Language and Health 1 (2023) 12–19

Contents lists available at ScienceDirect

Language and Health

journal homepage: www.sciencedirect.com/journal/language-and-health

Communication disorders: A complex population in healthcare

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ARTICLE INFO

Keywords:
Communication disorder
COVID-19
Health communication
Hearing loss
Language disorder
Narrative discourse
Speech disorder
Speech-language pathologist
Traumatic brain injury
Voice disorder

ABSTRACT

This article provides readers with an overview of a population of clients that requires special consideration in healthcare settings: children and adults with communication disorders. In addition to standard barriers to effective communication between patients and doctors, people with communication disorders face a further challenge – communicating with medical and health professionals when their speech and language skills are impaired. The article examines how communication skills may fail to develop normally in the early years or may break down in adulthood and later life in the context of illness, injury or disease. Several communication disorders are illustrated using a lifespan perspective. The prevalence and impact of communication disorders are also considered. Finally, the article examines how communication disorders are assessed and treated by speech-language pathologists. The discussion serves as a primer or orientation for health practitioners and communication researchers to an important population of clients who have largely been neglected in health communication research that has been conducted to date.

1. Introduction

Health communication researchers have been proactive in investigating a range of barriers to effective communication in healthcare. These barriers include poor educational attainment, challenging cultural factors, and low levels of trust in healthcare institutions (Rademakers et al. 2012; Kreuter and McClure, 2004; Armstrong et al. 2006). And yet, one of the greatest barriers to effective health communication – an inability to communicate as a result of developmental disorders, injury, or disease – has been all but completely overlooked in health communication research. This article argues that children and adults with so-called communication disorders require special consideration in healthcare settings and in health communication research.

The reasons for limited research into people with communication disorders by health communication researchers are twofold. First, the medical conditions that cause communication disorders require a wide range of knowledge in areas such as neurology, anatomy, and clinical linguistics. These fields of study and clinical practice often lie outside the expertise of health communication scholars. Second, there is a mistaken assumption that this population of children and adults has language proficiency issues, and that this area is addressed by research in other aspects of health communication (e.g., interpreter-mediated communication). This assumption is unhelpful in that it conflates a clinical impairment of language and communication with language use among healthy speakers of different languages.

This article begins with a definition of communication disorder. It then discusses the prevalence of these disorders in the general population and in healthcare settings. The impact of communication disorders on mental well-being and quality of life is also examined. Several communication disorders are highlighted using five key life stages: the early years; older childhood; adolescence; young adulthood; and old adulthood. Finally, the work of the professionals who assess and treat communication disorders – speech-language pathologists (SLPs) – is considered. By the end of the discussion, it is hoped that communication researchers and health professionals should have a comprehensive understanding of this complex population of clients in healthcare and a better understanding of why the needs of this population should be addressed in health communication research.

2. Characterizing communication disorders

A communication disorder is an impairment of any of the processes by means of which speakers produce, and hearers comprehend, spoken, written, or signed utterances. The impairment can have its onset before,

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https://doi.org/10.1016/j.laheal.2023.06.005
Received 23 December 2022; Received in revised form 17 June 2023; Accepted 18 June 2023
Available online 30 June 2023

during, or after birth, or at any time during the developmental period (a *developmental* communication disorder). (The developmental period can extend anywhere up to 22 years of age, according to the definition of the American Association on Intellectual and Developmental Disabilities (2021).) Alternatively, the impairment that causes a communication disorder may arise for the first time in adulthood, or at least after the point at which language and communication skills are normally fully developed (an *acquired* communication disorder). The impairment may disrupt the processes that allow linguistic encoding and decoding to occur (a language disorder) or the processes that permit movements of the speech musculature to take place (a speech disorder). Also, there may be disruption in the flow of speech (a fluency disorder), the production of voice in the larynx (a voice disorder), or in the sensory processes that underpin hearing (a hearing disorder). Some communication disorders may resolve spontaneously (e.g., stuttering in young children), others may remain static (e.g., alaryngeal voice production in people with surgical removal of the larynx), while still others may deteriorate or worsen over time (e.g., language disorder in dementia). Each of these communication disorders can be mild, moderate, or severe in nature, with some disorders more effectively addressed through speech-language pathology than other disorders.

Communication in health settings has the same dyadic character of communication in general. A child or an adult with a communication disorder must take turns with a healthcare provider to assume the roles of hearer and speaker. In the role of the hearer, communication breakdown can take several forms. If a child or adult has hearing loss, he or she may not be able to process the speech signal that a healthcare provider produces, while an individual with visual impairment may lack important visual cues as to what a speaker is saying. Even if sensory processing of the speech signal takes place, there may be breakdown at the stage of language decoding in a child with developmental language disorder or in an adult with stroke-induced aphasia. A child with autism spectrum disorder (ASD) or an adult with schizophrenia may succeed in decoding an utterance, only to fail in interpreting the speaker's communicative intention in producing the utterance. This failure compromises a hearer's ability to establish a speaker's *purpose* in speaking, which linguists characterize as the *pragmatic* meaning of an utterance.

