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## REVUE CANADIENNE D'ORTHOPHONIE ET D'AUDIOLOGIE | RCOA

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Speech-Language &  
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Communicating care  
La communication à cœur

Using Gestures to Help Children With Developmental  
Language Disorder in Word Learning  
ANNE BRAGARD, MARIE-ANNE SCHELSTRAETE

Formalizing Local Intersectoral Practices: A Case Study of an  
Initiative Targeting Language Development  
MÉLISSA DI SANTE, ANGÈLE BILODEAU, CATHERINE CHABOT, LOUISE POTVIN

Dysphagia and Oral Health Concerns in Long-Term Care  
REBECCA AFFOO, REBECCA CLIFFE POLACCO, BONNIE LAM, JINHUI MA,  
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Report on the Impact of LSVT LOUD in Improving  
Communication of a Preschool Child and a Young Adult With  
Cerebral Palsy  
ANNIE JOËLLE FORTIN, ALEXANDRA HAMEL, FRÉDÉRIQUE ASSELIN-GIGUÈRE,  
SIMONE POULIN, DAVID H. MCFARLAND

An Umbrella Review of Systematic Reviews: Characteristics  
of Communication Partner Training That Facilitate Learning  
in Communication Partners of Adults With Acquired  
Neurogenic Communication Disorders  
ARINÉ KUYLER, ENSA JOHNSON, JUAN BORNMAN



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## TABLE OF CONTENTS

## TABLE DES MATIÈRES

ARTICLE 1	79
Using Gestures to Help Children With Developmental Language Disorder in Word Learning	
ANNE BRAGARD, MARIE-ANNE SCHELSTRAETE	

ARTICLE 1	79
Utiliser des gestes pour aider les enfants ayant un trouble développemental du langage à apprendre des mots nouveaux	
ANNE BRAGARD, MARIE-ANNE SCHELSTRAETE	

ARTICLE 2	95
Formalizing Local Intersectoral Practices: A Case Study of an Initiative Targeting Language Development	
MÉLISSA DI SANTE, ANGÈLE BILODEAU, CATHERINE CHABOT, LOUISE POTVIN	

ARTICLE 2	95
Formaliser les pratiques intersectorielles locales : une étude de cas sur une initiative ciblant le développement du langage	
MÉLISSA DI SANTE, ANGÈLE BILODEAU, CATHERINE CHABOT, LOUISE POTVIN	

ARTICLE 3	109
Dysphagia and Oral Health Concerns in Long-Term Care	
REBECCA AFFOO, REBECCA CLIFFE POLACCO, BONNIE LAM, JINHUI MA, CATRIONA M. STEELE, ASHWINI NAMASIVAYAM-MACDONALD	

ARTICLE 3	109
Dysphagies et problèmes de santé buccodentaire dans les établissements de soins de longue durée	
REBECCA AFFOO, REBECCA CLIFFE POLACCO, BONNIE LAM, JINHUI MA, CATRIONA M. STEELE, ASHWINI NAMASIVAYAM-MACDONALD	

ARTICLE 4	125
Report on the Impact of LSVT LOUD in Improving Communication of a Preschool Child and a Young Adult With Cerebral Palsy	
ANNIE JOËLLE FORTIN, ALEXANDRA HAMEL, FRÉDÉRIQUE ASSELIN-GIGUÈRE, SIMONE POULIN, DAVID H. MCFARLAND	

ARTICLE 4	125
Rapport clinique de l'impact du protocole LSVT LOUD pour, améliorer la communication d'un enfant d'âge préscolaire et d'un jeune adulte ayant une paralysie cérébrale	
ANNIE JOËLLE FORTIN, ALEXANDRA HAMEL, FRÉDÉRIQUE ASSELIN-GIGUÈRE, SIMONE POULIN, DAVID H. MCFARLAND	

ARTICLE 5	141
An Umbrella Review of Systematic Reviews: Characteristics of Communication Partner Training That Facilitate Learning in Communication Partners of Adults With Acquired Neurogenic Communication Disorders	
ARINÉ KUYLER, ENSA JOHNSON, JUAN BORNMAN	

ARTICLE 5	141
Revue parapluie de revues systématiques : caractéristiques des formations des partenaires de communication qui favorisent l'apprentissage chez les interlocuteurs d'adultes atteints d'un trouble acquis de la communication d'origine neurologique	
ARINÉ KUYLER, ENSA JOHNSON, JUAN BORNMAN	





## Using Gestures to Help Children With Developmental Language Disorder in Word Learning



## Utiliser des gestes pour aider les enfants ayant un trouble développemental du langage à apprendre des mots nouveaux

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### Abstract

Children with developmental language disorder show significantly lower word-learning performance than typically developing age-matched children do. Although gesture is used to support speech in some special education classrooms for children with developmental language disorder, only a limited amount of research has shown empirical evidence for a multimodality effect on word learning. This study aimed to investigate the role of gestures in word learning with children presenting with developmental language disorder (aged 5–10) in comparison to typically developing children. Ten children with developmental language disorder were compared to 10 chronological-age-matched children and 10 language-age-matched children. These 30 children learned new phonological labels for common concepts under three conditions: with the help of iconic gestures, with arbitrary gestures, and without gestures. The results indicate a scaffolding effect of both types of gesture for novel-word retrieval in comparison to the control condition. No group differences were reported: All children benefited from gesture. These data suggest that using gestures with both children with developmental language disorder and typically developing children may support their spoken language development. Theoretical and clinical implications are discussed.

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### Abrégé

Les performances d'enfants ayant un trouble développemental du langage dans des tâches d'apprentissage de mots nouveaux sont significativement inférieures à celles d'enfants au développement typique du même âge. Bien que les gestes soient utilisés en complément à la parole dans certaines classes spécialisées pour enfants ayant un trouble développemental du langage, le nombre d'études qui ont montré de façon empirique l'effet de la multimodalité sur l'apprentissage de mots nouveaux est limité. La présente étude visait à étudier le rôle des gestes dans l'apprentissage de mots nouveaux chez des enfants ayant un trouble développemental du langage (âgés de 5 à 10 ans), lorsque comparés à des enfants au développement typique. Les performances de dix enfants ayant un trouble développemental du langage dans des tâches d'apprentissage de mots nouveaux ont été comparées à celles de dix enfants appariés selon l'âge chronologique et de dix enfants appariés selon le niveau langagier. Ces trente enfants ont appris de nouvelles formes phonologiques représentant des concepts courants dans trois tâches expérimentales différentes : une tâche intégrant des gestes iconiques, une tâche intégrant des gestes arbitraires et une tâche n'intégrant pas de geste. Les résultats indiquent que les deux tâches intégrant des gestes soutenaient la reconnaissance de mots nouveaux. Aucune différence n'était rapportée entre les groupes; tous les enfants ont bénéficié des gestes. Ces données suggèrent que l'utilisation de gestes peut supporter le développement du langage oral, et ce, autant chez les enfants ayant un trouble développemental du langage que chez ceux ayant un développement typique. Les implications théoriques et cliniques de ces résultats sont discutées.



Developmental language disorder (DLD) is a linguistic developmental pathology in which children present with slow development of spoken language in the absence of neurological, emotional, sensory, or cognitive impairments (Bishop, 2017; Leonard, 2014; Schwartz, 2017). Children affected by such a disorder (hereafter referred to as children with DLD) present with varied profiles of language deficits (Schwartz, 2017) in both expressive and receptive language development, and in various language components (phonological, lexical, morphosyntactic, and pragmatic). More specifically, problems with vocabulary development occur in many, although by no means all, children with DLD (Nash & Donaldson, 2005).

A large body of evidence supports the view that vocabulary deficits in children with DLD are likely attributable to word-learning difficulties that make their acquisition of new lexical items slower and/or less extensive than in age-matched children (Kan & Windsor, 2010). A growing body of research suggests that this poor word learning by children with DLD is related to difficulty creating and storing phonological and semantic representations of new words and establishing strong links between those representations (Alt & Plante, 2006; Gathercole et al., 1997; Gray, 2005; McGregor et al., 2002; Storkel, 2001).

Specific pathways for treatment are therefore needed to help children with DLD in learning new words. Among the various types of intervention targeting word learning, gesture-supported speech is used in some special education classrooms for children with DLD: Teachers, speech-language pathologists, and other caregivers offer a whole series of visual aids, including gestures, to children along with oral language in everyday contexts. Nevertheless, there is a need for theoretical support explaining why a gesture can help someone to recover a piece of information by providing an additional cue. In addition, empirical evidence for the contribution of gestures to helping children when learning words, either in typical development (TD) or with DLD, is required. Better understanding of the underlying processes in children could lead to more targeted and, therefore, more effective interventions.

### The Scaffolding Effect of Gestures on Word Learning From a Theoretical Point of View

Dual coding theory (Paivio, 2010) supports the idea that gestures can play an important role in scaffolding word learning: Information processing in both the visual-manual and auditory-oral channels creates a stronger connection in memory (Capone & McGregor, 2005). Someone using the auditory and visual modalities together when learning words

creates two paths to the concept in memory. Gestures then support the link formed between the phonological form of the word and its referent (semantic representation). As a result, the information is better retained compared to that stored through pure verbal encoding (Allen, 1995; de Nooijer et al., 2014; Macedonia & von Kriegstein, 2012; Tellier, 2008). Such a beneficial effect of input from more than one modality on word learning is called the *multimodality effect* (Paivio, 2010).

Similarly, Macedonia (2003, as cited in Macedonia & von Kriegstein, 2012) proposed the connectivity model of semantic processing to account for the high memorability of novel words learned with gestures. According to this model, a complex code involving sensory and motor information is deeper and so improves retrievability. Along the same lines, the levels of processing model ( Craik & Lockhart, 1972) established a positive relationship between greater effort or more elaborate processing and better comprehension and recall. Deeper levels of analysis produce more elaborate, longer lasting, and stronger memory traces than shallow levels of analysis. Finally, because the lexical learning deficits of many of children with DLD are associated with deficient short-term memory functioning (Majerus et al., 2006; Montgomery, 2003), using multimodality could be useful in reducing the burden on verbal short-term memory during encoding and retrieval. Using gestures could then minimize the memory deficit often reported in children with DLD and help them to retrieve words easily.

### Empirical Evidence of the Effectiveness of the Use of Gestures for Children With TD and Children With DLD

First, for children with TD, the use of multiple channels (e.g., speech and gesture) appears to facilitate their language development, including word learning (Capone & McGregor, 2005; de Nooijer et al., 2014; Goodwyn et al., 2000; Marentette & Nicoladis, 2011) and aids second-language word acquisition (Tellier, 2008). For example, Goodwyn et al. (2000) instructed an experimental group of 32 parents of 11-month-old infants to add iconic<sup>1</sup> gestures (of their own invention) and a control group of 32 parents to only label words in their interactions with their children. The target gestures included simple movements for five objects and three nonobject concepts, although the eventual goal of the study was to get families in the experimental group to model many iconic gestures and to get families in the control group to label many words. Results showed that the children in the experimental group (iconic gestures) scored significantly higher than children in the control group did on receptive lexical measures at the ages of 19 and 24 months, and on expressive measures at the ages of 15 and

<sup>1</sup> Iconic gestures, also referred to as representational gestures, are manual or facial movements that represent the semantic content of the segments of speech that they accompany (Capone & McGregor, 2005). For example, opening and closing two fingers in the form of a "V" can represent a pair of scissors.

24 months. The authors concluded that iconic gestures support word learning better than verbal labelling.

In the same vein, McGregor et al. (2009) demonstrated the beneficial effect of iconic gestures on the understanding of the preposition “under” in 20- and 24-month-old toddlers. Forty children participated in one of three training conditions: The gesture group viewed an iconic gesture for “under” during training; those in the photo group viewed a photograph of objects in an under relationship, and those in the control group did not receive any supplemental symbolic support. Only the gesture group demonstrated overall gains; their improvement from pretest to delayed posttest was significant. The authors proposed the following explanation for their results: Gestured input likely reduced cognitive load, while emphasizing both the location and the movement relevant to the meaning of “under.”

In a study with 19 toddlers (mean age: 28 months), Capone and McGregor (2005) compared three word-learning conditions: gestures cued attention to object shape in one experimental condition or to its function in the other, and no semantic cue was provided under the control condition. Six stimuli were used for each condition. Results showed that young children were better at word retrieval in both gesture conditions (shape gesture or function gesture) than in the no-gesture condition, but shape gesture was more effective than function gesture. The authors concluded that semantic representation of objects can be enriched by gestures. In So et al.'s (2012) experiment, 4- to 5-year-old children ( $n = 38$ ) watched three different videos, each consisting of a list of five words in three conditions (words accompanied by iconic gestures or by beat gestures,<sup>2</sup> or without gesture), and were asked to recall the words without moving their hands. Children recalled more words when encoding them with iconic gestures than when encoding words alone or with beat gestures. So et al.'s data therefore suggested that gestures that are not semantically meaningful do not enhance memory compared to iconic gestures.

In contrast, van Berkel-van Hoof et al. (2016) did not report any effect of gestures on word learning in 9- to 11-year-old children when teaching them new labels for new or unfamiliar words. The materials consisted of 20 pictures of friendly looking aliens. Half of the words were presented with an iconic gesture and half without one. The children performed similarly in the gesture condition and no-gesture condition.

Some studies have investigated the contribution of gesture type to word learning by comparing the contribution of iconic and arbitrary<sup>3</sup> gestures. For example, Marentette and Nicoladis (2011) exposed 86 two- to five-year-old children to 20 objects (10 familiar and 10 novel), each of which was associated with an iconic or an arbitrary gesture. The child was introduced to each object, shown the gesture and received the label verbally (“Look at the ....; this is a....”). The results from a picture pointing task with three foils showed that children rapidly mapped both types of gestures as labels for objects. In addition, the performance for iconic gestures appeared to increase with age. Along the same lines, Lücke and Ritterfeld (2014) reported an effect of arbitrary and iconic gestures in 3- to 5-year-old children ( $n = 20$ ; mean age of 4;9 years) compared to a no-gesture condition, suggesting that word learning can profit as much from arbitrary as from iconic gestures. In Lücke and Ritterfeld's study, children had to associate nine new phonological patterns (novel words equally divided among words having one, two, or three syllables, constructed following German phonotactic rules) with new concepts (cartoon characters).

However, more recently, Vogt and Kauschke (2017) showed that children aged 4 benefited more from observing iconic gestures for word learning than those in two control noniconic conditions (attention-directing gesture<sup>4</sup> or arbitrary gesture). In their study, children were taught words that they did not know prior to training: six nouns (rare animal species) and six verbs (unusual movement types).

Overall, although not all authors agreed, most studies conducted with children with TD showed a contribution of gestures to word learning compared to a condition without gestures. In addition, both iconic and arbitrary gestures appeared to be beneficial, although some studies noted a slight advantage of iconic gestures.

For children with DLD, contradictory data were reported. Some studies showed that, as for children with TD, gestural cues had a positive influence on novel-word acquisition. For example, Weismer and Hesketh (1993) observed in a receptive task that word-spatial concept pairings (for example, “under”) that were taught with iconic gestural support were learned significantly better than when using only verbal input. This benefit was found for 5- to 6-year-old preschool children both with DLD ( $n = 8$ ) and with TD ( $n = 8$ ). Lücke and Ritterfeld (2014) investigated whether preschool children with DLD could

<sup>2</sup>A beat gesture is a nonmeaningful gesture involving simple motoric movement produced along with the rhythm of the speech (e.g., hand with open palm flips outwards).

<sup>3</sup>Arbitrary gestures are manual movements having no relation between the form or embodiment of the gesture and the meaning of the verbalization, for example, moving one's index finger up and down in front of one's head to represent a cup.

<sup>4</sup>In the control condition, stimuli were paired with an attention-directing gesture in the form of a raised forefinger in front of the upper body.

benefit from gestures in learning words using fast and slow mapping; the slow-mapping–fast-mapping contrast was used because of growing evidence that children often require considerable input and repetition to fully acquire a word (Deák, 2014). Participants were asked to learn nine novel words corresponding to nine new concepts (cartoon characters) presented in a game format. Twenty children with DLD (3;1 to 5;7 years old) were assigned to two matched experimental groups: with iconic gestures or with no gestures. Although comparisons of the two groups revealed no difference after one session (fast mapping), the performance for word learning increased over the intervention sessions, with the iconic gestures group outperforming the control group after the third intervention. It is worth noting that, contrary to the results obtained by Weismer and Hesketh (1993), the groups did not differ at any time in their receptive learning outcomes: The only differences noticed were in expression.

More recently, Vogt and Kauschke (2017) found that observing iconic cospeech gestures made word learning more efficient in age-matched ( $n = 20$ ) or language-matched children with TD ( $n = 20$ ) and in children with DLD ( $n = 20$ ; age 4) than did attention-directing or arbitrary gestures. The target items consisted of 12 German words (6 nouns and 6 verbs). Note, however, that although results revealed a numerical advantage for the iconic gestures, the difference between iconic and noniconic gestures was not significant.

However, as with children with TD, some studies have found no effect of gestures on word learning in children with DLD. Van Berkel-van Hoof et al. (2016), using a fast-mapping design similar to Lüke and Ritterfeld's (2014; see above for a detailed description), reported that 9- to 11-year-old children with DLD performed similarly in the gesture and no-gesture conditions.

In summary, although the positive influence of gestures has been reported for children with TD in most studies (Capone & McGregor, 2005; de Nooijer et al., 2014; Goodwyn et al., 2000; Marentette & Nicoladis, 2011; Tellier, 2008), results suggest that the effect of multimodal input may be more complex than has been assumed so far, especially with regard to nontypical populations. Indeed, only a few studies have focused on multimodal learning in children with DLD. Moreover, those few studies obtained mixed and inconclusive results (Lüke & Ritterfeld, 2014; van Berkel-van Hoof et al., 2016; Vogt & Kauschke, 2017; Weismer & Hesketh, 1993). Many differences between the studies could explain these conflicting data. First, children's age was quite variable, from 2 to 11 years old. Second, the criterion for diagnosis of DLD differed from one study to

another, with participants presenting various profiles of severity of oral language impairment. Third, some studies compared the performance of children with DLD to that of a control group with TD and others did not. Fourth, in some studies, each participant was assigned to one condition (with gestures or without gestures) and in others, children learned half of the words with a gesture and half without one; this latter method is more reliable. Finally, various materials and learning paradigms were used to train children. In some studies, children already knew target words, and in other studies children were taught new words for new objects; target words were illustrated by pictures in some cases and not in others; slow or fast mapping was used; and so on. Tasks assessing the effect of the gestures were also different (expression or comprehension) as were the learning tasks. It therefore seems difficult to compare these studies and their results. Based on this literature review, further research in this field is definitely needed to understand in what conditions gestures are likely to scaffold lexical development in children with DLD.

## Research Goals

This study aimed to examine the impact of iconic and arbitrary gestures on word learning for children with DLD who showed word-learning difficulties. In order to determine whether the results could be related to differences in language level, two control groups were set up: a group of children matched on chronological age (AC group) and a group of children matched on receptive language level (LC group). More specifically, this study addressed three questions:

1. Will children with TD and children with DLD benefit from gesture in comparison to a control condition (no gesture) in retrieving newly learned phonological patterns during word learning (fast mapping task)? Our hypothesis here, based on the multimodality effect (Paivio, 2010), was that supporting novel phonological labels with gestures would lead to better learning in children with DLD and TD because input using more than one modality enhances word learning by reducing the load on phonological short-term memory.
2. Will children with DLD and children with TD benefit more from iconic than from arbitrary gestural cues (in the same task of word learning)? Our second hypothesis, supported by the levels of processing model ( Craik & Lockhart, 1972) was that the use of iconic gestures would be more beneficial than the use of arbitrary gestures, because iconic gestures are closely related to meaning and would therefore produce stronger traces than arbitrary gestures, thereby reinforcing the connection between phonological and semantic representations.

3. Will children with DLD and children with TD perform differently in word learning suggesting a variable benefit of gestures? Due to the persistent difficulties in word learning experienced by children with DLD, it could be expected that they would be particularly helped by the presence of gestures, especially the iconic ones.

In this experiment, children were taught new phonological labels for familiar concepts under three conditions: with the help of iconic gestures, with arbitrary gestures and without gestures. Although in most previous studies, children knew neither the phonological pattern nor semantic referent prior to training, we decided to investigate word learning in a context similar to that of learning a new language, as Tellier (2008) did, in order to determine if gestures help children to encode and retrieve new phonological patterns (pseudoword) linked to well-known common concepts. This type of design allowed us to focus on a subpart of the word-learning process.

**Method**

**Participants**

Thirty French-speaking children, divided into 3 subgroups, were recruited from primary schools to participate in the present study. None of the children was

diagnosed with a sensory, cognitive, motor, or emotional disorder. No bilingual children were included and none of them had any experience of sign language or benefiting from treatment-involved gestures. For the purpose of the present research, all children were tested with the Coloured Progressive Matrices (Raven et al., 1998) to assess their nonverbal intelligence, and all children fell within the normal range (performance superior to 10<sup>th</sup> percentile). The French version of the Peabody Picture Vocabulary Test-Revised (PPVT-R; Dunn & Theriault-Whalen, 1993) was also administered to evaluate receptive vocabulary level in order to match children. AC and LC children fell within the normal range (> 25<sup>th</sup> percentile) on this picture-pointing task (Dunn & Theriault-Whalen, 1993). Written informed parental consent was obtained for all children and each child participated voluntarily in the study. Procedures were approved by the Research Ethics Boards of the Psychological Institute (approval Projet2015-22).

Three subgroups of children participated (see **Table 1**):

**Children With DLD (DLD Group)**

10 children (8 boys and 2 girls) with DLD were recruited from three special schools for children with language impairment; they had a mean age of 8 years ( $M = 8;3$ ,  $SD = 12.3$  months, range = 6;5-10;1). All the children were

<b>Table 1</b>			
<b>Sex, Chronological Age, Raw Score on PPVT-R, and Nonverbal Intelligence Score for the Three Groups of Participants</b>			
<b>Measure</b>	<b>AC</b>	<b>LC</b>	<b>DLD</b>
<b>Sex</b>			
Female/Male	7/3	5/5	2/8
<b>Chronological age (months)</b>			
<i>M</i>	98.0	74.0	99.4
<i>SD</i>	13.16	10.40	12.30
Min-max	74-117	64-97	77-121
<b>Raw scores on PPVT-R</b>			
<i>M</i>	96.9	73.0	70.8
<i>SD</i>	17.09	13.67	15.01
Min-max	74-117	54-100	55-93
<b>Raw scores on nonverbal intelligence test</b>			
<i>M</i>	28.5	21.6	26.7
<i>SD</i>	4.70	5.08	3.40
Min-max	20-35	14-31	22-32

Note. AC = age-matched children; LC = language-matched children; DLD = children with developmental language disorder; Min = minimum; Max = maximum; PPVT-R = Peabody Picture Vocabulary Test-Revised (the French version was used in this study; Dunn & Theriault-Whalen, 1993). Nonverbal intelligence was measured with the Coloured Progressive Matrices (Raven et al., 1998).

previously diagnosed by a multidisciplinary team as having severe and persistent developmental language disorder and all of them were enrolled in speech and language treatment.

### **Age-Matched Children (AC Group)**

The AC group consisted of 10 children (3 boys and 7 girls) matched to the children with DLD for chronological age. They ranged between 6;2 and 9;9 years old ( $M = 8.2$ ,  $SD = 13.1$  months);  $t(18) = 0.25$ ,  $p = .80$ . According to their teachers' report and the background information supplied by the parents, they had no history of speech, language, or hearing problems, and no special needs.

### **Language-Matched Children (LC Group)**

Ten children with TD (5 boys and 5 girls) served as language-matched control children (LC). They had a mean age of 6 years ( $M = 6;2$ ,  $SD = 10.4$  months, range = 5;4–8;1). To select the group of children matched on receptive vocabulary with our DLD group, we tested a larger group of 26 children with TD with the PPVT-R (Dunn & Theriault-Whalen, 1993), picking those children who fell within the target range. The results obtained on the PPVT-R were used to select the language-matched control group children;  $t(18) = 0.34$ ,  $p = .74$ .

### **Material**

Fifteen novel words (nonwords) were constructed following French phonotactic rules. Because research on children with DLD has shown that they have more difficulties repeating words as the number of syllables increases (Parigger & Rispens, 2010), two-syllable words were constructed, with a consonant-vowel-consonant-vowel (CVCV) structure. We did not want to make the task too easy by using monosyllabic words or too difficult by using longer words. As children with DLD have more precise representations of initial phonemes than final phonemes (Alt & Suddart, 2012), position-specific biphone frequency (New et al., 2001) was also controlled for. Moreover, we ensured that these nonwords were not phonologically close to each other or to real words.

Each novel word was associated with a familiar concept (a noun). To be sure that the concepts were well known to the participants, all selected words were concepts considered to be acquired before 3 years old (Chalard et al., 2003).

Each novel word–familiar concept pair was randomly assigned to one of the three conditions: iconic gestures, arbitrary gestures, or no gestures (five per condition). Moreover, the five concepts in each condition corresponded to the same five semantic categories. **Table 2** presents the 15 items constructed and their linguistic properties.

For the two conditions using manual movements, all gestures were produced in the head and chest area. Each gesture consisted of a sequence of two repeated movements that could be easily imitated. Iconic gestures give semantic or functional information about a concept. For example, the gesture associated with the novel word /beRO/ that designates “rabbit” consisted of miming rabbit ears with two hands on the head. In contrast, arbitrary gestures show no relation between the form or embodiment of the gesture and the meaning of the verbalization. For example, the gesture for “pen” consisted of making two circles with the index finger in front of the nose. In a pilot study, gestures were tested for their iconicity by presenting them to seven French-speaking adults who were unaware of the purpose of the study. Iconic gestures were selected when all the adults were able to recognize the concept associated with the gesture without any cue. By contrast, arbitrary gestures were chosen when no adult recognized the concept even when a semantic cue was given. **Figure 1** gives examples of the gestures used.

### **Procedure**

The participants attended four 30-min sessions. The first session involved the administration of the screening tests (PPVT-R and Coloured Progressive Matrices) in order to compose the subgroups, and the following three sessions were devoted to the experimental tasks. All children participated in each experimental condition: (a) iconic gestures, (b) arbitrary gestures, and (c) no gestures. The order of encountering the experimental conditions was counterbalanced across participants. The three conditions were identical with regard to procedures, task, and frequency of naming the novel words. Children participated in the experiment individually in a quiet room at school.

In each experimental session, the child had to learn five novel words (nonwords), which were introduced as words used by Martians. Each word was associated with a familiar concept. Each experimental session (one session for each condition) consisted first of a training phase (of about 20 min) followed by an interference task (of about 5 min) and ending with the test phase (of about 5 min). To limit interference between sessions, a minimum interval of 2 days occurred between each session.

### **Training Phase**

In order to stimulate participants, the training task was presented as a game. Children were instructed that they were going to learn some “funny-sounding” words. A board game was created to give visual motivation. They were told about the game as follows:

**Table 2**  
**Items Used in the Experiment and Their Linguistic Properties**

Condition	Familiar concept	Semantic category of the concept	Novel word (in SAMPA)	Biphone frequency
Iconic gestures	Moto (motorbike)	Means of transport	/dite/	2016
	Lapin (rabbit)	Animal	/beRO/	292
	Couteau (knife)	Kitchen	/fOza~/	350
	Lunettes (glasses)	Clothes	/se~Ri/	660
	Ciseaux (scissors)	School	/ZynE/	421
Arbitrary gestures	Camion (trucks)	Means of transport	/puti/	337
	Cheval (horse)	Animal	/kytO/	286
	Poubelle (bin)	Kitchen	/laze/	788
	Chaussures (shoes)	Clothes	/naso~/	396
	Crayon (pen)	School	/fima~/	2024
No gestures	Vélo (bicycle)	Means of transport	/kORo~/	2028
	Souris (mouse)	Animal	/ma~de/	398
	Bouteille (bottle)	Kitchen	/vEZi/	356
	Chapeau (hat)	Clothes	/tuna/	293
	Ballon (ball)	School	/seta~/	749

Note. SAMPA = Speech Assessment Methods Phonetic Alphabet.

**Figure 1**




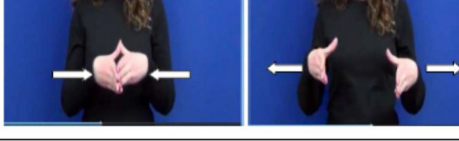
	Item	Picture of the gesture
Iconic gestures	Knife	
	Scissors	
Arbitrary gestures	Horse	
	Shoes	

Illustration of the Different Types of Gestures

A little Martian has arrived on Earth, but he speaks another language. The Martian needs your help to find his flying saucer. To understand what he is saying, you have to learn his language. Each time you learn a word, you will move the little Martian on the board.

In each condition, novel words were presented many times in two semistandardized tasks, which were introduced as games. In the first game (the discovery game), the experimenter named the novel word twice (“The Martian calls a hat /tuna/; a hat is a /tuna/ for the Martian”). After that, the child had to produce the novel word: the first time after being prompted with the first syllable and the second time without any prompt. The experimenter then gave the child feedback and said the correct novel word again. The five novel words were presented in this way, with a reminder of the word just learned being given before each new word was introduced. In the second game (the reminder game), all associations (concept–novel word) were reviewed using rapid recall. First, the experimenter gave a novel word and the child had to recall the associated concept. Next, the experimenter pronounced a French word and the child had to recall the novel word linked to it. In each case (correct response, incorrect response, or no response), the experimenter gave feedback by recalling the novel word and the associated concept.

In this first phase, the concept–novel word pairs were heard six times (four times in the discovery game and twice in the reminder game) and the child repeated each novel word orally four times (twice during the discovery game and twice during the reminder game). In the iconic gestures condition and the arbitrary gestures condition, the procedure was the same, but a gesture was added to the novel word. The gestured input was given at the same time as the word to be learned. The children were not asked to imitate any of the gestures in any of the conditions and none of the participants spontaneously imitated the gestures during the tasks. **Figure 2** illustrates the underlying mechanisms of the training task. In daily life, when a child learns a new word, they have to associate a phonological representation with a semantic representation. In this experiment, we tested if the use of gesture helps children to link a phonological form (the novel word to learn, e.g., /ZynE/) and a preexisting semantic representation (a familiar concept, e.g., scissors).

**Interference Task**

As an interference task, participants and the experimenter played the published game “Dobble” (*Amsodéé Edition*) for about 5 min. The aim of this game is to identify a common picture on two different cards as quickly as possible.

