of SLI and the need for intervention. In particular, Beitchman accords to speech and language pathologists the responsibility for educating the public and other professionals in this regard.

There are several problems with these broad recommendations. First, a recent review concluded that there is insufficient evidence to warrant universal screening at this point in time.[12] Barriers to be overcome include the development of screening measures with improved sensitivity, consensus on case definition, and a more complete understanding of the prevalence and natural history of the various subgroups of SLI.[12,13] This should not be interpreted as a recommendation against case identification, since early SLI clearly constitutes a major problem in its own right and may flag an increased risk for other problems. Alternate approaches to universal screening might include screening populations at high risk for SLI or screening populations identified by parental concern about possible SLI or related socio-emotional or behavioural problems.[13]

Second, despite Beitchman’s claim of demonstrated efficacy of early language intervention, a recent meta-analysis reveals mixed evidence for short-term effects and little or no evidence of the long-term effectiveness of the programs on language abilities per se.[11] For example, there is no robust evidence of effective intervention for receptive language difficulties. Moreover, although there is some support for beneficial effects of intervention on primary caregivers who provide the communicative environment, there are no data on the effects of intervention on

amelioration and prevention of associated problems such as poor literacy and psychopathology (anxiety, attention-deficit/hyperactivity disorder, antisocial personality disorder).

Third, making speech and language pathologists responsible for educating the public and other professionals poses major challenges, the least of which is the inadequate supply of this category of professionals. More importantly, enhancing parent recognition of the child's potential problem and the need to seek help are among the primary barriers to accessing the existing services.[14] In today's multicultural and technological society, information about the significance of language impairments and the need for intervention may be most effectively delivered by and accessed through responsible media (multicultural TV, radio, newspapers) backed by government policy and funding.

Finally, additional key issues are missing from these two articles, including the following; 1) consensus statements about the definitions of boundaries around the population(s) in need of service; 2) consensus approach to the operationalization of these boundaries (i.e. standards of assessment and diagnosis), with particular attention to populations for whom English is not the primary language of the family; 3) estimates of prevalence and incidence with reference to regional and ethnic/cultural variations, along with any projected changes in these rates; 4) standards for service providers (particularly for daycare providers, early childhood educators, classroom teachers and pediatric speech-language pathologists); 5) evidence of cost-effective evidence-based intervention approaches and their relative efficacy at various developmental stages; and 6) challenges and solutions to accessibility to services, particularly for inner-city, rural, indigenous and ethnic populations.

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Note:

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Literacy as an Outcome of Language Development and its Impact on Children's Psychosocial and Emotional Development

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Introduction

One of the most striking accomplishments of the preschool years is the child's development of speech and language. As children enter school, they are expected to use these newly developed language skills as tools for learning and social negotiation. The important role of spoken and written communication in school-aged children's lives suggests that individual differences in these skills may entail benefits and risks, in terms of broader academic and psychosocial competence.

Subject

Spoken language competence involves several systems. Children must master a system for representing meaning, and acquire a facility with the forms of language, ranging from the sound structure of words to the grammatical structure of sentences. This knowledge must be joined with their social competence. Much of this learning is accomplished without formal instruction, and what is known is largely tacit in nature. Preschool children begin to develop some awareness of this knowledge by rhyming words, for example, or taking a word apart into syllables. This ability to think about the sounds in words is called phonological awareness. Early reading development in alphabetic languages such as English depends on the integrity of phonological awareness and other related phonological processing abilities.[1]

Learning to read also requires several skills. It is common to differentiate between two main aspects of reading: word recognition and comprehension. Word recognition consists of knowing how a word is pronounced. Early in reading development, children need to recognize letters, be aware of and able to manipulate sounds within words, and use conventions about the relationship between letters and their pronunciation. In addition, the child needs to be able to

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interpret the meaning of the printed text. The skills involved in this aspect of reading are very similar to those used in listening comprehension.

Although word recognition and comprehension are often considered separately, they can influence one another over development, in a bidirectional way. For example, vocabulary knowledge contributes directly to growth in word recognition,[2,3] and later in the school years, skill in word recognition predicts the rate of vocabulary growth.[4]

Problems

Children may enter school with poor skills in listening, speaking and/or phonological processing. Children with poor listening and speaking skills are referred to as having a language impairment (LI) or developmental language disorder (DLD): current estimates are that about 10% of children entering schools in the U.S. and Canada have LI.[5-7] There are other children for whom phonological processing skills are poor, and these children are at risk for reading disorder (RD). Estimates of the prevalence of RD among school-aged children typically range between 10 and 18%.[8-10] While LI and RD in the early school years can occur alone, it is very common for a child to be affected by both.

