

KEYWORDSFEEDING-SWALLOWING
DIFFICULTIESDEVELOPMENTAL
LANGUAGE DISORDERSCROSS-SYSTEM
INTERACTIONS

CHILDREN

QUESTIONNAIRE

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Montréal, QC, CANADA**Editor:** Emily Zimmerman**Development and Preliminary Application of a Caregiver Directed Questionnaire to Identify Feeding–Swallowing Difficulties in Young Children****Développement et application préliminaire d'un questionnaire parental pour identifier les difficultés d'alimentation-déglutition de jeunes enfants**

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Abstract

The present clinical focus article was designed to explain the development and preliminary application of a questionnaire to query parents/caregivers about the feeding–swallowing difficulties of their children. The overall goal of this questionnaire is to provide a tool for the identification of feeding–swallowing difficulties we found retrospectively to be associated with developmental language disorders (Malas, Trudeau, Chagnon, & McFarland, 2015; Malas et al., 2017), which might eventually aid in early diagnosis and intervention for these disorders. Our working hypotheses were that the questionnaire would provide a useful/feasible method to query for feeding–swallowing difficulties and that specific indicators of feeding–swallowing difficulties would occur more frequently in our all comers and developmental language-disordered samples. The questionnaire contains 30 Likert-type questions querying for indicators of feeding–swallowing difficulties from the four general categories of difficulties in sucking, food transition difficulties, food selectivity, and salivary control issues. We sent it to parents from an all comers population and to parents from a smaller sample of children with developmental language disorders; 97 and 9 questionnaires were analysed from these two samples, respectively. Preliminary results suggest that the questionnaire might be a useful tool in identifying feeding–swallowing difficulties via parent-directed questions in young children and that indicators of the general categories of difficulties in sucking and food selectivity were the most frequently observed in both samples. Ongoing work in our lab is directed at the refinement and further validation of the tool to increase its utility in identifying feeding–swallowing difficulties in children with later occurring developmental language disorders.

Abrégé

Le présent article clinique a été conçu pour rapporter/décrire le développement et l'application préliminaire d'un questionnaire parental recueillant des informations sur les difficultés d'alimentation-déglutition de jeunes enfants. L'objectif général de ce questionnaire est de fournir un outil permettant l'identification de difficultés d'alimentation-déglutition ayant été montrées comme étant rétrospectivement associées au trouble développemental du langage (Malas, Trudeau, Chagnon et McFarland, 2015; Malas et al., 2017), ce qui pourrait éventuellement aider à l'identification et l'intervention précoce auprès des enfants atteints de ce trouble. Nos hypothèses étaient que le questionnaire serait une méthode utile/faisable pour recueillir des informations sur les difficultés d'alimentation-déglutition et que des indicateurs spécifiques de difficultés d'alimentation-déglutition apparaîtraient comme plus fréquents dans nos échantillons d'enfants tout-venant et ayant un trouble développemental du langage. Le questionnaire contient 30 questions recueillant des informations à propos d'indicateurs de difficultés d'alimentation-déglutition provenant de quatre catégories générales : difficultés de succion, difficultés de transition vers les solides, sélectivité alimentaire et difficultés de contrôle salivaire. Nous l'avons envoyé à des parents d'une population d'enfants tout-venant et d'un petit échantillon d'enfants ayant un trouble développemental du langage. Les réponses de 97 et 9 questionnaires, provenant respectivement de ces deux échantillons, ont été analysées. Les résultats préliminaires suggèrent que le questionnaire pourrait s'avérer un outil utile pour identifier les difficultés d'alimentation-déglutition de jeunes enfants, et ce, directement auprès de leurs parents. Les résultats suggèrent également que des indicateurs de difficultés de succion et de sélectivité alimentaire étaient les plus fréquents dans les deux échantillons. Les projets de recherche actuels de notre laboratoire sont dirigés vers le raffinement et la poursuite des travaux de validation de cet outil afin d'augmenter son utilité dans le processus d'identification des difficultés d'alimentation-déglutition des enfants ayant un trouble développemental du langage.

A long-standing research interest in our laboratory has been to examine potential relationships between feeding–swallowing and speech–language behaviours in both children and adults (i.e., Lapointe & McFarland, 2004; Malas, Trudeau, Chagnon, & McFarland, 2015; Malas et al., 2017; McFarland & Tremblay, 2006). This work is intended to expand our theoretical understanding of interactions between these seemingly diverse behaviours but also, and of potential relevance to the current study, to eventually improve the clinical services offered to patients with underlying pathologies or neurological injuries impacting feeding–swallowing and speech–language (e.g., Flowers, Silver, Fang, Rochon, & Martino, 2013; Martin & Corlew, 1990; Stipanovic, Borders, Brates, & Thibeault, 2019).