**Figure 2**

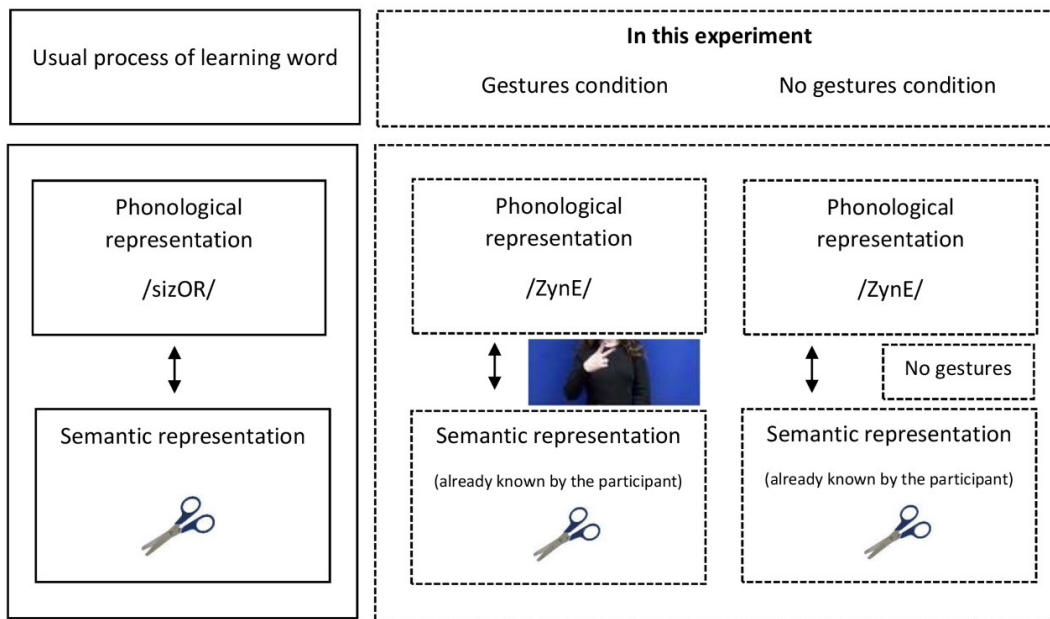


Illustration of the Underlying Mechanisms in the Word-Learning Process and in This Experiment

### Testing Phase

During the testing phase, the experimenter explained that the Martian was coming to check whether the child had learned the words properly. The child had to recall the novel word associated with each concept: "Could you remind me what the Martian calls scissors?" In case of an incorrect or no answer, the gesture or the first syllable was given as a prompt. If the child still failed, a word recognition task was administered. In this task, the child was asked to select the correct novel word from a choice of three: the correct answer, a phonological distractor, and an interference distractor (one of the novel words associated with another concept). Four points were awarded for mentioning the target word directly, three points for recalling the novel word after being prompted by the gesture (in gestures conditions), two points for recalling the novel word after being prompted with the first syllable, and one point if the child identified the target word only in the recognition task. The maximum score per condition was thus 20 points.

### Analyses

The analyses were performed using the statistical software SPSS 19. We first checked each variable (PPVT-R score, nonverbal IQ, and word-learning score) in our experimental model for normal distribution and homogeneity of variance (Levene's test). These conditions being met, a repeated-measures ANOVA was conducted on the word recall scores, in which the learning condition was the within-subjects variable (iconic gestures, arbitrary gestures and no gestures) and the group (AC, LC and DLD) was the between factor.

### Results

The mean performance and standard deviation per group and condition are displayed in **Table 3**. As illustrated in **Figure 3**, children with DLD and those in the LC group

performed more or less identically, and children in the AC group showed higher performance.

The data first showed a group effect:  $F(2,27) = 4.326$ ,  $p = .023$ ,  $\eta^2 = 0.243$ . The Tukey test for post hoc comparisons revealed that the AC group showed a significantly higher performance in word learning than the DLD group ( $p = .039$ ) and the LC group ( $p = .048$ ). In contrast, no significant difference was identified between the DLD and LC groups ( $p = .99$ ).

Second, the results revealed a significant condition effect:  $F(2, 27) = 3.43$ ,  $p = .040$ ,  $\eta^2 = 0.113$ . Performance was better for the two conditions using gestures in comparison to the control condition (no gesture). Because our hypothesis is that gestures play a role in retrieving phonological patterns during learning words, we used a unilateral test. A Bonferroni correction for post hoc comparisons revealed a significant difference between the iconic gestures and no gestures conditions ( $p = .041$ ) and between the arbitrary gestures and no gestures conditions ( $p = .009$ ), but no significant difference between iconic and arbitrary gestures ( $p = .87$ ).

Note that the data showed no interaction effect between group and condition:  $F(2,27) = .204$ ,  $p = .935$ ,  $\eta^2 = .015$ . Gesture type influenced word-learning performance in the same way for all three groups.

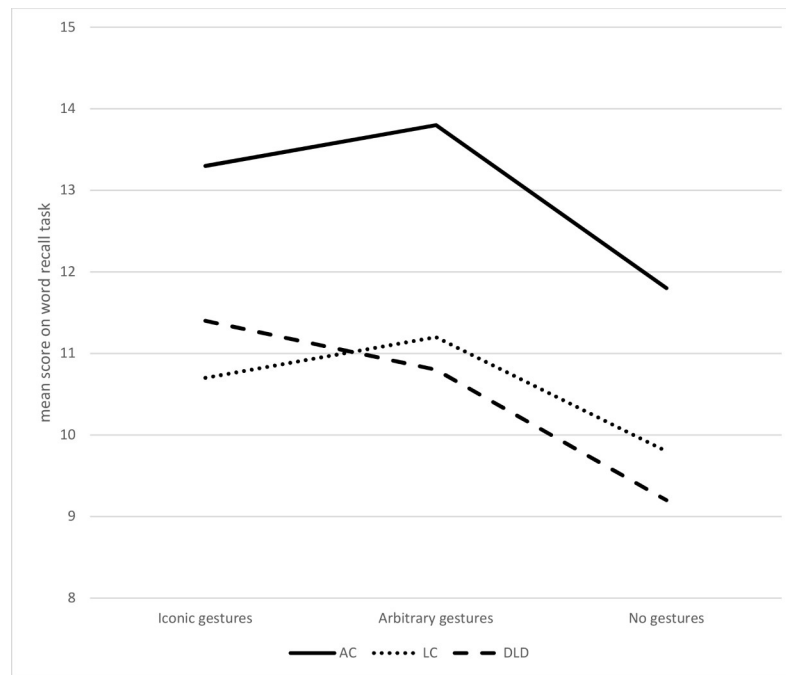
We also calculated the mean percentage of each type of answer in the testing phase for each group of children, depending on condition. As a reminder, in the testing phase, the children had three possibilities for answering: directly (free recall), by being prompted (gestural or phonological prompt), or as a choice among three words (recognition). Because the data lacked normal distributions and homogeneity of variance, nonparametric tests were used.

		AC	LC	DLD
Iconic gestures	M	13.3	10.7	11.4
	SD	3.4	3.65	3.17
Arbitrary gestures	M	13.8	11.2	10.8
	SD	3.91	2.44	3.45
No gestures	M	11.8	9.8	9.2
	SD	2.97	2.09	2.30

Note. AC = age-matched children; LC = language-matched children; DLD = children with developmental language disorder.



Figure 3



Children's Performance Per Group and Condition (Mean Score)

Note. AC = age-matched children; LC = language-matched children; DLD = children with developmental language disorder

When we treated performance separately depending on the type of answer (free recall, with prompting or recognition), there was no significant effect of condition. As far as group effects, the data showed no significant difference between the LC and DLD groups for free recall ( $U = 37.5, p = .33$ ), prompting ( $U = 36.5, p = .294$ ), or recognition ( $U = 48, p = .878$ ). In contrast, the data showed a significant difference between the AC and DLD groups for free recall ( $U = 21, p = .027$ ) and for prompting ( $U = 22.5, p = .035$ ); the difference for recognition was not significant ( $U = 49.5, p = .969$ ). The same significant differences were observed between the LC and AC groups for free recall ( $U = 17.5, p = .013$ ) and prompting ( $U = 15.5, p = .007$ ) but not for recognition ( $U = 48.5, p = .908$ ). As illustrated in **Figure 4**, the AC group used mainly free recall, and the DLD and LC groups needed a prompt to recall a novel word, regardless of condition.

## Discussion

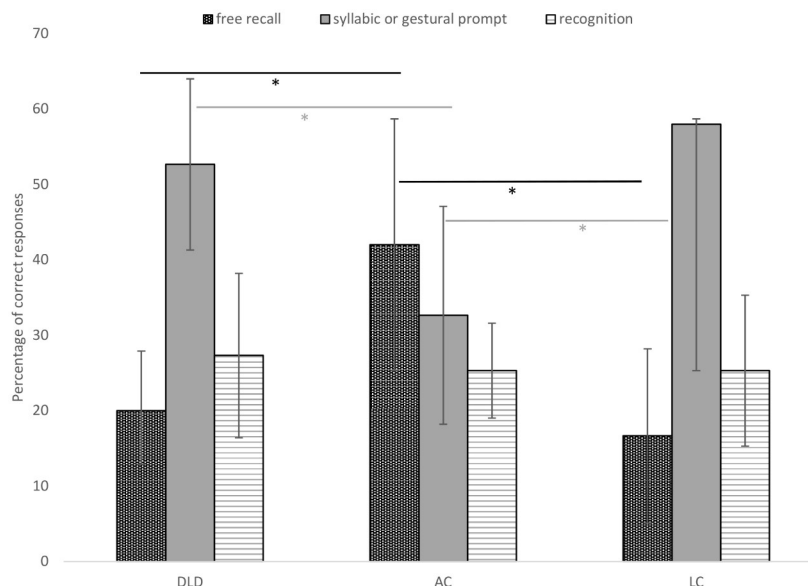
### The Scaffolding Effect of Gestures on Word Learning

On the basis of these data, it appears that word learning continues to be a challenging area for children with DLD in comparison to age-matched children (Alt & Plante, 2006; Gray, 2003, 2004, 2005; Kan & Windsor, 2010), even if they

only have to learn a new phonological form. Nevertheless, children with DLD performed similarly to younger children at the same lexical receptive level. Second, our results showed that gestures had a beneficial effect on word learning for both children with DLD and children with TD. More specifically, the children in the LC group and children with DLD performed similarly in word learning when retrieving a new phonological pattern for already known words, and the AC group showed better performance, but every group showed higher scores for both gesture conditions in comparison to the control condition without gestures. Globally, in terms of groups, children in the AC group were mainly able to answer using free recall, but DLD and LC children needed a prompt to recall novel words. Memorization seemed to be more effective for children in the AC group. Note that our design enables us to identify some tendencies, but it would need to be adjusted to really determine the role of response modality. We would have to assess each participant in separate response modalities: one with only free recall, another with only recall with a prompt, and a last one for recognition (see the Limitations section).

These data confirm previous studies with children with TD showing improved performance when more paths

Figure 4



Mean Percentage of Responses Across Groups Depending on Type of Answer

Note. Error bars display 95% confidence interval. AC = age-matched children; LC = language-matched children; DLD = children with developmental language disorder.  
\*  $p < .05$

are created through multimodal input when learning new words (Capone & McGregor, 2005; Goodwyn et al., 2000; Lüke & Ritterfeld, 2014; So et al., 2012) or learning a second language (Macedonia & von Kriegstein, 2012; Tellier, 2008). These results also underline the scaffolding effect of gestures reported for some preschool children with DLD (Lüke & Ritterfeld, 2014; Weismer & Hesketh, 1993). Because gestures give visual/gestural cues when learning words, the information is retained better by children with TD and children with DLD, supporting the multimodality effect as predicted by dual coding theory (Paivio, 2010).

In contrast, this study did not replicate the findings reported by van Berkel-van Hoof et al. (2016), namely, that children with DLD and TD do not benefit from augmentative gestures for word learning. The difference between that previous research and the present study may lie in the age of the children tested: 8 years old in our study, but 9 to 11 years old in van Berkel-van Hoof et al. (2016). The beneficial effect of gestures may no longer be apparent at this older age, as suggested by McGregor et al. (2009), because these older children would have already developed compensatory strategies. By 9 or 10 years old, children have perhaps already created specific ways of learning words and do not need gestures anymore to acquire words. Another difference is that in this present study, we focused on learning new object labels for familiar objects (e.g., Macedonia et al., 2011; Tellier, 2008), so that participants

only had to remember a novel word for an existing concept. By contrast, in van Berkel-van Hoof et al.'s study, the participants had to learn both a new phonological pattern and a new concept. A last difference between the present study and van Berkel-van Hoof et al.'s research is that our participants with DLD seemed to present more severe and more persistent lexical deficits, and therefore probably had more opportunities to benefit from gestures.

### Influence of the Nature of the Gesture on Lexical Learning

Although our main expectation was that iconic gestures would better aid children in learning new words than arbitrary gestures, we observed no difference between the two gesture types in their impact on novel-word learning in children with DLD and the AC and LC groups. In agreement with the findings of Lüke and Ritterfeld (2014), children with TD showed similar performance with iconic or arbitrary gestures. Thus, both types of gestures reinforce the connection between phonological and semantic representation and are easier to retrieve, as supported by the levels of processing model ( Craik & Lockhart, 1972). Both types of gestures seem to have a compensatory effect with children with TD and children with DLD. The data did not confirm previous research conducted on young children with TD that found significantly better memory performance for iconic gestures than for meaningless gestures (Feyereisen, 2006; Macedonia et al., 2011; Marentette &

Nicoladis, 2011; So et al., 2012; Vogt & Kauschke, 2017) and in second-language learning (Kelly et al., 2009).

The fact that iconic and arbitrary gestures affected word learning in the same way in our three groups suggests that gesture may play a role as only an additional form of information. Adding gesture may increase the child's attention to novel word and improve the ability to retain the word for later retrieval. Note that in the present study, participants had to learn phoneme chains associated with already known concepts. This may explain why the semantic properties of the gestures seemed to matter less than in other studies.

### Limitations

Some limitations of this study need to be mentioned. First, it must be considered as exploratory research. The small number of items per condition and small sample size limited the statistical power.

Second, we did not objectively measure phonological short-term memory skills, although children with TD are known to have stronger short-term memory skills than children with DLD (Gray et al., 2019). Differences in word learning could therefore be related to the phonological short-term memory component. Indeed, given the brief number of exposures and interference task prior to response, there is likely to be a memory component in addition to word learning. It would then be necessary in future studies to take phonological short-term memory skills into account to check their potential impact on word learning when gestures are provided.

Third, it is sometimes suggested that children show higher rates of learning when they perform the gestures themselves (Engelkamp & Cohen, 1991), rather than merely observing another person gesturing and hearing the words (Allen, 1995; Cohen & Otterbein, 1992; Saltz and Donnerwerthnolan [1981] as cited in Macedonia & von Kriegstein, 2012; Tellier, 2008). Indeed, some authors have suggested that gesture and language form one integrated communication system (McNeill, 1992; Wray et al., 2016). Some studies posit that physical enactment creates a motor trace in the memory representation of the verbal item (see Macedonia & von Kriegstein [2012] for a review of the possible mechanisms underlying the effects of gestures on verbal memory). In the present study, children were not encouraged to enact the gestures. Future research is therefore needed to tackle questions about the possible added value of using the motor modality during word learning. Is retrieval better if participants (with TD or DLD) have to imitate gestures?

Fourth, it is well known that the amount of exposure to words plays a role: Children with DLD need more exposures than children with TD. In the present study, only fast mapping was tested.

Last, combining free recall, prompted recall, and recognition measure to derive a single unit of retrieval accuracy is challenging; these various measures focus on different types and aspects of word learning. It would be necessary to assess each participant in separate response modalities: one with only free recall, another with only recall with a prompt, and a last one for recognition.

### Future Directions

In addition to the avenues suggested by the above-mentioned limitations, several future directions could be investigated. First, children's age and the severity of their language impairment could influence the results. A controlled study of children of different ages could be conducted to check if the effect of scaffolding gestures disappears with time, suggesting that this type of support does not help after a certain point. Controlling the level of language impairment could also help for understanding whether a specific level of language skills is required to benefit from gesture input.

To prove that gesture is a real support in word learning and to identify the role of any symbolic support in general, we could test the beneficial effects of using photographs, pictograms, or drawings, by comparing the learning of children who received gesture support to children who received photograph/drawings/pictogram supports or no extra symbolic support.

Future research could also attempt to replicate the beneficial effect of both types of gestures by assessing and controlling for the gestures' degree of iconicity. Macedonia and von Kriegstein (2012) showed that material paired with actions during learning leaves a motor trace independent of the kind of gestures used. Moreover, it could be relevant to pretest our novel words and our gestures on a larger group of children with TD to check if any of them are easier to remember. This would reduce any effect of condition linked with our materials.

Furthermore, the type of words the children learn may influence the gesture effect. De Nooijer et al. (2014) studied the effect of augmentative gestures on verb learning by children with DLD. In their study, gestures only aided word learning for locomotion verbs, but not for verbs for object manipulation or abstract verbs. The benefit of augmentative gesture should thus be investigated for different types of words (nouns, verbs, etc.).

Last, when assessment occurs may play a role in memorization. Because learning is a long-term process, it would be relevant to check any variations in maintenance of gains over the long term, and not assess memorization only right after the training (i.e., fast versus slow mapping).

### Clinical Implications

These findings have relevant implications for practice, specifically for speech-language pathologists and teachers who work with children with DLD or TD. Based on these data, we recommend the use of gesture for word learning or other memorization tasks, particularly in children with language development barriers, up to the age of about 8. Using visual aids such as gestures could also help children with TD children learn spoken words.

### Conclusion

Although this study indicates a scaffolding effect of two types of gestures for children with DLD and children with TD, further assessment is needed of the effectiveness of the use of gestures in speech therapy or language training in primary school and preschool and of the respective roles of iconic and arbitrary gestures in learning new words.

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## Formalizing Local Intersectoral Practices: A Case Study of an Initiative Targeting Language Development



## Formaliser les pratiques intersectorielles locales : une étude de cas sur une initiative ciblant le développement du langage

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### Abstract

Intersectoral action is a potential avenue for increasing the availability of and access to language-oriented resources in local communities. Although this strategy has been recommended for reducing social inequalities between children of different communities, the effective practices that underlie intersectoral action (i.e., what intersectoral networks do to achieve change) are rarely discussed in the field of speech-language pathology. The objective of this case study was to document the process of a local intersectoral initiative aimed at promoting the language development of preschool-aged Bengali children living in Montréal. Documentary sources and interviews with key informants were used to reconstruct the chronological story and to identify critical events that were crucial to the progression of the intersectoral process. Critical events were interpreted in the light of three essential functions that lead intersectoral networks to produce change: (a) network setup and governance, (b) representing and influencing, and (c) aligning essential actors and resources. The analysis revealed that the network produced outcomes related to all three functions to achieve their goal. The importance of network-building practices with people from different activity sectors, institutional commitments to build bridges between institutional and community settings, and engaging in participatory approaches are highlighted in the analysis. By identifying effective practices of local intersectoral action, this study can guide speech-language pathologists and actors in early childhood who wish to engage in intersectoral work to act on resources for language development in their local areas.

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### Abrégé

L'action intersectorielle est une avenue potentielle pour accroître la disponibilité et l'accessibilité à des ressources favorisant le développement du langage au niveau communautaire. En dépit des recommandations en faveur de cette stratégie pour réduire les inégalités sociales entre les enfants issus de différentes communautés, les pratiques efficaces qui la sous-tendent (c.-à-d. ce que font les réseaux intersectoriels pour aboutir à des changements) sont rarement discutées dans le domaine de l'orthophonie. L'objectif de cette étude de cas était de documenter une initiative intersectorielle locale de promotion du développement du langage chez des enfants bengalis d'âge préscolaire vivant à Montréal. Des sources documentaires et des entretiens avec des intervenants clés ont servi à reconstituer la chronologie des événements et à identifier les événements qui étaient cruciaux à l'avancement de l'action intersectorielle. Ces événements ont été interprétés à la lumière des trois fonctions essentielles productrices de changement des réseaux intersectoriels : (a) se constituer et se maintenir, (b) se représenter et influencer et (c) faire converger les acteurs et les ressources nécessaires à l'action. L'analyse a montré que le réseau a produit des effets liés à ces trois fonctions pour atteindre son objectif. De plus, celle-ci souligne l'importance des pratiques de création de réseau impliquant des personnes issues de différents secteurs d'activité, des engagements institutionnels pour créer des ponts entre les milieux institutionnels et communautaires et de l'adoption d'approches participatives. Les pratiques efficaces de l'action intersectorielle locale définies par la présente étude peuvent guider les orthophonistes et les intervenants du domaine de la petite enfance qui désirent s'engager dans des pratiques intersectorielles pour agir sur les ressources qui soutiennent le développement du langage au sein de leur communauté.



## Social Inequalities in Early Language Development

In Quebec, results from the latest province-wide survey on children's development and school readiness show that around 11% of 5-year-old children do not meet developmental expectations regarding language and communication skills (Institut de la statistique du Québec, 2018). This rate represents a province-wide average that hides significant variations: The number of children who present with difficulties on such measures can be 2 to 4 times higher in neighbourhoods characterized by higher levels of social disadvantage in the Montréal and Québec metropolitan areas (5%–22% in Montréal and 12%–28% in Québec; Blanchard, 2019). Similar disparities have also been found in other countrywide studies conducted in Australia, the United Kingdom, and Scotland (Law et al., 2017). Yet, effective actions conducted at the level of the local community and aimed at reducing these unfair and avoidable disparities in language development are rarely studied. This article reports on the practices led by a local intersectoral network to create new local resources supporting children's language development in their communities.

## Intersectoral Action

Intersectoral action has been recommended as a strategy to address complex societal problems and reduce social and health inequalities through better coordinated and integrated interventions between individuals, sectors, and spheres of society (Bilodeau, St-Louis, et al., 2022; Divay et al., 2013; World Health Organization, 2008). It refers to the mobilization of social actors (people, organizations, or institutions with a role and function with regard to action in the public space) from various activity sectors (e.g., health, education, transportation) and spheres within the public space (e.g., institutional, community organizations, private corporations, philanthropy) with a capacity to improve the availability and accessibility of resources that contribute to health (Chircop et al., 2015; Duff, 2011). This strategy is based on the assumption that health is notably produced in everyday life through the transformation and redistribution of locally accessible resources (e.g., housing, employment, access to public services, or a social network) controlled outside the health sector. These actions can be conducted at the local, regional, or national level.

Applying these concepts to the field of early language development, actions conducted on the social determinants of language—responsive proximal interactions with adults; access to learning materials such as books inside and outside the home; access to language-promoting environments such as parks, libraries, or museums; health and social services such as speech-language therapy and psychology; and high-

quality early childcare settings (Di Sante & Potvin, 2022)—require the involvement of a variety of sectors. As such, we argue that intersectoral action is well suited to maximize language learning opportunities available to children in their local communities and should interest researchers and practitioners in early language development.

Despite being acknowledged as a potential strategy to reduce health inequalities in the population, the ways by which intersectoral action can lead to transformations in the availability or access to local health-related resources are discussed less often (Chircop et al., 2015; Villeval et al., 2016). Studies on intersectoral action do, however, often report on its relevance, successful intersectoral initiatives, and conditions that favour or impede such collaborations. That notwithstanding, those studies generally fail to report on how intersectoral processes unfold to achieve change. Moreover, the need for a more in-depth examination of these collaborative, taken-for-granted practices has been emphasized in previous studies (Calancie et al., 2021; Chircop et al., 2015; Seaton et al., 2017).

Recent research has highlighted some core components of effective intersectoral collaborations, including three of focus here: formalizing partnership and functioning (i.e., who is included and with what roles, rules for collaboration and decision-making, structure and mission of the network, management of interests); communication and leadership practices (i.e., communicating information within and outside the network, including community partners, writing, and reporting); and actions that lead to balance, gain, or allocating human and financial resources (Bilodeau, Chabot, Martin, et al., 2022; Butterfoss & Kegler, 2009; Corbin et al., 2018).

To our knowledge, the ways these three practices are linked to the production of observable effects in terms of locally available resources for the language development of children have never been studied. Speech-language pathologists have the expertise to engage in public-health discussions and intersectoral action to support the language development of children in their local areas (Di Sante & Potvin, 2022). Understanding the intersectoral practices that are likely to generate local resources aimed at supporting the language development of children appears to be an important first step to guide speech-language pathologists in conducting intersectoral action effectively (Di Sante & Potvin, 2022).

## Current Study

To shed light on these issues, the objective of this study was to document the intersectoral practices conducted in the context of a local initiative targeting the language

development of Bengali children living in a low-income neighbourhood of Montréal. More specifically, we aimed to understand which intersectoral practices were crucial to creating a new locally available resource allocated to early language development.

### Context

In Montréal, local intersectoral action is a strategy supported by the Montréal Initiative for Local Social Development (Comité de pilotage de l'initiative montréalaise de soutien au développement social local, 2015). This initiative has been operating since 1997 through the partnership of three regional funding agencies (United Way of Greater Montréal, the City of Montréal, and the Montréal Directorate of Public Health), together with the Montréal Neighbourhood Committee Coalition, which represents the 32 neighbourhood committees funded through the initiative. Based on their knowledge of local realities and their ability to mobilize local actors and citizens, the mission of these neighbourhood committees is to produce local diagnoses and strategic plans as well as to prioritize and coordinate intersectoral action to improve living conditions.

### Theoretical Framework

This study builds on the foundations of the actor-network theory (ANT), a sociological theory that focuses on how changes and innovations are driven by network action and how such activities are constructed and operated (Lascoumes, 1996; Latour, 2005). In ANT, networks are sociotechnical, meaning they assemble both human (e.g., individuals, social actors) and nonhuman entities (e.g., knowledge, programs, laws/policies, equipment, resources) to create solutions to complex situations or problems (Bilodeau & Potvin, 2018; Latour, 2005).

An ANT-informed theoretical framework developed and validated by Bilodeau et al. (2019) and Bilodeau, Chabot, Martin, et al. (2022) theorizes the process-effect links of local intersectoral action. This theory has been built on multiple case studies stemming from more than 20 years of collaborative research conducted with the Montréal Coalition of Neighbourhood Committees. This theoretical frame serves as the primary foundation for the current case study.

This framework is organized around the critical events that mark the progression of network action (the *process*) to its effects on the local environment (i.e., observable changes in the availability or access to a local health-promoting resource). *Critical events* are those

repeatedly mentioned in the data sources to generate documented consequences in the ongoing action (Figueiro et al., 2017): transformations in the network and its actions, interests and representations of the situation; . . . new actors, resources, or knowledge; new roles negotiated; . . . generation of new solutions; opportunities taken or constraints imposed on the action. (Bilodeau, Chabot, Martin, et al., 2022, p. 2)

These events generate specific transitional outcomes (henceforth referred to as *outcomes*) which are crucial points of inflection that lead the intersectoral process to its effects (Bilodeau, Chabot, Martin, et al., 2022; Bilodeau et al., 2019). These outcomes are linked to one of three essential functions that lead intersectoral networks to produce change: (a) network setup and governance, (b) representing and influencing, and (c) aligning essential actors and resources. These three functions are the lenses through which we documented intersectoral practices in this study (i.e., what intersectoral networks do). They are presented in more detail below.

#### **Network Setup and Governance**

Building the network and establishing methods of collective functioning is an essential function of intersectoral networks. To do so, they must gather together human (individuals, social actors) and nonhuman entities (knowledge, policies, technologies, legislation) from different sectors and fields, around common goals. They can also adopt rules and strategies to regulate their actions (e.g., decision-making processes, coordination of activities, roles of members). Handling controversies, by identifying solutions in response to problems that arise in the network and prevent cooperation and progression of action, is also an essential outcome that helps sustain network composition and functioning.

#### **Representing and Influencing**

To achieve change, intersectoral networks need to make themselves known, gain credibility, and influence other people and networks towards making commitments. They do this through a variety of externally oriented strategies, such as productions (plans, reports, briefs, position statements), representations (meetings, presentations), and activities (public consultations, collective deliberating) to express who they are, what their ideas are, and what positions and priorities they take. This is done in an effort to solicit support and resources and to gain legitimacy and credibility with the interlocutors they seek to interest and influence.

### **Aligning Essential Actors and Resources**

Partnerships and resources are essential to achieving change. Obtaining them depends mainly on external actors (e.g., commitment of decision-makers) that the networks seek to mobilize in order to strengthen themselves, solidify their projects, and achieve their goals. The critical impact of failure to gain resources or develop alliances with key actors, and the withdrawal of actors already involved in the course of action, are also observed in this function.

Using this framework to identify outcomes related to these three functions that are generated by networks can help link the intersectoral process under study to its effects in terms of the creation of a new local resource allocated to early language development.

## **Method**

### **Study Design**

This case study adopted a retrospective longitudinal design and was conducted as part of a funded research project entitled *Value of Local Intersectoral Action in the Production of Healthy Environments* by Potvin, Bilodeau, and Bourque, from 2017 to 2021. Ethical approvals for both this case study and the funded research project were obtained from the Comité d'éthique de la recherche en sciences et en santé (ethics committee; University of Montréal, 17-130-CERES-D, for this study).

### **Case Selection**

A voluntary neighbourhood committee in early childhood development collaborated in selecting a case for the current study. This committee is situated in a Montréal neighbourhood with high rates of (a) children with communication and language difficulties upon entering kindergarten, as measured in the 2017 edition of the "Québec Survey of Child Development in Kindergarten" (Blanchard, 2019), and (b) social and material disadvantage (Blanchard, 2019; CIUSSS-Centre-Sud-de-l'Île-de-Montréal, 2016; Montpetit & Bergeron, 2011). The coordinator of this neighbourhood committee helped the research team select a case that, at the time of selection, had (a) involved at least three organizations, and (b) successfully created new resources or facilitated access to locally available resources for the language development of children. This led to selecting the Bengali Language Workshops initiative as the case for this study.

### **The Bengali Language Workshops Initiative**

Around 2016, Bangladesh became the third main country of origin of immigrant families in this local area (CIUSSS-Centre-Sud-de-l'Île-de-Montréal, 2016). In the summer of

2018, speech-language pathologists working in this area noted a significant overrepresentation of Bengali children in their caseloads. Moreover, these children were particularly lagging behind their peers in terms of school readiness and language development. As part of their mandate as front-line workers in the public health and social services network in Montréal, these speech-language pathologists served on their neighbourhood's intersectoral committee on early childhood development. When members of the committee expressed the need to focus on promoting the development of vulnerable and hard-to-reach communities in their territory, a speech-language pathologist suggested a project aimed at creating new local resources to support the language development of Bengali children. This was the starting point of an intersectoral initiative.

The initiative mobilized a heterogeneous group of social actors from different activity fields (speech-language pathology, social work, immigration, family, and parenting) and sectors of society (philanthropic, community, municipal library, institutional, academic). **Table 1** summarizes the main social actors (people, institutions, and organizations) involved, as well as their roles in the initiative.

In less than a year, the initiative led to the creation of a new local resource in the form of a series of language-stimulation workshops for parents and their children. These workshops were led by facilitators (community organizers, speech-language pathologists, and students). The workshops included multiple targets: language skills (supporting vocabulary development in Bengali and French), parent-child interactions (introducing shared-book reading practices, promoting the use of the Bengali language, teaching language facilitation techniques), preparation for school (providing information and support to parents regarding their child's transition to school entry), and parenting support (providing information about child-rearing practices, accompanying families to local resources supporting child development). Six workshops were held in the first edition (winter 2019) conducted as a pilot version of the project. The future of this initiative was deemed promising, as it was formally included in the 2020–2023 local action plan of the neighbourhood committee. Because families from outside the Bengali community expressed an interest in participating in the workshops, the network planned for an expanded target audience (i.e., allophone children) as well as new potential partners (e.g., childcare centers) and funding sources to expand the initiative to an adjacent neighbourhood in the following year. Unfortunately, the onset of the COVID pandemic in March 2020 brought these efforts to a halt.

**Table 1****Main Social Actors Involved in the Bengali Language Workshops Initiative**

Social actor	Sector	Activity field/expertise	Role and contribution to the initiative
Coordinator of the neighborhood committee <sup>a</sup>	Community (neighbourhood committee)	Community work Family and parenting	Coordination of the actions of the group, knowledge of local territory and resources (partners and community organization in childhood, funding, opportunities).
Speech-language pathologists (S-LPs) <sup>a</sup> (2)	Institutional (public) Health and social services frontline institution	Language development	Instigator of the idea to support the language development of Bengali children (S-LP1); evidence-based practices to support language; work experience with immigrant families; member of the neighborhood committee (S-LP2).
Community animator: La Relance Jeunes et Familles <sup>a</sup>	Community (community organization)	Social work Immigration	Facilitation of Bengali workshops (training of students); experience in conducting workshops for families; experience and trust bonds with local immigrant parents.
Facilitator/trainer <sup>a</sup>	Self-employed/consultant	Family and parenting	Helped develop and facilitate the workshops. Experience in parenting, parent-child interactions, school readiness.
Researcher	University/academic	Research on language development of children from minority language communities	Evidence-based knowledge to support the language development of Bengali children; knowledge about a language intervention program for refugee children; recruited student volunteers to animate the workshops.
Bengali mothers (2)	Community/citizen	Realities of local families, Bengali language and culture	Insights regarding the needs and concerns of immigrant parents, translation of documents and during workshops, recruitment of families from the Bengali community.
La Relance Jeunes et Familles	Community (community organization)	Family, child development (0-12 years), and parenting	Provided venue for Bengali workshops, facilitated the recruitment of parents for Bengali workshops through French-language workshops for immigrant parents.
Frontenac Library	Municipal	Reading, literature	Book selection and purchase; activity held at the library as part of the workshops.
Réseau Réussite Montréal	Philanthropic (regional organization)	Educational success and perseverance	Provided funding to support the purchase of materials (e.g., books, snacks).