In addition to academic difficulties, several studies have shown elevated rates of behaviour problems among children with LI, including externalizing and internalizing problems, and have an especially strong relationship with ADHD.[5,11-27] Similarly, children with a diagnosis of behavioural or emotional disorder very frequently meet the criteria for LI, as do incarcerated youth.[26,28-30] Language impairments are commonly undiagnosed in these children, possibly because professionals are not sensitive to the manifestations of language impairments in this group.[30] Another concerning social outcome for individuals with language impairment is an elevated risk of victimization, including sexual assault.[31,32]

Research Context

The relationships between spoken language development, reading development and social development have been explored by several researchers in an effort to determine the extent to which these problems are associated with each other and the bases for these relationships.

Key Research Questions

The prominent research questions have been concerned with the extent to which aspects of early language status are predictive of later reading and behaviour problems and what the possible bases might be for these relationships. Specifically, two hypotheses have figured prominently in the literature. One hypothesis is that the associations between spoken language and later outcomes are causal. Alternatively, the association of language and reading problems with behaviour problems may rest on a common underlying condition such as a neuromaturational delay that results in poor achievement in both domains.

Recent Research Results

It is clear that as a group, children with LI have poorer reading achievement and higher rates of RD.[33-37] In these studies, the prevalence of RD in children with LI ranged from 25%[8] to 90%.[11] The strong relationship between RD and LI has been shown to be attributable to the limitations these children have in both their ability to understand language and their phonological awareness.[13,14,38-41] The phonological-awareness deficits place them at risk for difficulties in learning decoding skills and the comprehension problems place them at risk for reading comprehension problems.

There are several possible causal relationships between language and behavioural disorders: language difficulties might lead to reactive behaviour problems, behaviour problems could lead to fewer opportunities for language learning, or the relationship between language and behavioural difficulties could be bidirectional.[18] During the school years, children with poor language may encounter difficulties with the spoken and written communication demands of the classroom, such that communication failure, especially in the classroom, serves as a stressor, and behaviour problems are maladaptive responses to this stressor. In support of this notion, behaviour problems are reported by the children's teachers to a greater degree than their parents. Furthermore, teacher ratings of behaviour problems correspond more closely than parent ratings to child's language test scores.[17,33,42] Further support for this view arises from data showing that among children with LI, reading disorder further increases the risk of behaviour disorder. This supports the notion that LI in conjunction with RD results in the child facing excessive failure, particularly within the classroom, which in turn results in reactive behaviour problems. These conclusions, however, fail to explain why behaviour problems seem to be reported in preschool children with LI,[22] a finding that could be used to argue for an underlying factor such as neurodevelopmental delay that contributes to all these conditions. Another possibility is a bidirectional relationship between language and behavioural difficulties. This idea is supported by evidence that language difficulties at age three increase the risk of conduct

disorders at age five, and vice versa.[23] In particular, children with language impairment are vulnerable to difficulties with self-regulation, which may in turn lead to observed behavioural difficulties.[27,43,44]

Research Gaps

Further research efforts are needed, focusing on the particular mechanisms that produce this complex of spoken, written and behaviour problems. Several recent studies have addressed the question of whether certain profiles of language weaknesses are associated with different types of behavioural outcomes.[24,25,31,45-49] This approach seems promising, as it could help focus interventions on the communication skills that are most likely to affect important outcomes. There is also a need for classroom-based studies of how children with language difficulties respond to communication demands and failure. Finally, given the risk of adverse outcomes such as incarceration or victimization, there is a need to continue to identify experiences and skills that contribute to resilience in children with early language difficulties.[48-50]

Conclusions

The existence of a strong relationship between spoken language skills and subsequent reading and behaviour development is generally supported in the literature. The basis of the relationship between early spoken language and later reading development is thought to be causal in nature, such that spoken language skills, especially phonological awareness and listening comprehension, are fundamental precursors to later successful reading. Children with limitations in phonological processing are at risk for early decoding problems, which can then lead to problems of reading comprehension. Children with problems of listening comprehension are at risk for reading comprehension problems even if they can decode words. These skills can also dynamically interact over development.

The basis of the relationship between spoken language and later behaviour problems is less clear, although it seems possible that there are multiple mechanisms that could explain the relationship. In particular, academic difficulties that result from LI may contribute to the increased risk of behavioural disorders.

Implications

The evidence is compelling that a foundation in spoken language competence is important for the successful achievement of academic and social competence. Children with poor language skills are therefore at risk for reading and psychosocial problems. Language difficulties could be identified efficiently at school entry. This identification process should be an especially high priority for children who already show signs of behavioural difficulties, given the high incidence and low identification of language difficulties in this group. Interventions are available for promoting language growth, and in particular, numerous programs exist to promote phonological awareness. Additionally, intervention efforts need to focus on approaches that provide supportive educational environments, to reduce the stressors that may result in maladaptive behaviours. Finally, early intervention efforts are warranted, to support the development of language skills prior to school entry. Where successful, such efforts could be expected to reduce a child's risk of important academic and psychosocial difficulties throughout childhood, and into adulthood.