We recently focused our experimental attention on how feeding–swallowing difficulties might characterize children with developmental language disorders (i.e., Malas et al., 2015, 2017). We carried out two retrospective case-file analyses to quantify and characterize prior history of feeding–swallowing difficulties in children with language disorders without other co-occurring neurodevelopmental deficits or history of prematurity. Specific indicators of feeding–swallowing difficulties from the four general categories of difficulties in sucking, food transition difficulties, food selectivity, and salivary control issues were selected based on clinical experience and previous literature (e.g., Adams-Chapman, Bann, Vaucher, & Stoll, 2013; Delaney & Arvedson, 2008; Lindberg, Bohlin, & Hagekull, 1991; Motion, Northstone, Emond, Stucke, & Golding, 2002). Results revealed that children with developmental language disorders had significantly higher percentages of history of feeding–swallowing difficulties when compared to the general population estimate of Lindberg et al. (1991). Indicators of food transition difficulties (e.g., late or difficult introduction of solids, increased mealtime duration, poor or reduced appetite, choking, difficulty in oral or pharyngeal phase of swallowing) and food selectivity (e.g., food rigidity, food refusal) were the most frequently occurring in the samples of children with developmental language disorders in these previous studies.

These retrospective data indicated a potential developmental relationship between feeding–swallowing and language competence. It is clear that feeding–swallowing and speech–language production share a common anatomy (McFarland, 2016; McFarland & Tremblay, 2006), and we have previously hypothesized that co-occurrence of difficulties in these seemingly diverse behaviours may result from underlying deficits and distributed effects across feeding–swallowing and

speech–language systems (Hill, 2001; McFarland & Tremblay, 2006; Nip, Green, & Marx, 2011). We also hypothesized that mealtimes are important learning contexts for speech and language (Zimmerman, Connaghan, Hoover, Alu, & Peters, 2019) and that the presence of feeding–swallowing difficulties—and/or parental frustration related to these difficulties (Faith, Storey, Kral, & Pietrobelli, 2008)—may disrupt caregiver–infant interactions and language stimulation during feeding (Harding, Wade, & Harrison, 2013).

During the course of these previous studies, it became apparent that we needed a method to directly query caregivers about the feeding–swallowing abilities of their children to supplement case-files and/or to prospectively assess feeding–swallowing progression. We set about, therefore, to develop a parent-directed questionnaire using the rigorous procedures detailed in Streiner and Norman (2008).

A parent-directed questionnaire was selected for several reasons. First, parents are reliable sources of information about their children’s feeding–swallowing (Bortolus et al., 2002) and they are sensitive to feeding–swallowing difficulties (Barkmeier-Kraemer et al., 2017). Further, home-based, as contrasted to laboratory-based, judgments have been shown to provide ecologically valid indicators of feeding–swallowing difficulties (Sanchez, Spittle, Allinson, & Morgan, 2015). Lastly, a parent-directed questionnaire may eventually provide an efficient and economical tool for identification and referral of children for further assessments of both feeding–swallowing difficulties and speech–language difficulties (Bricker & Squires, 1989; Centre Hospitalier Universitaire Sainte-Justine, 2017; Sanchez et al., 2015; Thoyre et al., 2014), one of our ultimate goals in this line of research.

Although there are several standardized and non-standardized parental questionnaires to document feeding–swallowing abilities in children (e.g., Arts-Rodas & Benoit, 1998; Barkmeier-Kraemer et al., 2017; da Costa, van den Engel-Hoek, & Bos, 2008; de Lauzon-Guillain et al., 2012; Howe, Lin, Fu, Su, & Hsieh, 2008; Jaafar, Othman, Majid, Harith, & Zabidi-Hussin, 2019; Ramsay, Martel, Porporino, & Zygmuntowicz, 2011; Sanchez et al., 2015; Seiverling, Hendy, & Williams, 2011; Thoyre et al., 2014), none met our experimental/clinical needs of highlighting *feeding–swallowing difficulties* occurring between birth and 2 years of age by sampling all indicators we found retrospectively to be associated with developmental language disorders (Malas et al., 2015, 2017). For example, several of the existing questionnaires primarily aimed at distinguishing children with and without *feeding–swallowing disorders* (e.g., the

Behavioral Pediatrics Feeding Assessment Scale by Crist & Napier-Phillips, 2001; the Montreal Children's Hospital Feeding Scale by Ramsay et al., 2011; and the Pediatric Eating Assessment Tool by Thoyre et al., 2014) and would not have been useful to characterize early feeding–swallowing difficulties that would be less clinically apparent. Other questionnaires query parents only about difficulties with breast- or bottle-feeding (e.g., the Baby Eating Behavior Questionnaire by Llewellyn, van Jaarsveld, Johnson, Carnell, & Wardle, 2011; the Infant Breastfeeding Assessment Tool by Matthews, 1988) and thus would not have provided the more complete profile of feeding–swallowing difficulties we needed.