<sup>a</sup> Key informants for the case study interviews (n = 5).

### Data Sources

Our goal was to analyze the intersectoral process underlying this initiative and determine how it achieved effects. In line with our theoretical framework, the process included the critical events that characterized the progression of the initiative, from the identification of its objective to the creation of the desired resource. In the same line of thought, the effects under study are those of the

intersectoral process (i.e., observable changes in availability or access to a local resource favorable to children's language development), rather than its impact on children's language development.

The observation period began with the first meeting of the intersectoral network to pursue its goal in June 2018 and continued until the end of the first edition of the Bengali language workshops in the spring 2019. Multiple data

sources were used to document the process and its effects: (a) administrative documents ( $n = 21$ , including 10 sets of meeting minutes, five working papers and internal documents, four action plans and reports, and two presentation documents); (b) two other documents (a manual of a language intervention program aimed at refugee and immigrant children and a local sociodemographic report); and (c) individual interviews with five key informants (see **Table 1** note) involved in the initiative to clarify and validate information from the documentation sources. Interviews were audio recorded for further analysis.

## Analysis

A qualitative deductive analysis was conducted based on the previously presented theoretical frame (Bilodeau, Chabot, Martin, et al., 2022; Bilodeau et al., 2019). Its use is appropriate to document intersectoral processes targeting resources in the community, regardless of their goals or activity fields (transport, housing, food).

The analysis took place in five steps:

1. The chronological story of the case was reconstructed based on the documentary sources and interviews.
2. Within this story, the critical events that were crucial to the progression of the intersectoral process were identified.
3. A database was created to organize the data related to each critical event, with the following headings: What action was conducted/What event occurred? When? By whom? With what consequence/outcome for the network?
4. The significance of these critical events in the intersectoral process (the answer to the question "With what consequence/outcome for the network?") was interpreted in the light of the three essential functions that characterize the production of a change process led by local intersectoral networks (Bilodeau, Chabot, Martin, et al., 2022): (a) network setup and governance, (b) representing and influencing, and (c) aligning essential actors and resources.
5. These interpretations were validated in a final group interview with four of the five key actors. The first author (MD) led all steps of the analysis, supported by the other authors, who have extensive experience with this type of analysis. They validated each step of the analysis before its results were submitted to the key informants for final validation.

In addition to this qualitative analysis, a quantitative descriptive analysis identified the frequency of critical events related to each function over the course of the process. To get a better sense of the functions mobilized at the beginning, in the middle, and towards the end of the process, the chronological sequence of critical events was divided into three parts (or tertiles). These defined intervals each included one third of the critical events that took place. Tertile 1 thus included the first third of the critical events that took place (beginning of the process), Tertile 2 the second third (middle of the process), and Tertile 3 the last third (end of the process).

## Results

Results related to the analysis of the intersectoral process are presented first, followed by their effects in terms of change in the availability or access to local resources in language development.

### Process

**Table 2** presents the critical events in chronological order, and the interpretation of their outcomes in light of the three functions of intersectoral networks. In total, 27 critical events occurred between June 2018 (the network's first meeting) and January 2019 (the holding of the first workshop). Results show that the network generated a series of outcomes related to the three functions of interest: Network setup and governance ( $n = 8$ , 30% of total), representing and influencing ( $n = 8$ , 30% of total), and aligning essential actors and resources ( $n = 11$ , 40% of total).

**Table 3** details the frequency of occurrence of outcomes related to each function in each tertile of the process. Results indicate that each of the three functions was mainly mobilized at one specific period in the process. Practices related to setting up the network (Function 1) occurred mostly at the beginning of the process (66% of outcomes in Tertile 1). These practices helped the group identify important actors and resources, which they then engaged and obtained to make the workshops come to life (Function 3, 66% of outcomes in Tertile 2). In the end of the process, the outcomes generated by the network mainly related to representation efforts and influencing other people and networks (Function 2, 66% of outcomes in Tertile 3), when the group tried to publicize the project and make it known in the community.

Furthermore, the qualitative analysis highlighted the importance of specific practices and their significant effects on the progression of the process. These practices are detailed in the following sections and pertain to network-building practices, institutional commitments,

**Table 2**

**Critical Events Within the Process of the Bengali Language Workshops Initiative (in Chronological Order), Associated Outcomes, and Functions Mobilized**

Tertile 1 (Beginning of process)	Tertile 2 (Middle of process)	Tertile 3 (End of process)
<p>Observations shared between neighbourhood committee members (including an S-LP from a local health-care institution) about the challenges of reaching out to vulnerable children and their families and the need for a project to support their development (#1 <b>Function 1: knowledge shared</b>);</p>	<p>Recruitment of speech-language pathology students to animate the workshops facilitated by the researcher (#10 <b>Function 3: resources acquired</b>)</p>	<p>A description of the workshops was developed (#19 <b>Function 2: productions</b>) and submitted as part of a funding application to Réseau Réussite Montréal, a philanthropic organization (#20 <b>Function 2: productions shared</b>)</p>
<p>The local health-care institution agreed that participation in this project fell within the mandate of both the institution and its S-LPs (#2 <b>Function 3: commitment of decision-maker</b>; #3 <b>Function 3: resources acquired</b>);</p>	<p>Focus group conducted with immigrant parents on their concerns and perceptions of their child's development (#11 <b>Function 2: legitimacy gained</b>)</p>	<p>Funding was obtained (#21 <b>Function 3: resources acquired</b>)</p>
<p>Working committee established for a project targeting the language of Bengali children (#4 <b>Function 1: network created</b>);</p>	<p>Consultation and involvement of two mothers from the Bengali community (#12 <b>Function 3: network expanded</b>; #13 <b>Function 2: legitimacy gained</b>)</p>	<p>The group chose to begin workshops in the winter to acquiesce to the funding body's requests (#22 <b>Function 3: interests aligned</b>)</p>
<p>Knowledge about the language development of allophone children added to the problematization (#5 <b>Function 1: knowledge shared</b>)</p>	<p>Alignment of the committee around the idea of academic success, which was highlighted as very important to parents, as a basis for the workshops (#14 <b>Function 3: interests aligned</b>)</p>	<p>Tasks to prepare for the workshops were shared among the group according to each actor's expertise (#23 <b>Function 1: rules and structures adopted within network</b>)</p>
<p>Selection of workshops as the preferred format (#6 <b>Function 1: new ideas and solutions generated</b>)</p>	<p>Translation of documents into the Bengali language by volunteer mothers (#15 <b>Function 3: resources acquired</b>)</p>	<p>Dissemination of information about the workshops and invitation for parents participate (#24 <b>Function 2: representations</b>)</p>
<p>A community organization for children and families (La Relance Jeunes et Familles) became one of the leading carriers of the initiative (#7 <b>Function 1: network created</b>);</p>	<p>Involvement of the local library in the selection and purchase of books for the workshops (#16 <b>Function 3: network expanded</b>; #17 <b>Function 3: resources acquired</b>)</p>	<p>Meetings with organizations, cultural sites, and key institutions in the area (#25 <b>Function 2: representations</b>)</p>
<p>Knowledge shared by S-LPs about an existing evidence-based program to support refugee children's vocabulary through parent-child interactions and shared book-reading (#8 <b>Function 1: knowledge shared</b>)</p>	<p>Integration of the Bengali language workshops into the actions of a prelitteracy committee, (active, recognized, already funded by the neighbourhood committee) (#18 <b>Function 1: rules and structures adopted within network</b>).</p>	<p>Calls to local schools (#26 <b>Function 2: representations</b>)</p>
<p>A researcher presented this program to the group and agreed to support the network in adapting the program to their needs (#9 <b>Function 3: interests aligned</b>).</p>		<p>Information about the workshops shared by one Bengali mother with local Bengali parents through word-of-mouth (#27 <b>Function 2: representations</b>). The first workshop took place (<b>effect: creation of a local resource in the form of a series of parent-child workshops</b>).</p>

Note. Based on the three functions of intersectoral networks (Bilodeau, Chabot, Martin, et al., 2022): Function 1 = network setup and governance; Function 2 = representing and influencing; Function 3 = aligning necessary actors and resources; S-LP = speech-language pathologist; #s refer to critical events.

**Table 3**  
**Frequency of the Functions Mobilized by the Network in Each Tertile (Beginning, Middle, and End) of the Process**

Functions	Tertile 1 (Beginning)	Tertile 2 (Middle)	Tertile 3 (End)	Total
	n (%)	n (%)	n (%)	
Function 1: network setup and governance	6 (66)	1 (11)	1 (11)	8 (30)
Function 2: representing and influencing	0 (0)	2 (22)	6 (66)	8 (30)
Function 3: aligning essential actors and resources	3 (33)	6 (66)	2 (22)	11 (40)
Total	9	9	9	27

Note. Based on the three functions of intersectoral networks (Bilodeau, Chabot, Martin, et al., 2022).

and the expansion of the network through the addition of social actors.

**Building the Network**

At the onset of the process, the network sought to understand the local issue and agree on a project to address it. Individuals of various activity sectors (e.g., speech-language pathology, social work, community work) put in common scientific, clinical, and field knowledge related to language development, support for parents in minority language situations, and school readiness. These practices helped the network achieve important outcomes, such as getting a clear understanding of the problem at hand and identifying the people who needed to be involved for the problem to be addressed adequately (Function 1). In response, new individuals and partnerships were added to the network (local community organization dedicated to immigrant families, researcher in the field of language development, trainer specialized in parenthood). Their interests and expertise solidified the network by bringing in additional resources (Function 3), namely, voluntary students in speech-language pathology to facilitate the workshops, access to physical settings in a primary school to conduct the workshops, and knowledge about already existing evidence-based language stimulation programs developed for immigrant children.

**The Importance of an Institutional Commitment Towards Change**

Informants repeatedly highlighted the importance of the approval of a health institution to let speech-language pathologists participate in intersectoral work with an existing network of local actors in a community-based setting. When questioned about the significance of this critical event on the intersectoral process, they emphasized that this commitment was necessary to achieve change in their local

territories (Function 3) because professionals working in institutional primary-care settings are typically required to prioritize the provision of direct clinical interventions with children and their families, despite the mandate of these institutions to provide population-based services. According to them, this commitment allowed a speech-language pathologist to bring the concerns about the language skills of Bengali children in the neighbourhood to the committee’s attention. This is what truly enabled the network to place language development at the heart of its priorities (Function 3). This event also helped the network acquire specialized clinical resources in speech-language pathology, which are rarely available in community settings (Function 3). On the other hand, speech-language pathologists deemed this commitment essential to reach out to recently immigrated families, who were less likely to know about and use public health and social services, and with whom the community organizations had already built bonds of trust.

**Addition of New Partners Who Influenced the Shape of the Project**

Throughout the process (primarily Tertiles 1 and 2), the network involved new collaborators, namely the local library and a philanthropic funding agency supporting school readiness. In addition to expanding the network (Function 3), these events yielded additional financial and specialized resources (Function 3) and enriched the project by adding innovative components to support language development, such as accompanied visits and shared reading activities at the local library (Function 1).

The network also conducted focus groups and discussions with parents from the Bengali community, which led to the involvement of a Bengali mother in planning, translating, and leading workshop content. These critical events had numerous positive outcomes for the network and its progression towards achieving effects:

(a) gaining credibility and legitimacy as spokespersons of the community they wished to serve (Function 2); (b) aligning their goals and priorities with those of parents in this community, that is, the academic success of their child (Function 3); and (c) reaching out to Bengali families more effectively (Function 2). This last outcome was important: In spite of the network's various attempts to recruit families in this community to participate in the workshops (Function 2, 66% of Tertile 3), the word-of-mouth approach led by the Bengali mother was the only effective recruitment method.

## Effects

The analysis brought out two main effects of the intersectoral process: (a) the creation of language stimulation workshops for Bengali children and their parents, and (b) the facilitation of access by families enrolled in the workshops to existing local resources that offer opportunities to foster language development, such as the library and speech-language pathology services. For example, informants mentioned that activities held at the library helped demystify some perceptions that parents from the Bengali community presented about the fact that such quiet settings are unsuitable for young (possibly noisy) children. Furthermore, the analysis revealed that the presence of speech-language pathologists during some of the workshops promoted trust links with parents and facilitated the process for some parents to ask for and access public services in speech and language for their child.

## Discussion

This case study aimed to identify intersectoral practices that enabled a network to generate transformations in the availability or access to local resources for language development. This study made it possible to formalize practices that are often invisible, yet essential to generate change. Four main findings and their implications for researchers and practitioners in the field of language development will be discussed.

### Mobilizing a Series of Outcomes Related to Three Essential Functions

The results reveal that, even over a relatively short period (less than a year), outcomes related to the three main functions of local intersectoral networks can be seen in the process, that is, creating and sustaining network composition, representing and influencing other people and networks, and aligning essential partners (e.g., decision-makers) and resources. These results suggest that all three functions contribute to some extent to the effectiveness of intersectoral practices. From a theoretical point of view, it further suggests that this framework focusing on

transitional outcomes and functions mobilized by local intersectoral networks is, as anticipated, appropriate for documenting local cross-sector initiatives regardless of their pursued goals in local territories (e.g., urban planning and transportation, food and housing initiatives) including those targeting child development (Bilodeau, Chabot, Martin, et al., 2022; Bilodeau et al., 2019).

Certain functions were mobilized more frequently than others, and each predominated at different stages in the process. These results are in line with those of cross-case analyses of intersectoral initiatives in Montréal (Bilodeau, Chabot, Di Sante, et al., 2022) that suggest that intersectoral processes can be divided into two main types, depending on whether networks hold control over decision-making and levers of action to produce the desired change within their neighbourhood. When they do (“Do it” type projects), processes are mainly characterized by network setup practices (Function 1), which appear in the early stages of the process and help the network build on its momentum afterward, and by those related to capturing resources (Function 3) which appear throughout the process. This was observed in the present case study: the network started by concentrating its efforts on involving core actors, built on readily available human and financial resources to provide language stimulation workshops, and continued engaging new partners to strengthen the project throughout the process. On the other hand, when local networks don’t hold these levers of action themselves (“Make it happen” type projects)—for example, if they wish to have a bus route changed to better serve the needs of the population—they must allocate most of their time to gathering evidence and information about the needs of the population and presenting these data to the right people (Function 2), to convince them of the importance of their issues and obtain commitments towards change.

As this remains an understudied topic, more research is needed to better understand the links between the aims of network projects and how intersectoral processes unfold. In the meantime, intersectoral networks who wish to create, transform, or facilitate access to local resources that promote early language development can nonetheless reflect on (a) their ability to conduct practices consistent with these three essential functions to increase their success, and (b) the specific functions on which they may need to concentrate their efforts, depending on their goals, existing resources, and action-levers. Specific questions can help them with this endeavor (*Tool for Assessing the Effects of Local Intersectoral Action, available in English and French, by Chaire de recherche du Canada Approches communautaires et inégalités de santé*, 2019), for example:



- Function 1: Should other actors be mobilized when looking at the desired effects? Why? To what extent are the populations directly concerned by the issue engaged in our network?
- Function 2: Does our network need to convince or connect with specific people to move our project toward its goals? If so, has our network produced means of communication and influence (plans, tables, summaries, reports) to develop a shared definition of the problem and potential solutions? Which new actors would be likely to use these means of communication?
- Function 3: What actions, actors, or resources are required to strengthen our network or project further? Which decision-makers must remain or be newly engaged? Which decision-makers will be a determining factor in engaging other decision-makers?

### Giving People From Different Worlds Opportunities to Talk About Language Development

Network setup and governance represent around one third of the outcomes that make up the process. In line with the results of a cross-case study on intersectoral action (Bilodeau, Chabot, Martin, et al., 2022), these outcomes were particularly prominent at the beginning of the process, suggesting that they served as a solid foundation upon which the network built to progress and generate effects. Such network-building practices contribute to constructing a common vision and arguments, essential to developing innovative, tangible, and complex solutions adjusted to the complexity of issues and local contexts—they are a crucial starting point for creating change. Sufficient time and space should be allocated to early childhood actors (including speech-language pathologists) so they can integrate, develop, and maintain collaborative networks around child development. This also involves developing knowledge about potential partners in early childhood working in their local area, reaching out to them, and regularly devoting time to participate in, consolidate, and maintain these collaborative links. In the case of speech-language pathologists working in institutional healthcare settings, the importance of such practices is often under-recognized by public institutions, whose performance is generally evaluated based on clinical actions (i.e., number of families met, assessments, and direct intervention sessions conducted with children). Recognizing these intersectoral practices as part of the roles of speech-language pathologists—especially those in primary-care settings with population-based mandates—appears to be

an essential step to create supportive environments for children’s language development in local areas (Di Sante & Potvin, 2022).

The contribution of people from different worlds (e.g., health, education, social work, parenthood) in implementing local change was particularly interesting in this case study. The heterogeneity of the knowledge, action levers and competencies the heterogeneous actors involved in the Bengali Language Workshops brought to the table is precisely what increased the network’s capacity to conceptualize the problem from different, complementary perspectives (e.g., language-development expectations, the value of the home language, parent-child interactions, parenting in the context of immigration, transition to school and school readiness, access to language learning materials), and, ultimately, identify more holistic or comprehensive solutions that mirror these perspectives. As a reflection of the heterogeneous group of people involved in the project—who came from the health, education, social work, municipal, and community sectors and had expertise and experience in speech-language pathology, immigration, and parenthood—the output of this initiative is a multifaceted project, including interventions conducted at the level of the child (language), the parents (parent-child interactions, knowledge about language and school readiness) and, to some extent, the social determinants of language development (i.e., access to language-learning materials through the library and access to speech-language pathology services).

Considering this, heterogeneity in the composition of a local intersectoral network is an extremely promising avenue to act on the social determinants of language development (e.g., access to educational materials and settings, social-support network, parenting support, employment, and social and health care services), and thus, tackle the root causes of important language disparities among children (Di Sante & Potvin, 2022). Increasing opportunities to target multiple social determinants of language is an important added-value of intersectoral action that speech-language pathologists should take advantage of to achieve the most gains in children’s language development. Taking part in local intersectoral networks devoted to early childhood appears essential for speech-language pathologists to simultaneously target language and its numerous social determinants, which leads to the next key findings.

### Building Bridges Between Institutional and Community Settings

This case study also highlighted the importance of the commitment of a public institution to allow its speech-

language pathologists to participate in intersectoral work with an already established community network of intersectoral collaborators in early childhood, and how this contributed to making language development a local priority. These collaborative links increased the power of institutional and community-based settings to achieve common goals by combining their respective strengths and resources. Indeed, compared to health institutions, community organizations benefit from easier access to local immigrant families, multiple partnerships, and greater leeway to carry out multiple actions in the various environments where children live, play, and learn (family, parks, libraries, childcare settings). That notwithstanding, insufficient recognition and funding of their activities limit their access to specialized resources such as speech-language pathologists who can help them select appropriate, evidence-based practices to support language development and provide guidance to adjust practices to different populations, settings, and contexts.

Results show that collaborations between institutional and community settings might help promote what Corbin and Mittelmark (2008) referred to as *synergy* in their model of collaborative functioning for health promotion (i.e., the output is greater than what would have been achieved by working in isolation). The synergetic outcomes observed in this case study (workshops in the home language; fostering parent-child interactions, vocabulary development, as well as parent knowledge about school and public services; supported by speech-language pathologists; led in the community setting by a Bengali mother, community leaders, and students in speech-language pathology) go beyond the simple addition of actions conducted by actors from different sectors, which is what is typically observed in the context of early childhood interventions.

### **Engaging in Participatory Practices With Members of the Local Community**

A final finding raised in this case study was the significant contribution of consultations with parents from the Bengali community, which led to the network expanding, reinforcing its legitimacy, adjusting its project goals and forms to the concerns and needs of the community, and achieving greater success in reaching out to families within this community. The magnitude of the effects generated by the involvement of individuals from the community is consistent with studies affirming that community participation and the empowerment that can result from it are necessary to increase democracy, harness untapped community resources and energy, develop more holistic and integrated approaches to tackle issues that are important to community members, achieve better

decisions, provide more effective services, and ensure the sustainability of programs through their wide ownership (World Health Organization, 2002).

In addition to informing and consulting with local communities about children's language development, actors engaged in intersectoral action should seek to enable genuine partnerships with the populations they wish to support, delegating more power to members of these communities to exert control over the circumstances that affect their lives (Davidson, 1998). Because increasing community participation can likely produce effects on other more distant social determinants of language development—such as increased knowledge about and use of local health and social services resources and developing social ties within the community—community participation can be thought of as an end in itself, in addition to a means of supporting the language development of children (Kahssay & Oakley, 1999).

### **Limitations**

This study focused on the intersectoral practices mobilized by an intersectoral network that led to creating a new local resource for language development in a neighbourhood. Additional research is needed to identify the extent to which the transformations of local resources generated by initiatives such as the one under study do promote the language skills of children and if they succeed in reducing the prevalence of language difficulties in local areas over time. Furthermore, although this case study demonstrates that local intersectoral initiatives can create and help facilitate access to local resources related to language development, it must be remembered that the impact and sustainability of such initiatives ultimately depend on the existence of broader policies and funding supporting intersectoral practices in early childhood.

### **Conclusion**

This case study aimed to identify how the process of an intersectoral initiative led to the creation of a new language-oriented resource for children in a local urban area. It highlighted the importance of building bridges between institutional and community settings, allocating sufficient time to build heterogeneous networks, and engaging in collaborative practices with individuals from the local communities. The theoretical framework used in this study, specifically its attention to three core functions that contribute to effective intersectoral practices, can guide practitioners and administrators who wish to engage in intersectoral work to act on local resources for language development.

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## Dysphagia and Oral Health Concerns in Long-Term Care



## Dysphagies et problèmes de santé buccodentaire dans les établissements de soins de longue durée

### KEYWORDS

DYSPHAGIA

ORAL HEALTH

TEXTURE-MODIFIED DIETS

LONG-TERM CARE

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### Abstract

Swallowing impairment, or dysphagia, is highly prevalent in older people living in long-term care, as are oral health concerns such as missing teeth and periodontitis. Texture-modified diets are frequently prescribed for long-term care residents to manage concerning oral health conditions and dysphagia, but their use is associated with increased risk of malnutrition, dehydration, and reduced quality of life. This survey study was conducted to explore the knowledge and perspectives of long-term care staff pertaining to swallowing disorders, oral health, texture-modified diet use, and barriers and facilitators to identifying and advocating for swallowing and/or oral health assessments for long-term care residents. The survey was developed with input from an advisory panel and refined through two rounds of Delphi-method polling. The survey was administered to staff working in long-term care facilities in roles that involved face-to-face contact with residents in the provinces of Ontario, New Brunswick, Nova Scotia, Prince Edward Island, and Newfoundland and Labrador. Complete responses were obtained from 148 participants who primarily reported working as nursing assistants, health care aides, or personal support workers in Nova Scotia and New Brunswick. The results suggest that frontline long-term care staff may have limited knowledge of swallowing disorders, and overreliance on texture-modified diets is likely. Instrumental swallowing evaluations and professional oral health assessments appear to be rarely accessed. Speech-language pathologist involvement on long-term care interprofessional teams could be beneficial for educating staff, providing comprehensive management of swallowing impairments, and curbing the overuse of texture-modified diets in long-term care.

### Abrégé

Les troubles de la déglutition (dysphagies), de même que les problèmes de santé buccodentaire (p. ex. dents manquantes, parodontites), sont très fréquents chez les personnes âgées vivant dans des établissements de soins de longue durée. Une modification de la texture et de la consistance des aliments est fréquemment prescrite aux résidents de ces établissements pour remédier aux problèmes de santé buccodentaire ou de déglutition. Cependant, cette modification de la texture et de la consistance est associée à un risque accru de malnutrition et de déshydratation, ainsi qu'à une réduction de la qualité de vie. La présente étude avait pour objectif d'explorer les connaissances et les points de vue des employés des établissements de soins de longue durée au sujet des troubles de la déglutition, de la santé buccodentaire, de l'utilisation d'aliments de texture ou consistance modifiée. L'étude visait à explorer également les connaissances concernant les obstacles et les facilitateurs à l'identification et des obstacles et facilitateurs à l'identification des problèmes de déglutition et de santé buccodentaire des résidents de ces établissements et à la promotion de l'évaluation de ces problématiques. Le questionnaire utilisé dans l'étude a été conçu à l'aide de commentaires formulés par les membres d'un groupe consultatif et a été peaufiné à l'aide de la méthode Delphi. Ce questionnaire a ensuite été distribué à des employés d'établissements de soins de longue durée localisés en Ontario, au Nouveau-Brunswick, en Nouvelle-Écosse, à l'Île-du-Prince-Édouard et à Terre-Neuve-et-Labrador qui côtoyaient directement les résidents de par leur emploi. Cent quarante-huit participants ont rempli le questionnaire au complet. La plupart d'entre eux ont déclaré travailler à titre d'aide-infirmier, d'aide-soignant ou de préposé aux services de soutien à la personne en Nouvelle-Écosse et au Nouveau-Brunswick. Les résultats suggèrent que le personnel de première ligne dans les établissements de soins de longue durée ne possède que de connaissances limitées sur les troubles de la déglutition et que l'on utilise probablement trop souvent des aliments de texture ou consistance modifiée. De même, il semble que l'on procède rarement à des évaluations instrumentales de la déglutition et à des examens buccodentaires réalisés par des professionnels. L'intégration d'orthophonistes aux équipes interprofessionnelles des établissements de soins de longue durée pourrait être bénéfique pour la formation du personnel, pour une prise en charge plus complète des troubles de la déglutition et pour diminuer la surutilisation d'aliments de texture ou consistance modifiée dans ces établissements.

There are approximately 6.6 million people aged 65 years and older living in Canada, and approximately 5% of those individuals live in long-term care (LTC) facilities (Public Health Agency of Canada, 2020). That number is expected to increase in the coming years as Canada is experiencing a dramatic increase in the population proportion of older people. Many of these older people will develop physical and cognitive challenges requiring institutional LTC (Jackson et al., 2017). Swallowing impairment, or dysphagia, affects the preparation and transportation of saliva and ingested materials along the digestive tract (Logemann, 1998). The prevalence of dysphagia has been reported to be as high as 53% in people living in LTC (Park et al., 2013).

Dysphagia is characterized by two primary functional concerns: (a) reduced safety of the swallow, resulting in the misdirection of ingested material into the airway (aspiration); and (b) reduced efficiency of the swallow, resulting in residual material left behind in the throat after the swallow has been completed. A host of negative health consequences are associated with dysphagia. Dysphagia may lead to aspiration, which is associated with aspiration pneumonia. Aspiration pneumonia is generally considered to be an infection of the lung parenchyma that occurs when a substance, such as food or liquid, secretions, or regurgitated contents of the stomach or esophagus enter the lower airways (Bennett & Vella, 2022). Aspiration pneumonia increases the risk of patients requiring ICU admission, mechanical ventilation, longer hospital stays, and mortality (Lanspa et al., 2015). Dysphagia may also increase the risk of a person developing dehydration (Crary et al., 2013; Whelan, 2001) and malnutrition (Namasivayam-MacDonald et al., 2018; Takeuchi et al., 2014). Malnutrition and dehydration in LTC residents are concerning conditions that potentially lead to morbidities such as frailty, muscle wasting, reduced functional status, and poor quality of life (Crogan & Pasvogel, 2003; Cruz-Jentoft et al., 2017; Welch, 2014).

Over the past several decades, the population of older people in Canadian LTC facilities has shifted from being either partially or fully edentulous (i.e., having no teeth) to being partially or fully dentate (i.e., having teeth; Wyatt & Kawato, 2019). The presence of natural teeth requires more prevention and maintenance care needs. This shift in the profile of LTC residents led to a 37% increase in need for oral health services from 2002 to 2010 (Wyatt & Kawato, 2019). Over half (58%) of LTC residents living in Canada have at least one tooth and most LTC residents (80%) experience moderate to severe inflammation in the surrounding tissues (Yoon et al., 2018). LTC residents experiencing oral health concerns, such as missing teeth, often experience

concurrent difficulty chewing or pain when eating, which are risks for malnutrition and poor quality of life (Algra et al., 2021; de Medeiros et al., 2020; Porter et al., 2015; Toniazzo et al., 2018). Furthermore, poor oral health in LTC residents has been identified as a risk factor for the development of aspiration pneumonia (Langmore et al., 1998, 2002).

Texture-modified diets (TMDs) are foods and liquids that have been prepared to be a specific texture or consistency and are frequently prescribed for LTC residents to manage concerning oral health conditions and dysphagia (Robbins et al., 2002; Yoon et al., 2018). Other factors associated with the prescription of TMDs are seen in residents who require a high level of care and include living in LTC for a long time, diagnosis of dementia or cognitive impairment, signs and symptoms of malnutrition such as weight loss, and being dependent on others to complete activities of daily living (Vuca et al., 2019). There is widespread use of TMDs in LTC across Canada despite being disliked by many people and having been found to negatively impact quality of life (Swan et al., 2015). Refusal of TMDs and/or nonadherence to TMD recommendations have been reported (Makhnevich et al., 2023; Shim et al., 2013). Furthermore, TMDs are associated with increased risk of malnutrition and dehydration due to poor intake associated with reduced palatability but also due to the poor nutritional quality of the TMDs themselves (Logemann et al., 2008; Vuca et al., 2018, 2019). A recent study of 32 LTC facilities across Canada, the "Making the Most of Mealtimes (M3)" study, revealed that pureed menus typically provided lower amounts of nutrients compared to the regular texture menus (Vuca et al., 2017).

Although evidence about the appropriateness of TMD prescription is limited, it is thought that TMDs are overused and many residents living in LTC may be on an overly restricted TMD (Groher & McKaig, 1995). Speech-language pathologists (S-LPs) are uniquely qualified to evaluate and manage dysphagia and to identify poor oral health in LTC residents. However, S-LP services are not widely available in LTC facilities in Canada. Given that TMDs are associated with malnutrition, dehydration, and reduced quality of life (Swan et al., 2015), overuse of TMDs is a concern warranting closer scrutiny. Therefore, the aims of this study were to (a) explore the current knowledge, perspectives, and practice patterns of LTC staff pertaining to swallowing disorders, oral health, TMD use, and the barriers and facilitators to identifying and advocating for swallowing and/or oral health assessments for LTC residents; and (b) investigate potential associations between variables of interest identified a priori, including relationships between knowledge and training, years of experience and practice patterns, and years of experience and confidence. We hypothesized that LTC staff

(e.g., nurses, dietitians) and formal caregivers (e.g., nursing assistants, personal support workers) currently recommend TMDs with good intentions (e.g., to manage swallowing difficulties, dentition challenges, and oral health concerns), but do not access skilled assessments to guide these recommendations. Furthermore, we hypothesized that experience and training would be associated with practice patterns and confidence.

## Method

A cross-sectional survey study was conducted to explore the knowledge and perspectives of LTC staff pertaining to swallowing disorders, oral health, TMD use, and the barriers and facilitators to identifying and advocating for swallowing and/or oral health assessments for LTC residents. This study was approved by the research ethics boards at Dalhousie University (#2020-5268), University Health Network (#20-6075), and the Hamilton Integrated Research Ethics Board (#12937). Sharma et al.'s (2021) checklist for reporting of survey studies was used to ensure transparent reporting.