These receptive deficits on the part of the hearer in communication have corresponding expressive deficits on the part of the speaker. The child with ASD or the adult with schizophrenia may struggle to form a communicative intention that can be conveyed through a spoken, written, or signed utterance. Even if a communicative intention can take shape in the mind of the speaker with a communication disorder, it may still have a rather difficult journey on its way to production. The child or adult with language disorder may be unable to select the linguistic structures – sounds, grammatical constructions, and word meanings – that are needed to express the utterance. Even if linguistic encoding takes place successfully, the message may still fail to be conveyed to the hearer because nervous signals cannot reach speech muscles, instructing them to contract. In this case, the child or adult with a communication disorder may produce a grammatically well-formed utterance that is nevertheless unintelligible, because the oral, respiratory, and laryngeal muscles that are needed to produce voice and articulate speech sounds are contracting with abnormal force, timing, and range.

As the above discussion demonstrates, there are many ways in which communication with healthcare providers can be compromised in children and adults with communication disorders. This is in addition to the well-known barriers to effective communication between patients and healthcare providers (e.g., time constraints and limited patient knowledge). It is incumbent on providers to be aware of the communicative challenges of this complex population and to address disparities in care that these challenges can create. There is clear evidence, for example, that people with communication disorders experience significantly poorer health outcomes than adults without these disorders. In this way, Stransky et al. (2018) studied 33,166 adults, among whom 3346 (10.1%) had some form of communication disability. Adults with communication disability reported a higher prevalence of chronic health conditions (e.g., hypertension) than adults without communication disability. While only 25% of adults without communication disability reported $\geq$ 2 chronic conditions, this same number of chronic conditions was reported by 40% of people with voice disorder, 44% of adults with speech and language disorder, and 63% of adults with speech, language, and voice disorders. To address the disproportionately large health burdens experienced by people with communication disorders, healthcare providers must understand how communication disability contributes to poor health outcomes and must implement interventions that can mitigate the harmful effects of these disorders.

3. Prevalence of communication disorders

It is important to recognize that communication disorders have a high prevalence not only in the general population but also in children and adults in healthcare settings. It is for this reason that we should focus on these disorders in health communication research and strive to understand their impact on communication in healthcare. All health professionals encounter individuals with these disorders at some point in their careers; most health professionals encounter individuals with communication disorders on many occasions. The presence of people with these disorders on medical wards and in clinics of health professionals is not some hypothetical situation that *may* come about; rather, it is a present-day reality of healthcare systems around the world. Accepting this fact is the first step on the road to integrating clients with communication disorders into health communication research.

The prevalence of communication disorders in children and adults varies considerably across studies. In 2012, 7.7% of children aged 3–17 years in the United States had a communication or swallowing disorder (American Speech-Language-Hearing Association, 2015). This equates to nearly one in 12 children. The most common disorders were speech problems (5%), language problems (3.3%), voice difficulties (1.4%), and swallowing difficulties (0.9%). Among school-aged children in South India and Spain, communication disorders have prevalence rates of 4.29% (Ravi et al. 2021) and 1.05% (Bosch et al. 2021), respectively. In 2016, approximately 10% of the non-institutionalized adult population in the United States reported a speech, language and/or voice problem in the preceding 12 months (Morris et al. 2016). Prevalence varied with age, gender, and race/ethnicity. Communication disorders were more commonly reported by people aged 80 years and older than by people aged 25–64 years. A greater proportion of the female population reported voice problems than the male population, and Black adults were more likely to report language problems than White adults (Morris et al. 2016).

There has been limited research into the prevalence of communication disorders in healthcare settings. Studies that have been conducted report higher prevalence rates of communication disorders in these settings than in the general population. Moderate or severe difficulties in at least one aspect of speech and language have been reported in over two-thirds of people in a mental health unit (Emerson and Enderby, 1996). Among patients on an acute ward of a department of medicine for the elderly, 73% had speech and/or language problems and 36% had hearing problems (Sweeney et al. 1993). Unsurprisingly, a high prevalence of communication impairment is reported for patients in critical care facilities. Freeman-Sanderson et al. (2019), for example, found that approximately one-third of patients in an intensive care unit of a tertiary Australian hospital had difficulty in communicating.

It is important to acknowledge that many communication disorders remain undiagnosed. Cohen et al. (1998) identified previously unsuspected language impairment in 40% of 380 children aged 7–14 years who were referred to child psychiatric services. Of the 34,525 adults surveyed by Morris et al. (2016), only 17% of adults who reported a

voice problem received a diagnosis. A similarly low rate of diagnosis was also found for language and speech problems, with only 23% of those reporting a language problem and 23% of those reporting a speech problem receiving a diagnosis. Only two (2.4%) of 82 relatively healthy adults with HIV/AIDS showed normal findings when assessed using a total of 24 communication assessments (Kallail et al. 2014). The high prevalence (97.6%) of communication problems in this group of adults illustrates once again that many people with communication disorders do not receive a diagnosis of their condition.