We therefore embarked on the development of a new parent-directed questionnaire to identify the presence of feeding–swallowing difficulties in children between birth and 2 years of age. It should be emphasized that the goal of this questionnaire is *not the clinical identification of feeding–swallowing disorders*, but rather the presence of more subtly represented *feeding–swallowing difficulties* that have been shown previously to be associated with developmental language disorders (Malas et al., 2015, 2017). Based on the consensus statement provided in Goday et al. (2019), pediatric feeding disorders can be defined as age inappropriate impairments in oral intake that have significant medical, nutritional, and/or psychosocial consequences to an infant's health and well-being. This is in contrast with difficulties, that are usually clinically subthreshold, often signalled by parents, and typically without serious medical or nutritional consequences.

The goals of the present clinical focus article, therefore, were (a) to explain the development of the questionnaire and (b) to provide preliminary retrospective data on its application with children from an all comers sample and children with developmental language disorders. In terms of the second objective, we were specifically interested in determining the feasibility of the questionnaire to sample early feeding–swallowing difficulties and to highlight the characteristics of those feeding–swallowing difficulties in our all comers and developmental language-disordered samples.

These objectives led to the following working hypotheses: (a) the parent-directed questionnaire will be a feasible method, as measured by rate of return of parental responses and rate of missing responses, and (b) specific indicators of feeding–swallowing difficulties will emerge as more frequently occurring in our all comers and developmental language-disordered samples. In terms of this last experimental objective, we are eventually interested in not only providing a more complete profile

of feeding–swallowing difficulties as provided by the questionnaire, but also in determining the “quickest” clinical route for identifying feeding–swallowing difficulties that may eventually provide clinical indicators of later developmental language disorders.

Method

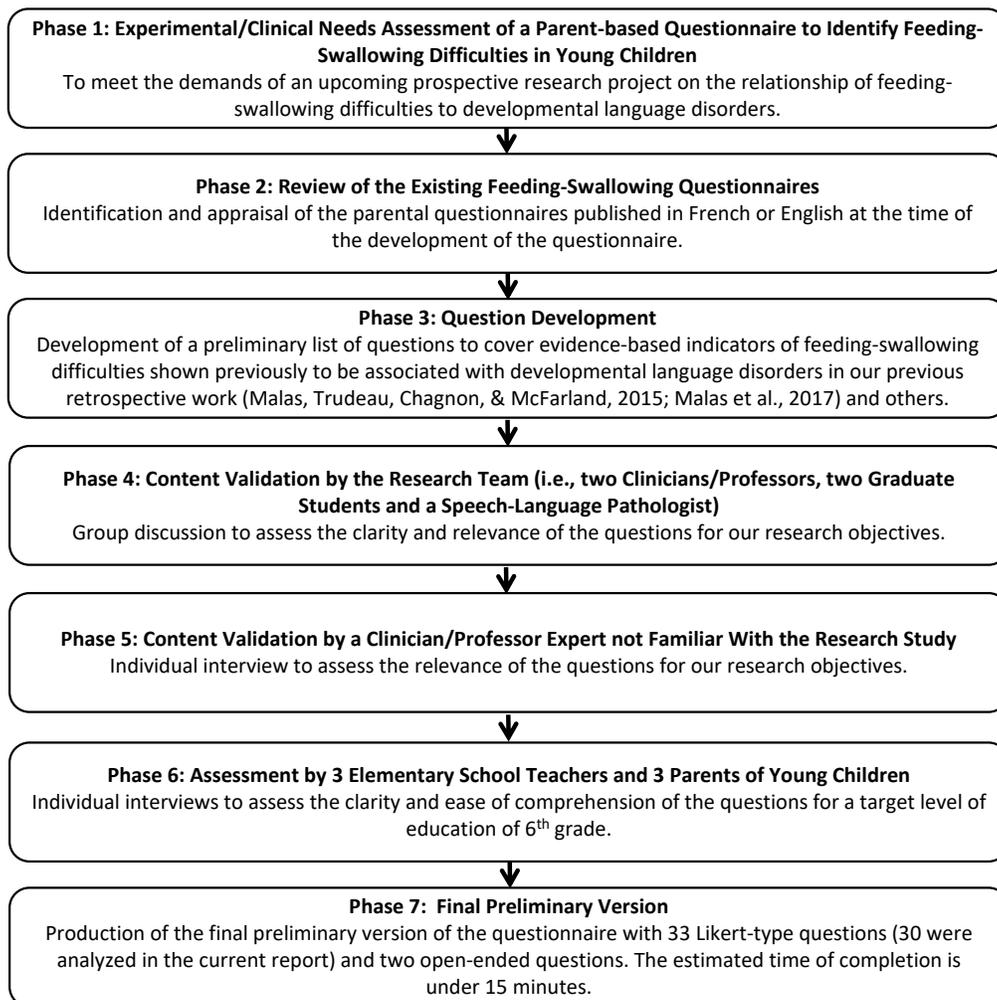
All experimental procedures were approved by the research ethics board of the Centre Hospitalier Universitaire Sainte-Justine (file number: 3786).