## Survey Development

The survey instrument was developed during a 1-day meeting with an advisory panel made up of key stakeholders including LTC leadership, frontline nursing staff, dietitians, S-LPs, and researchers. The goal of the meeting was to solicit the opinions and discuss the experiences of the stakeholders on the topics of swallowing disorders, oral health, and TMD use, and to generate a list of relevant topics that were eventually drafted into survey items and refined through two electronic rounds of Delphi-method polling of the advisory group. The final version of the survey consisted of 54 items that were primarily closed-ended questions and was delivered using Opinio (<https://www.objectplanet.com/opinio/>) online survey software in both English and French. The survey included seven items to collect demographic information about the respondents, five items to collect information about the LTC facility, 35 items to collect information on oral health and swallowing knowledge and/or practice patterns, and one item to collect information about the impact of the COVID-19 pandemic on swallowing and oral health care. The remaining items provided respondents with an opportunity to share anything relevant that was not captured by the survey and provide feedback about the survey instrument. A copy of the questionnaire is available from the authors upon request.

## Participants

The survey was administered to LTC staff, including but not limited to registered nurses, licensed practical nurses, registered practical nurses, nursing assistants,

health care aides, personal support workers, registered dietitians, clinical dietitians, food service workers, food service managers, recreation therapists, occupational therapy assistants, physical therapy assistants, physical therapists, occupational therapists, and S-LPs. To be eligible to complete the survey, participants had to be currently employed or employed in the last 12 months in a LTC facility in the provinces of Ontario, New Brunswick, Nova Scotia, Prince Edward Island, or Newfoundland and Labrador, in a role that involved face-to-face contact with LTC residents.

## Recruitment

Convenience sampling was used to recruit potential participants. Because this was a preliminary investigation and the total number of LTC staff in Canada is unknown, an a priori sample size was not calculated. LTC facilities in the provinces of interest were identified using online searches and an email invitation was sent by a member of the research team (RHA, ANM, CMS) to each facility, describing the study and requesting support with participant recruitment. Twenty LTC facilities in Nova Scotia, ten LTC facilities in New Brunswick, and one LTC facility in Ontario agreed to support participant recruitment and forwarded the study invitation email, in both English and French, to appropriate staff members within the organization using staff email lists. Email invitations were sent out in November and December of 2020 and due to the ongoing challenges associated with the COVID-19 pandemic, email invitations were sent out again in November and December of 2021. Two LTC facilities in Ontario initially agreed to support participant recruitment but were unable to continue participation or forward the study invite to staff members due to the ongoing challenges related to the pandemic.

The email invitation directed potential participants to a landing page powered by mailchimp (<https://mailchimp.com>), where participants submitted their email address to receive the link to the Opinio survey. To prevent multiple participation of participants, the IP address checking feature was enabled in Opinio. The mailchimp landing page was used to manage the respondent email list, calculate a response rate, and send follow-up reminder emails 1 week and 2 weeks after the initial invitation to those who had not completed the survey. The first page of the survey included information about the purpose of the study, ethical considerations, and information about privacy and informant rights. Participants indicated their informed consent by clicking the "start survey" button. Each participant received a \$10 gift card as a token of appreciation for completing the survey. Each participant was also entered into a draw to win an additional \$50 gift card. Only study personnel had access to survey data.



## Data Analysis

Raw data were exported from Opinio into Excel for data cleaning and were then analyzed using R (<https://www.r-project.org>). Descriptive analyses were performed, and frequency and percentage were reported for categorical data. Missing responses were excluded from the analysis. Fisher's exact tests were used to investigate potential associations between variables of interest identified a priori, including relationships between knowledge and training, years of experience and practice patterns, and years of experience and confidence. Statistical significance was set at  $\alpha = .05$ .

For free-text response items, thematic analysis was used to code and identify response trends (Vaismoradi et al., 2013). A semiductive thematic analysis was conducted according to a six-step process described by Braun and Clarke (2014). Common and unique responses were included in the analysis. Responses were coded systematically according to relevant features by RHA and ANM. The coded responses were then collated into themes, reviewed, and interpreted for final reporting. Any discrepancies between raters were discussed to consensus.

## Results

### Description of Participants

During the data collection period, the mailchimp landing page received a total of 379 visits and 215 individuals submitted their email addresses to receive the link to the Opinio survey. Of the 178 survey participants, 30 participants were removed from analysis due to incomplete or missing data, resulting in a total of 148 participants (response rate of  $178/379 = 47\%$ ). All respondents except one (99%) reported currently working in a LTC facility. Respondents were primarily English-speaking (88%), identified as female (87%), worked in Nova Scotia (75%), and reported being involved in mealtimes in some way at their LTC facility (93%). Nursing assistant/health care aide/personal support worker was the most commonly reported role (39%). The next most common roles were licensed practical nurse (22%) and registered nurse (17%). The respondents most commonly reported having more than 10 years of experience working in LTC (38%). A complete description of the participants is reported in **Table 1**.

### Knowledge, Perceptions, and Practice Patterns

About one third of respondents (36%) reported that the prevalence of swallowing difficulty on their unit was 25% to 50% (**Figure 1**). When asked to identify clinical signs of a swallowing disorder, respondents were generally able to identify at least one correct response (**Figure 2**). The most

frequently selected signs included choking (14%) and food refusal (13%). Surprisingly, only 8% of respondents indicated that coughing during meals is a sign that a person has difficulty swallowing. Similarly, when asked to identify signs that a resident may require a TMD, respondents selected a range of responses including coughing at meals (18%), poor intake (14%), and taking a long time to chew (13%; see **Figure 3**). The majority of respondents (66%) had not heard of or did not know about the international dysphagia diet standardization initiative (IDDSI).

When asked about the types of mealtime assistance that the respondents typically provided to residents, they reported a variety of aids, including assistance with transporting food and drink to the mouth, providing encouragement and instructions, cutting food into small pieces, and providing reminders to use recommended eating strategies. The most commonly reported management strategy used when observing a resident coughing during a meal was to encourage them to cough (43%; **Figure 4**). When respondents observed individuals experiencing difficulty chewing, they reported cutting food into smaller pieces (24%), reporting it to someone else who would decide how to help (such as the dietitian; 23%), or suggesting to the team that the person may need pureed food (18%; **Figure 5**). Respondents reported that they received training to support residents with their meals in school (36%) or during new staff orientation (30%), and most respondents reported feeling very confident about their ability to act upon suspected swallowing disorders (63%) and in recommending the use of TMDs (62%).

The majority of respondents (57%) reported that more than half of the residents on their unit required assistance with mouth care, however the most common response was that respondents did not support residents with their oral care (21%; **Figure 6**). For those that did report supporting residents with their oral care, the average time spent was most commonly reported to be between 5 and 10 min per day (17%), and some types of denture or mouth care assistance provided by respondents included assistance with brushing teeth or dentures, assistance with rinsing the mouth, and providing encouragement or instructions to clean the mouth or dentures. The most commonly reported management strategy when oral health concerns were suspected was to report them to someone (24%), however, respondents reported feeling very confident about their ability to provide oral care to residents (61%; **Figure 7**).

### Swallowing and/or Oral Health Assessments

Occupational therapists were the most commonly reported health professional performing swallowing

**Table 1****Description of Participants (N = 148)**

Label	Variable	n (%)
Primary language	English	130 (87.8)
	French	1 (0.7)
	Other language	15 (10.1)
	Prefer not to answer	2 (1.4)
Title and role	Food service manager	2 (1.4)
	Food service worker	2 (1.4)
	Licensed practical nurse	32 (21.8)
	Nursing assistant/health care aide/personal support worker	57 (38.8)
	Occupational therapist	1 (0.7)
	Occupational therapy assistant	2 (1.4)
	Prefer not to answer	1 (0.7)
	Recreation therapist	4 (2.7)
	Registered dietitian	7 (4.8)
	Registered nurse	25 (17.0)
	Other <sup>a</sup>	14 (9.5)
Number of beds	1–96 beds	73 (49.7)
	97–160 beds	27 (18.4)
	More than 160 beds	46 (31.3)
	Prefer not to answer	1 (0.7)
Location of facility	New Brunswick	34 (23.1)
	Nova Scotia	110 (74.8)
	Ontario	3 (2.0)
Community population over 100,000	No	51 (34.7)
	Yes	79 (53.7)
	Prefer not to answer	17 (11.6)
Private or not-for-profit	I don't know	32 (21.8)
	Prefer not to answer	5 (3.4)
	Privately funded/for-profit	64 (43.5)
	Publicly funded/not-for-profit	43 (29.3)
	None of the above	3 (2.0)
Length of time worked at current facility	1.5–2 years	24 (16.3)
	2.5–5 years	30 (20.4)
	5.5–10 years	20 (13.6)
	6–12 months	19 (12.9)
	Less than 6 months	16 (10.9)
	More than 10 years	36 (24.5)
	Prefer not to answer	2 (1.4)

**Table 1 (continued)**

**Description of Participants (N = 148)**

Length of time worked in long-term care (total)	1.5–2 years	20 (13.6)
	2.5–5 years	27 (18.5)
	5.5–10 years	27 (18.5)
	6–12 months	13 (8.8)
	Less than 6 months	3 (2.0)
	More than 10 years	56 (38.4)
	Prefer not to answer	1 (0.7)
Role at mealtimes	I am not involved with meals	9 (6.1)
	I assist residents with table set up	23 (15.6)
	I assist with table/tray clean up after meals	12 (8.2)
	I observe residents' abilities during mealtimes	25 (17.0)
	I provide personal assistance, including hands-on assistance with a meal	39 (26.5)
	I receive/solicit feedback from residents about mealtimes	13 (8.8)
	I serve food	17 (11.6)
	Other	8 (5.4)
Prefer not to answer	1 (0.7)	
Staffing ratios	1 staff member to 10+ residents	26 (19.0)
	1 staff member to 4–5 residents	14 (10.2)
	1 staff member to 6–7 residents	43 (31.4)
	1 staff member to 8–9 residents	43 (31.4)
	Prefer not to answer	11 (8.0)

<sup>a</sup>Other titles and roles included client relations coordinator, community manager, housekeeper, music therapist, long-term care assistant, recreation coordinator, and recreation therapy programmer.

**Figure 1**

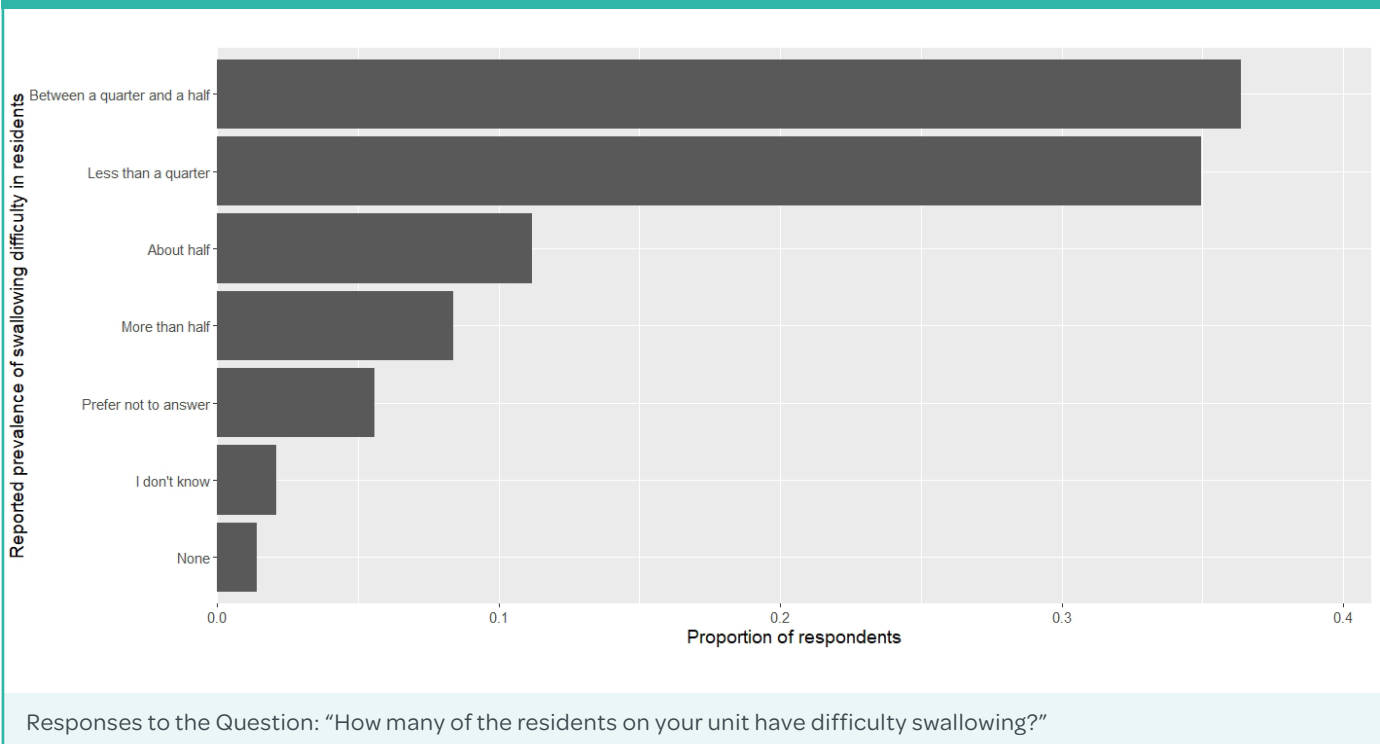
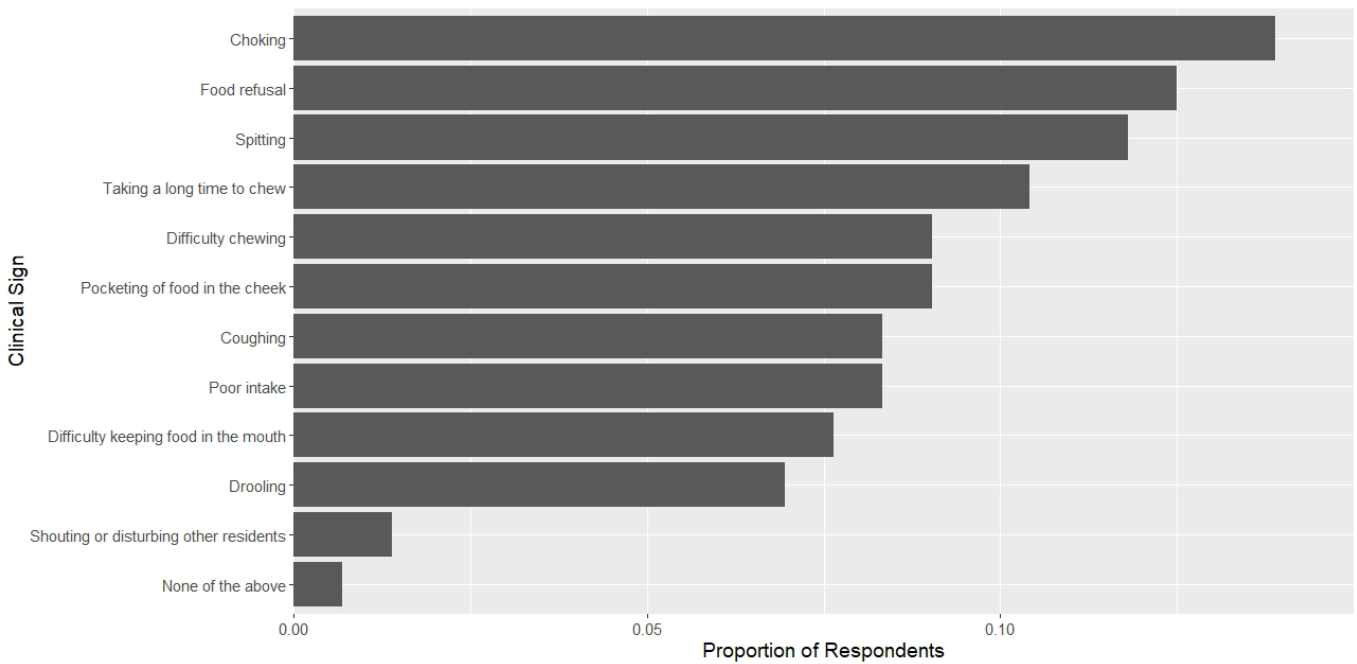
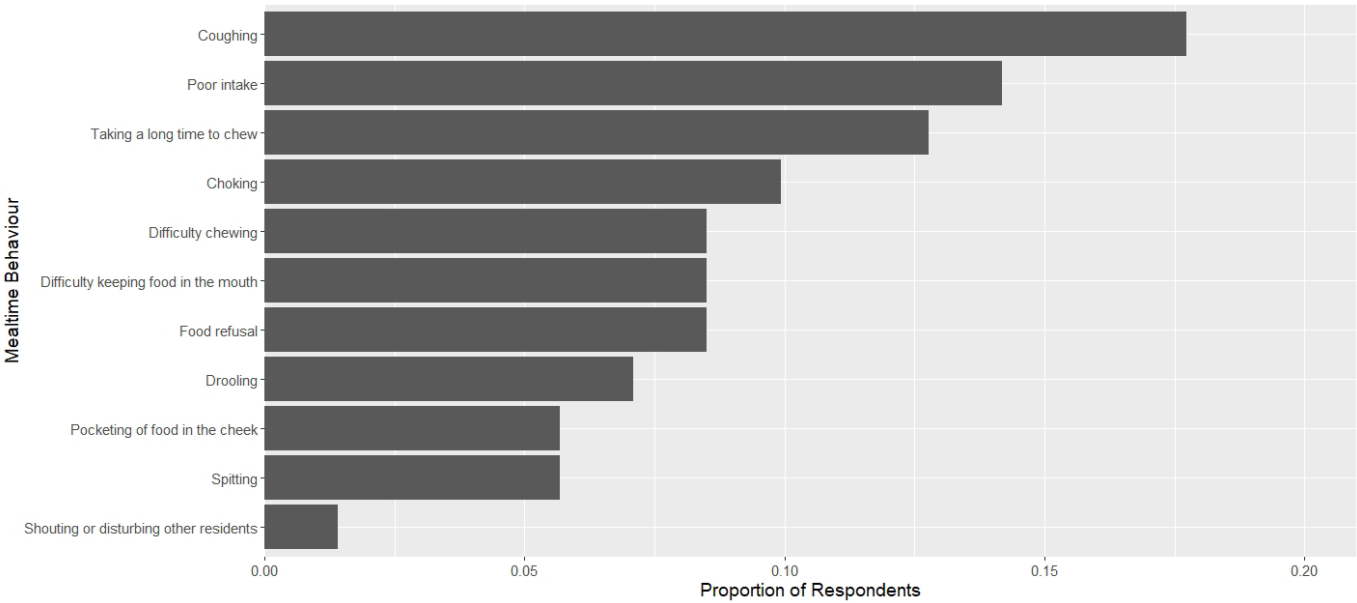


Figure 2



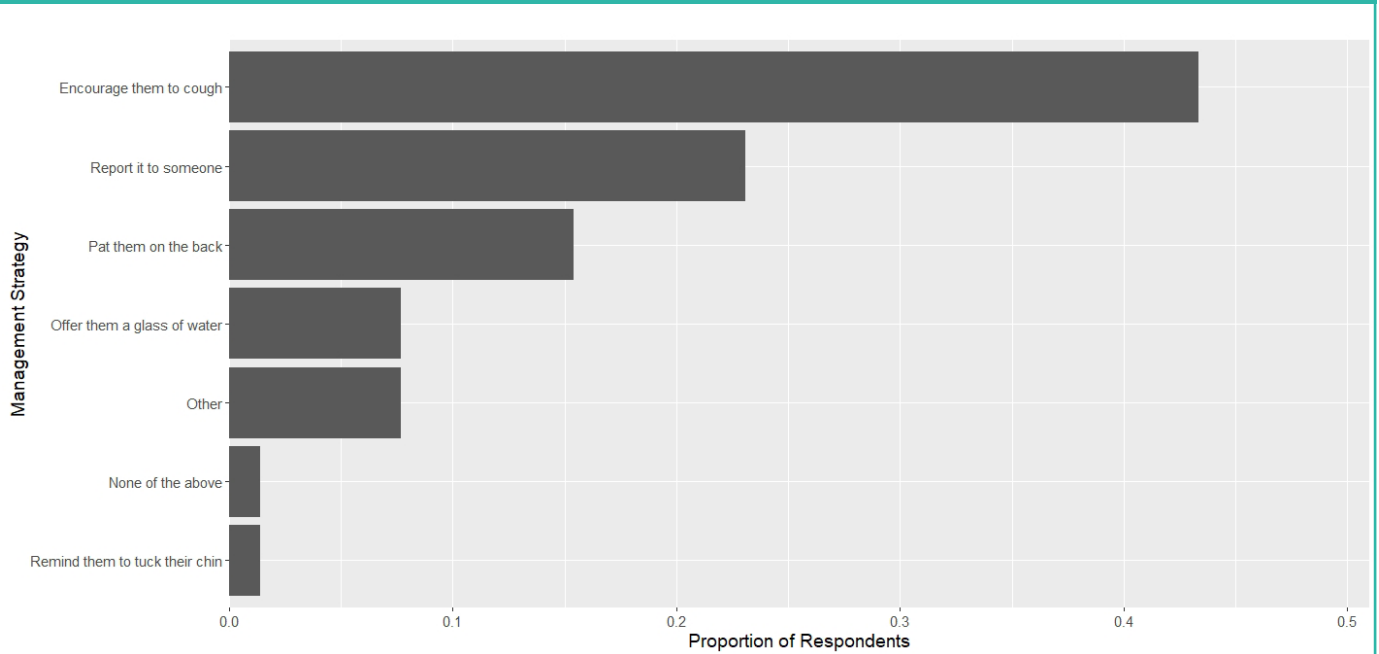
Responses to the Question: "Which of the following might suggest to you that a person has difficulty swallowing?"

Figure 3



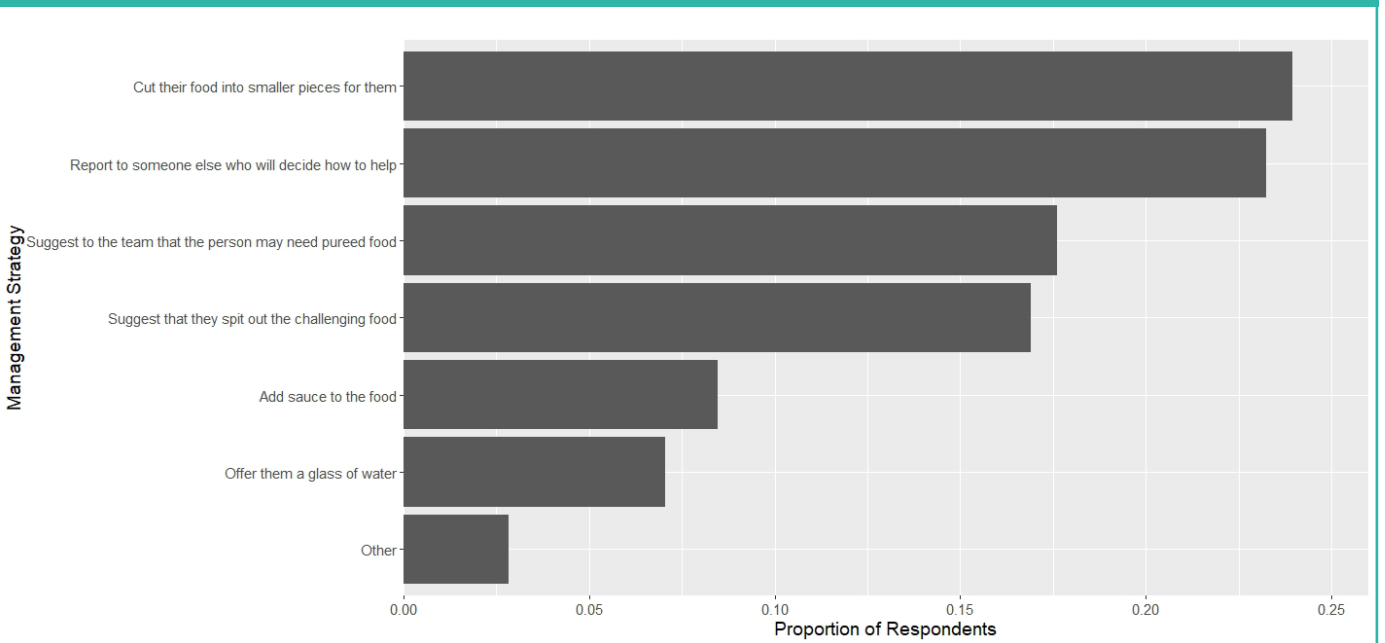
Responses to the Question: "Which mealtime behaviours suggest to you that the person may need a modified texture diet?"

**Figure 4**



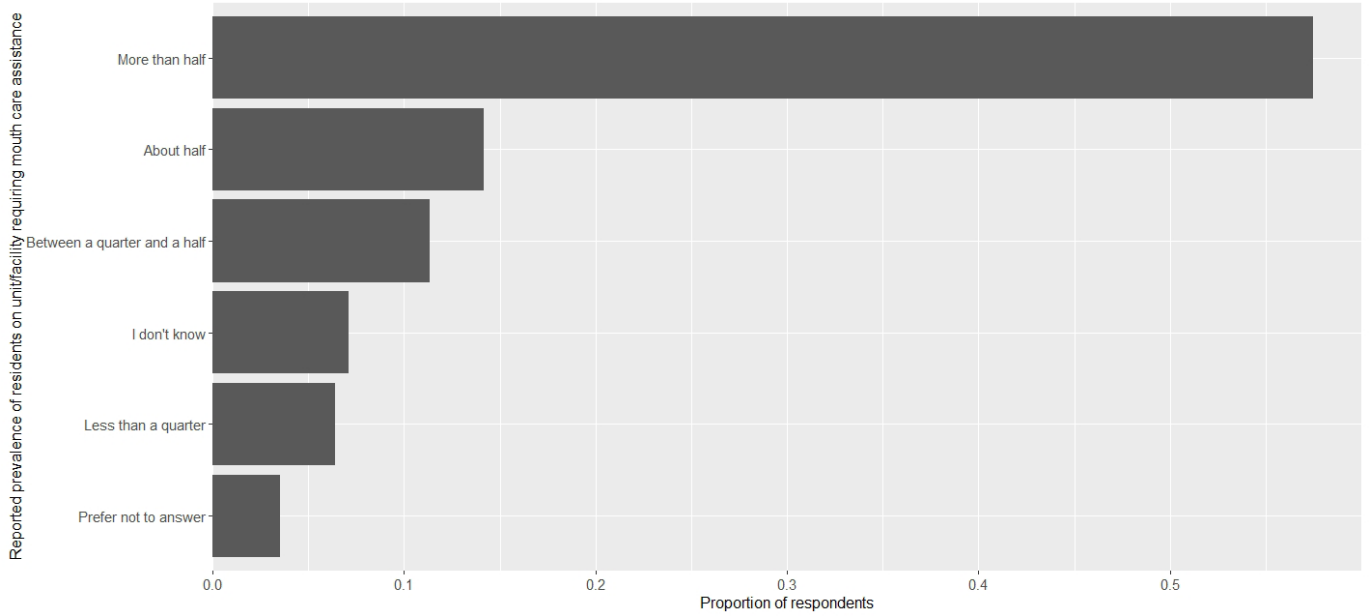
Responses to the Question: "What do you do when you observe a resident coughing during a meal?"

**Figure 5**



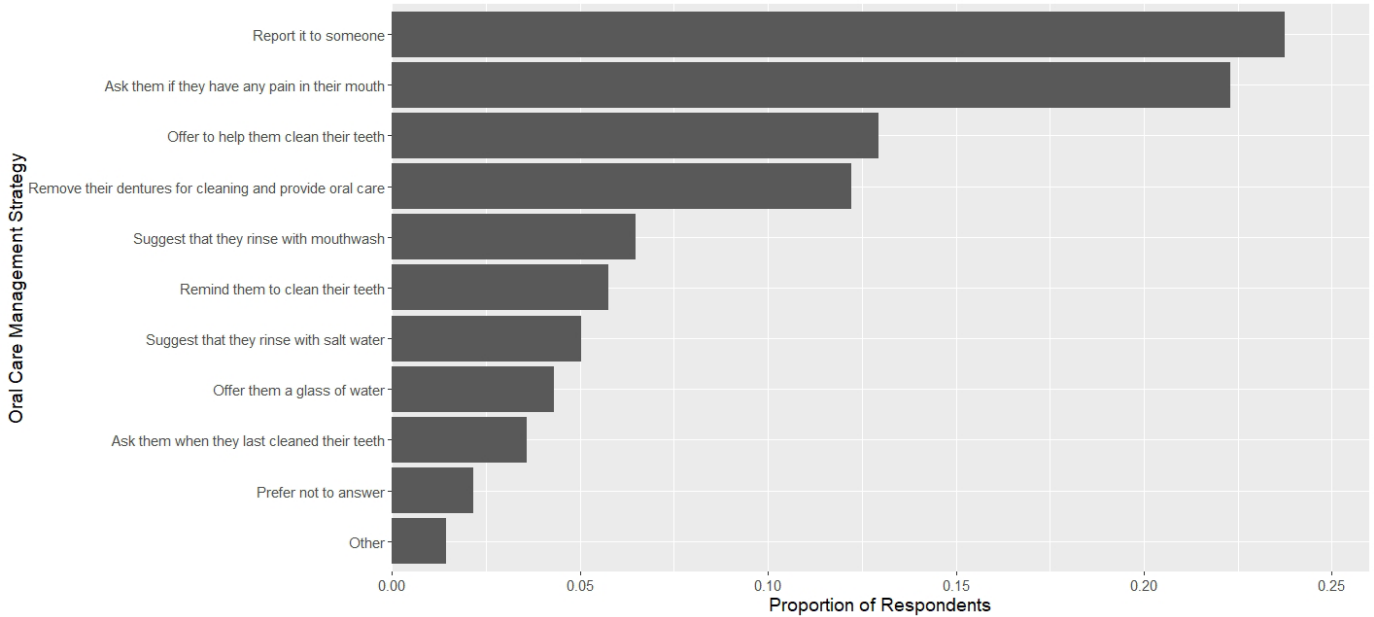
Responses to the Question: "What do you do when you observe a resident having difficulty chewing food during a meal?"

Figure 6



Responses to the Question: "How many residents on your unit/in your facility require assistance with mouth care?"

Figure 7



Responses to the Question: "When you notice something unusual about a resident's mouth, what do you do?"

assessments when they were needed (72%). Dietitians (8%), S-LPs (7%), and nurses (1%) were also reported to perform swallowing assessments (Figure 8). LTC residents reportedly waited for less than a week before they received a swallowing assessment (58%), although some waited for 1 to 2 weeks (12%). Most respondents did not know how LTC residents accessed professional oral health care (39%) or how long that might take (43%), however some reported that a referral had to be made for the resident to go to a special dental clinic (21%) and some reported that a family member had to transport the resident to their dentist (17%). Waiting time for those appointments might take 1 to 2 (18%) or 2 to 4 weeks (18%).