4. Impact of communication disorders

Communication disorders can have an adverse impact on a person's mental well-being and quality of life, especially when they are undiagnosed and untreated. Depression, anxiety, substance use disorders, and suicidal behaviour have been reported alongside communication disorders in several studies. Botting et al. (2016) reported higher levels of depression and anxiety in people with language impairment at age 16. This was still the case in adulthood (24 years). However, while anxiety remained static between 16 and 24 years, depression decreased after 16 years before returning to a high level at 24 years. Language performance did not predict anxiety or depression in the study's participants. Khurana et al. (2021) reported an association between hearing impairment and past-year suicide attempt and ideation in 7546 household residents aged 16 and over in England. In a model adjusted for five sociodemographic and clinical covariates, the odds of having suicidal thoughts were almost doubled in those with hearing impairment.

Stransky et al. (2020) compared behavioral health outcomes of adults aged over 17 years with no communication disability (n = 29,873) to adults with voice disorder only (n = 2169), speech and language disorder only (n = 730), and adults with speech, language, and voice disorders (n = 450). Adults with communication disabilities more frequently reported diagnoses such as depression, bipolar disorder, and attention deficit hyperactivity disorder (7.1–35.9%) compared with adults without communication disabilities (1.8–8.6%). Adults with speech and language disorder only had more substance misuse (15.5%) than adults without communication disability (5.5%). Also, adults with speech and language disorder only and those with speech, language, and voice disorder had more non-specific psychological distress (14.7% and 22.3%, respectively) than adults without communication disabilities (2.3%).

Researchers are increasingly examining quality of life (QoL) in children and adults with communication disorder. QoL is a complex construct that goes beyond well-being to include the functional limitations of a communication disorder on an individual's life. Eadie et al. (2018) found lower parent-reported QoL at 9 years of age in 70 children with developmental language disorder than in typically developing children. Co-occurring social-emotional problems at 4 and 7 years were predictive of lower QoL at 9 years in these children. QoL has been extensively investigated in people who stutter. High quality of life in adults who stutter is associated with high levels of stuttering disclosure (Boyle et al. 2018) and of self-compassion (i.e., self-kindness, mindfulness, and social connectedness) (Croft and Byrd, 2020). Aphasia has long been associated with reduced QoL in stroke patients. Bullier et al. (2020) reported that poor QoL in 32 stroke patients was associated with increased severity of aphasia (initially and at follow-up) and increased communication activity limitations (at follow-up). Communication activity limitations predicted 24% of the variance in QoL in these patients.

Speech-language pathologists also assess a more specific concept of QoL to examine the impact of communication disorders. So-called communication-related quality of life (CR-QoL) has been examined in Chinese alaryngeal speakers (Law et al. 2009), adults with a tracheostomy tube (Freeman-Sanderson et al. 2018) and spasmodic dysphonia (Baylor et al. 2005), and in adults with oromandibular dystonia (Page et al. 2017). Several measures have been developed to assess CR-QoL, including the *Quality of Communication Life Scale* (ASHA QCL; Paul et al. 2004). This scale defines quality of communication life as "the extent to which a person's communication acts—influenced by personal and environmental factors and filtered through a person's own perspective—allow meaningful participation in life situations". It captures information about the impact of an adult's communication disorder on several domains: relationships; communication; interactions; participation in social, leisure, work, and education activities; and overall quality of life. The ASHA QCL is designed specifically for use with adults. While adult measures are also used to assess QoL in children, it should be noted that an instrument that has undergone psychometric development in adult populations may not be suitable for children who may also struggle with the comprehension of certain items (see Gomersall et al. (2015) for a review of QoL measures in children with speech and language difficulties).

5. Communication disorders from birth to old age

As we pass from birth into old age, there are many ways in which communication can break down. While limited space precludes an examination of most of these ways, we can briefly address several communication disorders. We will do so according to five key life stages: the early years; older childhood; adolescence; young adulthood; and old adulthood.

For each life stage, one communication disorder will be highlighted and its impact on speech and language will be examined. The choice of disorders is motivated by two considerations. First, each condition has a high prevalence in the general population and an even higher prevalence in the population of children and adults who require healthcare. This is because children and adults with these conditions often have complex medical needs that necessitate long-term medical supervision. Accordingly, health professionals encounter these types of patients among their clinical caseloads on a routine basis. Second, the conditions that will be discussed also reflect different etiologies. These etiologies include infectious diseases (e.g., COVID-19), neurodevelopmental disorders (e.g., autism spectrum disorder), psychogenic or functional conditions (e.g., puberphonia), and acquired brain injury and disease (e.g., traumatic brain injury and neurodegenerative disease). These diverse medical etiologies are also typical of the clinical caseloads of health professionals, with each presenting unique challenges for communication in health settings.