Feeding–Swallowing Questionnaire

As explained above, no previously published questionnaires met our research needs. We therefore developed and content-validated a series of parent-directed questions in French to sample indicators of the four categories of feeding–swallowing difficulties used in our previous studies (i.e., Malas et al., 2015, 2017) and by applying the guidelines for creation of health measurement scales outlined in Streiner and Norman (2008). As illustrated in **Figure 1**, this process involved (1) the determination of experimental/clinical needs, (2) a thorough appraisal of existing feeding–swallowing questionnaires, (3) rigorous question development, (4) content validation by the research team, (5) content validation by a clinician/professor expert not familiar with research objectives and method, and (6) content validation by three elementary school teachers and three parents of young children not familiar with the research study to ensure that the questions selected and the language used were appropriate to our research objectives, free from jargon, and at a level that was comprehensible to French-speaking parents with at least a Grade 6 reading level.

The questionnaire in its current form consists of 30 Likert-type questions querying indicators of feeding–swallowing difficulties occurring between birth and 2 years of age that can be grouped into general categories of difficulties in sucking, food transition, food selectivity, and salivary control difficulties (Malas et al., 2015, 2017) and 3 Likert-type questions assessing food appreciation, general mealtime behaviours, and parental concerns. A 5-point Likert scale from 1 (*very rarely, not at all*) to 5 (*very often, absolutely*) was used to provide a range of responses (Streiner & Norman, 2008), and as suggested by Streiner and Norman (2008), we used an inverted response scale for 11 of the questions distributed randomly to discourage “yea-saying” biases. We also included two open-ended questions asking parents whether they observed other feeding–swallowing difficulties in their child, and/or whether they had additional comments to share about their child's feeding between birth and 2 years of age. The entire

Figure 1



Flowchart of the process used to develop the feeding-swallowing questionnaire based on the guidelines for creation of health measurement scales outlined in Streiner and Norman (2008).

questionnaire takes parents approximately 15 minutes to complete. For the purposes of the present report, we focus only on the responses to the 30 questions of specific indicators presented in **Table 1**. It is important to note that the questionnaire was developed and tested in French as it is the language used in the authors' research and clinical environment, and the English translation is provided as a convenience for the non-French-speaking readership.

Participants

Parents of children from the all comers sample. We advertised the study in preschools identified through the childcare establishment locator website of the Gouvernement du Québec (<https://www.mfa.gouv.qc.ca/fr/services-de-garde/parents/localisateur/Pages/>

[index_en.aspx](#)) and other places frequented by parents with young children and among the family and the social network of the research team. We targeted children from 2 to 7 years of age to be consistent with the age range used in our previous publications (i.e., Malas et al., 2015, 2017). Based on this outreach, 125 questionnaires and self-addressed stamped return envelopes were sent to parents that expressed interest. Given that one of the eventual goals of our research is to "detect" feeding-swallowing difficulties that may signal later language disorders in the general population, no attempt was made to screen for birth status (e.g., premature), neurodevelopmental or language development of the children, nor their socioeconomic nor health status. It should be emphasized, therefore, that it is highly likely that this questionnaire was directed to parents

Table 1**Feeding–Swallowing Questions**

	Original French Question	English Translation
Questions querying for indicators of difficulties in sucking		
Introductory statement:	<i>En général, lors de l'allaitement ou du boire au biberon...</i>	[In general, during breast- or bottle-feeding...]
Question 1:	<i>Mon enfant prenait le sein ou la tétine du biberon correctement.</i>	[My child correctly latched on to the breast or nipple.]
Question 2:	<i>La succion (tétée) de mon enfant était forte.</i>	[My child had a strong suck.]
Question 3:	<i>Pendant un boire, la succion (tétée) de mon enfant était constante.</i>	[My child's sucking was constant during a feed.]
Question 4:	<i>Mon enfant vomissait ou régurgitait (par la bouche ou par le nez).</i>	[My child vomited or regurgitated (through the mouth or nose).]
Question 5:	<i>Mon enfant s'étouffait.</i>	[My child choked.]
Question 6:	<i>Mon enfant avalait facilement.</i>	[My child swallowed easily.]
Question 7:	<i>Mon enfant terminait un boire dans un temps raisonnable.</i>	[My child finished a feed within a reasonable time.]
Question 8:	<i>Mon enfant avait de la facilité à compléter un boire.</i>	[My child finished a feed easily.]
Question 9:	<i>Mon enfant avait un bon appétit.</i>	[My child had a good appetite.]
Question 10:	<i>Le poids de mon enfant était trop faible pour son âge, ou son poids diminuait.</i>	[My child was low weight for his/her age or his/her weight was diminishing.]
Questions querying for indicators of food transition difficulties		
Introductory statement	<i>En général, lors d'un repas (purées ou aliments solides)...</i>	[In general, during mealtime (purees or solid foods)...]
Question 11:	<i>L'introduction des purées a été difficile.</i>	[Introduction of purees was difficult.]
Question 12:	<i>L'introduction des aliments en morceaux a été difficile.</i>	[Introduction of pieces of food was difficult.]
Question 13:	<i>Mon enfant vomissait ou régurgitait (par la bouche ou par le nez).</i>	[My child vomited or regurgitated (through the mouth or nose).]
Question 14:	<i>Mon enfant avait des nausées (« haut-le-cœur »).</i>	[My child gagged.]
Question 15:	<i>Mon enfant s'étouffait.</i>	[My child choked.]
Question 16:	<i>Mon enfant avait de la difficulté à mastiquer (mâcher) les aliments.</i>	[My child had difficulties masticating (chewing).]
Question 17:	<i>Mon enfant avalait tout rond, sans bien mastiquer (mâcher).</i>	[My child swallowed food whole without chewing well.]
Question 18:	<i>Mon enfant gardait de la nourriture ou des liquides dans sa bouche sans avaler (pendant plus de 5 secondes).</i>	[My child held food or liquids in his/her mouth prior to swallowing (more than 5 seconds).]