**Relationships Between Variables**

A significant relationship was identified between greater number of years of experience and feeling very confident recommending the use of TMDs ( $p = .039$ ; Table 2). The following additional potential associations were explored, however no significant relationships were identified: staffing ratios and the amount of time staff dedicated to assisting residents with meals ( $p = .332$ ) or with oral health ( $p = .859$ ); number of beds in the LTC facility and the ability to access a dentist ( $p = .070$ ); the location of the LTC facility and wait time for an S-LP assessment ( $p = .823$ ); years of experience and knowledge of how to manage oral health ( $p = .942$ ) or chewing difficulties ( $p = .252$ ); and years of experience

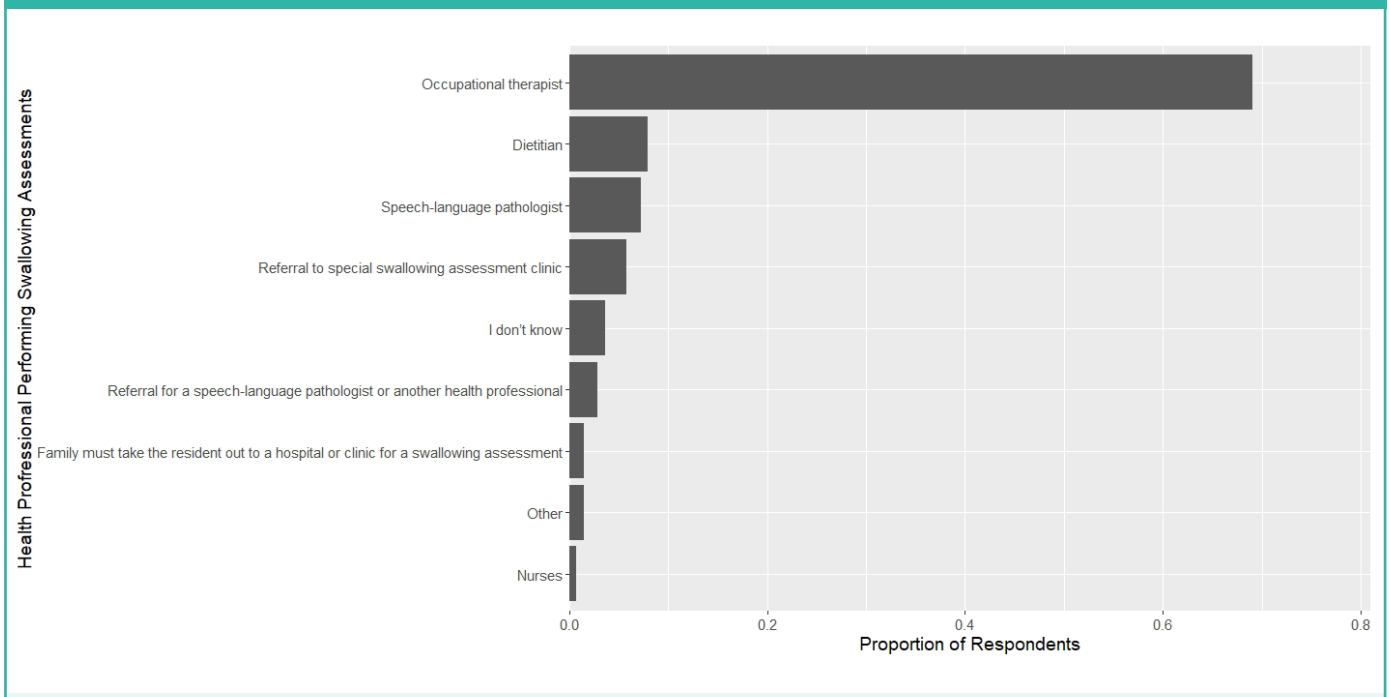
and confidence managing swallowing disorders ( $p = .606$ ), providing assistance at mealtimes ( $p = .427$ ), or managing oral health ( $p = .511$ ).

**Additional Comments**

Eighteen percent of respondents provided a free-text response when asked to share any additional comments or thoughts not captured by the survey questions. Responses were coded by RHA and ANM. Raters disagreed on 6 of the 35 codes assigned (17%) and discrepancies were discussed to consensus.

Staff shortages were reported as a barrier to providing optimal care ( $n = 4, 14\%$ ). Respondents indicated they were aware that oral health care may be lacking in LTC ( $n = 4, 14\%$ ); however, they reported that managing resident behaviours could be a major challenge to providing oral care ( $n = 2, 8\%$ ), and there could be a shortage of hygiene equipment ( $n = 3, 11\%$ ). Respondents reported a lack of education and training and an interest in obtaining more education and training to improve their understanding and management practices pertaining to swallowing impairment, IDDSI, and providing oral hygiene ( $n = 5, 19\%$ ). Respondents felt that access to swallowing assessments and an on-site oral health professional (such as a dental hygienist) would have a positive impact on eating and oral care ( $n = 1, 4\%$ ).

**Figure 8**



Responses to the Question: "How do residents in your facility access a swallowing assessment when needed?"

**Table 2**

**Relationship Between Number of Years of Experience and Feeling Very Confident Recommending the Use of Texture-Modified Diets**

Years of experience	How confident do you feel recommending the use of modified texture diets?	
	Not confident <i>n</i> (%)	Confident* <i>n</i> (%)
2 years or less	18 (41.9)	16 (18.8)
2.5–5 years	7 (16.3)	16 (18.8)
5.5–10 years	4 (9.3)	18 (21.2)
More than 10 years	14 (32.6)	35 (41.2)

Note. The years of experience were reported by participants in answer to the question, "How many years in total have you worked in long-term care (any facility)?"  
\* *p* = .039 using Fisher's exact test for count data

**Additional Comments: Impact of the COVID-19 Pandemic**

Thirty-five percent of respondents indicated that the COVID-19 pandemic impacted the eating-related and oral care provided to LTC residents and of those, 82% (*n* = 42) provided a free-text description. Raters disagreed on 7 of the 106 codes assigned (1%) and discrepancies were discussed to consensus. Several themes were identified from the free-text responses, including staff shortages, visitor restrictions, mask requirements, being confined to rooms for meals, and limited accessibility of off-site appointments.

Staff shortages were very commonly reported as having a negative impact on eating and oral care (*n* = 22, 58%). Respondents reported that staff shortages resulted in staff having less time to dedicate to assisting each resident during mealtimes or with oral care (*n* = 2, 5%). Staff burnout was also identified as a challenge (*n* = 1, 3%). Respondents reported that staff shortages resulted in the presence of new and untrained and/or unfamiliar staff who were inexperienced with providing care or were unaware of what assistance was needed by the residents (*n* = 2, 5%).

Visitor restrictions were also commonly reported as having a negative impact on care. Respondents reported that visitor restrictions had a negative impact on residents' emotional well-being, which could impact appetite, as well as on the ability to provide mealtime assistance as many family members were involved with providing mealtime assistance prepandemic (*n* = 9, 24%). Moreover, mask requirements were reported to negatively impact communication between residents with hearing loss and staff or visitors (*n* = 3, 8%). Interactions between residents and staff were reported to be less personal and more medical.

Respondents reported that during the pandemic residents were confined to their rooms for meals, which negatively impacted eating-related care (*n* = 5, 12%). Mealtimes were reported to be less social, routines were disrupted, and respondents felt residents had less sensory stimulation (food aromas and seeing others eating around them) than before the pandemic (*n* = 2, 5%). Respondents reported that additional time was required when staff were providing mealtime assistance to each resident individually in their rooms, resulting in meals being served at nonoptimal temperatures, and they felt that some residents did not receive the level of assistance they required (*n* = 5, 13%). One respondent mentioned that during the pandemic, residents had to use disposable utensils at mealtimes and were not able to use prescribed assistive devices (*n* = 1, 3%).

Respondents reported that the COVID-19 pandemic negatively impacted the accessibility of sending residents to off-site appointments (*n* = 5, 13%). Transporting residents to appointments was reported to be more challenging than usual due to restrictions pertaining to the number of support persons allowed to travel with residents (*n* = 1, 3%). Accessing professional oral health care was limited due to dental office closures during the first wave of the pandemic (*n* = 1, 2%).

**Discussion**

The purpose of this study was to explore the current knowledge, perspectives, and practice patterns of LTC staff pertaining to swallowing disorders, oral health, TMD use, and the barriers and facilitators to identifying and advocating for swallowing and/or oral health assessments for LTC residents. A survey instrument was developed with input from an advisory panel made up of key stakeholders and was



administered to staff at LTC facilities in Nova Scotia, New Brunswick, and Ontario. Complete responses were obtained from 148 participants (response rate of 47%) primarily working in LTC facilities in Nova Scotia and New Brunswick. The results of the survey suggest that frontline LTC staff may have limited knowledge of swallowing disorders and that overreliance on TMDs is likely. Staff appear to be reporting concerns related to oral health and swallowing impairments when they identify them, however, assessment of these concerns using instrumental measures (such as videofluoroscopic or endoscopic swallowing studies) in the case of swallowing impairments, or professional oral health assessment, appears to be rare.

Despite reporting high levels of confidence to act upon suspected swallowing disorders, responses to items pertaining to knowledge of swallowing disorders suggest that survey respondents may not be aware of the breadth of clinical signs associated with swallowing disorders. These high levels of confidence could also be accounted for by the Dunning-Kruger effect (Kruger & Dunning, 1999), where less skilled LTC staff provide higher self-assessments, resulting in respondents reporting what they believe the survey is looking for, regardless of their actual perceptions. As such, we cannot be sure that staff confidence in swallowing disorders is associated with best practices. Moreover, 36% of survey respondents reported the prevalence of swallowing disorders on their unit to be between 25% and 50%, which is consistent with prevalence values previously cited in the literature (between 13% and 53%; Park et al., 2013; Streicher et al., 2017). However, a similar number of respondents (35%) reported the prevalence to be less than 25% suggesting that swallowing disorders may be underidentified in some facilities. Similar findings pertaining to potentially underidentifying swallowing disorders were reported in a survey study conducted with nursing home leadership in Norway (Eng & Speyer, 2021).

Few respondents reported receiving formal education to support residents during mealtimes and signs of potential malnutrition (poor intake) were reported as an indicator of needing a TMD, which could worsen nutritional status due to general unpalatability and reduced levels of nutrient density in TMDs (Wu et al., 2020). Also concerning, most respondents did not know about IDDSI, which is an internationally accepted framework to ensure standardization of TMDs. Increased awareness and education around IDDSI may help to ensure residents are receiving the least restrictive diet required, consequently helping to improve palatability and intake. Despite reporting limited knowledge and training, respondents reported being very confident recommending the use of TMDs and

those who reported having a greater number of years of experience working in LTC were significantly more likely to report feeling very confident recommending TMDs. Feeling confident about recommending TMDs may be related to feelings of self-efficacy. Holteng et al. (2017) conducted a qualitative study where they held focus group interviews with frontline LTC staff who reported that they felt safer in the meal situation when they served TMDs to patients with identified swallowing impairments than when serving regular food. Despite TMD use being associated with malnutrition, participants reported that with TMDs, they felt more able to provide sufficient nutritional care that was customized according to patients' needs and that could be eaten with fewer problems (Holteng et al., 2017).

Most survey respondents reported that more than half of residents require assistance with oral care, which is consistent with other estimates cited in the literature (Canadian Institute for Health Information, 2020). Of note, most respondents reported feeling very confident about their ability to provide mouth care, however, most respondents reported that they did not provide mouth care to residents despite performing roles such as nursing assistant/health care aide/personal support worker, licensed practical nurse, or registered nurse. Furthermore, most respondents reported that they did not know how residents accessed professional oral health services. This is a concern because oral care issues may not be resolved in a timely manner if proper referrals are not being made due to lack of knowledge regarding access to appropriate services. This could subsequently lead to increased risk of aspiration pneumonia (Langmore et al., 1998) and other illnesses linked to poor oral care.

Occupational therapists and dietitians were overwhelmingly reported to be involved in swallowing assessments. Outside LTC settings in Nova Scotia, New Brunswick, and Ontario, S-LPs are most commonly involved in conducting and interpreting instrumental swallowing assessments, such as videofluoroscopic swallowing studies or flexible endoscopic evaluations of swallowing. The survey results suggest that S-LPs are rarely involved in conducting swallowing assessments within LTC, and instrumental assessments are not used when prescribing TMDs, a finding which was expected given anecdotal clinical reports suggesting that S-LPs have a limited presence in Canadian LTC facilities. However, given S-LPs are uniquely qualified to evaluate and manage dysphagia and to identify oral health concerns, increased involvement of S-LPs within LTC interprofessional teams could be beneficial for educating staff and providing comprehensive management of swallowing impairments (Affoo et al., 2022).

Most respondents reported working in Nova Scotia or New Brunswick, which may provide some important insights given the unique characteristics of these two provinces. Nova Scotia and New Brunswick have an aging population compared with the rest of Canada, with the first and second (respectively) largest percentages of older people among all other provinces (Statistics Canada, 2019). Moreover, data from Nova Scotia reveal a higher rate of LTC residents with at least one tooth (59%) compared to the national average (Matthews & Clovis, 2012), which suggests that professional oral health care is particularly important for LTC residents in Nova Scotia. In 2016, provincial guidelines were developed that outlined specific expectations for oral health evaluation and daily care in LTC facilities in Nova Scotia. The fact that most respondents reported that they did not provide mouth care to residents and did not know how residents accessed professional oral health services is surprising. Provincial guidelines require that each resident have a daily mouth care plan that includes appropriate oral hygiene techniques and products individualized to their specific needs (The Nova Scotia Department of Health and Wellness, 2022) and a suite of open access resources that support optimum daily mouth care were provided (and continue to be freely available) to LTC facilities in the province (Brushing Up on Mouth Care, n.d.; McNally et al., 2015).

### Clinical Implications

The results of this study suggest that increased education and training is required for LTC staff to improve knowledge of how to best reduce the risk of, screen for, and improve management of swallowing disorders and oral health concerns. Further, LTC facilities in Canada may greatly benefit from increased physical presence of S-LPs to provide continuous training and education, and liaise with nursing staff, dietitians, and occupational therapists who are currently supporting residents with swallowing disorders and oral care issues. S-LPs could also provide critical training on IDDSI to both frontline and kitchen staff to ensure TMDs are being prescribed only when absolutely necessary, weighing both the risks and benefits, and are being created in a standard way to ensure the least restrictive diet is always being provided to residents. Finally, results also suggest that clear clinical pathways should be developed and conveyed to all LTC staff so the processes of screening for swallowing disorders and oral health issues and of making subsequent appropriate referrals are clear.

### Limitations

This study has several limitations. The advisory panel that was assembled to inform survey development did not include patient/resident representation and therefore that

perspective was not adequately captured in the final version of the survey. Furthermore, because the total number of LTC staff in Canada is unknown and an a priori sample size was not calculated, it is unclear whether the sample of respondents is representative of the total population of LTC staff in Canada.

The COVID-19 pandemic disproportionately impacted LTC facilities including residents and staff (Canadian Institute for Health Information, 2021). Recruitment and data collection occurred during the COVID-19 pandemic at a time when staff shortages and staff burnout were a major concern, as can be seen from our qualitative findings. Survey responses were collected for over a year, and it is unclear what impact this may have had on the findings. It is possible, given the impacts of the pandemic on LTC staff that nonresponse bias may have been an issue in our study. One of the indicators of this may have been the high response rate from LTC staff working in Nova Scotia and New Brunswick (where infection rates tended to be lower in early waves of the pandemic) compared to Ontario. Although 148 participants completed the survey (response rate of 47%), the length of the survey (at 54 items) may have been burdensome on respondents and influenced their responses. Social desirability bias may have also been an issue, although the fact that most respondents reported that they did not provide mouth care to residents does not support this.

### Future Directions

This survey did not include items pertaining to nutritional assessment and management of residents receiving TMDs. Future research should focus on exploring the knowledge and perspectives of LTC staff pertaining to nutrition and TMDs. Evaluating the appropriateness of TMD prescription in LTC facilities across Canada should also be the focus of future research.

### Conclusion

Frontline LTC staff appear to be reporting concerns related to oral health and swallowing impairments when they identify them, however, they need education and training to improve their knowledge and ability to identify disorders and concerns. Increased involvement of S-LPs within LTC interprofessional teams could be beneficial for educating staff and for providing comprehensive management of swallowing. Improved access to instrumental swallowing assessments and professional oral health evaluations would contribute to reducing the overuse of TMDs in LTC facilities.

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## Report on the Impact of LSVT LOUD in Improving Communication of a Preschool Child and a Young Adult With Cerebral Palsy



## Rapport clinique de l'impact du protocole LSVT LOUD pour améliorer la communication d'un enfant d'âge préscolaire et d'un jeune adulte ayant une paralysie cérébrale

### KEYWORDS

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### Abstract

This clinical report presents real-world clinical data on the use of Lee Silverman voice treatment (LSVT LOUD) to improve the communication of one preschooler and one young adult with cerebral palsy. Each client received LSVT LOUD per protocol with 16 individual 1-hour-long therapy sessions, four times per week over a period of 4 weeks. Standard LSVT LOUD acoustic measures that included average vocal intensity during sustained vowel phonations and sentence repetitions and maximum duration of sustained vowel phonations were collected pre- and posttreatment. LSVT LOUD and our own perceptual ratings were also used to assess treatment effects from the caregivers' (and teacher's) perspective on speech, voice, and communicative participation. Our clinical findings revealed significant posttreatment increases in average vocal intensity during sustained vowel phonations for both clients and during sentence repetitions for the preschooler. Follow-up data from the young-adult client collected 3 and 20 months posttreatment revealed gains in average vocal intensity that were maintained well beyond the end of treatment. Our clinical findings also revealed significant increases in maximum duration of sustained vowel phonation pre- to posttreatment for the preschooler only. For the young adult, significant differences were found between pretreatment and the 20-month follow-up data. Perceptual ratings revealed improvements in communicative effectiveness, participation, and speech (for both clients) and velopharyngeal function (for the young adult) posttreatment. Combined, these clinical findings demonstrated to us the potential of our clients to increase their communicative abilities to be heard and understood well beyond what we thought were their clinical boundaries.

**Editor:**  
Karine Marcotte

### Abrégé

Le présent article clinique rapporte des données cliniques « réelles » relatives à l'utilisation du protocole *Lee Silverman voice treatment* (LSVT LOUD) pour améliorer la communication d'un enfant d'âge préscolaire et d'un jeune adulte ayant une paralysie cérébrale. Conformément au protocole LSVT LOUD, chaque patient a reçu 16 thérapies individuelles d'une durée d'une heure à raison de 4 séances par semaine sur une période de 4 semaines. Les mesures acoustiques standard du protocole LSVT LOUD, qui incluaient l'intensité vocale moyenne de phonations soutenues et de phrases répétées et la durée maximale de phonations soutenues, ont été recueillies pré- et post-traitement. Une mesure perceptuelle suggérée dans le protocole LSVT LOUD et des mesures perceptuelles fréquemment employées dans nos milieux cliniques ont également été utilisées pour évaluer l'effet de l'intervention perçue par l'entourage des patients sur la parole, la voix et la participation communicative. Nos données cliniques ont révélé une augmentation significative de l'intensité vocale moyenne des phonations soutenues post-traitement pour les deux patients et de l'intensité vocale moyenne des phrases répétées pour l'enfant d'âge préscolaire. Les données de suivi du jeune adulte recueillies 3 et 20 mois post-traitement ont révélé que les gains sur le plan de l'intensité vocale moyenne se sont maintenus bien au-delà de la fin du traitement. Nos données cliniques ont également révélé une augmentation significative de la durée maximale des phonations soutenues post-traitement pour l'enfant d'âge préscolaire seulement. Pour le jeune adulte, une augmentation significative de la durée maximale des phonations soutenues a été constatée entre les données recueillies prétraitement et celles recueillies 20 mois post-traitement. Les mesures perceptuelles ont révélé des améliorations post-traitement au niveau de l'efficacité de la communication, de la participation communicative et de la parole (pour les deux patients), ainsi qu'au niveau de la fonction vélopharyngée (pour le jeune adulte). L'ensemble de nos résultats cliniques nous ont montré que nos patients ont le potentiel d'améliorer leurs habiletés de communication pour être entendus et compris bien au-delà de ce que nous pensions être leurs limites cliniques.

### Clinical Context

Cerebral palsy (CP) is a heterogeneous group of permanent impairments in motor function caused by nonprogressive lesions or abnormalities in the developing brain at any time from pregnancy through early childhood (Rosenbaum et al., 2007). It is one of the most common causes of neurodevelopmental motor disabilities, affecting approximately 0.21% of children born worldwide (Oskoui et al., 2013). Dysarthria resulting from disruptions in respiratory, phonatory, articulatory, prosody and/or velopharyngeal processes is the most common motor speech disorder in individuals with CP (Mei et al., 2020). Audible inspirations, monotone pitch, reduced loudness variation, harsh voice, imprecise consonant and vowel articulation, prolonged phonemes, short phrases, reduced rate, reduced stress, prolonged intervals between words or syllables, hypo- and/or hypernasality often characterize the speech of persons with CP (Mei et al., 2020; Nordberg et al., 2014; Schölderle et al., 2016; Workinger & Kent, 1991). These impairments reduce the intelligibility of words in isolation, sentences, and/or discourse (Hustad, 2007; Hustad et al., 2012, 2019; Mei et al., 2014, 2020), even when the severity of the dysarthria is mild to moderate (Hustad, 2007; Mei et al., 2020). Impaired communication consequent to CP and reduced intelligibility may negatively impact the ability of individuals with CP to express their needs, to start and maintain conversations, and to develop friendships (Connaghan et al., 2022; Mei et al., 2015; Pennington & McConachie, 2001), resulting in social isolation and reduced independence (Connaghan et al., 2022; Mei et al., 2014). These communicative impairments may also create behavioural issues related to an individual's frustration with communication breakdowns (Mei et al., 2015).

As speech-language pathologists in a large pediatric hospital system in Montréal, Québec, we regularly see children and young adults with these communicative impairments and the social consequences of dysarthria consequent to CP. We evaluate and treat individuals from 0 to 21 years of age in our hospital, rehabilitation centre, and specialized schools (Centre de réadaptation Marie-Enfant du Centre hospitalier universitaire Sainte-Justine, 2015a, 2015b, 2019). Our typical clinical approaches with these individuals have been traditional motor speech treatments that target one speech subsystem at a time (Hustad, 2010; Love, 2001; Workinger, 2005) and articulation treatments that focus on facilitating the acquisition of new phonemes and syllable structures in a hierarchical manner using external, multimodal feedback (visual, auditory and/or tactile cues; Hustad, 2010; Love, 2001). Both of these types of traditional therapies are given with a low intensity mode of treatment. Our typical approach has also included

compensatory communication strategies such as the use of augmentative and alternative communication systems (Hustad, 2010) as needed.

As part of our regular clinical practice, we probe the available research literature to determine the availability of evidence-based treatments to improve the communication abilities of the individuals with CP seen in our clinical facilities. Prior to the case studies presented in the current report, an informal review of this literature drew our attention to three treatment approaches: the speech systems approach by Pennington et al. (2006, 2010, 2013, 2018, 2019), Lee Silverman voice treatment (LSVT LOUD) by Boliek, Fox, and colleagues (Boliek & Fox, 2014, 2017; Ertan et al., 2022; Fox & Boliek, 2012; Langlois et al., 2020; Levy et al., 2013; Moya-Galé et al., 2022; Reed et al., 2017), and the speech intelligibility treatment approach by Levy and colleagues (Carl et al., 2022; Levy et al., 2021; Moya-Galé et al., 2021).

Of these three treatment approaches, LSVT LOUD appeared to be the most promising for our specific clinical context for several reasons. First, the standardized protocol and well-established training and certification process provided all of the necessary information/documentation and online support needed to implement the protocol within our own clinical environments. Second, LSVT LOUD's low task complexity and low cognitive load using a single treatment focus on vocal loudness (Fox & Boliek, 2012) appeared to be ideal for our clients with CP who, similarly to what has been reported in the literature (Gabis et al., 2015; Mei et al., 2020), frequently have concomitant lower intellectual functioning and/or language difficulties. Third, and in contrast to the speech intelligibility treatment that is delivered in a camplike environment (Carl et al., 2022; Levy et al., 2021; Moya-Galé et al., 2021), LSVT LOUD's 60-minute, individual treatment sessions, 4 days per week, for 4 weeks was more easily implemented in our clinical context. Finally, we were encouraged by the promising results of the application of LSVT LOUD in driving the neuroplasticity potential of individuals with dysarthria consequent to CP (Bakhtiari et al., 2017; Reed et al., 2017) to improve their speech production abilities (Bakhtiari et al., 2017; Boliek & Fox, 2014, 2017; Ertan et al., 2022; Fox & Boliek, 2012; Langlois et al., 2020; Levy et al., 2013; Moya-Galé et al., 2022; Reed et al., 2017). These findings were in turn supported by the extensive clinical-research literature of the successful application of LSVT LOUD to other adult and pediatric populations, including Parkinson disease (for which it was initially designed; Ramig et al., 2018; Ramig, Sapir, Countryman, et al., 2001; Ramig, Sapir, Fox, & Countryman, 2001), Parkinsonian plus syndromes

(Countryman et al., 1994), adults without neurological disease or voice disorders (Ramig, Gray, et al., 2001), stroke (Mahler & Ramig, 2012; Mahler et al., 2009; Wenke et al., 2008, 2010), traumatic brain injury (Wenke et al., 2008, 2010), multiple sclerosis (Baldanzi et al., 2022), ataxia (Lowit et al., 2020; Sapir et al., 2003), Down syndrome (Boliek et al., 2022; Langlois et al., 2020; Mahler & Jones, 2012), and autism (Galgano et al., 2021).

The initial application of LSVT LOUD with individuals with CP was by Fox and Boliek (2012). They recruited five children with spastic CP between 5 and 7 years of age for an exploratory study. Four individuals were treated with LSVT LOUD, and a nontreated child acted as control. Despite some differences in the clinical findings of their participants, significant gains posttreatment were found on at least one of the acoustic measures of duration, frequency range, intensity, or harmonics-to-noise ratio in all four treated children.

Later studies amplified these results and revealed that, although LSVT LOUD with individuals with CP targets increased vocal loudness, its spread of effects extended to voice quality, pitch range, speech intelligibility, articulatory precision, and resonance (Boliek & Fox, 2014, 2017; Ertan et al., 2022; Langlois et al., 2020; Levy et al., 2013; Moya-Galé et al., 2022; Reed et al., 2017). Results of parental interviews have also indicated that LSVT LOUD may improve functional daily activities and social participation by helping individuals with CP to be better understood, increasing their confidence in their abilities to communicate orally, and enabling them to gain a voice among the members of their family by expressing their interests and wishes more frequently (Boliek & Fox, 2017). Furthermore, and of particular importance to our main therapeutic objectives (see below), we became aware of the maintenance of treatment gains in vocal intensity in individuals with CP following LSVT LOUD for up to 4 months (Moya-Galé et al., 2022) and for resonance up to 3 months (Boliek & Fox, 2017). Because we are interested in the functional impact of our therapy, we were also encouraged to learn of maintenance of gains in sentence intelligibility up to 3 months (Langlois et al., 2020) and social participation up to 6 weeks (Fox & Boliek, 2012; but see lack of maintenance of single word intelligibility in Boliek & Fox, 2017, and Langlois et al., 2020).

Based on this research literature, the well-defined protocol and training process, and the applicability to our clients and treatment centres, LSVT LOUD was selected as the treatment protocol of choice, and the two treating clinicians of the present report took the initiative to be trained and certified in LSVT LOUD and to use LSVT LOUD in

their own clinical environment to treat the communicative impairments of two of their clients with CP. Because to our knowledge no case study had previously documented the application LSVT LOUD in a nonresearch environment and in daily clinical practice to treat the communicative impairments associated with CP, we decided to document the effectiveness of the clinical application of this treatment approach using standard LSVT LOUD and our own clinical measures. *It is important to note that this clinical initiative was not a research project.* The success that was observed encouraged us to share our clinical findings with the hope that they might prove useful to other clinicians working in similar clinical environments. The present clinical focus article, therefore, presents real-life clinical data of the application of LSVT LOUD with two individuals with CP, one preschool-age client and one young adult who was receiving school and therapeutic services in our clinical network in the province of Québec.

## Clinical Approach

### Sharing of Clinical Information

Clinical case studies are exempt from ethical review and approval because they do not meet the definition of research (K. Sénécal [Advisor for Research Ethics at the Université de Montréal], personal communication, April 3, 2020). They do, however, require written consent to share clinical information, and such permission was received from the mother of Client 1 (the preschool-age client) and from Client 2 (the young adult).

### Client Characteristics and Therapeutic Objectives

#### Client 1

Client 1 was a 5-year-old girl with the medical diagnosis of mixed (spastic quadriplegia and dystonic) CP related to hypoxic ischemic encephalopathy and a Gross Motor Function Classification Systems score of III (Palisano et al., 1997). The client was receiving rehabilitation services at the Centre de réadaptation Marie-Enfant (the rehabilitation centre affiliated with the Centre hospitalier universitaire Sainte-Justine in Montréal, Québec) with various healthcare professionals, including speech-language pathologists and physical and occupational therapists, since 1 year of age. Audiological evaluation reported normal hearing. The client was bilingual in French and Spanish. Intervention was provided in French.

Although the client's receptive language abilities were age-appropriate, expressive language abilities were very limited (e.g., use of short and simple sentences, limited conversational topics). The client was identified as having moderate-to-severe dysarthria by the treating clinician



using the Functional Communication Measures of the American Speech-Language-Hearing Association (1997). The specific type of dysarthria was later identified by another speech-language pathologist as being spastic dysarthria. Clinical evaluation revealed poor respiratory-phonatory coordination, weak and sometimes tense voice, articulatory inaccuracies, lip and tongue movement incoordination, and movement execution delays. These speech characteristics resulted in inappropriate pauses within words and sentences, slow and effortful speech, imprecise articulation, and communication breakdowns with conversational partners. Uncontrolled movements of the head and arms during speech were also observed. This client was not responding well to traditional speech treatments.

The primary therapeutic objectives for this client were to increase vocal loudness and speech intelligibility and to improve communication with peers.

### **Client 2**

Client 2 was a 19-year-old French-speaking male with a medical diagnosis of spastic quadriplegia CP and a Gross Motor Function Classification System score of III (Palisano et al., 1997). At the time of the treatment, the client was enrolled in a special education program at the École Joseph-Charbonneau, a specialized high school in Montréal for children, teenagers, and young adults aged 12 to 21 years with motor disorders. The client was also receiving rehabilitation services from speech-language pathologists and physical and occupational therapists on site through a service agreement with the Centre hospitalier universitaire Sainte-Justine. Individuals with special needs, such as those with CP, can attend specialized schools until the age of 21 in the province of Québec. Audiological evaluation reported normal hearing, and receptive and expressive language abilities were both judged functional for daily life activities. Speech-language pathology evaluation of this client revealed moderate spastic dysarthria and velopharyngeal incompetence with mild-to-moderate hypernasality, imprecise articulation, and breathy and mildly hoarse voice. Inappropriate pauses within sentences, slower rates of speech, production of inaudible word segments, and communication breakdowns in some contexts and/or with some conversational partners were common. Although educational reports indicated that the client had learning disabilities, cognitive abilities were functional for daily life activities.

This client had previously received traditional speech treatments and was responsive to treatment, but the results were limited, and no generalization was observed outside of treatment.

The client had consistent school attendance, showed strong involvement in studies and rehabilitation services, and had a strong motivation to improve communication abilities. Further, this client was shown to be stimulable for increased vocal loudness and improved articulation prior to treatment when asked to use a loud voice in the stimulability tasks of LSVT LOUD (i.e., a sustained vowel /a/ phonation task, a maximum high and low phonation task, and a functional sentence repetition task). All of these suggested that the client was a good candidate for LSVT LOUD. In addition, the client was approaching graduation, which meant a discontinuity in rehabilitation services, and the treating speech-language pathologist was motivated to provide an intensive, end-of-treatment approach for this client.

The therapeutic objectives for this client were to (a) increase vocal loudness, (b) improve speech intelligibility in daily life, and (c) reduce velopharyngeal incompetency through the potential distributed effect of LSVT LOUD across the speech production systems (Boliek & Fox, 2017; Fox et al., 2006). In all treatment sessions, the client was seated in a manually operated wheelchair (wheels locked) and was wearing his lumbar corset designed to slow the progression of scoliosis.