5.1. The early years

The first years in a child's life are a period of phenomenal language development. The basics of the child's sound system are established between 1 year 6 months and 4 years (Yavaş 1998). Between 3 and 5 years of age, several morphological and grammatical developments occur, including over-regularization (e.g., *flied* versus *flew*), question and passive formation, and negation. In terms of vocabulary development, children learn the equivalent of 14 words a day for the first six years of their lives, an achievement that is unmatched by even the most able foreign language learners. But the early years can also be a time when language development does not proceed along normal lines. A child may be born with an anatomical defect (e.g., cleft lip and palate) that affects the acquisition of speech sounds. A child's neurodevelopment may be compromised as part of a genetic syndrome (e.g., fragile X syndrome), leading to intellectual disability and disordered language development. Pre-natal exposure to alcohol, narcotics, prescribed medications, toxins (e.g., lead), and infectious diseases (e.g., rubella) can also place a child at risk of brain damage and disorders of language development.

Children with ASD may not acquire language at all or may make use of delayed and deviant language processes. Table 1 below shows the single-word productions of a boy called BD, aged 8;3 years, who was studied by Wolk and Edwards (1993). BD was diagnosed with autism

Table 1
BD's single-word productions at 8;3 years.

Target	Production	Target	Production
sky	[daɪ]	cow	[taω]
fish	[bet]	glove	[gʌ]
green	[wi]	tub	[dʌ]
spoon	[bu]	snail	[zʌ]
thumb	[dʌ]	ski	[di]
sled	[zʌ]	snake	[zʌ]
spring	[s̥wi]	three	[s̥wi]

when he started school at 4 years of age. His language development was significantly delayed. The speech-language pathologist at his school reported that he had almost no expressive language prior to his seventh birthday. BD began to produce two-word utterances at 7;5 years. He had a productive vocabulary of approximately 400–500 words and a mean length of utterance of 2.0–2.2 morphemes at 8;3 years. The intelligibility of BD's speech was compromised by use of echolalia and jargon at the time of data collection.

BD's single-word productions reveal several phonological processes that have persisted beyond the point at which they would resolve in a child with normally developing phonology. These processes include velar fronting (e.g., *cow* [taω]), stopping (e.g., *fish* [bet]), final consonant deletion (e.g., *sled* [zʌ]), prevocalic voicing (e.g., *tub* [dʌ]), and /s/ cluster reduction (e.g., *spring* [s̥wi]). More than one phonological process occurs in some of BD's productions. In the word *thumb* [dʌ], for example, there is final consonant deletion of /m/, stopping of the fricative /ɵ/, and prevocalic voicing. BD's production of vowels is also problematic, with the quite different vowel sounds in the words *sled, tub* and *snake* all realized as [ʌ]. These various sound deletions and substitutions lead to considerable homonymy in BD's speech, with words like *spring* and *green* realized by the single form [s̥wi]. These homonymous productions result in marked speech unintelligibility, with BD unable to signal differences of meaning between words.

5.2. Older childhood

Many children are born without challenges and develop normally in the early years of life, only later to experience an illness or injury that compromises their ability to communicate. A child may live in a home environment in which there is physical abuse and may sustain a traumatic brain injury (TBI) through the actions of a parent. TBI-related brain damage can compromise language development and disrupt language skills that have already been acquired. A previously healthy child may suffer hearing loss due to a cerebral infection like meningitis. A child with a repaired cleft of the palate may experience a speech resonance disorder as maturation of the oral cavity alters the dimensions of the velopharyngeal port, and air escape into the nasal cavities becomes a significant issue. The onset of childhood psychiatric problems including mood disorders and bipolar disorder may disrupt once normal patterns of communication for a child. Sustained vocal abuse in school-aged children related to playground screaming may lead to the development of vocal nodules and a voice disorder. In each of these conditions, a speech, language, hearing, or voice disorder becomes apparent for the first time as children move beyond the early developmental period and progress towards older childhood.

Biddle et al. (1996) examined narrative production in 10 children who sustained a TBI. Children were asked to produce narratives on four themes. In one theme, children had to describe an episode when they were stung by a bee. The 'bee' narrative of one child in their study, a girl aged 7;4 years, is shown below.

> "Ummm, I, once, there was a, we went. There was a for. There was this umm fort. A tree fell down. And there was dirt, all kinds of stuff there. It was our fort. And one day, I have a friend named Jude. She's umm grown up. She has a kid. She has a cat named Gus, a kitten. It's so cute. But once, when she didn't have that kitten, one day, me, my brother, my cousin Matt, and her, and my dad, and one of his friends, went into the woods to see the fort, to show her. And we went up there. I stepped on a bee's nest. And they chased us all the way back. And I got stung and my cousin Matt got stung in one of the private parts. And umm I had a bite right here (points), right here (points), right there (points), and umm one on my cheek. And right here. And when I umm went over, when we got back to my friend Jude's house, in her bathroom she had this clean kind of stuff. And I put it on me. She put it one me right here (points). But umm, I had to go to the bathroom to put it on, you know. It hurt! And my brother Jason he got stung once. He got stung I think three right here (points). I remember where I got stung, but I don't remember where Jason got stung. My friend Jude didn't even get stung. She ran so fast that she didn't even get stung. The bees chased us and I looked back. And there was one right in front of my face. That's when I got stung here (points). There was like two hanging around my legs. I was running and trying to get them off me. They both went, "Bzzzzz". It hurt! I was crying my head off."