Question 19:	<i>Mon enfant mangeait trop lentement.</i>	[My child was eating too slowly.]
Question 20:	<i>Mon enfant avait un bon appétit.</i>	[My child had a good appetite.]
Question 21:	<i>Mon enfant mangeait comme les autres enfants de son âge.</i>	[My child was eating like other child his/her age.]
Question 22:	<i>Le poids de mon enfant était trop faible pour son âge, ou son poids diminuait.</i>	[My child was low weight for his/her age or his/her weight was diminishing.]
Questions querying for indicators of food selectivity		
Introductory statement:	<i>En général, lors d'un repas...</i>	[In general, during mealtime...]
Question 23:	<i>Mon enfant était difficile (concernant ses goûts alimentaires).</i>	[My child was a picky eater.]
Question 24:	<i>Mon enfant était sensible à la température ou à la texture des aliments.</i>	[My child was sensitive to food temperature or texture.]
Question 25:	<i>Mon enfant mangeait seulement des aliments en purée ou hachés.</i>	[My child only ate pureed or ground food.]
Question 26:	<i>Mon enfant refusait de goûter à des nouveaux aliments.</i>	[My child refused to taste new food.]
Question 27:	<i>Mon enfant recrachait de la nourriture.</i>	[My child spit up food.]
Questions querying for indicators of salivary control issues		
Introductory statement:	<i>En général...</i>	[In general...]
Question 28:	<i>De la salive s'écoulait à l'extérieur de la bouche de mon enfant.</i>	[My child drooled.]
Question 29:	<i>Mon enfant avait beaucoup de salive dans sa bouche.</i>	[My child had a lot of saliva in his/her mouth.]
Question 30:	<i>Mon enfant avait de la difficulté à contrôler sa salive.</i>	[My child had difficulty controlling his/her saliva.]

Note. Parental responses to questions 1 to 9, 13 to 20, and 26 to 30 were collected using a Likert response scale ranging from 1 (*très rarement* [very rarely]) to 5 (*très souvent* [very often]), and parental responses to questions 10 to 12 and 21 to 25 were collected using a Likert response scale ranging from 1 (*pas du tout* [not at all]) to 5 (*tout à fait* [absolutely]). An inverted response scale was used for questions 1 to 3, 6 to 9, 20, and 21.

of children that had feeding–swallowing difficulties and/or current or future speech–language difficulties given current population estimates (Lindberg et al., 1991; Tomblin et al., 1997). Of these 125 questionnaires, 106 were completed and returned. From this base, we excluded nine questionnaires because parents reported their child's age as outside of the target range. The demographics of the 97 remaining children are provided in **Table 2**. These children ranged from 2 years 0 months to 6 years 11 months ($M_{age} = 3;11$, $SD = 1;4$) at the time the caregivers completed the questionnaires.

Parents of children with developmental language disorders. These participants were recruited from the

medical files of the 131 children seen between April 2011 and March 2012 for a suspicion of a language disorder in the outpatient speech–language pathology clinic of the Centre Hospitalier Universitaire Sainte-Justine, a large Montréal-based pediatric hospital. These 131 medical files went through an initial screening to eliminate children with cognitive, sensory, visual, hearing, or motor impairments or global developmental delay ($n = 8$); epilepsy, neurological, or genetic problems ($n = 4$); autistic spectrum disorders or other pervasive developmental deficit ($n = 7$); oral or craniofacial abnormalities ($n = 2$); childhood apraxia of speech ($n = 35$); and prematurity ($n = 11$). Questionnaires and self-addressed stamped return envelopes were sent

to the parents of the remaining 64 children and 23 were returned.