### **Treatment**

#### **Assessment of Vocal Medical Status Prior to Treatment**

Although the verification of potential vocal fold pathology through otorhinolaryngologic examination (videolaryngostroboscopy) is standard research and clinical practice prior to beginning LSVT LOUD in adult patients such as those with Parkinson disease (e.g., Ramig et al., 2018; Ramig, Sapir, Countryman, et al., 2001), this procedure is inconsistent in the research literature on the application of LSVT LOUD in patients with CP. Two studies mentioned that an otorhinolaryngologic exam was used to rule out vocal pathology prior to LSVT LOUD (Ertan et al., 2022; Fox & Boliek, 2012), two indicated that the assessment of vocal pathology was gained from medical chart reviews (Boliek & Fox, 2017; Reed et al., 2017), one did not specify how vocal pathology was ruled out (Langlois et al., 2020), and four did not indicate that vocal pathology was assessed or ruled out prior to treatment (Bakhtiari et al., 2017; Boliek & Fox, 2014; Levy et al., 2013; Moya-Galé et al., 2022). Our clinicians verified the absence of vocal fold pathology from medical chart review and discussions with each client's medical team prior to beginning LSVT LOUD treatments.

#### **LSVT LOUD**

The LSVT LOUD protocol was administered to both clients by their own licensed speech-language pathologist

(contributing authors to this report) certified in LSVT LOUD. As specified in the LSVT LOUD protocol, each client received 16 individual 1-hour long therapy sessions, four times per week over a period of 4 weeks. The first half of each session consisted of three tasks: (a) repetitions of maximum duration of a sustained vowel, (b) repetitions of maximal frequency range, and (c) repetitions of 10 functional phrases/sentences. This was followed by speech hierarchy exercises that changed daily and progressed to more challenging goals both in length and complexity and that were individualized for each client. Throughout all the exercises, the focus was on maintaining a loud, good quality voice (i.e., normal, healthy vocal loudness). Clients also practised their voice/speech exercises at home once a day on treatment days and twice a day on nontreatment days. Further they were encouraged to perform a functional carryover exercise every day of the treatment month. The parents of Client 1 (the preschool-age client) reported that their child completed these exercises two or three times a week (on days without treatment sessions), whereas Client 2 (the young adult client) self-reported completing them every day.

The functional phrases and tasks (such as the exercises practised at home) differed between the two clients given their difference in age. Measurement procedures and clinical measures used to determine the impact of LSVT LOUD on communication abilities also differed slightly between the two clients, as the speech-language pathologists used the resources and technologies available to them in their respective clinical environments.

### **Medication During Treatment**

Medical chart review revealed that Client 1 received trihexyphenidyl (Artane) consistently during the course of treatment, but the dose was not specified in this client's medical records. Client 2 received 35 mg of Baclofen each day and this was maintained during the course of treatment.

### **Technologies Used to Monitor Clinical Progress and Collect Pre- and Posttreatment Acoustic Data**

#### **Client 1**

The treating speech-language pathologist used the LSVT Companion, a software/hardware system that provides calibrated values of vocal intensity (in dB SPL), duration (in seconds), and frequency (in Hz), to monitor clinical progress during LSVT LOUD treatment (Halpern et al., 2012) and to collect pre- and posttreatment acoustic data. Recording was performed using the standard clinical procedure detailed in the user manual and a constant mouth-to-microphone distance of 30 cm.

#### **Client 2**

Because the treating speech-language pathologist did not have access to a LSVT Companion, she used the Voice Analyst application (version 2.21) that was running on an iPad Air (MD785C/A model) to monitor clinical progress and provide feedback during LSVT LOUD treatment and to collect pre- and posttreatment acoustic data. This application provides uncalibrated values of vocal intensity (in uncalibrated dB SPL), duration (in seconds), and frequency (in Hz). The iPad on which the Voice Analyst application was running was supported by an easel during data acquisition to ensure stability, visibility of the screen (to both the client and the speech-language pathologist), and a constant mouth-to-microphone distance of 30 cm within and across all treatment sessions.

### **Clinical Measures and Analyses**

#### **Acoustic Measures**

**Client 1.** Standard LSVT LOUD clinical pre- and posttreatment acoustic measures were taken the day before the first day of treatment and the day after the last day of treatment. The treatment acoustic measures were average vocal intensity (in dB SPL) and maximum duration (in seconds) during six repetitions of the sustained /a/ phonation task, and average vocal intensity (in dB SPL) during a sentence repetition task containing twelve different sentences. These are standard acoustic measures in LSVT LOUD, and they have also been used in research projects to determine the impact of LSVT LOUD on the speech abilities of individuals with CP (Boliek & Fox, 2014; Ertan et al., 2022; Fox & Boliek, 2012; Moya-Galé et al., 2022).

Although increased maximal frequency range was treated, these data did not provide a reliable clinical measure as the clinician was required to continually model this task at the same time as the client produced the task, and thus, the acoustic data were contaminated.

To summarize the clinical acoustic measures and to provide a statistical measure of gains, if any, means and standard deviations were calculated pre- and posttreatment and compared statistically using paired *t* tests (Boliek & Fox, 2014). *P* values below .05 were considered statistically significant (Boliek & Fox, 2014, 2017; Fox & Boliek, 2012). All statistical analyses were performed with SPSS (Version 27).

**Client 2.** Standard LSVT LOUD clinical pre- and posttreatment acoustic measures were taken 11 days preceding the first day of treatment and on the last day of treatment, respectively. The treatment acoustic measures were average vocal intensity (in uncalibrated dB SPL) and

maximum duration (in seconds) during six repetitions of the sustained /a/ phonation task, highest fundamental frequency (F0; in Hz) during six repetitions of the high sustained /a/ phonation task, and lowest F0 (in Hz) during six repetitions of the low sustained /a/ phonation task. The same process as described for Client 1 above was used to assess treatment gains, if any, in these pre- to posttreatment acoustic data. Because this client was in a school setting and thus available to the treating speech-language pathologist for clinical follow up, measures from the sustained phonation task (average vocal intensity and maximum duration) collected under the same conditions as pre- and posttreatment were also recorded at 3- and 20-month follow-up periods. Paired *t* tests were used to compare pretreatment average vocal intensity and maximum duration from the sustained phonation task to data collected at the 3- and 20-month follow-up periods (Boliek & Fox, 2014; Moya-Galé et al., 2022).

Although average vocal intensity during a sentence repetition task was also measured the first and last day of treatment, the clinician recorded only a mean across all the sentences instead of an average vocal intensity for each individual sentence and thus, no statistical comparisons were completed for this task for this client.

### Perceptual Measures

**Client 1.** In addition to the acoustic measures, two clinical perceptual tools, one suggested by LSVT LOUD protocol, and one often used in our standard clinical practice, documented LSVT LOUD treatment impact from the caregiver perspective. First, a French version of the perceptual rating form from the LSVT LOUD treatment materials was completed by the child's mother pre- and posttreatment. This form uses visual analogue scales to evaluate 10 key aspects of voice, speech, and communication. Specifically, and as described in Fox and Boliek (2012), the child's mother is asked to place a mark on a horizontal line whose endpoints are defined as the extreme limits of the voice/speech parameter of interest (e.g., *always loud enough to never loud enough*). The rating of each of these parameters is extracted from the visual analogue scale by measuring the distance of the mark from the right limit and by calculating the proportion of this distance to the total distance between the two endpoints, and by converting this proportion to a percentage. Each percentage indicates the mother's judgments of her child's voice, speech, or communication with a higher percentage indicating a positive perceptual judgment. As in Fox and Boliek (2012), the pre- to posttreatment difference in percent ratings for each variable was used as an indication of treatment impact for each of the voice/speech parameters of interest.

The child's mother also completed the French version of the Focus on the Outcomes of Communication Under Six (FOCUS-34) questionnaire (Oddson et al., 2019; Turcotte et al., 2013/2016) pre- and posttreatment. This questionnaire is a valid and reliable parent-report outcome measurement tool that is designed to capture changes in communicative participation over the course of treatment (Oddson et al., 2019; Turcotte et al., 2013/2016). It includes 34 seven-point Likert-scale questions about activities/capacities (e.g., "My child uses new words," "My child uses words to ask for things") and participation/performance (e.g., "My child is included in play activities by other children," "My child can communicate effectively with other children"). Responses to these questions are summed to obtain a total score. Each total represents the client's communicative participation status, with a higher score representing better communicative participation. The pre- to posttreatment FOCUS-34 total score difference was calculated and compared to the following published criteria: below 6 = absence of likelihood of meaningful clinical change, between 7 and 10 = potential meaningful clinical change, and above 11 = significant clinical change (Oddson et al., 2019).

**Client 2.** The client's mother and class teacher (who taught the client several subjects during the week) completed a French version of the perceptual rating form from the LSVT LOUD treatment materials pre- and posttreatment. Details of this form were provided in the description of perceptual measures for Client 1. The same analyses as described previously for Client 1 were used to determine the impact of LSVT LOUD on speech, voice, and communication characteristics.

Perceptual estimates of the adequacy of the velopharyngeal function and its articulatory impact were also performed pre- and posttreatment by the treating clinician using the Universal Parameters Ratings for Reporting Speech Outcomes in Cleft Palate (Henningsson et al., 2008; John et al., 2006). This rating tool that we regularly use in our clinical practice has been developed to standardize the perceptual evaluation of speech characteristics of children with cleft palate and is also used for the assessment of resonance disorders (American Speech-Language-Hearing Association, n.d.). It includes the ratings of five universal speech parameters (hypernasality, hyponasality, nasal air emissions and/or nasal turbulence, consonant production errors, voice disorders) and two global speech parameters (speech understandability and speech acceptability). The hypernasality, speech understandability and speech acceptability parameters are rated on a scale from 0 to 3 (0 = *within normal limits*, 1 = *mild*, 2 = *moderate*, 3 = *severe*). The hyponasality, nasal

air emission and/or nasal turbulence, consonant production errors and voice disorder parameters are rated as 0 (*within normal limits*) or 1 (*present*). The nasal air emission and/or nasal turbulence and consonant production errors parameters also include descriptors of frequency or type of errors. The perceptual evaluation was performed during a sentence repetition task containing 18 sentences (14 with words with oral sounds only and 4 with coarticulation of oral and nasal sounds). The characteristics of the sentences followed the guidelines of speech sample contexts and principles listed in Henningsson et al. (2008). A plastic tube with one end placed at the entrance of the client's nostril and the other near the clinician's ear was used to estimate hypernasality and/or nasal emissions during the sentence repetitions. This "listening tube," as described by Kummer (2011), is used clinically to detect inappropriate acoustic energy escaping through the nasal cavity during the production of oral sounds.

### Clinical Findings

#### Acoustic Measures

##### Client 1

Presented in **Figure 1** are the pre- and posttreatment means and standard deviations of average vocal intensity and maximum duration from the six repetitions of the sustained vowel phonation task. Average vocal intensity increased from 68.3 dB SPL (*SD* = 2.2 dB SPL) pretreatment

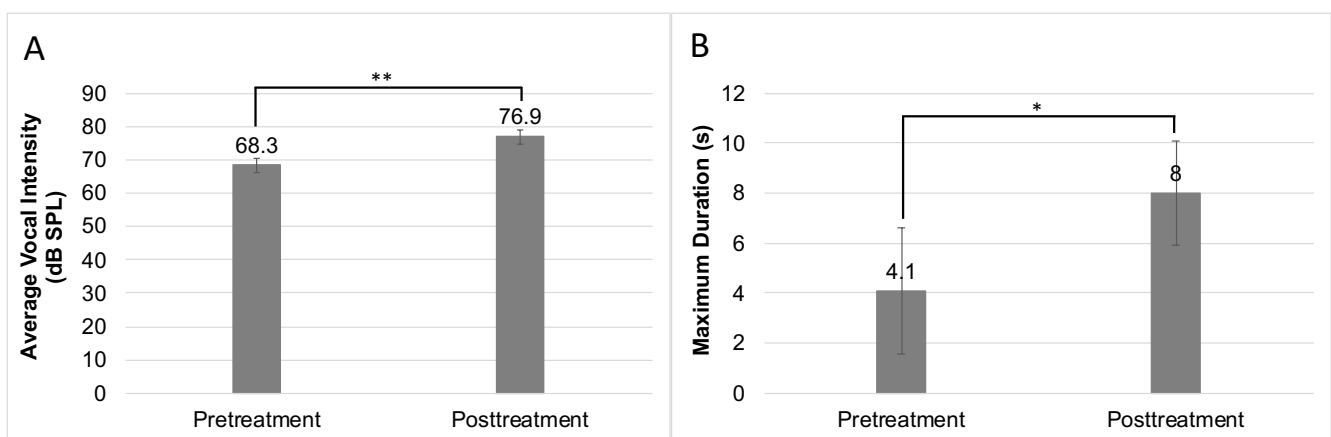
to 76.9 dB SPL (*SD* = 2.0 dB SPL) posttreatment and maximum duration increased from 4.1 s (*SD* = 2.5 s) pretreatment to 8.0 s (*SD* = 2.1 s) posttreatment. Paired *t* tests revealed that these increases were statistically significant (average vocal intensity:  $t(5) = -8.189, p < .001$ ; maximum duration:  $t(5) = -3.845, p = .012$ ).

Presented in **Figure 2** are the pre- and posttreatment means and standard deviations of average vocal intensity from the repetitions of the twelve sentences of the sentence repetition task. These values also increased significantly from 65.4 dB SPL (*SD* = 1.8 dB SPL) pretreatment to 73.0 dB SPL (*SD* = 2.1 dB SPL) posttreatment ( $t(11) = -9.297, p < .001$ ).

##### Client 2

Presented in **Figure 3** are the means and standard deviations of average vocal intensity and maximum duration from the six repetitions of the sustained phonation task at pre- and posttreatment and at the 3- and 20-month follow-up periods. Also shown are the means and standard deviations of the highest and lowest F0 from the six repetitions of the high and low phonation tasks at pre- and posttreatment. As seen in **Figure 3**, average vocal intensity was 67.9 dB SPL (*SD* = 1.6 dB SPL) pretreatment, 74.3 dB SPL (*SD* = 1.4 dB SPL) posttreatment, 74.8 dB SPL (*SD* = 0.8 dB SPL) at the 3-month follow-up period, and 78.3 dB SPL (*SD* = 0.8 dB SPL) at the 20-month follow-up period.

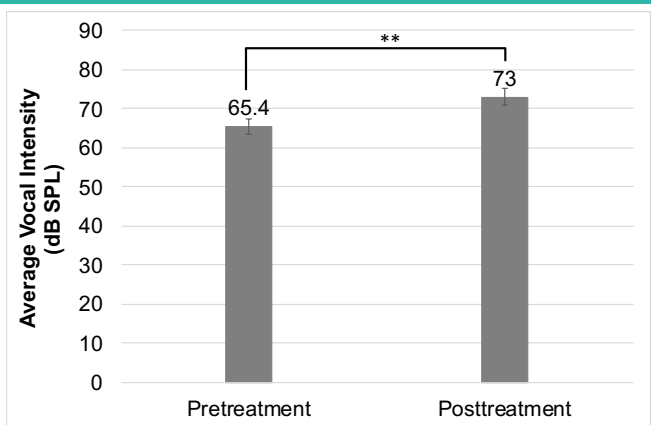
**Figure 1**



Client 1's pre- and posttreatment means and standard deviations of (A) average vocal intensity and (B) maximum duration from the six repetitions of the sustained phonation task

\*  $p < .05$ . \*\*  $p < .001$ .

Figure 2

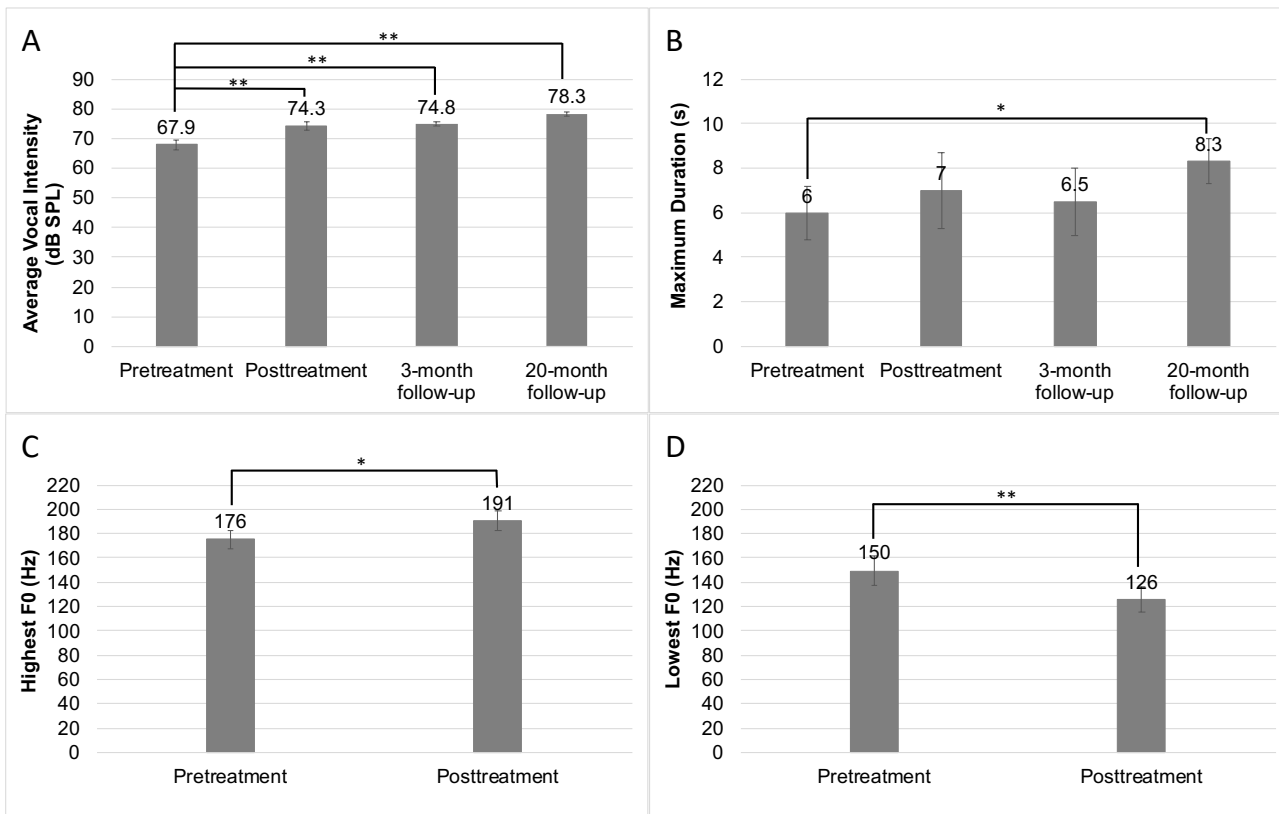


Client 1's pre- and posttreatment means and standard deviations of average vocal intensity (dB SPL) from the repetitions of the twelve sentences in the sentence repetition task

\*\*  $p < .001$ .

Paired  $t$  tests were used to compare average vocal intensity pretreatment to posttreatment and pretreatment to the 3-month and 20-month follow-up periods. Significant increases in average vocal intensity were observed pre- to posttreatment ( $t(5) = -11.355, p < .001$ ) and pretreatment to 3-month ( $t(5) = -8.990, p < .001$ ) and 20-month ( $t(5) = -13.795, p < .001$ ) follow-up periods. Maximum duration of sustained phonation was 6.0 s ( $SD = 1.2$  s) pretreatment, 7.0 s ( $SD = 1.7$  s) posttreatment, 6.5 s ( $SD = 1.9$  s) at the 3-month follow-up period and 8.3 s ( $SD = 1.0$  s) at the 20-month follow-up period. The only significant difference in these phonation times was between pretreatment and the 20-month follow-up period ( $t(5) = -4.108, p = .009$ ). Significant differences were found between pre- (176 Hz,  $SD = 8$  Hz) and post- (191 Hz,  $SD = 8$  Hz) treatment highest FO ( $t(5) = -2.948, p = .032$ ) and between pre- (150 Hz,  $SD = 13$  Hz) and post- (126 Hz,  $SD = 10$  Hz) treatment lowest FO ( $t(5) = 6.986, p < .001$ ). Neither highest or lowest FO was measured at the 3- or 20-month follow-up periods.

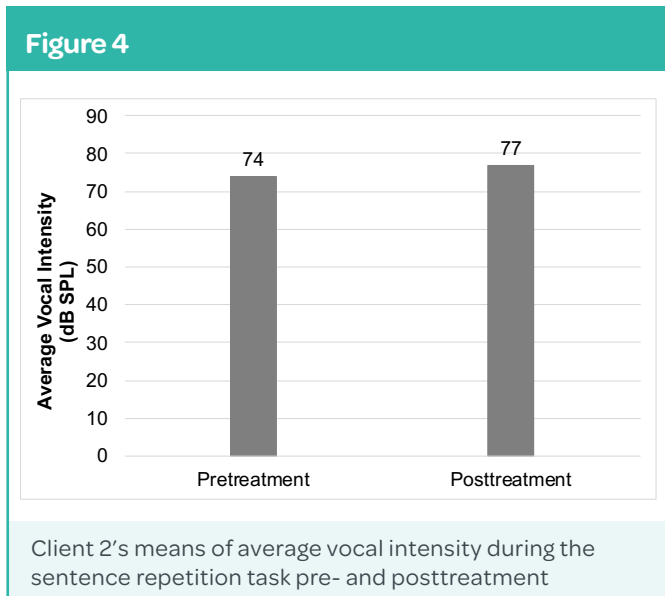
Figure 3



Client 2's pretreatment, posttreatment, 3-month follow-up, and 20-month follow-up means and standard deviations of (A) average vocal intensity and (B) maximum duration from the six repetitions of the sustained phonation task. Also shown are the pre- and posttreatment means and standard deviations of (C) highest and (D) lowest F0 from the six repetitions of the high and low phonation tasks, respectively

Note. F0 = fundamental frequency.  
\*  $p < .05$ . \*\*  $p < .001$ .

Presented in **Figure 4** are the pre- and posttreatment means of average vocal intensity from the sentence repetition task. As mentioned above, only means were available for this task and thus, no statistical analyses were performed.

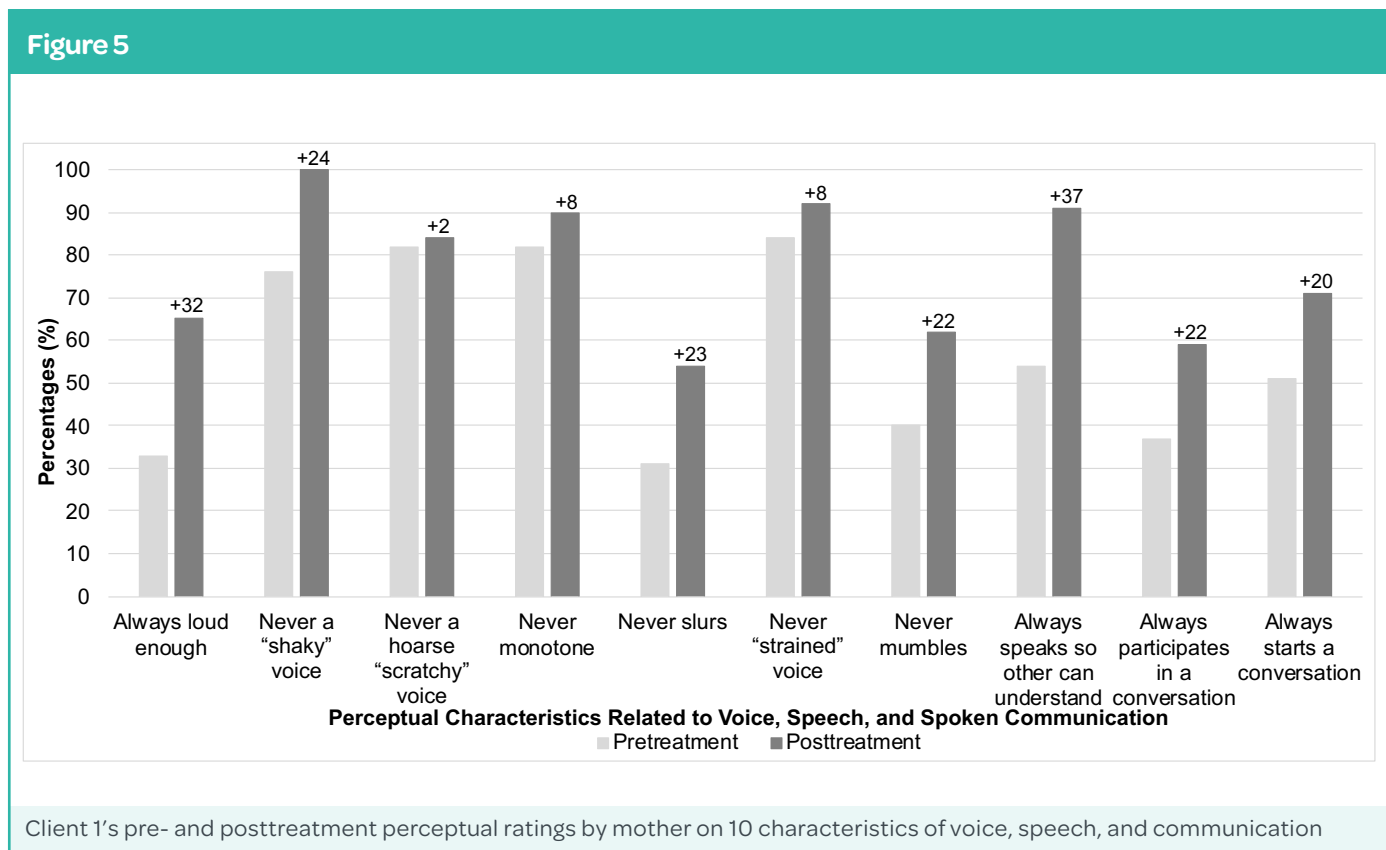


**Perceptual Measures**

**Client 1**

**LSVT LOUD Perceptual Rating Form.** Presented in **Figure 5** are the pre- and posttreatment ratings by Client 1's mother of the 10 variables of the LSVT LOUD perceptual rating form. As can be seen, the greatest improvements in percent change pre- to posttreatment were seen in "always speaks so others can understand" (37%), "always loud enough" (32%), "never a 'shaky' voice" (24%), "never slurs" (23%), "never mumbles" (22%), "always participates in a conversation" (22%), and "always starts a conversation" (20%).

**FOCUS-34 Questionnaire.** The total score of the FOCUS-34 questionnaire by Client 1's mother increased from 87 pretreatment to 115 posttreatment, resulting in a pre- to posttreatment difference score of 28. When compared to the criteria of Oddson et al. (2019), this pre- to posttreatment difference score of 28 suggests a significant clinical change in Client 1's communicative participation abilities following treatment.



Note. The percentage of change (+ indicates improvement) pre- to posttreatment is indicated above the posttreatment bar.

## Client 2

**LSVT LOUD Perceptual Rating Form.** Presented in **Figure 6** are the pre- and posttreatment ratings by Client 2's mother and teacher of the 10 variables of the perceptual rating form. For the mother, the greatest improvements in percent change pre- to posttreatment were seen in "always starts a conversation" (49%), "always loud enough" (48%), "always participates in a conversation" (43%) and "never slurs" (32%). For the teacher, the greatest improvements were seen in "always loud enough" (31%), "never monotone" (21%), "never slurs" (19%) and "always starts a conversation" (18%). Differences in percent change pre- to posttreatment were observed between the mother (M) and teacher (T) on three voice/speech variables: "never a hoarse, scratchy voice" (M: 18%; T: 2%), "never mumbles" (M: 17%; T: 2%), and "always participates in a conversation" (M: 43%; T: 3%). "Never a strained voice" was rated worse posttreatment by the teacher (-36%).

**Universal Parameters Ratings.** Presented in **Figure 7** are the pre- and posttreatment ratings by the clinician of the Universal Parameters Ratings. Improvements were observed for the hypernasality and speech acceptability parameters with both going from a *severe* rating (3) pretreatment to a *moderate* rating (2) posttreatment. Speech understandability also improved from a *moderate* rating (2) pretreatment to a *mild* rating (1) posttreatment. Audible nasal air emission and/or nasal turbulence was *present* pre- and posttreatment (rating of 1), but the frequency of this characteristic improved from *frequent* pretreatment to *intermittent* posttreatment. The parameters voice disorder and consonant production errors remained at the same rating pre- to posttreatment (1). The consonant production errors identified were weak oral pressures and other oral misarticulations. The parameter hyponasality was characterized as *normal* pre- and posttreatment (rating of 0).

## Clinical Conclusions

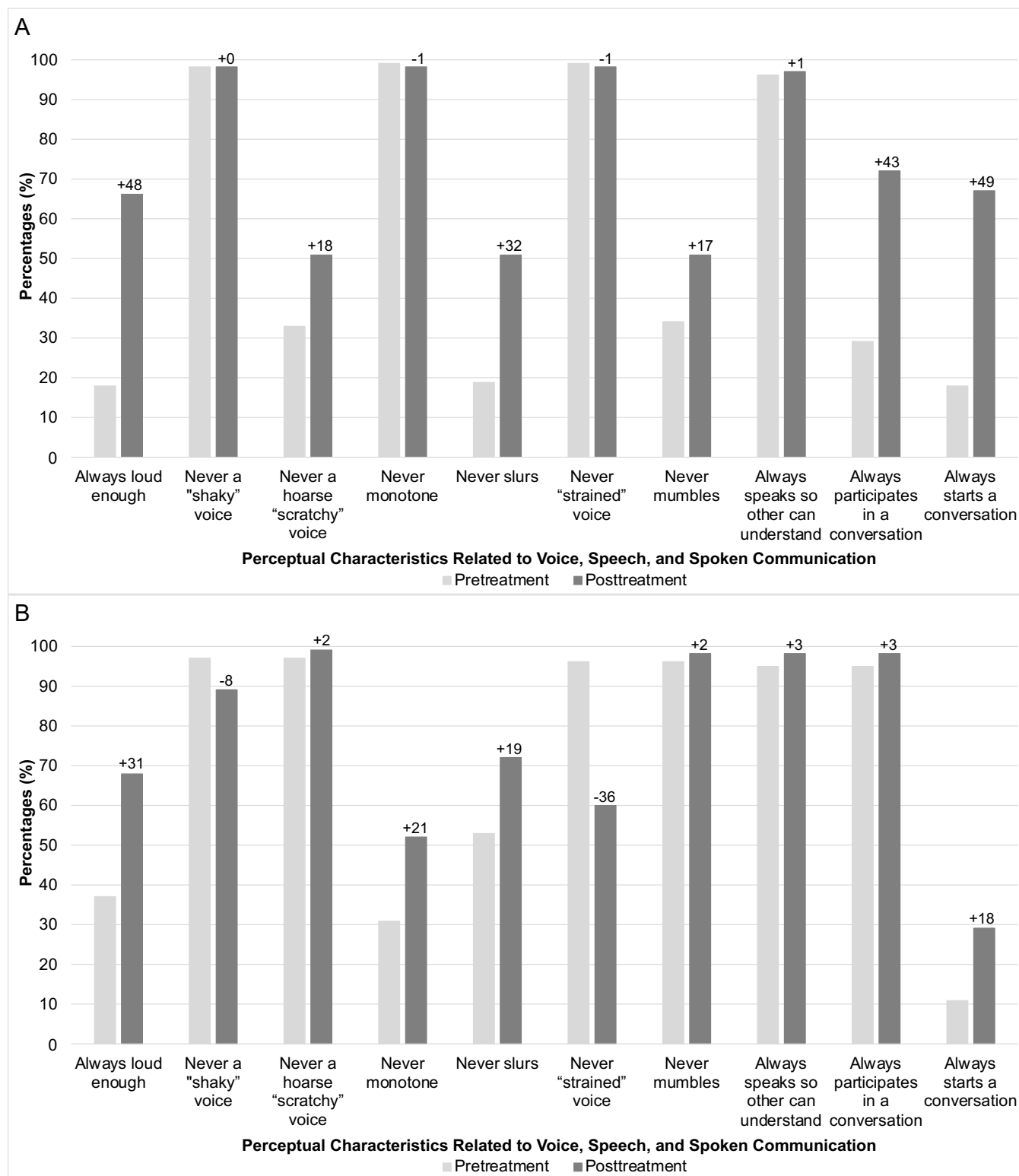
This is the first report, to our knowledge, of clinical case studies outside of a planned research investigation of the application of LSVT LOUD in the treatment of the communicative impairments associated with CP in two individuals, a preschooler and a young adult. These clinical findings add to the growing body of research literature supporting the application of evidence-based treatments to improve communication in pediatric and adult individuals with CP (e.g., Boliek & Fox, 2014, 2017; Carl et al., 2022; Ertan et al., 2022; Fox & Boliek, 2012; Langlois et al., 2020; Levy et al., 2013, 2021; Moya-Galé et al., 2021, 2022; Pennington et al., 2006, 2010, 2013, 2018, 2019; Reed et al., 2017). The LSVT LOUD protocol was applied and standard acoustical

and perceptual measures were used to assess clinical outcomes. Our clinical findings revealed that average vocal intensity increased significantly pre- to posttreatment in the sustained phonation task for both clients, and for Client 2, for whom data were available, from pretreatment to 3- and 20-month follow-up periods. These clinical findings are generally similar to those of previous research investigations of increased posttreatment average vocal intensity for the sustained phonation task in individuals with CP (Boliek & Fox, 2017; Ertan et al., 2022; Reed et al., 2017) and maintenance of treatment impact at 3- (Boliek & Fox, 2017; Reed et al., 2017) and 4-month follow-up (Moya-Galé et al., 2022). Data from adults with Parkinson's disease also suggest that maintenance following LSVT LOUD can be documented over a longer period of time, more than 12 months after treatment (Nakayama et al., 2020; Ramig, Sapir, Countryman, et al., 2001).