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Literacy and its Impact on Child Development: Comments on Tomblin and Sénéchal

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Introduction

Only within the last decade has the concept of "literacy" become a central focus in early education. Previously, experts rarely viewed literacy as an essential aspect of healthy growth and development in young children. The current rate of reading problems among school children remains unacceptably high. Estimates show that about 40% of fourth graders struggle with reading at even basic levels and there is a markedly disproportionate representation of children who are poor and who belong to ethnic or racial minorities among those who struggle with reading.[1] The paradigm shift of the last decade, which received a great push forward with the 1998 publication by the United States' National Research Council titled *Preventing Reading Difficulties in Young Children*, has increasingly emphasized early education as the context in which solutions to these pressing problems are most likely to have effect. Early education is the time in which young children develop skills, knowledge and interest in the code-based and meaning aspects of written and spoken language. I refer to these abilities and interests here as "pre-literacy" abilities to emphasize their role as precursors to conventional literacy. The current emphasis on pre-literacy as an essential part of early education draws upon two growing bodies of research showing that:

1. Individual differences among children in pre-literacy skills are *meaningful* – early differences contribute significantly to longitudinal outcomes in children's reading achievement;[2] and
2. The prevalence of reading difficulties is more likely to be influenced through *prevention* rather than *remediation*, since once a particular child shows a reading delay in elementary school, the odds suggest that a return to healthy progress is quite unlikely.[3]

Research and Conclusions

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Experts Tomblin and Sénéchal provide timely and relevant discussions of current literature on pre-literacy development and its short- and long-term relationship to other developmental competencies. My reading of their texts suggests that three important points require further elaboration: decoding precursors, the language-literacy relationship, and the role of temperament and motivation.

First, the current cumulative research literature on early literacy development and its relationship to later reading outcomes identifies three unique predictors of reading competence: phonological processing, print knowledge and oral language.[2] Whereas the first two prepare children most directly for word-level skills (i.e. decoding), the third prepares children to comprehend text with little direct impact on decoding. Tomblin accurately notes that reading competence requires both decoding and comprehension, and Sénéchal emphasizes that children must first "learn to read" before they can "read to learn." Readers should recognize that the relationship between the two aspects of reading is multiplicative, meaning that both sides of the equation (Decoding X Comprehension = Reading) require some value other than 0 for reading to be functional.[4] Neither Tomblin nor Sénéchal adequately emphasizes the importance of ensuring children's development of decoding precursors during the years of early education. Children will never be able to read to learn (i.e. comprehend) if they cannot successfully decode. Children who enter beginning reading instruction with inadequate pre-literacy ability will be unable to keep pace in decoding instruction, which undermines the eventual transition to reading for meaning. Early education is the time in which educators can most readily improve children's odds of becoming a reader by giving them the pre-alphabetic competencies (print knowledge and phonological awareness) that will enable them to profit from decoding instruction.

Second, both Tomblin and Sénéchal emphasize the role of oral language in literacy development yet do not emphasize the relationship of literacy to language development. Scholars increasingly view the integrative relationship between language and literacy as *reciprocal*. Children's engagement in literacy activities, such as storybook reading or listening to rhymes, requires a metalinguistic focus in which oral or written language is the object of attention. Children's ongoing engagement in literacy activities and their developing propensity towards considering language as an object of attention become primary routes for language development. Once children begin to read, even at the most basic level, their reading of text becomes the greatest source of novel words and concepts, complex syntax and narrative structures, which then further propel their language development forward. In short, literacy is an essential vehicle for furthering children's language competencies in both the preschool years and during early and later schooling, and the relationship between language and literacy is more than a "one-way street" – language provides a base from which to explore and experience written language,

which in turn further builds children's language competencies.

Third, the role of temperament and motivation in influencing children's pre-literacy accomplishments and experiences requires further consideration than is provided by Tomblin and Sénéchal. Tomblin notes the overlap among internalizing behaviours (e.g. anxiety and depression) and literacy difficulties, and Sénéchal notes that some children may avoid reading experiences, particularly those who view themselves as poor readers. The role played by early motivation, self concept and temperament in pre-literacy development requires greater attention in general, particularly when we consider how to facilitate other internal competencies (e.g. phonological processing and vocabulary) in prevention programs. Most early educators know that a child's motivation towards literacy is one of the most important contributors to pre-literacy success. By seeking out literacy experiences on their own or in the context of interactions with others, children essentially implement their own pre-literacy interventions! A small yet converging body of research shows that children's motivation towards and engagement in literacy activities varies considerably from child to child and relates uniquely to children's literacy gains from these activities.[5] Some children actively resist pre-literacy experiences, such as storybook reading, and children who have under-developed language skills or who are inexperienced with literacy at home may be more likely to resist literacy activities. The scientific literature has not yet shown why some children resist literacy activities and how this resistance relates more generally to children's temperament. Nonetheless, approaches to supporting young children's engagement in and motivation towards literacy experiences require consideration as one of the more important design characteristics of effective interventions.