A second round of screening removed from further consideration questionnaires from children with acquired

cerebral lesion ($n = 1$) or stuttering ($n = 1$) and normal ($n = 7$) or delayed language ($n = 5$). This resulted in a small sample of nine questionnaires from parents of children that received a clinical diagnosis of receptive and/or expressive developmental language disorders (see Malas et al., 2017, for

Table 2		
Demographics of Participants		
	AC sample ($n = 97$) n (%)	DLD sample ($n = 9$) n (%)
Person(s) that completed the questionnaire		
Mother	89 (92)	8 (89)
Father	4 (4)	1 (11)
Both parents	3 (3)	0 (0)
Mother and sister	1 (1)	0 (0)
Child's gender		
Male	47 (48)	6 (67)
Female	50 (52)	3 (33)
Premature birth (< 37 weeks)		
Yes	10 (10)	0 (0)
Adoption		
Adopted child	2 (2)	1 (11)
Family size		
1 child	12 (12)	0 (0)
2 or more children	85 (88)	9 (100)
Birth order		
First	57 (59)	6 (67)
Other(s)	40 (41)	3 (33)
Children speaking		
One language	86 (89)	6 (67)
Two or more languages	11 (11)	3 (33)
Children understanding		
One language	81 (84)	4 (44)
Two or more languages	16 (16)	5 (56)
Best spoken and understood language(s)		
French	95 (98)	7 (78)
English	2 (2)	0 (0)
French and English	0 (0)	2 (22)

Note. AC = all comers; DLD = developmental language disorder.

a detailed explanation of language assessment procedures used at the Centre Hospitalier Universitaire Sainte-Justine in 2011–2012) and who ranged in age from 6 years 10 months to 9 years 1 month at the time of the completion of the questionnaires ($M_{age} = 7;11$, $SD = 0;10$). Note that although the average age of the children in this sample is higher than the all comers sample, no comparisons are made between these two groups. The demographic and language characteristics of these children are presented in **Tables 2 and 3**, respectively.

Analyses

As stated previously, parental responses to the 30 questions querying feeding–swallowing difficulties were collected using a Likert scale ranging from 1 (*very rarely, not at all*) to 5 (*very often, absolutely*). These responses were gathered in an Excel file and the scores from the inverted scale questions converted back to the non-inverted scale.

Feasibility.

Percentage of returned questionnaires. As a first indicator of feasibility of the questionnaire, we calculated

individually for both samples the percentage of completed questionnaires that were returned. Based on published guidelines (i.e., Streiner & Norman, 2008) and results from previous studies that have used the percentage of returned questionnaires as an indicator of feasibility (e.g., Seid, Sobo, Gelhard, & Varni, 2004; Troude, Squires, Foix L'Hélias, Bouyer, & de La Rochebrochard, 2011), we operationally defined a high response rate as 80% or more.

Percentage of missing responses. As a second indicator of feasibility of the questionnaire, we calculated for both samples the number of responses that were left blank, and this was converted to a percentage of the total number of possible responses. Based on published guidelines (i.e., Streiner & Norman, 2008) and previous studies that have used percentages of missing responses as an indicator of feasibility (e.g., Bouwmans et al., 2013; Seid et al., 2004), we operationally defined a low rate of missing responses as 5% or less.

Characterizing parental responses to the questionnaire. In order to address our second experimental objective and to determine whether specific indicators of

Table 3

Language Characteristics and Diagnosis of DLD

	Age of diagnosis of DLD (Years;Months)	Expressive (E) and/or receptive (R) language difficulties	Presence of standardized testing contributing to the DLD diagnosis (Percentile)*
1	3;7	E & R	Yes: ÉVIP (6)
2	4;10	E & R	Yes: ÉVIP (32), EOWPVT-R (1)
3	4;3	E & R	Yes: ÉVIP (47), CELF-BC (16)
4	5;2	E & R	Yes: ÉVIP (4)
5	4;8	E & R	Yes: ÉVIP (45)
6	3;11	E	No
7	4;7	E & R	Yes: ÉVIP (8), CELF-CFD (9), CELF-NR (9)
8	5;9	E & R	Yes: CELF-CFD (1), CELF-SS (2), EOWPVT-R (6)
9	5;2	E	No

Note. *Cut-offs used when standardized testing contributed to the DLD diagnosis: ÉVIP = 50th percentile (Elin Thordardottir et al., 2011); Clinical Evaluation of Language Fundamentals [CELF]–Canadian French version (all subtests) = 16th percentile (Elin Thordardottir et al., 2011); EOWPVT-R = 16th percentile (Groupe coopératif en orthophonie–Région Laval, Laurentides, Lanaudière, 1995). CELF-BC = basic concepts; CELF-CFD = concepts and following directions; CELF-NR = number repetition; CELF-SS = sentence structure; DLD = developmental language disorder; EOWPVT-R = Expressive One-Word Picture Vocabulary Test-Revised; ÉVIP = Échelle de vocabulaire en image Peabody [French version of Peabody Picture Vocabulary Test].

feeding–swallowing difficulties emerged as more frequently occurring in our two samples, we compared the individual responses to questions in our two samples. Recall that each question queried for a specific indicator of feeding–swallowing difficulty (see Method above). A question was judged to be indicative of a feeding–swallowing difficulty if the parental response on the 5-point Likert scale was 4 or above. A similar cut-off has been used in the past for identifying and characterizing questionnaire-based feeding–swallowing difficulties in samples of children from the general population and with neurodevelopmental disorders (e.g., Hubbard, Anderson, Curtin, Must, & Bandini, 2014; Schmitt, Heiss, & Campbell, 2008; Toyama & Agras, 2016).