This girl's narrative displays several linguistic strengths. Her lexical repertoire is age-appropriate and is adequate for the narrative task at hand. Her story includes proper nouns for the names of people and pets. There are also nouns to refer to artefacts (e.g., *fort*), body parts (e.g., *cheek*), animate entities (e.g., *kitten*), and familial relations (e.g., *brother*); adjectives to capture states (e.g., *cute, clean*); and verbs to express a range of actions and mental states (e.g., *stepped, remember*). The narrator also uses a range of grammatical constructions, including negation (e.g., *she didn't have that kitten*), infinitive clauses (e.g., *I had to go to the bathroom*), and passive voice (e.g., *Matt got stung*).

Notwithstanding these linguistic strengths, the narrative also exhibits several features that convey an impression of discourse inefficiency. The girl's narrative contains some irrelevant information such as when she talks about the child and kitten of her friend Jude. It is also highly repetitive and excessively detailed in parts. She describes how she and her friends were stung on nine separate occasions, with information provided on the exact body part of each sting. The narrative lacks linear progression and unfolds in circles, with the narrator returning to an earlier point in discourse. She describes, for example, how she and her cousin were stung, then relates how they went to her friend's house and cleaned the stings, and then returns to give a further description of the bee stings. The somewhat circuitous and repetitive nature of this girl's narrative is reflected in its word count. This speaker produced 317 words in her narrative, while a similarly-aged girl with no neurological injury in Biddle et al.'s study produced her narrative in only 74 words. These discourse-level difficulties in the presence of relatively intact structural language (e.g., grammar and vocabulary) are indicative of cognitive deficits in planning and organization (executive functions) that can arise following TBI.

5.3. Adolescence

The physical and psychological changes that occur during puberty make adolescence a challenging time for any teenager. During adolescence, we define our identity and develop self-esteem. We try to establish rewarding social networks with others and may participate in romantic relationships for the first time. Employment and vocational training become increasingly significant, requiring important decisions that often affect the rest of our lives. For teenagers who have a new-onset communication disorder, or a communication disorder that has persisted since childhood, the psychological, social, and occupational challenges of adolescence can be particularly difficult to overcome. A teenager with developmental stuttering must cope with their anxiety in speaking to attend job interviews and interviews for admission to college and university. Young people with communication disorder may lack the language skills needed to negotiate conflict with their peers.

Table 2
TC's responses during confrontation naming.

Target word	TC's response
seahorse	"it's a one of those sea things urm urm urm urm they're very small erm seahorse"
doorknob	"you open the door with it erm it's uhm uhm eer I wanna say door handle but there's a better word than that erm erm because you'd find it in a kitchen on a on a on a press erm er I know what it is it's a doorknob"
windmill	"it's a erm er (.) things go around with the wind it's a windmill"
thimble	"you sew with it and you put it on your (.) finger no you don't you put it on your thumb it is a thimble"
lobster	"the pinchy guys it's a er it's a lobster"

This may lead them to engage in offending behaviour and to develop substance use disorders, with the risk that these activities may bring them into contact with the criminal justice system (Cummings, 2014). A voice disorder may erode a teenager's confidence to speak in front of peers in class and to participate in social activities. A speech disorder in a teenager with cerebral palsy or intellectual disability may cause them to be subjected to bullying and social exclusion (Lindsay and McPherson, 2012).

A new-onset communication disorder during adolescence is mutational falsetto or puberphonia. Maturational changes in the larynx during puberty cause vocal pitch to drop by almost one octave in males and one third of an octave in females. In a person with puberphonia, the pitch of the speaking voice does not drop, with the result that the adolescent does not acquire expected adult vocal pitch. The larynx is invariably normal when visually examined during laryngeal videostroboscopy. In a voice disorder where there is a considerable psychosocial impact on the puberphonic individual, research has largely focused on acoustic parameters of the speaker's voice (e.g., Carlson, 1995; Hamdan et al. 2019). The true impact of this condition, however, can be gauged best by listening to the personal narratives of people with puberphonia. Landera (2004) described his experience of puberphonia, a condition that left him feeling isolated and without hope, but that also ultimately led him to become a speech-language pathologist:

> "I developed a soft, whispery, and hoarse voice. I went to countless doctors seeking answers, to no avail […] I had to endure the pain of being picked on as "the mute" in my school. Kids would tease me every day, to see if they would be the first to hear my voice. I felt resigned to unhappily live with the condition."

Puberphonia poses a significant risk to an adolescent's self-esteem and identity formation during a life stage when psychological resources that might mitigate this risk are still in development. For this reason, prompt assessment and intervention must be undertaken by speech-language pathologists. The important role of these health professionals in the management of children and adults with puberphonia and other communication disorders is examined in Section 6.