Implications for the Policy and Services Perspectives

Current policy and service perspectives are derived from three unequivocal findings in the literature. First, children with an under-developed oral language base will exhibit great vulnerability for achieving reading competence, which in turn inhibits ongoing language development. Second, it is much more difficult to remediate reading problems than it is to prevent them. Third, it is possible to shift the odds towards better literacy outcomes for children with high-quality, intensive, systematic pre-literacy programs delivered to preschoolers and kindergarteners prior to the manifestation of reading problems.

Integrating policy, practice and research

Significant gaps persist in integrating policy, practice and research and in conducting research that can be readily applied to real-world programs. Tomblin emphasizes the need for future

research on the mechanisms that produce literacy problems for children with language difficulties. The body of research on such mechanisms is one of the more well-developed and well-funded areas of research in the United States, and it has unequivocally shown the importance of oral language, phonological processing and print knowledge as causally linked to a child's ability to learn to read. What is currently needed is an increased focus on how best to facilitate linkages among policy, practice and research to ensure the effectiveness of real-world efforts to improve literacy outcomes for young children, particularly those who arrive in these programs with under-developed literacy and language skills. Sénéchal offers several evidence-based suggestions for promoting pre-literacy skills for young children, such as playing word games and reading books. The extent to which such activities are effective for children with language weaknesses, have a longitudinal positive effect and can be integrated into existing interventions has yet to receive careful examination.

Does quality matter?

Policy-makers, practitioners and researchers have rarely considered how the quality of adult-child interactions focused on literacy might matter, whether playing word games or reading books. Developmental theories of how children develop pre-literacy abilities presume that the quality of interaction matters greatly, with children's skills progressing more quickly and more readily in instructional interactions that are characterized by sensitive, responsive and non-controlling adult input. When provided with systematic, research-based early literacy interventions, the quality of teacher delivery of these interactions can vary immensely, and this variation appears to make great differences in children's literacy outcomes. As we design policies and services for young children that are designed to reduce the risk for reading failure through prevention, we must ensure that the relationships and interactions children have with adults – which provide the context in which children's knowledge, skills and interests will grow – are of the highest quality.

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Early Identification of Language Delay

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Introduction

Because language is central to so many aspects of human life – cognition, social interaction, education and vocation – valid identification, prevention, and treatment of language disorders is a high priority for the therapeutic professions. Delay and/or difficulty in beginning to use language is one of the most common causes of parental concern for young children brought to pediatricians and other professionals. Delay may indicate specific difficulty with language, or it may be an early indicator of a broader problem such as developmental delay or autism.

Subject

In this article, we summarize current knowledge about the assessment of young children's language below age 3, particularly in the range of 24 to 30 months (for which we have the most extensive information), in order to identify early language delay and/or risk for persistent language impairment. The goal of this screening process is to guide decisions concerning the need for further evaluation and treatment, in order to prevent the development of more significant problems. Language sampling and analysis have substantial time and expertise requirements.

Problems

Early identification of language delay must resolve two fundamental problems. The first is the problem of obtaining valid information at an age when children are often not sufficiently compliant for direct testing, especially those with limited communication skills who are the primary focus. Furthermore, the assessment technique must be cost-effective with respect to professional time, and broadly applicable across a range of social classes and language backgrounds, including bilingualism. Language sampling and analysis have substantial time and expertise requirements.

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The second problem is one of interpretation. Many children whose language is delayed at 24 or 30 months will catch up over the next few years, and do not warrant intervention.[1] The challenge is to identify and use other relevant information to improve decisions about individual children.

Research Context

The solution to the first problem above has been the revival of an older, but neglected technique: parent report.[2,3] Parents have much more experience with their children than professionals, and their experience is more representative of their child's experiences and interests. Vocabulary checklists and related questions for parents have proven to be highly valid measures of early language development.[4,5,6,7,8,9,10]

Solving the second problem has required two programs of research: first, large-scale norming studies to provide a basis for judgment of the relative status of a child's language (delayed or not)[3] and second, longitudinal studies of outcome of early delay to identify predictors of "spontaneous recovery" or continued delay.[1]

Key Research Questions

Five questions are central to early identification of language delay:

1. What is a valid criterion for defining early language delay?
2. How much variability in outcome is there for early delay?
3. What other factors can add to prediction of outcome, and how should they be integrated?
4. How do differences related to social class, gender, and ethnicity affect the identification process?
5. How should the process be modified for children acquiring two or more languages?