In order to determine which indicators of feeding–swallowing difficulties emerged as most frequently occurring in our all comers and developmental language-disordered samples, we identified those questions with the highest percentage of parental responses exceeding the Likert-scale cut-off. No attempt was made to statistically compare the data between our two samples given (a) the large differences in age of the children, (b) the large differences in sample size, (c) the fact that the samples were collected under very different experimental conditions, and (d) it was not an experimental goal of the current work.

Results

Percentages of Returned Questionnaires and Missing Responses

All comers sample. As mentioned, 106 of the 125

questionnaires sent to parents of children from the all comers sample before additional exclusion criteria were applied were returned. This gave rise to an overall returned questionnaire rate of 85%. Of the 2910 possible responses on the questionnaire (97 questionnaires multiplied by 30 questions per questionnaire), only six were left blank which gave rise to a missing response rate of less than 1%. There was also one questionnaire in which the parent indicated two responses for three single questions. These responses were eliminated from further consideration.

Sample of children with developmental language disorders. As mentioned, 23 of the 64 questionnaires sent to the parents of children before additional screening was applied were returned. This gave rise to an overall returned questionnaire rate of 36%. Of the 270 possible responses on the questionnaire (9 questionnaires multiplied by 30 questions per questionnaire), none were left blank. This gave rise to a missing response rate of 0%.

Characterizing Parental Response to the Questionnaire

Presented in **Figures 2 and 3** are the percentages of above cut-off responses per question for the all comers and developmental language-disordered samples, respectively. Data are colour coded to represent the general categories of the feeding–swallowing difficulties that are queried by the specific questions/indicators.

As illustrated in **Figure 2**, for the all comers sample the three questions with the highest percentages of above cut-off responses were Questions 8 (29%), 4 (26%), and 24 (20%). Questions 4 and 8 queried for sucking difficulties,