5.4. Young adulthood

Progression into adulthood can pose new personal, social, and occupational challenges to young people. But it is not uncommon for communication disorders to arise for the first time during this stage of life. Previously healthy people can develop multiple sclerosis (MS), a neurodegenerative disorder that is a significant cause of disability in young adults. Speech production can be compromised in MS, resulting in dysarthria (a speech disorder of neurological origin). Men are at an increased risk of TBI during young adulthood because of road traffic accidents, sporting injuries, violent assaults, and their participation in military campaigns. Speech, language, and hearing disorders are common sequelae of TBI in these young adults. The onset of psychiatric conditions such as schizophrenia, bipolar disorder, and substance use disorders can compromise communication skills in young adults, leaving affected individuals unable to perform social and occupational roles. Young adults can develop cancers that require treatment by means of surgery, chemotherapy, and radiotherapy. Each of these medical interventions carries risks of communication disorder (e.g., language impairment following cranial irradiation) in addition to the risks to communication from cancer itself. Finally, infectious diseases such as meningitis, HIV, and Creutzfeldt-Jakob disease can damage the central nervous system, resulting in speech, language, hearing, and voice disorders.

By way of illustration of these communication disorders, we need only turn to the current COVID-19 pandemic. It has become apparent during the pandemic that the SARS-CoV-2 virus can cause cognitive and language problems in children and adults. The author examined the language skills of 92 adults who contracted the virus and developed mostly mild-to-moderate illness at the onset of their infection (Cummings 2021a, 2021b, 2022). Many of these adults went on to experience significant cognitive-linguistic difficulties, even though their acute illnesses were not sufficiently severe to require hospitalization. One of the participants in the study was a 49-year-old woman called TC. She contracted SARS-CoV-2 at the start of the pandemic in Ireland in early 2020. TC is a previously healthy university lecturer who has not been able to resume employment since the onset of her COVID illness. She was recorded 337 days (11.2 months) after the onset of her symptoms. Although TC achieved 90% accuracy on confrontation naming, her naming behaviour was noteworthy on account of her extensive use of circumlocution (i.e., she 'talked around' a target word). TC's lexical retrieval appeared to function less efficiently following her illness and she required additional activation to produce target words. TC achieved this activation through engaging in circumlocution; she appeared to trigger the production of the target word by talking around it. Table 2 shows several of the circumlocutions that TC produced during confrontation naming before she uttered the target word correctly in each case.

Adults with COVID-19 also exhibited other language problems. Their discourse production during picture description and narration was often markedly under-informative. This can be seen in the following narrative produced by a 46-year-old woman called SE. SE developed COVID symptoms at the beginning of the pandemic in the UK. She was 259 days (8.6 months) post-onset at the time of testing. SE's narrative is based on a sequence of six black-and-white line drawings (the 'Flowerpot Incident') that remained on view during the telling of her story:

> "Okay (.) erm (0.2) so the gentleman with the dog has got something just (.) a plant's just fallen on his head (.) aaaar he's now shouting at whoever (0.2) well he's he's just shouting from the the plant falling on his head the dog's barking erm he's now into to er (0.2) property no he's banging on the door erm (0.2) yeah he's now banged on the door a lady's answered (0.2) and the dog's running off with the ah! the lady's given the dog a bone (.) the dog's now run off with the bone (.) and he's been invited in."

SE obtained an informativeness score of 9.5 out of 20 (47%) for her narration of the Flowerpot Incident. This score placed SE between 1 and 2 standard deviations below the mean score of 13.85 out of 20 (69%) obtained by 26 healthy participants in the study. SE's low score reflected her omission of full propositions and parts of propositions in the story. Among the full propositions omitted from her story were (i) the man doffed his hat to the lady, (ii) the man had a large bump on his

head, and (iii) the man kissed the lady's hand. In addition, SE omitted parts of propositions, including the fact that (iv) the man and dog *were walking along the street*, (v) the flowerpot fell from *an overhanging balcony*, and (vi) the man banged on the door *with his walking stick*. As well as the omission of (i) to (vi), SE's informativeness is further reduced by her repetition of information. During her narration, she states each of the following propositions twice: the man is shouting; a plant has fallen on the man's head; the man is banging on the door; and the dog is running off. The repetition of these propositions conveys no new information in the story. Finally, SE uses non-specific words in the verb phrases *has got something* and *shouting at whoever*. The combination of omitted and repeated information, alongside certain lexical choices, confers reduced informativeness on SE's narrative.

5.5. Old adulthood

Older adults are at an increased risk of communication disorder. Age-related neurodegeneration in conditions like Alzheimer's disease has resulted in a burgeoning number of dementia cases globally. Communication skills are particularly vulnerable to the effects of neurodegeneration. Communication disorders such as aphasia, cognitive-communication disorder, and hearing loss are relatively common in people who develop dementia and contribute to poor quality of life of people with the condition (Khan et al. 2021; Ruggero et al. 2019). Aged adults are also at increased risk of stroke-induced communication disorders such as aphasia (a language disorder), the speech disorders dysarthria and apraxia of speech, and cognitive-communication disorder. The structure and function of the larynx can deteriorate with advancing years, leading to the development of presbylarynx, particularly in older men (Takano et al. 2010). Ear anatomy and physiology can also deteriorate due to aging, leading to conductive and sensorineural hearing loss. This is in addition to the hearing loss that can arise from the presence of neurodegenerative diseases in the brain's auditory cortices. Age-related visual impairment can compromise communication further, as many of the visual signals that facilitate comprehension of a speaker's meaning (e.g., facial expressions) are not so readily perceived by older adults with loss of vision.