Recent Research Results

Toddlers who have not attained the expressive language skills exhibited by most children the same age can be identified as having slow expressive language development (SELD). Among English-speaking children, studies suggest that 90% of 24-month-olds have an expressive vocabulary of at least 40-50 words and about 85% are combining words.[6] Based on these findings, two criteria for identifying SELD among 24-month-olds are commonly used: 1) small

expressive vocabulary (less than 40-50 words, or below the 10th percentile, depending on the tool used) and/or 2) no word combinations.[6,8] The 10th percentile criterion can be extended to other ages.

Children with SELD at age 2 are at 2 to 5 times higher risk for language impairment persisting into the late preschool to elementary school years than children without SELD.[1,11] Even though at least half of the two-year-olds with SELD will have language skills that are within the normal range by school age,[9,10] early expressive language delays should not be ignored, given the elevated risk of persisting language impairment.

Longitudinal studies of two-year-olds with SELD have examined a variety of potential predictor variables for persisting difficulties. Those variables which most regularly are found to make some prediction include parent concern about possible problems with the child's speech/language development or hearing, family history of language impairment or dyslexia (especially first degree relatives: parents, full siblings), receptive language delays, frequent ear infections, limited vocalizations, and delayed pretend play.[12,13,14] Although none of these is a highly accurate predictor by itself, parental concern has been the most consistently associated with language impairment.[1,10] Combining predictors has improved accuracy of predictions, but the optimal combination of predictors is not yet known.

For monolingual children who speak languages other than English, there are adaptations of the widely used *MacArthur-Bates Communicative Development Inventories* (*CDI)*[a] and the *Language Development Survey (LDS)*[8,16,17] in a number of languages. There is considerable consistency across languages in children's early expressive language development. For example, word combinations are reported for about 85% of Spanish-speaking and over 90% of French-speaking 24 to 26-month-olds children.[15,18]

Bilingual children's development of expressive vocabulary is comparable to monolingual children when parent reports for both languages are obtained and combined. There are two methods for combining vocabulary scores: "Total conceptual vocabulary (TCV)," in which words with similar meanings (e.g., English "cat" and Spanish "gato") are counted only once,[19] and "Total vocabulary (TV)" which includes all words in each language, regardless of possible overlap in meaning. For young children, TV (Language A + Language B) is recommended because it is simple to calculate and it yields vocabulary size scores and growth rates for young bilingual children that are similar to those for monolingual children's vocabulary.[20] Age of onset of word combinations also is

similar for bilingual and monolingual children if bilingual children are credited with combining words if they do so in either language.[16,21,22,23]

Although pairs of monolingual forms can be used, there are also some bilingual adaptations of vocabulary checklists available, including Spanish-English[22] and German-English[16] adaptations of the *Language Development Survey* and a bilingual Spanish-English scoring adaptation of the *CDI*.[21]

Research Gaps

Variation in findings across social groups and gender differences indicates that parent report tools and/or criteria for early identification may need adjustment for different populations. The rate of identification of SELD using parent report tools is much higher for children from lower SES families; cut-offs that yield about 10% of middle class children identify two to three times as many children from lower SES backgrounds.[24] Although children from low SES backgrounds are at somewhat higher risk for language impairment, these major differences in rate of identification raise concerns about over-identifying SELD among children from lower SES backgrounds. Children from minority ethnic backgrounds had lower average scores when SES was controlled for in one study, raising similar questions about the validity of parent report tools in culturally diverse populations.[24] Finally, when uniform expressive vocabulary and word combination criteria are used, more 2-year-old boys are identified with SELD,[1,11,25] raising a question of whether different criteria may be appropriate for boys and girls. Research comparing outcomes for boys and girls with SELD is needed to address this question.

Conclusions

Young children with expressive language skills that are approximately below the 10th percentile are at much higher risk than peers for persisting language or even broader developmental problems, even though there is a wide range of outcomes and many children with SELD at two years of age are in the average range by four years of age. A variety of additional variables are associated with persisting delays, and parental concern about possible speech-language problems is a key predictor of risk for language impairment.

Implications

Early childhood educators, health care providers and other professionals can identify risk for language impairment in young children based on parent-reported information. Immediate referral to a speech-language pathologist is recommended for children with slow expressive language development if the parents are concerned that the child has possible speech-language problems or when there are additional risk factors. On the other hand, if the parents are *not* concerned about the child's speech-language development and there are no additional risk factors, monitoring ("watchful waiting") is recommended for children who are not combining words or who have a small expressive vocabulary (under 40 words) at 24 months.

Monolingual children who speak languages other than English should be referred for evaluation if they are delayed in expressive vocabulary and onset of word combinations in their native language. Because expressive language development is comparable among monolingual and bilingual children when bilingual children's development in both languages is taken into account, bilingual two-year-olds who are not combining and/or have small total expressive vocabularies should be monitored and/or referred for further evaluation.