In Client 1 (for whom data were available), average vocal intensity also increased significantly pre- to posttreatment for the sentence repetition task, and these clinical findings are also consistent with those of previous research studies of children with CP (Boliek & Fox, 2017; Langlois et al., 2020; Reed et al., 2017). Highest and lowest F0 for the high and low phonation tasks increased significantly pre- to posttreatment for Client 2 (for whom data were available) and these clinical data are consistent with the increased F0 range in adults (Ertan et al. 2022; Moya-Galé et al., 2022) and children (Fox & Boliek, 2012) after LSVT LOUD. No significant difference pre- to posttreatment in F0 range was observed in children with CP in the Boliek and Fox (2017) study.

Maximum duration of the sustained vowel phonation task increased significantly pre- to posttreatment for Client 1, but not for Client 2, despite a significant difference between the pretreatment and the 20-month follow-up data for this client. These differences between Clients 1 and 2 in changes in maximum duration of sustained phonation consequent to treatment may not be surprising given the inconsistency observed in the research literature of the impact of LSVT LOUD on this acoustic variable in individuals with CP (i.e., Boliek & Fox, 2017; Ertan et al., 2022; Fox & Boliek, 2012; Moya-Galé et al., 2022; Reed et al., 2017). As suggested previously (Boliek & Fox, 2014), it is possible that our clients might have benefited from receiving LSVT LOUD over a longer period of time to improve maximum duration of sustained phonation. The significant difference at the 20-month follow-up period and not posttreatment and at the 3-month follow-up period in Client 2 may be related to the continuation of practice and application of the strategies developed during treatment, as suggested by Boliek and Fox (2017).

Figure 6

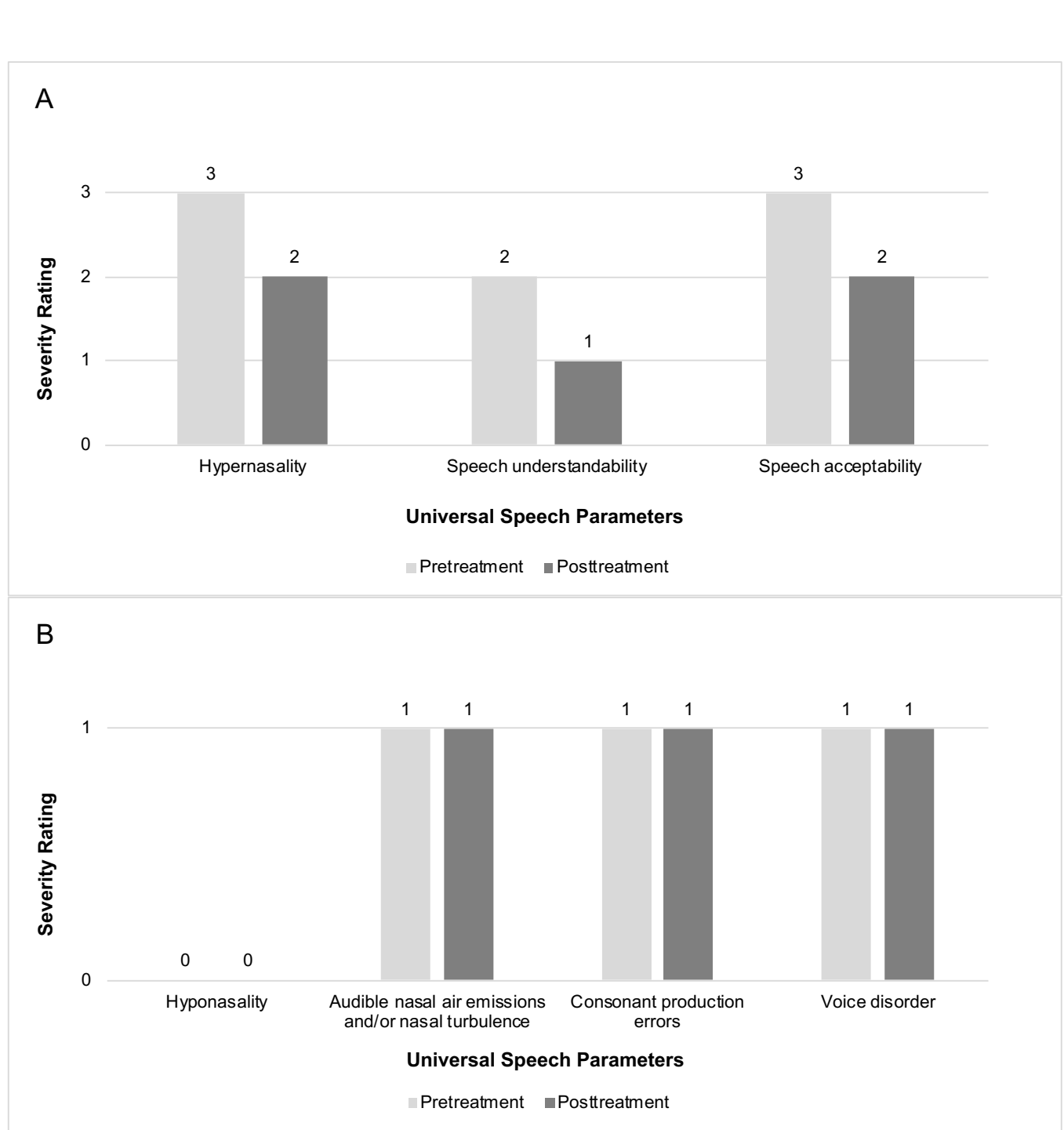


Client 2's pre- and posttreatment perceptual ratings by mother (A) and teacher (B) on 10 characteristics of voice, speech, and communication

Note. The percentage of change (+ indicates improvement; - indicates worsening) pre- to posttreatment is indicated above the posttreatment bar.



Figure 7



Client 2's pre- and posttreatment ratings of (A) one universal speech parameter (hypernasality) and two global speech parameters (speech understandability and speech acceptability) having a rating scale from 0 to 3, and (B) four universal speech parameters (hyponasality, nasal air emission and/or nasal turbulence, consonant production errors, voice disorder) having a score of 0 or 1

Note. Panel A: 0 = within normal limits/none, 1 = mild, 2 = moderate, 3 = severe. Panel B: 0 = within normal limits/none, 1 = present.

The FOCUS-34 from the mother of Client 1 indicated significant improvements in the quality of, and confidence in, communication pre- to posttreatment. The perceptual ratings of the clients' caregivers (and teacher) are perhaps a more powerful indication of clinical outcomes as they represent the complexities of communication beyond isolated vocal intensity, duration, and frequency measures. Taken together with previous research findings (Boliek & Fox, 2017; Ertan et al., 2022; Fox & Boliek, 2012), we are highly optimistic about the potential of LSVT LOUD to drive functional communicative outcomes in at least some of our clients with CP. We suggest that this might be of great interest to clinicians working with individuals with CP given that their ultimate therapeutic goal is to have an impact on real-life communication abilities and to enhance participation and integration in everyday lives (Centre de réadaptation Marie-Enfant du Centre hospitalier universitaire Sainte-Justine, 2015c; McLeod & Threats, 2008).

For Client 2, the young adult with CP, the teacher's ratings were consistently lower than those of the client's mother. One possible explanation is that the teacher has been exposed to many students with various profiles and severities of speech impairments, and perhaps the initial characteristics of the client's speech were judged less severe and thus improvements would be potentially less apparent posttreatment. The teacher also indicated that vocal strain actually increased posttreatment. This seems unlikely given that both clients were encouraged to use only a healthy, good quality voice, and Boliek and Fox (2017) reported improvements in acoustic measurement of voice quality following LSVT LOUD. Increased vocal strain was not observed by the treating clinician or mother outside of the treatment sessions. It might be hypothesized that the increase in vocal loudness made whatever vocal strain may have been present even more salient to the teacher. One could also argue that the mother's greater familiarity with the client's voice and speech may have contributed to differences in ratings between mother and teacher.

Improvements in velopharyngeal function and speech adequacy after LSVT LOUD were also observed in Client 2. Hypernasality and nasal air emissions both decreased posttreatment. Boliek and Fox (2014, 2017) attributed improvements in speech articulation and velopharyngeal function after LSVT LOUD to increased orofacial effort and greater velopharyngeal muscle activation and velopharyngeal closure. Perhaps similar mechanisms were at play in the improvements in velopharyngeal function and speech articulation in Client 2 after LSVT LOUD.

In summary, the present clinical results have revealed that LSVT LOUD positively impacted the communication of a preschooler and young adult with CP outside of a planned research study. Of course, this is a very small snapshot of only two clients, but we believe that these clients are highly representative of those we work with on a daily basis, so we are optimistic that we might have similar treatment gains with our future clients with CP. Although these clinical findings are highly encouraging and consistent with previous research investigations, they were not conducted under research conditions, and we present them with the full understanding that they lack research experimental controls and measures of reliability. They are, however, highly reflective of our real-world clinical contexts.

One of the primary goals of treatment research is the eventual translation of research knowledge into everyday clinical practice. Our clinicians took the initiative to bring the research findings of the impact of LSVT LOUD in individuals with CP (and other disorders) out of the lab and into their own clinical worlds. Our hope is that the current clinical report encourages other clinicians to consider the application of this, and other evidence-based protocols, in the treatment of the often-devastating communicative impairments associated with CP. Our current clinical experience convinced us that our clients with CP have a much greater potential than we previously realized to go beyond what we thought were their clinical boundaries to increase their communicative abilities to be heard and understood.

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**An Umbrella Review of Systematic Reviews: Characteristics of Communication Partner Training That Facilitate Learning in Communication Partners of Adults With Acquired Neurogenic Communication Disorders**



**Revue parapluie de revues systématiques : caractéristiques des formations des partenaires de communication qui favorisent l'apprentissage chez les interlocuteurs d'adultes atteints d'un trouble acquis de la communication d'origine neurologique**

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**KEYWORDS**

ACQUIRED NEUROGENIC COMMUNICATION DISORDERS

COMMUNICATION PARTNER TRAINING

ADULT LEARNING

ENGAGEMENT

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**Abstract**

Communication partner training is typically designed to equip communication partners of adults with acquired neurogenic communication disorders with the necessary skills to create communication opportunities. Communication partner training allows for opportunities for expression, language expansion, enhanced interaction, participation, and well-being in these adults. However, successful implementation of communication partner training programs is not guaranteed as various factors, such as adult learning principles, the teaching style of the trainer, and trainee engagement, impact on the quality of training, and training outcomes predict training transfer. An umbrella review of systematic reviews was employed for this article. Initially the searches yielded 75 systematic reviews, in which 40 duplicates were identified. The remaining reviews ( $n = 35$ ) were then screened on title, abstract, and full-text levels, resulting in a final inclusion of eight systematic review studies. A deductive approach to narrative synthesis was used to analyze the data based on previous theory. First, codes were identified, then themes, subthemes, categories, and subcategories were listed based on six adult learning principles and three trainee engagement components. This review highlights the importance of adult learning principles and trainee engagement when designing and implementing communication partner training within natural, real-life communication settings.

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### Abrégé

Les formations des partenaires de communication sont généralement conçues pour outiller les interlocuteurs d'adultes atteints d'un trouble acquis de la communication d'origine neurologique avec les habiletés nécessaires à la création d'opportunités de communication. Ces formations sont donc conçues pour générer des occasions où les personnes atteintes d'un trouble acquis de la communication peuvent s'exprimer, améliorer leurs habiletés de langage, ainsi qu'augmenter leurs interactions, leur participation et leur bien-être. Cependant, le succès de la mise en œuvre de ces programmes de formation n'est pas garanti; divers facteurs, tels que les principes de l'apprentissage chez l'adulte, le style pédagogique du formateur et le degré d'engagement des apprenants, ont une incidence sur la qualité et les résultats des formations. Ces facteurs sont également prédictifs de la rétention des acquis chez les apprenants. Une revue parapluie de revues systématiques a été réalisée dans cet article. Parmi les 75 revues systématiques initialement recensées, 40 se sont finalement révélées être des doublons. Les revues restantes ( $n = 35$ ) ont ensuite été analysées à différents niveaux (titre, abrégé ou texte intégral) et le résultat de ce processus a abouti en l'inclusion de huit revues systématiques. Une approche déductive s'appuyant sur des théories précédemment publiées a été utilisée pour analyser les données et créer une synthèse narrative. Spécifiquement, des codes ont d'abord été identifiés, puis des thèmes, des sous-thèmes, des catégories et des sous-catégories ont été établis en tenant compte de six principes de l'apprentissage chez l'adulte et de trois composantes liées à l'engagement des apprenants. La présente revue souligne l'importance de tenir compte des principes de l'apprentissage chez l'adulte et de l'engagement des apprenants aux moments de la conception et de la mise en œuvre de formations des partenaires de communication dans des contextes de communication naturels et représentatifs de la vie réelle.

Adults with acquired neurogenic communication disorders often experience communication difficulties due to impairments in cognition (thought processes, problem solving, and memory), speech (dysarthria, apraxia, and/or aphasia), motor skills (muscle movement, range, and/or tone), sensory abilities (vision and/or hearing), and language (receptive and/or expressive functioning), varying with the specific etiology of their disorders. Communication partner training (CPT) is typically designed to equip communication partners with the necessary skills to create communication opportunities for adults with acquired neurogenic communication disorders to express themselves, to improve their language, and to enhance their interactions, participation, and well-being (Ahlsén & Saldert, 2018; Chang et al., 2018; Finch et al., 2017; Jensen et al., 2015; Simmons-Mackie et al., 2010). CPT is regarded as the gold standard for reducing communication barriers (Chang et al., 2018; Cruice et al., 2018; Eriksson et al., 2016; Kagan et al., 2018).

CPT aims to equip the communication partner with the skills and knowledge to observe, acknowledge, and accommodate the communication attempts of adults with acquired neurogenic communication disorders by capitalizing on communication techniques and tools that these adults understand (Jensen et al., 2015). Such techniques and tools can include a range of communication strategies to support interaction (e.g., providing structure by using a communication support that the person understands, providing them with opportunities to communicate, and setting up the environment to facilitate interaction), using cueing (e.g., providing visual, tactile, or auditory cues when the person has word-finding difficulties during an interaction), and employing expectant time delay strategies (e.g., actively waiting and giving the person sufficient time to respond). Employing such techniques creates positive experiences and typically leads to more successful interactions (Behn et al., 2021; Cruice et al., 2018).

It is important to train communication partners to create successful interaction, as adults with acquired neurogenic communication disorders often perceive these partners as one of the most prominent communication barriers to their participation (Croteau & Le Dorze, 2006; Emerson & Enderby, 2000). These partners tend to speak for the person rather than supporting the person to make their own contribution during interactions (Croteau & Le Dorze, 2006). Additionally, adults with acquired neurogenic communication disorders commonly experience their communication partners as acting uncomfortable and awkward around them, misunderstanding them, providing limited interaction opportunities, and being unaware of how to support them (Jensen et al., 2015). Often, when adults with acquired

neurogenic communication disorders experience improved communication participation or engagement, their self-reported health outcomes, subjective well-being, and quality of life increase (Simmons-Mackie et al., 2010). These qualities are understandably also reflected by the communication partner as communication is coconstructed (Kagan et al., 2018; Simmons-Mackie et al., 2010, 2016).

However, even when including the communication partner and the adult with an acquired neurogenic disorder, the success of CPT programs may still be limited (van Rijssen et al., 2021). Various factors can influence the success of the training such as andragogy (the use of adult learning principles), the teaching style of the trainer (social learning strategies employed, materials used, presentation of information), and trainee engagement (Cruice et al., 2018; van Rijssen et al., 2021). These factors may impact the quality of the training and the training outcomes as well as predict training transfer (Moore et al., 2018). In this review, emphasis is placed on the components of CPT programs that target adult learning principles and trainee engagement to promote the successful transfer of skills to other settings. Research has shown that learning in adults occurs when they are self-directed, autonomous, motivated, interested, and cognitively engaged in the content of the program (Moore et al., 2018; Rangel et al., 2015).

Knowles (1984) suggested six critical adult learning principles: (a) having a need to know, which relates to understanding the reason and value of training and applying it to current life objectives; (b) being oriented to learning by applying knowledge in the current situation; (c) showing readiness to learn by relating life and developmental tasks to the social usefulness of the content; (d) building on prior experience to connect content to one's own life experience; (e) being internally motivated related to the experience of needs, interests, and benefits satisfied through learning; and (f) having a self-concept reflecting an internal locus of control that dictates responsibility for one's own life and decisions (Caruth, 2014; Mews, 2020). According to Tessier et al. (2021), these principles have been criticized in the literature for not including participant experience in training. To address this and ensure that training is effective, these adult learning principles proposed by Knowles (1984) were embedded with the concept of trainee engagement.

Trainee engagement refers to being actively involved in the learning experience (Moore et al., 2018; Rangel et al., 2015). Frade and Veiga (2014) described engagement in three domains, namely (a) cognitive engagement, referring to the use of metacognition to plan, monitor, and evaluate the completion of tasks, such as applying learning

strategies and effort on tasks; (b) behaviour engagement, which reflects adhering to the training protocol, applying the effort needed to persist, concentrating, contributing to tasks, and paying attention; and (c) emotional engagement, which suggests a subjective state where the trainee is completely engaged and experiences a sense of belonging and value. As learning is a continuous process, these six principles of adult learning (Knowles, 1984) can also be embedded in the three domains of trainee engagement (Frade & Veiga, 2014), in order to provide the conceptual framework for this review as presented in **Figure 1**. CPT programs that are founded on a combination of adult learning principles and embedded in the three domains of engagement may foster an autonomous, self-directed, and practical application of skills and knowledge for transfer to natural communication settings.

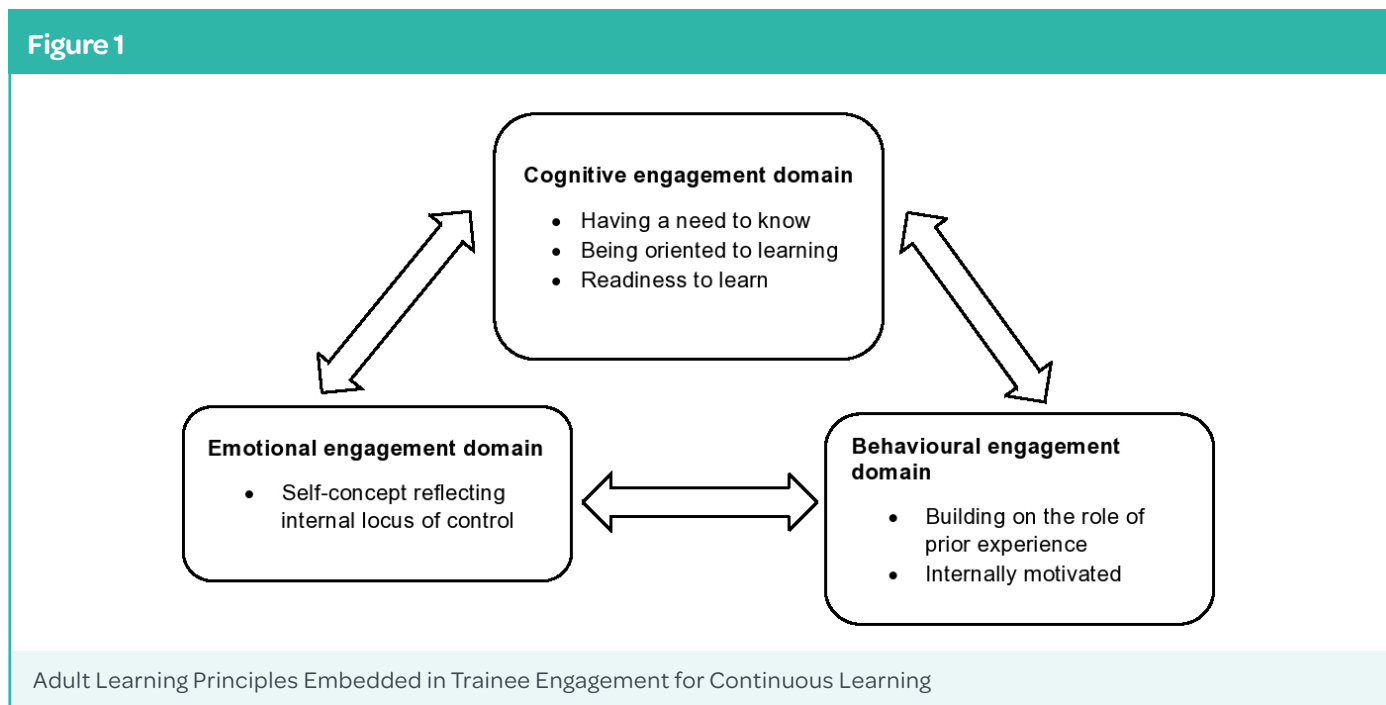
The aim of this review is to identify the characteristics of CPT that incorporate adult learning principles and trainee engagement for communication partners of adults with acquired neurogenic communication disorders to facilitate skill development. Numerous systematic reviews have been conducted on CPT programs within the field of acquired neurogenic communication disorders, each focusing on a specific disorder (Tessier et al., 2021). However, limited information is available on the application of adult learning principles and trainee engagement in the different programs mentioned in these systematic reviews (Cruice et al., 2018; Eggenberger et al., 2013; Simmons-Mackie et al., 2010; Tessier et al., 2021). To compare and contrast the

findings of these systematic reviews and to obtain a deeper understanding of the existing CPT literature, an umbrella review-of-systematic-reviews methodology was selected (Smith et al., 2011). Umbrella reviews aim to synthesize the highest level of evidence, namely systematic reviews and meta-analyses, which is in line with the current study's aim to synthesize systematic reviews on CPT program characteristics (Aromataris et al., 2015).

An umbrella review was therefore used to effectively compare and contrast findings of separate systematic reviews informing evidence-based practice for clinical decision-making (Smith et al., 2011). An umbrella review is particularly useful for the aim of the current study as this method seeks to answer a broader question and to identify collective trends across the different systematic reviews (Faulkner et al., 2022). Additionally, an umbrella review is a method of synthesizing literature that is evidence-based, rigorous, and transparent (Faulkner et al., 2022; Smith et al., 2011). The findings of the current study therefore contribute to the replicability and transferability of the CPT programs within clinical practice.

The sub-aims of this umbrella review include the following:

1. Describe the characteristics of existing CPT programs (materials, duration of the individual sessions, content, withdrawal period, and the characteristics of the trainer).



Note. Conceptualized from Frade & Veiga (2014) and Knowles (1984).



2. Identify the characteristics of CPT that facilitate adult learning principles embedded in trainee engagement for communication partners of adults with acquired neurogenic communication disorders.
3. Identify CPT programs that include aims 1 and 2.

### Method

The population, exposure, and outcome (PEO) approach was used to ensure that this umbrella review included information relevant to the main aim, namely, to identify characteristics of CPT programs (exposure) that incorporate adult learning principles and trainee engagement for familiar or unfamiliar partners of adults with various acquired neurogenic communication disorders of both chronic and neurodegenerative natures (population) to facilitate acquisition of skills (outcomes).

### Search Strategy and Study Selection

The three-part search strategy used started with a limited cross-database search to identify relevant keywords from studies relating to the topic with the support of an experienced librarian (Khalil et al., 2016). The specific focus of this review was addressed by identifying relevant study selection criteria (Anglemeyer et al., 2020; Bellanger et al., 2020; Varker et al., 2015). The selection criteria were (a) studies that were published in English and included only adults 18 years and older (person and caregiver); (b) systematic review and/or meta-analysis study designs; and (c) studies published between 1990 and 2021, because a limited research synthesis was conducted prior to 1990 (Aromataris et al., 2015). Systematic reviews that focused only on the structure of CPT programs or on the layout were excluded (Loh & Musa, 2015). Structure refers to procedures used in pretraining, training, and posttraining phases; length of the training; generalization strategies; trainee support strategies; and follow-up procedures. Layout refers to the composition of one session and procedures during each individual training session.

Following the appropriate selection of relevant search terms, relevant interfaces, namely EBSCOhost, Scopus, ProQuest, and Cochrane were used to access databases such as Medline, CINAHL, PubMed, PsycArticles, Academic Search Complete, Humanities Source, Health Source: Nursing/Academic Edition, Taylor & Francis, APA PsycArticles, and APA PsycInfo. Reference lists of studies relating to the topic were also screened to identify additional sources (Khalil et al., 2016; Manafò et al., 2018; Tricco et al., 2018). Search terms included Boolean operators (OR; AND) and truncation and were used in all fields—including keyword, title, abstract, subject terms, and mesh terms.

This aided in the quality control of searches and minimized potential errors during data entry (Varker et al., 2015). See **Table 1** for the search terms used, organized in PEO format.

### Title/Abstract Selection

This phase consists of identifying relevant studies to meet the aims of the review. Initially, 75 studies were identified using database searches ( $n = 45$ ) and manual review of reference lists ( $n = 30$ ). This search strategy resulted in 40 ( $n = 40$ ) duplicates, hence a total of 35 ( $n = 35$ ) remained for title and abstract screening. **Figure 2** includes the PRISMA diagram illustrating the process followed and the number of studies identified through the searches.

The 35 remaining studies were uploaded onto Rayyan (<https://www.rayyan.ai>), an open access online platform developed for collaborative systematic reviews (Ouzzani et al., 2016). Rayyan proved to be beneficial as it increased the objectivity of study selection and aided in improving the interrater agreement (Ouzzani et al., 2016). Prior to the selection process, the authors organized regular meetings on Google Meet (<https://meet.google.com>) to confirm an agreement on the selection criteria for the title and abstracts to ensure that the selected studies aid in answering the research question (Smith et al., 2011). The first author screened all the titles and abstracts, and the studies were divided equally between the second and third authors to act as second reviewers. This process ensured that all the titles and abstracts were reviewed by at least two authors (Blanco et al., 2019; Smith et al., 2011). The titles and abstracts were divided into three groups: undecided, included, and excluded. Two of the articles were categorized as undecided and 33 articles were categorized as either included or excluded. During the initial review, 80% consensus occurred between the three authors. Another online meeting was arranged between the three authors to discuss the inclusion and exclusion of the articles as well as to finalize the full-text selection criteria. Full consensus was obtained between the three authors (Smith et al., 2011) attending the meeting. During the process of the meeting, 24 studies were excluded based on factors such as the aim and focus of the study not addressing this review's aims or not including a description of characteristics of CPT programs.

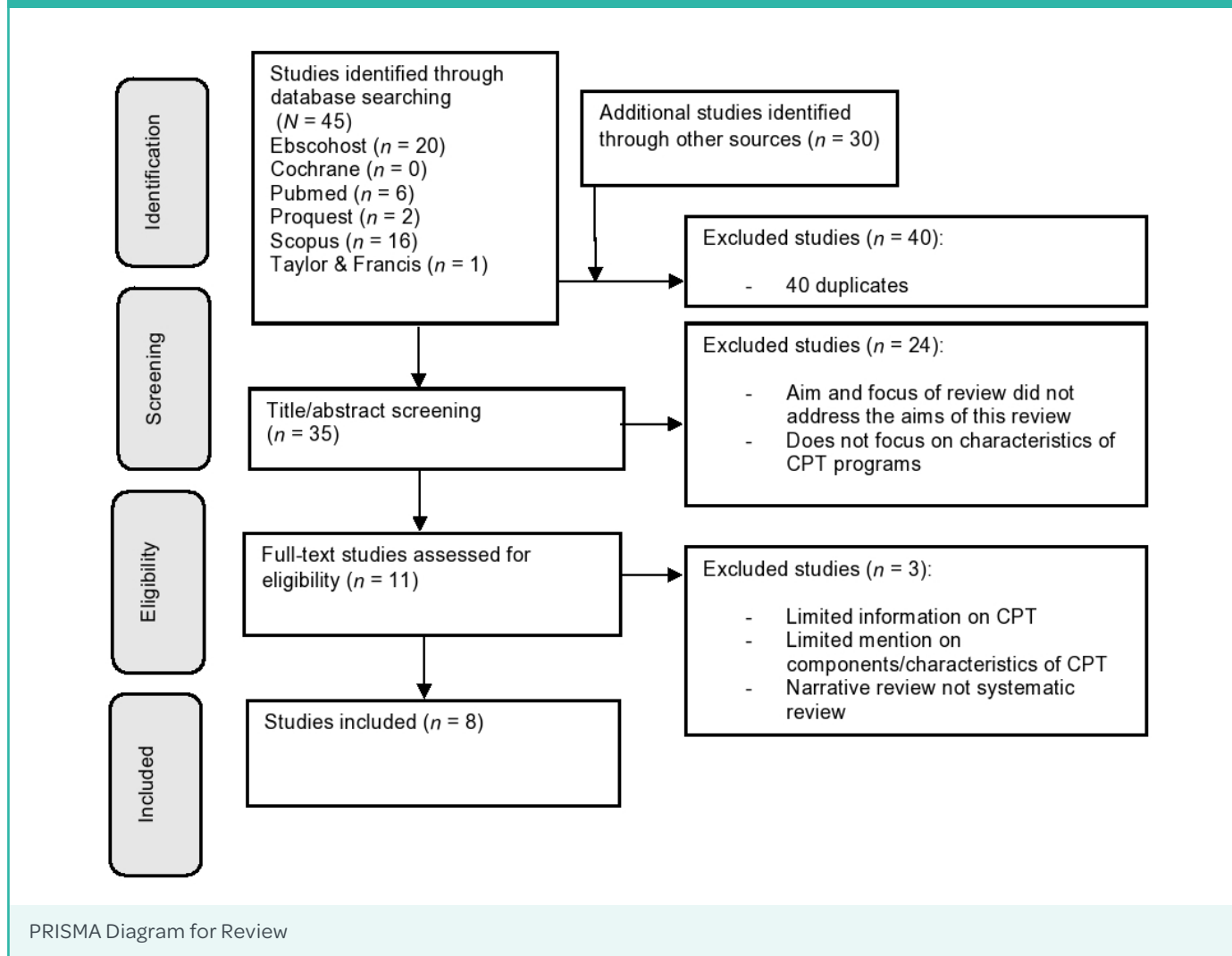
### Full-Text Selection

A total of 8 articles were included for the full-text selection. The first author read through all the full-text articles, and the articles were divided equally between the second and third authors to act as second reviewers. During this phase, partial agreement was obtained between the authors. However, after a scheduled online

<b>Table 1</b>				
<b>Search Term Inclusion in PEO Format</b>				
<b>Content</b>	<b>Keywords</b>	<b>Inclusion</b>	<b>Exclusion</b>	<b>Rationale</b>
Population Familiar or unfamiliar communication partners of adults (≥ 18 years) with acquired neurogenic communication disorders of both a chronic and neurodegenerative nature	Familiar partners: Caregiver OR spouse OR partner OR carer OR family OR paid OR unpaid OR untrained OR informal Unfamiliar partners: Caregiver OR carer OR healthcare practitioner OR trained OR formal	Both trained (healthcare practitioner) and untrained (family, partner, or friend) partners of persons with acquired neurological disorders were included. Acquired neurological disorders include traumatic brain injury, stroke, brain cancer or tumours, dementia, and Alzheimer’s disease, and other neurodegenerative disorders (e.g., Parkinson’s disease, amyotrophic lateral sclerosis).	Communication partners of adults with cerebral palsy, autism spectrum disorder, cognitive and learning disorders, etc. were excluded.	Communication partners of adults with acquired neurological disorders require adequate support and training to effectively facilitate communication interaction with these adults (Wiseman-Hakes et al., 2019).
Exposure Structure and layout of CPT programs	Communication OR conversation OR interaction AND intervention OR training OR education	Systematic reviews on CPT are included. These systematic reviews need to include characteristics of CPT (e.g., duration of program, duration of training sessions, training strategies based on adult learning principles and withdrawal) and the layout of the sessions (e.g., includes theoretical and practical information during sessions).	Studies that targeted other dyads such as practitioner-caregiver communication and practitioner-practitioner communication were excluded. Studies targeting high-technology communication aids were excluded (e.g., virtual reality training); as were those with peer simulation, and those with training aimed at improving physical functioning, leisure activity, or activities of daily living.	Training communication partners may enhance their awareness of potential barriers and facilitators of communication (Behn et al., 2021).
Outcome All outcomes were included		The outcomes of the studies were not a determining factor in the inclusion or exclusion of studies. All outcomes mentioned in the studies were included.		Many similarities exist between different CPT programs targeting traumatic brain injury, aphasia, and dementia (O’Rourke et al., 2018). However, discrepancies exist as limited implementation details were provided for replication of the studies (Cruice et al., 2018; Eggenberger et al., 2013; Simmons-Mackie et al., 2010).