To illustrate the language problems that can arise in later life, let us consider data from a 66-year-old woman called LM. LM has advanced progressive supranuclear palsy (PSP), a condition characterized by features of Parkinsonism (e.g., slowness of movement), oculomotor abnormalities, early postural instability, and cognitive impairment (Vecchio et al. 2018). LM was diagnosed with PSP in early 2015. The author visited her at home on 30 July 2018 and made an audio recording of her language (Cummings, 2020). LM passed away 8 months after this visit on 31 March 2019. LM's language profile displayed strengths and weaknesses. She was able to generate brief sentences using one, two, and three words that were presented to her auditorily:

Child-hospital:
The child went to the hospital with a sore hand.
Chair-doctor-sit:
Doctor told the girl sit in the chair.

LM was also able to respond appropriately to questions posed by the author (AU). Several of these questions were grammatically complex, suggesting LM had intact auditory verbal comprehension for conversation:

AU: Can you tell me how PSP has affected your daily life?
LM: Well, I can't, I can't do things, I can't em (2:92) I can't do ordinary things about the house.

Other aspects of LM's linguistic performance were impaired and reflected her underlying cognitive impairment. On a letter fluency task, LM was only able to produce 4 words beginning with the letter F in 60 s. This score is significantly below the mean score of 16.8 words beginning with F obtained by 51 cognitively normal subjects aged 68.9 years who were studied by Clark et al. (2016). LM's category fluency performance was also very weak, with only 4 animal names produced in 60 s. Healthy participants aged 60–69 years can produce 17.6 animal names on average in 60 s (Tombaugh et al. 1999). LM's immediate recall of a 100-word story that was read aloud to her by the author was also poor (delayed recall was not attempted). Her score for accuracy on immediate recall was 50%. LM's cognitive difficulties were most apparent during discourse production tasks. Her informativeness score on discourse tasks was 25% for picture description and 35% for the six-frame Flowerpot Incident story. The most complex of the three discourse production tasks undertaken – Cinderella narration – contained no relevant, accurate information. There was considerable perseveration on the expression *make/show her way home* in the narrative that LM produced for this task:

"well in (.) was there a little girl (.) who played with her toys her (.) he, e, e, er [her] (.) everything's (.) she was very happy (.) she (7:11) she couldn't e, e, em (2:20) she wondered how she could how she could **make her way home** em (6:18) she, she, she was (5:12) very she was xxx (unintelligible) (.) wee boy who em (3:11) who was he was to help her (.) he em (3:90) he was able to (.) **show her the way home** (.) em (2:96) he's is (4:82) he's a driver (.) em (5:17) and **showed ehh [her] the way home** (2:19) she **made her way home** (.) em (2:73) she (4:89) she wanted to she wanted to let her see (.) see for Cinderella em (3:03) xxx (unintelligible) (4:19) all it's away (.)"

In summary, LM's performance revealed a mixed pattern of preserved and impaired skills. LM retained in part the ability to produce well formed, meaningful utterances. However, she exhibited a significant impairment of high-level discourse skills. These skills, which are essential for planning discourse, depend on cognitive abilities that are impaired in PSP.

6. Speech-language pathology

As we reflect on people with communication disorders in healthcare settings, we would also do well to think about the health professionals who work with these clients. These professionals are variously referred to as speech-language pathologists (US), speech and language therapists (UK), speech therapists (Hong Kong), and as logopaedists (Europe). This final section briefly describes the size and composition of the speech-language pathology workforce in different countries. It also outlines the settings in which these clinicians work. Some remarks are made about the different roles of speech-language pathologists. These roles go well beyond the most obvious ones of the assessment and treatment of children and adults with communication disorders.

In 2020, the American Speech-Language-Hearing Association (ASHA) reported that there are 188,143 speech-language pathologists among its membership. While this may seem like a sizeable workforce, it is substantially lower than the number of physical therapists (220,870), dental hygienists (194,830), pharmacists (315,470), and social workers (681,400) in the United States in the same year (U.S. Bureau of Labor Statistics, 2021). The result is that even in well-resourced healthcare systems, there is a relatively low ratio of speech-language pathologists to the number of children and adults in the population with communication needs. The situation is worse still in less affluent countries. In the United States in 2020, there were 56.4 ASHA-certified speech-language pathologists for every 100,000 residents (American Speech-Language-Hearing Association, 2021). This is equivalent to one speech-language pathologist per 1773 people. This level of clinical provision stands in stark contrast to one speech-language pathologist per 100,000 people in Malaysia (Chu et al., 2019).