Collaborative efforts between practitioners and researchers on large scale screening programs that combine screenings with follow-up evaluations are needed to refine and validate models for predicting persisting language impairment for children with parent-reported SELD, using other information about the child and family. These efforts should also include work to adapt, implement and validate measures for children from homes in which languages other than English are spoken, and for children from lower socioeconomic backgrounds.

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Note:

[a] See also the MacArthur-Bates Communicative Development Inventories website. Available at: http://mb-cdi.stanford.edu/. Accessed February 15, 2017.

Programs Supporting Young Children's Language Development

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Introduction

Very young children with severe language delays, secondary to autism spectrum disorder (ASD) or other developmental disabilities (DD) will require effective early interventions to develop optimal language and social communication skills. Even very young children can acquire a means to communicate their needs, intentions and feelings. A number of well conducted early language intervention studies have increased our knowledge of approaches that enhance optimal language development for young children. There are also new technologies available to augment communication and to collect outcome data.

Subject

Early intervention is essential for young children with language delays to increase the rate of language development and reduce the risk of social, emotional and behavioural problems.[1,2] A variety of teaching procedures can be used to target imitation, turn-taking and joint attention as well as communication and language skills more directly.[3,4]

Prelinguistic milieu teaching (PMT) techniques help children who are not yet speaking transition from preintentional to intentional communication.[5,6] The adult uses questions or commands to initiate a teaching episode (e.g., a ball is on a shelf and the adult says, “What do you want?”), thus requiring a specific response from the child. Alternatively, the adult can wait for the child to initiate and then prompt a more complex response (e.g., the child reaches for the ball, and the adult says, “Can you say ball?”). As the child transitions to short sentences, recasting facilitates acquisition of new words and more complex grammar (e.g., the child says “ball” and the adult says “It’s a big ball”).[7]

Responsive teaching (RT) techniques include teaching caregivers to be highly responsive to the child’s communication attempts by following the child’s attentional lead, waiting for the child to

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initiate, responding by commenting on actions or toys of interest and modeling language.

Direct teaching is characterized by imitation based approaches that may include prompting, reinforcing, and immediate feedback on grammatical or vocabulary targets in structured sessions.

Augmentative and alternative communication (AAC) refers to non-speech modes of communicating (e.g., sign language, speech-generating devices, or picture exchange systems) used to enhance children's language, vocabulary, communicative turns and functions, and oral speech.[8]

Problems

Over 70% of children ages 3–5 years identified with a disability have delayed communication and language development,[9] and this is the single most common reason for special education referral.[10] The majority of preschool children with ASD are preverbal; although approximately 70% will learn to use spoken language by the start of kindergarten, 30% will remain nonverbal or minimally verbal.[11,12] Research to develop and test new early intervention approaches, with implementation at a young age, is key to improving long-term outcomes for these children.

Research Context

When a parent brings a child for therapy, the long-term goal is likely to be speech communication. In this time frame, the success of therapy can be observed in distal (far-reaching) measures such as broadly generalized increases in communication, language, or prosocial skills in non-treatment settings.[13] In the short term, the success of therapy can be observed in proximal measures (treatment targets) such as increased initiations, length of communicative turns, as well as comprehension and productive use of words expressed using speech or with AAC.[13,14,15,16] When the child initiates communication and takes turns more often, a transactional model would suggest that communication partners may respond in ways that provide additional opportunities for practice and development.[17] Therefore, effective therapy can change the child and the language environment at the same time supporting generalization and ongoing learning in the home and school environment.[17,18] Yoder and colleagues[19] suggested that if interventions lead to significant growth in both proximal and distal outcomes, one could be more confident in the efficacy of the intervention to impact social communication development in general.

Key Research Questions

Which treatment approaches are effective for children with DDs and/or ASD? Which child and family characteristics predict a treatment response? Do new technologies help minimally verbal children acquire intentional communication?

Recent Research Results

Over the years, a few general themes have emerged from milieu research. First, there is much research to support the significant role that parental responsivity plays in improving early communication and language development.[20,21,22] Specifically, children with highly responsive and more educated mothers benefited the most from PMT whereas children with less responsive, less educated mothers benefited more from a focus on RT techniques in one study.[22] However, a higher level of responsivity is by itself not adequate to substantially improve the communication of young children with developmental disabilities because the modest impacts on social communication observed post-treatment may not be maintained.[23,24,25] Second, parents can be coached to be more responsive, but more research is needed to determine how to increase generalization and maintenance of responsivity.[26] Third, child characteristics may predict individual differences in response to early communication intervention.[23] In various studies and depending upon the treatment procedure or parameter, response to treatment has been associated with certain child characteristics such as diagnosis, level of play skills or amount of joint attention at intake.