Note. CPT = communication partner training; PEO = population, exposure, outcome.

Figure 2



Note. CPT = communication partner training. Based on the framework by Blanco et al. (2019).

meeting, full consensus was obtained. Only three studies were excluded as they had limited information on characteristics of CPT programs.

**Data Extraction**

A data extraction form was compiled to extrapolate data relevant in addressing the aims of the review (Smith et al., 2011). The form was not used as an exhaustive checklist but rather as a means to provide descriptive data of the key terms on the characteristics of CPT within the systematic reviews (Faulkner et al., 2022). Specific categories included CPT, components such as the name of the training, structure of the program such as duration of training and outcomes such as the primary and secondary effect of the training. The first author conducted the data extraction and transferred the raw data to an excel spreadsheet (Dawson-Hahn et al., 2017). These data were reviewed by the second

and third authors to ensure that the data extracted were relevant and trustworthy (Loh & Musa, 2015; Sundström et al., 2017).

**Data Synthesis and Analysis**

The focus of this review is to provide a detailed account of the different components and characteristics of CPT programs and the relation it has to the principles of adult learning and trainee engagement. A deductive approach to narrative synthesis was used to analyze the data based on previous theory, namely adult learning principles and the three dimensions of trainee engagement (DeFranco & Laplante, 2017). This process occurred in a nonlinear fashion characterized by fragmenting, condensing, and dividing data into meaningful units followed by combining the units to form new patterns and reverted to context (Lindgren et al., 2020). Initially deductive codes were identified and

sorted by their similarities and differences abstracting them into categories (education) and then subcategories (disorder; Lindgren et al., 2020). These codes relate to labels attached to a phrase or short sequence of text such as diagnosis, symptoms, and impact on functioning and health, as shown in **Table 2**.

The deductive synthesis was followed by the processes of abstraction (different constituents were classified to a higher level) and interpretation (moving from descriptions of manifest content to latent content), which resulted in the formation of themes and subthemes (Lindgren et al., 2020). In this review, the categories are organized into themes (need to know) and subthemes (topic). The three authors independently coded data and then collaborated to establish themes and subthemes.

### Quality Appraisal

Diaby et al. (2015), Duncan et al. (2017), Loh and Musa (2015), and Smith et al. (2011) suggested A Measurement Tool to Assess systematic Reviews (AMSTAR) to assess and describe the methodological quality and strength of systematic reviews. AMSTAR has good reliability and validity for quality appraisal of systematic reviews (Hospel et al., 2016). This scale tool consists of 11 items with four main responses: “yes,” “no,” “can’t answer”, and “not applicable” (Hospel et al., 2016; Loh & Musa, 2015). The responses are then added to obtain a score, rating the quality and strength of the systematic review (Hospel et al., 2016; Loh & Musa, 2015). Three main ratings are classified as having a *low* (0–3), *moderate* (4–7), or *high score* (8–11; Hospel et al., 2016) as shown in **Table 2**. Heterogeneity in study interventions assesses outcomes measures, follow-up periods, structure, and layout of programs, prevented pooling of intervention effects (statistical analysis conducted when the included studies have the same design) and quantitative metasynthesis across reviews. To reduce the risk of counting the same results twice, that is, evidence where multiple reviews contained some of the same primary studies, the synthesis was primarily a narrative review of interventions and outcomes. The strength of the evidence from each meta-analysis was characterized according to the AMSTAR rating (Chinnasamy, 2013).

### Results

The findings of the umbrella review of systematic reviews are described according to the aims of the study and conceptual model provided earlier. **Table 2** includes a summary of the demographic information extracted from the data. Of the eight reviews, three were conducted in, or had affiliations with Australia, three in the United Kingdom, and the other studies had affiliations with the United States

(25%), Canada (25%), and other countries. Most of the reviews included both familiar (different family members and friends;  $n = 8$ ) and unfamiliar communication partners (police, volunteers, and healthcare practitioners;  $n = 7$ ) in various settings (workplace, residential care, nursing homes, and rehabilitation centres). Additionally, five of the CPT programs were presented by speech-language pathologists or other healthcare practitioners such as psychologists and nurses (2 reviews), with three reviews not specifying who conducted the training. All the CPT programs included strategies that could benefit both the partner and the adult with an acquired neurogenic communication disorder.

Only one of the reviews had a *moderate* quality score (4–7) and seven reviews were rated as having *high* quality scores (8–11) on the AMSTAR quality appraisal. **Table 2** provides more information regarding the AMSTAR ratings of the included reviews. The adult learning principles were embedded in trainee engagement and are discussed as follows:

### Characteristics of CPT Programs Focused on Adult Learning Principles and Trainee Engagement.

#### *Cognitive Engagement Domain*

Cognitive engagement of trainees related to three adult learning principles that were identified in all the reviews, namely having the need to know (topics of CPT), readiness to learn (cognitive learning), and orientation to learning (learning strategies used in the CPT programs). These findings are categorized in **Table 3** and were mentioned by all included reviews. First, to address the “having the need to know” principle, programs included components such as provision of information on the background of the disorder, specific information on the program, its purpose and information on communication (strategies on verbal and nonverbal communication). Both static (text materials) and dynamic materials (visual and audio output and audio output only) were used. Of the latter, PowerPoint presentations and video recordings or training videos were used in all the studies.

Second, the “oriented to learning” adult learning principle was included in all the reviews. These principles focused on learning strategies to assist in the application of newly acquired skills in the context related to the partner and person (e.g., modelling/demonstrating, repetition of information/revision, role-play).

Third, the programs included the trainees’ readiness to learn. By including trainees’ readiness to learn in the systematic reviews, CPT programs may facilitate cognitive learning through self-awareness and self-monitoring.

Table 2									
Study Characteristics of Included Systematic Reviews									
Authors and date	Countries	Communication assessment measures	AMSTAR quality rating <sup>a</sup> (level)	Diagnosis of population studied (N)	Target: Adult with acquired neurogenic communication disorder, partner, or both (N of studies)	Communication partners (n)	Course providers	Contexts	Categories of results reported
Behn et al. (2021)	UK Australia	Rating scales Questionnaires Linguistic analyses self-developed measures Self-reports (communication, knowledge, and confidence) Frequency counts (communication behaviour)	10 (high)	TBI (229)	Both (4) Partner (4)	Familiar partners: significant others (208) parents (14) siblings (2) friends (2)  Unfamiliar partners: shop assistants (64) police recruits (20) paid carers (18)	S-LP  Research assistant	Workplace activities: serving customers, telephone inquiries, everyday conversation	Participation (person and partner)  Overall impression of communication  Perceived communication ability of partner
Eggenberger et al. (2013)	Austria Germany UK	Questionnaires Observation of interaction Checklists Computer-assisted behaviour observation	9 (high)	Dementia (831)	Both (8) Partner (4)	Familiar partners: family members (162)  Unfamiliar partners: HCP – nurses, doctors, OTs, paraprofessionals (519)	HCPs (S-LPs, nurses, clinical psychologists, psychiatrists, social workers)	Nursing home Hospital Home care Community dwelling	Partner knowledge skills and attitude  Improved partner affect  Depression Challenging behaviour of person  Awareness of communication difficulties and communication strategies  Reported communication difficulties

**Table 2 (continued)**

McGilton et al. (2009)	Canada	Rating scales Questionnaires Discourse analysis Self-reports Checklists Computer-assisted observation systems	6 (moderate)	Dementia (16–120)	Both (6)	Unfamiliar partners: HCP – nurses, nursing assistants, other unspecified HCP (16–106)	Nurse	Nursing homes  Residential care	Communication behaviour, skills, and knowledge  Use of positive statements Provision of information to residents  Use of open-ended questions  Engagement and warmth  Patronization
Morris et al. (2018)	UK	Rating scale Questionnaire Video analysis Observation Checklist	11 (high)	Dementia (2245)	Both (20)  Adult (2)  Partner (16)	Unfamiliar partners: professional carers (1199) volunteers (29)  Familiar partners: family members (1701)	Not specified	Care home  Hospital  Residential care  Community care	Variability and care  Barriers to participation  Knowledge, skills, and attitude of partner  Perceived QOL  Partner self-efficacy  Preparedness to provide care  Satisfaction with training  Use of facilitative communication strategies

**Table 2 (continued)**

Nguyen et al. (2018)	Australia	Rating scale	9 (high)	Dementia (712)	Both (11) Partner (6)	Unfamiliar partners: residential carers – nurses, nursing assistants, nursing aides, recreational activity advisors (527)	Not specified	Residential care	Partner knowledge, skills and attitude			
		Questionnaire						Community care		Use of facilitative communication strategies		
		Video analysis						Nursing homes				
		Observation										
		Checklist									Familiar partners: family members (spouses, partners, children) and friends (267)	Partner satisfaction
		Inventory										Partner engagement
								Communication competence				
Simmons- Mackie et al. (2010)	Australia Netherlands US	Rating scale	8 (moderate)	Aphasia (319)	Both (16) Partner (15)	Unfamiliar partners: volunteers, students, strangers, acquaintances (118)	S-LP Psychologist	Rehabilitation centre	Partner knowledge, skills, and attitude			
		Questionnaire						Community care		Communication		
		Discourse analysis						Residential care				
		Observation										
		Standardized assessment									Familiar partners: family members (niece/nephew, brother/sister, fiancé, spouse, sister-in-law) and friends (234)	Nursing home
												Clinic
Simmons- Mackie et al. (2016)	US	Rating scale	9 (high)	Aphasia (185)	Both (16) Partner (9)	Unfamiliar partners: HCP – medical professionals and students (339)	S-LP	Rehabilitation centre	Partner knowledge, skills, and attitude			
		Questionnaire						Residential care		Use of facilitative communication strategies		
		Discourse analysis						University				
		Observation										
		Self-reports									Familiar partners: family members (spouses and children) and/or friends (115)	Hospital
		Standardized assessment										Care centre

**Table 2 (continued)**

Wiseman-Hakes et al. (2020)	Canada	Questionnaire Discourse analysis	9 (high)	TBI (228)	Both (8) Partner (4)	Unfamiliar partners: police officers (20) paid carers (15) sales assistants (64) HCP (23: doctor [1]; nurses [7]; physio [8]; S-LP [7])  Familiar partners: family members (167)	Not specified	Rehabilitation centre  Community care  Long-term care  Sales  Police	Partner knowledge, skills, and attitude  Efficient-focused interactions  Use of facilitative communication strategies  Knowledge, skills, and attitude  Satisfaction with course
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Note. S-LP = speech-language pathologist, OT = occupational therapist; HCP = healthcare practitioner; TBI = traumatic brain injury; UK = United Kingdom; US = United States; QOL = quality of life.  
<sup>a</sup> AMSTAR ratings of 0 to 3 = *low*, 4 to 7 = *moderate*, and 8 to 11 = *high*.

### Behaviour Engagement Domain

Behaviour engagement included two specific adult learning principles that were incorporated in the reviews, namely being internally motivated and building on the role of the trainee's prior experience. The data are presented in **Table 4**. CPT programs incorporating internally motivated principles were supported by the format of the training and included aspects such as the adaptation of the program, program length, the maintenance of skills and intervals of withdrawal of training, the structure of the training sessions, and the strategies employed to facilitate behaviour modification. TBI Express was the only program mentioned in the reviews that allowed for the adaptation of the content and length (Behn et al., 2021). Five reviews included a withdrawal of training at an interval of 3 months for trainees to generalize skills to their real-life contexts (Behn et al., 2021; Morris et al., 2018; Nguyen et al., 2018; Simmons-Mackie et al., 2010; Wiseman-Hakes et al., 2020). Great variability existed with the length of the programs, and it appears that each program based the length of training on the needs of the trainees. All of the CPT programs included in the review used a structure that commenced with lectures followed by practicing the newly learned skills taught in training through mentorship. All the trainees included in the training programs appeared to demonstrate persistence and motivation to complete the CPT and a minority received gratification such as certificates of completion when the training was completed (Eggenberger et al., 2013; Wiseman-Hakes et al., 2020). The findings

of this review suggest that CPT programs should be based on various theoretical models as well as include the trainees' prior experience. Conceptually, all the reviews were based on the social model of disability.

### Emotional Engagement Domain

Emotional engagement in CPT programs was related to a self-concept that reflects internal locus of control in trainees and included training aspects that centre on social connection and self-reported outcomes. **Table 5** includes more detail on these concepts. All the reported CPT programs included both individual and group support and the most typical mode of delivery was face-to-face training. All the reviews ( $n = 8$ ) used self-reported outcomes, including improved knowledge, skills, and attitudes; self-efficacy; facilitated self-reflection; and increased satisfaction with the course (Morris et al., 2018; Nguyen et al., 2018; Wiseman-Hakes et al., 2020).

The CPT program mentioned most frequently for supporting persons with a traumatic brain injury (TBI) was TBI Express/TBI Connect (Behn et al., 2021; Wiseman-Hakes et al., 2020); for persons with dementia, MESSAGE (Morris et al., 2018; Nguyen et al., 2018), and for persons with aphasia, Supported Conversation for Persons with Aphasia and Supporting Partners of People with Aphasia in Relationships and Conversation (Simmons-Mackie et al., 2010, 2016).



<b>Table 3</b>						
<b>Characteristics of CPT Programs Focused on Adult Learning Principles and Trainee Engagement (Cognitive Engagement Domain)</b>						
<b>Cognitive trainee engagement themes (adult learning principle)</b>	<b>Content of CPT programs</b>				<b>Mentioned in</b>	
	<b>Subthemes – components of training</b>	<b>Category</b>	<b>Subcategory</b>	<b>Code</b>		
Having a need to know (understanding the rationale for training and the feasibility during the partner’s current life situation)	Topics (topics addressed in the program)	Education (providing information and increasing awareness for the partner)	Disorder	Diagnosis, symptoms, and impact on functioning and health	All reviews	
				Effect of disorder on communication	All reviews	
				Future planning for changing needs of person as the disease progresses	Nguyen et al. (2018)	
			Program Communication	Person-centred care	Nguyen et al. (2018)	
				Components (e.g., purpose, structure, and layout)	All reviews	
				Communication strategies that support nonverbal and verbal communication	All reviews	
				Successful and failed communication	All reviews	
				Negative communication strategies that cause barriers	All reviews	
				Managing different situations/contexts	All reviews	
				Behaviour	Managing challenging behaviour	McGilton et al. (2009) Morris et al. (2018) Nguyen et al. (2018) Simmons-Mackie et al. (2010)
					Caregiver attitude towards person	Eggenberger et al. (2013)
					Psychological aspects	Emotional components (e.g., depression and anxiety of partners)
				Maintaining personhood		Simmons-Mackie et al. (2016)
				Maintaining autonomy and independence (abilities-focused)		Nguyen et al. (2018) Simmons-Mackie et al. (2016)
				Counselling		Nguyen et al. (2018) Simmons-Mackie et al. (2010)
Self-care and relaxation	Nguyen et al. (2018)					

**Table 3 (continued)**

Materials (materials used to facilitate the learning of new skills)	Dynamic material (material that changes)	Cognition	Memory strategies	Nguyen et al. (2018)
			Cognitive stimulation	Nguyen et al. (2018)
			Perspectives on tools or program	McGilton et al. (2009)
		Environment	Environmental adaptations	Nguyen et al. (2018) Simmons-Mackie et al. (2016)
			Multisensory and motor stimulation	Nguyen et al. (2018) Simmons-Mackie et al. (2016)
			Safety	Nguyen et al. (2018)
			Music	Behn et al. (2021)
	Participation strategies			
	Static material (material that remains the same)	Visual and audio output	Video recordings/training videos	All reviews
			PowerPoint presentations	All reviews
			DVD	Morris et al. (2018)
			Case studies	Nguyen et al. (2018) Wiseman-Hakes et al. (2020) All reviews
		Audio-only output	CD	Wiseman-Hakes et al. (2020)
			Audio recordings	Behn et al. (2021) Morris et al. (2018) Simmons-Mackie et al. (2016)
		Text	Information sheets/fliers	All reviews
Manuals			Behn et al. (2021) Nguyen et al. (2018) Wiseman-Hakes et al. (2020)	
Workbooks	McGilton et al. (2009) Nguyen et al. (2018) Simmons-Mackie et al. (2010)			
Booklets	Eggenberger et al. (2013) Nguyen et al. (2018) Simmons-Mackie et al. (2010)			
Handouts	Behn et al. (2021) Eggenberger et al. (2013) Nguyen et al. (2018)			

**Table 3 (continued)**

		Vignettes	Eggenberger et al. (2013) Nguyen et al. (2018)
		Recommended educational readings	Eggenberger et al. (2013) McGilton et al. (2009)
		Caregiver guides	Eggenberger et al. (2013) Nguyen et al. (2018)
		Cue cards (e.g., with communication techniques, memory cards, reminder cards)	Eggenberger et al. (2013)
		Memory books	Nguyen et al. (2018)
		Posters	
Being oriented to learning (application of knowledge in current situation)	Teaching strategies (strategies used to facilitate the learning of new skills)	Demonstration/modelling	All reviews
		Repetition/revision	All reviews
		Hands-on practice	All reviews
		Workshops	Simmons-Mackie et al. (2016) Wiseman-Hakes et al. (2020)
		Feedback/mentorship/supervision	All reviews
		Video/audio recording of interaction between caregiver and person	All reviews
		Case discussions (i.e., brainstorming, planning, problem solving, and analysis of videos)	All reviews
		Role play	All reviews
		Reflection	All reviews
		Observation	All reviews
Readiness to learn (partner realizes the need to learn and is prepared to participate in learning activities related to current life situations)	Cognitive learning (cognitive processes employed by the participant to learn new skills)	Provision of instructions	All reviews
		Rehearsal	All reviews
		Self-awareness	All reviews
		Self-monitoring	All reviews

Note. CPT = communication partner training.

**Table 4****Characteristics of CPT Programs Focused on Adult Learning Principles and Trainee Engagement (Behaviour Engagement Domain)**

Theme (Adult learning principle) Behaviour engagement	Subtheme	Category	Definition	Code	Mentioned in
Building on the role of previous experience (the participants' ability to connect the content of the CPT to their own life experience)	Content of CPT	Theoretical model	Theoretical model that forms the basis of CPT and facilitates partner behaviour modification	Supported conversation	Simmons-Mackie et al. (2010, 2016)
				Social model	All reviews
				Snoezelen multisensory environmental intervention	McGilton et al. (2009)
				Nursing child assessment satellite training model	McGilton et al. (2009)
				Participation model	Behn et al. (2021); Wiseman-Hakes et al. (2020)
				Functional behavioural approach	Wiseman-Hakes et al. (2020)
				Behavioural supervisory model	McGilton et al. (2009)
Internally motivated (the participants' experience of needs, interests, and benefits satisfied through learning)	Format of CPT	Adaptation	If the program was implemented as prescribed or if it was adapted	Adapted TBI Express (length and content)	Behn et al. (2021)
				Unspecified adaptations	Morris et al. (2018); Wiseman-Hakes et al. (2020)
				Not adapted	Morris et al. (2018); Wiseman-Hakes et al. (2020)
				Not specified	Eggenberger et al. (2013); McGilton et al. (2009); Nguyen et al. (2018); Simmons-Mackie et al. (2010, 2016)
	Length of programs	Range of length of the CPT	1–24 weeks	Behn et al. (2021)	
			1–8 weeks	Eggenberger et al. (2013)	
			Cognitive components, 1–3 days; behavioural components, 3–4 weeks; psychological components, 3–6 months	McGilton et al. (2009)	
			1–16 weeks	Morris et al. (2018)	
			1–17 weeks	Nguyen et al. (2018)	
			1–12 weeks	Simmons-Mackie et al. (2010)	
			1–20 weeks	Simmons-Mackie et al. (2016)	
			1–10 weeks	Wiseman-Hakes et al. (2020)	

**Table 4 (continued)**

	Maintenance of skills	Maintenance of skill after withdrawal and follow-up sessions	Maintenance	Behn et al. (2020); Eggenberger et al. (2013); Morris et al. (2018); Nguyen et al. (2018); Wiseman-Hakes et al. (2020)
			Not specified	McGilton et al. (2009); Simmons-Mackie et al. (2010, 2016)
	Interval of withdrawal	Timing of maintenance	3 months	Behn et al. (2021); Morris et al. (2018); Nguyen et al. (2018); Simmons-Mackie et al. (2010); Wiseman-Hakes et al. (2020)
			6 months	Behn et al. (2021); Eggenberger et al. (2013); Morris et al. (2018); Nguyen et al. (2018)
			9 months	Behn et al. (2021); Nguyen et al. (2018)
	Structure	Structure of the training sessions	Lecture and practice opportunities	All reviews
	Participant persistence	Activities during training sessions that allowed for behaviour modification of partners	Motivation and gratification (e.g., certificate of completion)	Eggenberger et al. (2013); Wiseman-Hakes et al. (2020)
			Mentoring by course provider or facilitator	All reviews
			Persistence to complete course	All reviews

*Note.* CPT = communication partner training; TBI = traumatic brain injury.

These programs’ content and structure included adult learning principles that were embedded in trainee engagement. **Table 6** includes a comparison of the different learning principles and trainee engagement concepts included in the different programs.

### Discussion

The aim of this review was to identify the specific adult learning principles embedded in trainee engagement facilitated by the characteristics of CPT programs targeting both familiar and unfamiliar partners of adults with acquired neurogenic communication disorders. Despite the diverse evidence base and variations within and across reviews in terms of the characteristics, duration, and intensity of interventions, some positive trends were evident. From the

findings of this study, it appears as if the majority of CPT programs included all the principles of adult learning across different domains of engagement in training. The CPT programs included in this review appear to include aspects of cognitive engagement that can facilitate the immersion of trainees in in-depth reflective learning processes that are situated in realistic problem-solving tasks (Hospel et al., 2016). The findings of the current review support the notion that CPT incorporates cognitive engagement as the trainees are expected to use cognitive and metacognitive strategies during the training to understand and master related knowledge and skills respectively. Additionally, findings suggested that cognitive engagement can be facilitated through trainee motivation by being oriented to learning and using deliberate and sustained attention during CPT, which requires mental effort. The findings of this review also confirmed that readiness to learn was a learning principle that can enable cognitive engagement of trainees due

**Table 5**  
**Characteristics of CPT Programs Focused on Adult Learning Principles and Trainee Engagement (Emotional Engagement Domain)**

Theme (adult learning principle) Emotional engagement	Subtheme	Category	Code	Mentioned in
Self-concept reflecting internal locus of control	Format of CPT (format of CPT that allows for social connection)	Mode of delivery	Face-to-face	All reviews
			Video conferencing	Behn et al. (2021); Wiseman-Hakes et al. (2020)
		Type of support	Individual	Behn et al. (2021); Eggenberger et al. (2013; Morris et al. (2018); Nguyen et al. (2018); Simmons-Mackie et al. (2010); Simmons-Mackie et al. (2016); Wiseman-Hakes et al. (2020)
	Self-reported outcomes (outcomes related to participants' self-reports)	Affect upon course completion	Group	All reviews
			Decreased depression	Eggenberger et al. (2013)
			Improved general affect	Eggenberger et al. (2013)
		Positive attitude	McGilton et al. (2009)	
		Satisfaction with training	Morris et al. (2018); Nguyen et al. (2018); Wiseman-Hakes et al. (2020)	
		Improved confidence	Simmons-Mackie et al. (2016)	
		Self-reported competence	Self-reflection	All reviews
	Self-efficacy		All reviews	
	Increase knowledge, attitude, and skills		All reviews	

Note. CPT = communication partner training.

to trainees' application of metacognition and self-regulated learning. This can allow trainees to engage in effortful tasks with purpose and for continued use of strategies (Hospel et al., 2016).

The CPT programs mentioned in the studies also appear to target behaviour engagement facilitated by the participation of trainees, their motivation to complete the training, and their involvement during learning activities (Hospel et al., 2016). Trainees' internal motivation can be supported by their ability to set learning objectives based on their individual needs. In particular, Chinnasamy (2013) suggested that the mentorship that trainees receive facilitates their ability to

identify their own needs for learning and allowed them to identify others' as well as their own experiences as the greatest resource for learning. CPT programs appear to particularly focus on this social aspect due to the application for both the adult and the partner who can identify each other as resources for learning. Additionally, seven systematic studies included in the review focused on training both familiar and unfamiliar communication partners. This may benefit adults with an acquired neurogenic communication disorder as it can facilitate the creation of an inclusive society and an accessible environment, as well as reducing participation barriers within different environments for these individuals (Tessier et al., 2020), which is in line with the social model of disability.

Table 6 Reviews that Mentioned Adult Learning Principles Embedded in Trainee Engagement							
Author and date	Cognitive engagement			Behaviour engagement		Emotional engagement	Programs mentioned
	Having a need to know	Being oriented to learning	Readiness to learn	Building on the role of prior experience	Internally motivated	Self-concept reflecting internal locus of control	
Behn et al., 2021	✓	✓	✓	✓	✓	✓	TBIconneCT TBI Express Mentioned only authors, not program names
Eggenberger et al., 2013	✓	✓	✓	✓	✓	✓	Mentioned only authors, not program names
McGilton et al., 2009	✓	✓	✓	✓	✓	✓	Mentioned only authors, not program names
Morris et al., 2018	✓	✓	✓	✓	✓	✓	Mentioned only authors, not program names
Nguyen et al., 2018	✓	✓	✓	✓	✓	✓	Eight function-supporting elements  Talking sense  Reminders, environment, consistent routines, attention, practice, and simple steps (RECAPS)  Maximise attention, watch your expression and body language, keep it simple, support their conversation, assist with visual aids, get their message, encourage, and engage in communication (MESSAGE)  Intensive interaction  Psychoeducational program  Focused, interventions, training, and support (FOCUSED) program  Abilities-focused program of care  Other programs' authors were mentioned but not the names of the programs

**Table 6 (continued)**

Simmons-Mackie et al., 2010	✓	✓	✓	✓	✓	Supported conversations for persons with aphasia Supporting partners of people with aphasia in relationships and conversation (SPPARC) Conversation coaching Solution focused therapy Other programs' authors were mentioned but not the names of the programs
Simmons-Mackie et al., 2016	✓	✓	✓	✓	✓	Connect partner training Learner-centred approach Supported conversations for persons with Aphasia Patient-centred communication intervention Communication therapy for people with aphasia and their partners Total communication approach Aphasia couples therapy Conversation partner scheme Better conversations with aphasia Interactive storytelling Solution focused couples therapy Supporting partners of people with aphasia in relationships and conversation (SPPARC) Other programs' authors were mentioned but not the names of the programs
Wiseman-Hakes et al., 2020	✓	✓	✓	✓	✓	TBI Express TBIconneCT Other programs' authors were mentioned but not the names of the programs



Moreover, by founding CPT programs on the social model, prior experiential origins can be targeted and environmental barriers to facilitate behaviour engagement can be reduced (Hospel et al., 2016). One critique of adult learning principles is that they do not include the social or cultural aspects of learning (Ekoto & Gaikwad, 2015). According to Booth et al. (2019), communication is a dialogical process that is dictated by sociocultural and sociohistorical influences and therefore should be considered during CPT. To address these influences, the authors of CPT programs appear to employ the social model of disability.

Emotional engagement included in CPT programs related to the emotional reactions of trainees during and after the training (Hospel et al., 2016). From the findings of this review, emotional engagement in CPT training appeared to allow trainees to feel supported, which can greatly influence their self-reported outcomes (Hospel et al., 2016). Emotional engagement can also closely relate to trainees feeling satisfied with their learning. Learning satisfaction can encompass both face-to-face and/or blended trainings. Additionally, trainee satisfaction can be influenced by their subjective perceptions of learning experiences as well as their expectations of learning (Ekoto & Gaikwad, 2015). The subjective experience of training can impact on the generalization of training, maintenance of learned skills, and the effectiveness of the programs (Passer et al., 2009; Smidt et al., 2007). The majority of CPT programs appear to target trainee experiences through self-reported questionnaires where trainees commented on positive experiences and skills maintained for months after the initial training period and withdrawal of training. Last, generalization of learned skills in CPT programs can be influenced by communication partners reporting positive outcomes and application to real-life contexts.

## Limitations

This review provided insights into the collective trends across the included studies to demonstrate the components of CPT programs that address adult learning principles embedded in trainee engagement during training. The limitations are largely due to the heterogeneity in the reporting of the original studies' aims, methodology, outcomes, and populations targeted and reported in the systematic reviews. As this was a secondary analysis of the systematic reviews, some information on adult learning principles in the original studies may not be included in this article. As this review focused on identifying the trends seen across the systematic reviews, future research may include empirical studies explicitly attending to the role of engagement in CPT programs by using the theoretical frameworks proposed in the current umbrella review.

## Conclusion

From the findings of this umbrella review, it is clear that adult learning principles can be embedded in different domains of engagement that play a key role in trainees' perceived effectiveness of CPT programs. Addressing these when considering the structure and layout of CPT programs should be of cardinal importance when designing and implementing training within natural, real-life communication settings. Ideally, these aspects should be analyzed in both the partner and the adult with an acquired neurogenic communication disorder to assess and optimize the benefits of CPT for both parties. Course providers should consider the learning style of the trainee and teaching style of the instructor. Future research could include assessing the level of engagement of both the partner and the adult with acquired neurological disorder. Additionally, future research could include assessing the level of engagement of both parties in multiple contexts (including culturally and linguistically diverse populations and those in low-to-middle-income countries).

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