Although speech-language pathologists serve populations that are highly diverse, the speech-language pathology workforce lacks

diversity, at least in the UK. The Health & Care Professions Council (2021) in the UK conducted a survey of 3755 of its registered speech and language therapists (SLTs) between December 2020 and March 2021 and found that the majority were white (70%), female (96%), heterosexual (90%), and not disabled (92%). Of its total 17,240 SLT registrants, the largest age group (33%) was between 25 and 34 years, while the average age was 40 years. Lack of diversity in the speech-language pathology workforce has implications for the provision of culturally sensitive clinical communication services to clients from different language and ethnic backgrounds.

Speech-language pathologists practice in a wide range of settings. This includes mainstream and special schools, health and community centres, hospitals, rehabilitation units, residential care facilities, and prisons. Many clinicians are employed by non-governmental organizations (e.g., in Hong Kong) or work in independent or private practice. Reflecting the priority to provide clinical services in the early years, most speech-language pathologists are employed in educational settings. The American Speech-Language-Hearing Association (n.d.) reports that 56% of SLPs work in educational settings (53% in schools and 3% in colleges and universities). A further 39% work in healthcare settings. This includes 16% in non-residential healthcare facilities, 13% in hospitals, and 10% in residential healthcare facilities. Finally, 19% of SLPs work either full-time or part-time in private practice.

Lastly, it is important to say something about the professional roles of speech-language pathologists. Chief among these roles is the *assessment* and *treatment* of communication skills in children and adults. Assessment can involve the use of formal language tests and batteries such as the *Boston Diagnostic Aphasia Examination* (Goodglass et al., 2001) to assess a client's expressive and receptive language skills. It can also involve the analysis of transcribed conversation and other forms of discourse (e.g., narration), and the completion of communication checklists, either with or without the input of parents, carers and other professionals. Assessment of speech and voice disorders may involve the use of instrumental techniques, such as videostroboscopy to image the larynx and nasometry to assess resonance disorders. Instrumental techniques are often used alongside perceptual assessments of the intelligibility of an individual's speech and the vocal quality of a person's speaking voice.

In terms of intervention, SLPs often use behavioural exercises to treat communication disorders. This may include exercises to improve vocal intensity or loudness in an adult with Parkinson's disease and hypophonia (weak voice), or articulatory exercises to improve speech sound production in a child with cleft lip and palate. Intervention may also employ instrumental techniques such as the use of electropalatography to improve articulatory placement during speech sound production. When a communication disorder is severe or is progressive in nature, intervention may involve the use of an augmentative or alternative communication (AAC) system, such as a communication board (low-tech AAC) or a voice output communication aid (high-tech AAC). Intervention is often conducted on a one-to-one basis with the client, but it can also take place in groups when doing do has therapeutic benefits. For example, teenagers who stutter and adults with aphasia often receive psychosocial support from others when treatment is delivered in group settings.

While the assessment and treatment of clients with communication disorders are two of the primary duties of SLPs, there are many additional duties that fall within the remit of speech-language pathology. SLPs also act as *educators* of other professionals, family members, and the public about communication disorders. Teachers, social workers, and health professionals must understand the challenges of people with communication disorders. SLPs are ideally placed to educate these key groups of workers. The educational role of SLPs includes work with families, as family members often conduct treatment tasks under the instruction of SLPs. SLPs can also play an important public education role. By educating the public about communication disorders, SLPs can help to improve access to employment for people with communication disorders and to reduce the stigma and prejudice that individuals with these disorders experience.

Speech-language pathologists must also fulfil three other duties as part of their professional remit. They are obliged to contribute to the knowledge base of their discipline by undertaking *research*. This might involve enrolment in a programme of study that leads to the award of a higher degree, or the implementation of a research study that investigates a new clinical intervention. Speech-language pathologists also play a vital *mentoring* role in support of junior clinicians and student SLPs who must complete practicum requirements as part of their university studies. Finally, speech-language pathologists can also act as powerful *advocates* for people with communication disorders. In this role, they may represent the views of people receiving end-of-life care, especially when communication skills are no longer functional, and decisions must be made about the continuation of treatment. The advocacy work of speech-language pathologists can also take place nationally when clinicians advocate for the rights of people with communication disorders in areas such as healthcare and employment and seek to influence government policy in ways that benefit children and adults with communication needs.

7. Summary

This article has presented an overview of communication disorders, including the children and adults who have these disorders and the health professionals – speech-language pathologists – who assess and treat them. The discussion highlighted the high prevalence of communication disorders in health settings. It also illustrated these disorders by examining how communication may be disrupted at different life stages.

The aim has been to make readers, who conduct research in health communication, aware of this large population of children and adults who face unique challenges when communicating with health professionals. These challenges are in addition to the challenges routinely experienced by patients in healthcare settings such as a range of barriers to effective communication (e.g., lack of medical knowledge, low trust in physicians). For people with communication disorders, the problems that characterise many health encounters are compounded by difficulties in using and understanding language. These difficulties place additional responsibilities on health professionals who must make adjustments to ensure that their spoken and written communications can be understood by the person with a communication disorder. They must also overcome language, speech and voice problems to understand their patients' needs and treatment expectations. If these adjustments can be achieved, people with communication disorders will begin to participate more actively in interactions with health professionals and will experience improved levels of care as a result.

Data Availability

The authors do not have permission to share data.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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