Many single case studies have supported the effectiveness of early AAC interventions to improve communication and language development in young children with ASD.[8] Clear improvements have been reported in vocabulary, requesting behaviours, initiations and responses, social engagement, and for some, spoken communication.[27,28,29,30,31] Evidence is building on the benefits of embedding AAC interventions within milieu teaching techniques.[32,33] Promising innovations include the use of speech-generating devices[17,34] and the inclusion of peer-mediated approaches.[17,30,31] Benefits include improvements in communication, social engagement and reciprocal peer interactions, with generalization to routine preschool settings, and maintenance of gains.

Another use of technology is to automatically estimate child and adult communication patterns in naturalistic environments using automatic speech detection and analysis devices such as the Language Environment Analysis (LENA) system.[35,36] LENA research has revealed complex

differences in the verbal interactions between parents and their children with Down syndrome[37] or ASD,[38] when compared to verbal interactions between parents and typically developing children. For example, vocal behaviours of children with Down syndrome remained low while increasing for typically developing children after 2 years of age,[37] and children with ASD produced fewer vocalizations and turns with their parents.[38] These data may inform the design of intervention programs. These outcomes along with other studies[39,40] demonstrate how this new technology can be used as a proximal outcome measure, and as a method to provide parent and caregiver feedback on enriching the child's language environment.

Research Gaps

Collectively, future research should:

1. conduct additional longitudinal, comparative analyses of the relative efficacy of different treatments in relation to specific treatment and learner characteristics, treatment goals and instructional contexts;
2. identify the optimum treatment intensity necessary to enhance communication and language development;
3. expand AAC intervention research to include different populations of children and teach a broader range of functional communication skills with a variety of partners.

Conclusions

Research has demonstrated that many variables influence treatment outcomes. Most importantly, child characteristics such as the cause of the language delay, level of play skills or joint attention, and other aspects of their cognitive profile may predict which teaching procedures are most appropriate and the intensity of intervention that may be required. Parent education and responsivity also play a role in the effectiveness of certain treatment procedures. It is necessary to train early interventionists to tailor treatment programs based on these factors. It is also important to attend to proximal and distal outcomes when selecting and measuring treatment goals and to document meaningful change across a broad range of communication and language skills. For children struggling to speak, interventions that ensure communication partners have the skills to support functional communication through AAC will enhance their opportunities for social participation and friendship development.[41] Early interventionists and speech-language pathologists need to stay current with emerging research in order to effectively

tailor intervention components to the needs of specific children and their families.

Implications

Parents should be able to access effective early interventions that are individualized to meet their child's needs and that fully involve the family. Language intervention programs require interactive situations and contexts that set the stage for language learning within child-caregiver dyads, and that support maintenance, generalization and extension of new skills.[42]

Over the past 10 years, there has been an explosion of mobile technologies and multi-function devices such as touch screen phones and iPads with a variety of apps designed to support communication of individuals with IDD, including ASD. These new technologies should increase the accessibility and effectiveness of technology assisted communication given the growing body of research on optimum design and implementation.

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Services and Programs Supporting Young Children's Language Development: Comments on Girolametto, and Thiemann and Warren

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Introduction

Language delays and disorders are an important issue in child development. Beyond the number of young children with language disorders, the long-term impact of such disorders increases the importance of programs to support young children's language acquisition. Children with early language disorders are at risk for social and behavioural problems as well as academic failure, including literacy difficulties.[1] Furthermore, most school-aged children diagnosed with learning disabilities have language as a component of their learning disability.[2] In broader societal terms, estimates have been made of the economic impacts of low language and literacy achievement.[3] Thus, the topic of these two texts is an important one for children and their families, and for society at large. Girolametto, Thiemann and Warren are among the most influential researchers in the area of treatment programs for language disorders in young children. In these papers, Thiemann and Warren conduct a broad review of the evidence for early language intervention while Girolametto specifically focuses his review on research into parent training programs.

Research and Conclusions

Thiemann and Warren highlight the social consequences of a language disorder and then proceed to discuss evidence of effective language intervention. They briefly summarize four different language-teaching strategies that have been demonstrated to improve children's language abilities. Their discussion of the area is particularly useful because they provide a model of language intervention that accommodates these various approaches. Thiemann and Warren argue that effective intervention requires the provision of ideal language-learning situations, which involve providing communication opportunities, following the interests of the child and building predictable, familiar routines. Within an enabling context, the adult can use specific techniques from any of the four language-teaching strategies. Thiemann and Warren

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review evidence showing some factors that may determine which approach is most effective, including developmental level and parent responsiveness.

Girolametto's review of parent-administered language intervention programs identifies the same basic principles and range of language teaching strategies as Thiemann and Warren, although different terminology is sometimes used (e.g. focused stimulation rather than responsive interaction). He reports on literature showing the effectiveness of parent-administered intervention for children with language delays/disorders with and without additional intellectual disabilities. Girolametto notes that programs that involved a focus on specific language targets resulted in greater gains in language than those that did not have such targets. He reports that there is evidence that, as a group, children involved in parent-administered programs make equivalent gains to those in clinician-administered ones. However, these gains may be less consistent on an individual level and influenced by the nature of the child's language profile. Thus, he concludes, while parent-administered programming is a viable, cost-efficient approach to providing services, the child's progress must be carefully monitored.

Not only do the two articles present a similar fundamental approach to language intervention, they also identify similar limitations in current research and areas for future research. As the authors note, a "one size fits all" approach to language intervention will not work. While there are fundamental components that are central to all the early language intervention programs reviewed, there are many child and parent variables that will affect a program's effectiveness. In the papers, the authors discuss some of the factors (e.g. developmental profile, language targets, responsiveness of parents, linguistic and cultural background), but there are other likely factors, such as child temperament and intervention context, that also need to be explored.

Girolametto's review explicitly discusses one intervention context – parent training. Although Thiemann and Warren's review cites studies that used a variety of intervention contexts, they do not discuss this variable in explicit terms. There are at least four general contexts in which language intervention can be provided: individual, small group, classroom and caregiver training. All of these are viable contexts, but much remains to be learned about which is the best approach for which children and families at any point in time. For example, for many "at-risk" children, providing a high-quality preschool with a language-focused curriculum may be sufficient, but some children may require more focused individual or group programming. These contexts can also be combined. Girolametto makes the distinction between parent-administered intervention and parent involvement, in which the parents play a secondary, supporting role in

clinician-administered intervention. This is an important distinction, as we should not assume that observing therapy or getting general language facilitation suggestions will be sufficient to enable parents to modify their interactions in facilitative ways. However, a parent-training program could be offered in conjunction with direct services. This may well be the most effective and efficient combination for some children. In order to identify which intervention context or combination of contexts are effective for particular children, additional research is needed.

Both papers note that most of the evidence available speaks only to short-term effects and that there is a need for longitudinal research to document treatment effects over the long term. One long-term effect that is briefly alluded to in the papers but needs closer examination is the ability of early language intervention programs to prepare children with language disorders to meet the language challenges of school, particularly the development of literacy. Thus, preschool language intervention needs to be concerned with and evaluated on its effects in areas such as phonological awareness, narrative abilities and emergent literacy skills, which are all foundations for literacy acquisition.

Finally, the authors call for additional work on the transfer of research findings into practice and policy. This is a critical step that requires specific attention. As Girolametto notes, the parents involved in efficacy research are generally not representative of the population. Similarly, the children and settings involved in a research study are often not typical, or at least are not representative of the full range of children with developmental language disorders and intervention contexts. Once an approach has been shown to be effective in a controlled research study, it is necessary to determine that similar effects can be achieved in average treatment settings.

Implications for the Development of Policy

Given the social, educational and economic impacts of developmental language disorders, it is clear that services for children with such disorders need to be a priority. As noted in both papers, research has shown that we can impact child outcomes. The research reviewed by these authors demonstrates that within a responsive environment, a variety of specific intervention techniques can be effectively used by clinicians, preschool teachers and parents. If we are to provide the support children and their families need, it is vital that adequate funding of the full range of intervention contexts – individual, small group, parent training and preschool-based – be provided. Further, appropriate preservice training and continuing education need to be provided

to everyone who works with the children and their families. This includes speech-language pathologists, early interventionists, early childhood educators and child-care providers.

In developing intervention programs, we need to be concerned about effectiveness and efficiency. As Girolametto notes, parent-administered intervention has been shown to be an effective intervention option that is cost-effective. However, he notes that there is evidence that the gains made by children may be more variable than those made by children receiving clinician-directed intervention and that little is known about the effects of this type of intervention with families from diverse cultures. Thus, more research is needed to establish for which children and families this cost-effective approach is the best option. Girolametto calls for the content of parent-administered interventions to be made widely available for those who cannot participate in a formal program. Such initiatives can be useful and it is important to provide all parents with information on language facilitation. However, it is not known what effect the provision of information alone will have, and it is unrealistic to assume that this will meet the needs of a child with a language disorder. Evidence that programs with specific language targets are more effective than programs with a more general facilitation approach, and findings that parent responsiveness is a factor in program outcomes suggest that the provision of information will not be sufficient. Thus, for parents who are unable to participate in a formal parent program, alternative intervention options should be available.

Although our current knowledge allows the development of effective interventions, there is still much to be determined if we are to develop programs that enable children to achieve full potential. Therefore, it is important that there be sufficient support for programmatic efficacy research. Efficacy research is difficult and expensive to conduct, but only by gathering more evidence-based data will we be able to determine the best match between child, family and intervention program. As additional evidence is gathered, it is essential that the knowledge transfer occurs, ensuring that research findings are incorporated into practice. This will necessitate support for the integration of findings across multiple studies in a manner that makes the research accessible. Coordinated efforts among researchers, service-providers and policy-makers are crucial if we are to develop effective and efficient early language intervention programs.

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