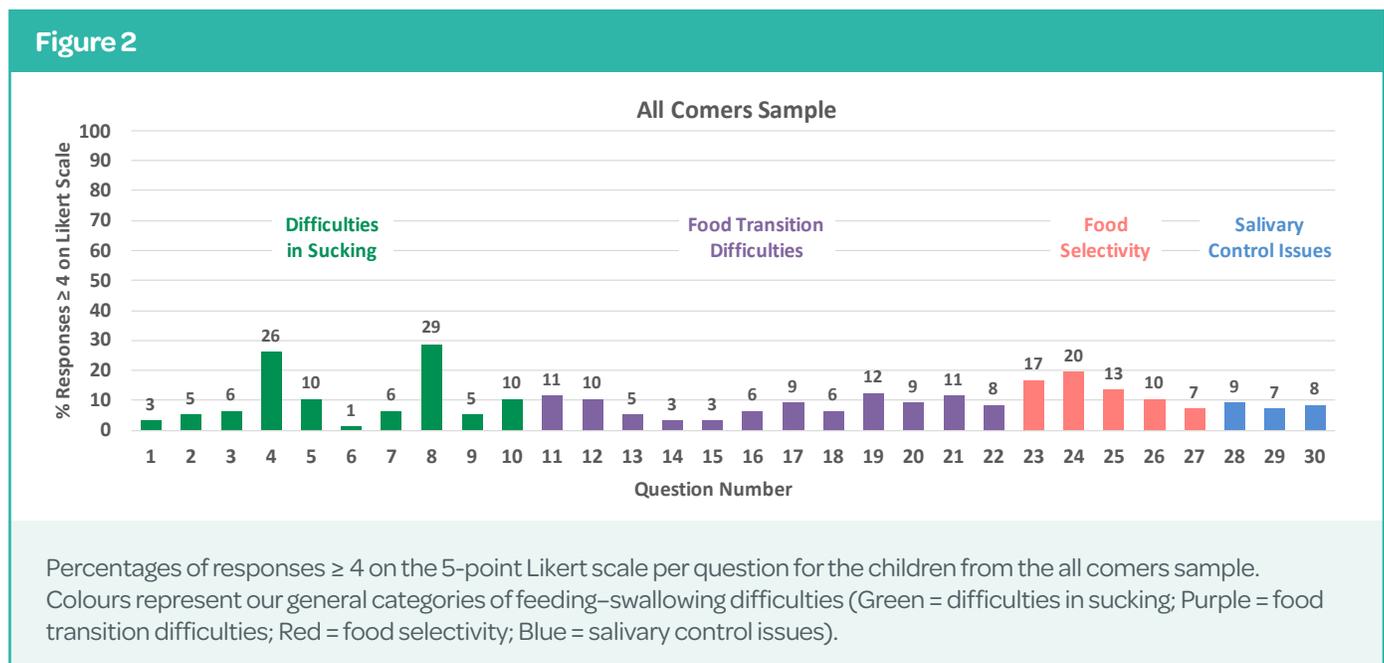
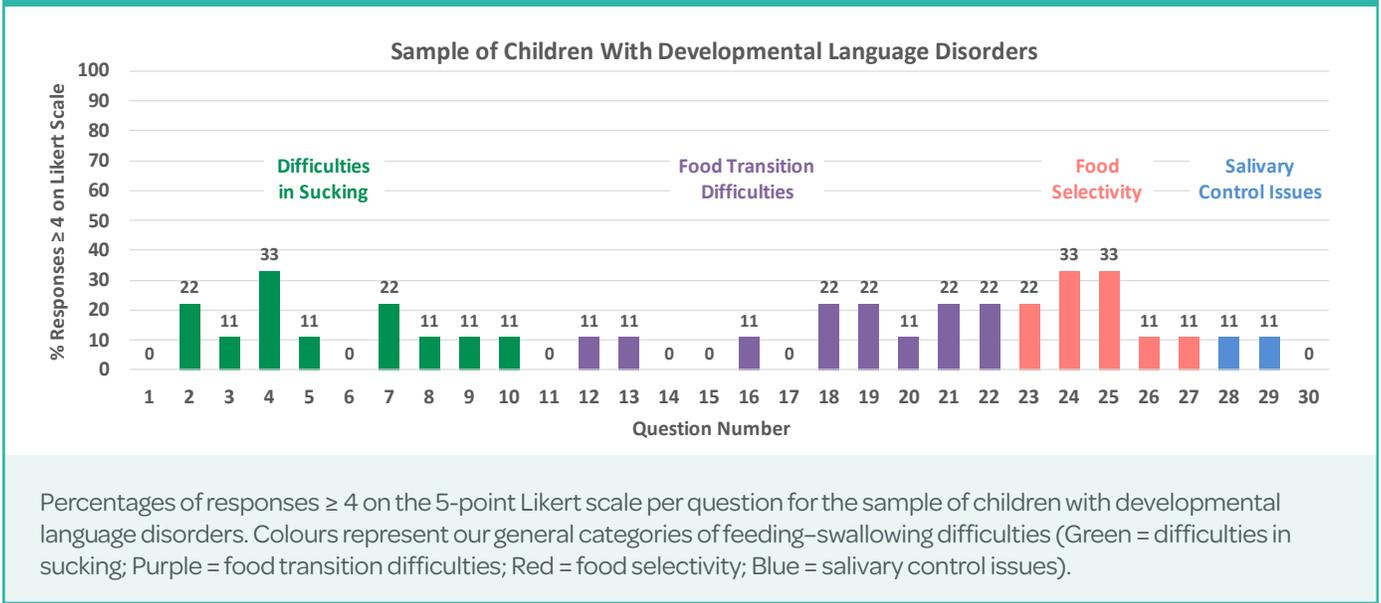


Figure 3



while Question 24 queried for food selectivity difficulties. As illustrated in **Figure 3**, for the sample of children with developmental language disorders the three questions with the highest percentages of responses above cut-off were Questions 4 (33%), 24 (33%), and 25 (33%). Question 4 queried sucking difficulties, and Questions 24 and 25, food selectivity.

Discussion

The present work was designed to explore the potential utility of a parent-directed questionnaire to sample feeding–swallowing difficulties in young children and to complement our previous retrospective findings looking at the relationship between feeding–swallowing difficulties and later language disorder (Malas et al., 2015, 2017). The questionnaire passed through rigorous content development and validation and was at a point where preliminary data were needed prior to explore its clinical/ research application.

We had two related hypotheses/predictions, one that the questionnaire would be a feasible method of sampling feeding–swallowing difficulties in young children, and two, that specific indicators of feeding–swallowing difficulties might emerge as most frequently occurring in the developmental language-disordered and all comers samples. The potential feasibility of our questionnaire was confirmed with the high rate of return of the questionnaire for the all comers sample (Seid et al., 2004; Streiner & Norman, 2008; Troude et al., 2011) and the low rate of missing responses for both samples (Bouwman et al., 2013; Seid et al., 2004; Streiner & Norman, 2008). This, combined

with the relatively short time of completion, suggests the tool might be a feasible tool for future research applications. The rate of return from the all comers sample is particularly encouraging as our overall research and clinical goal is to be able to sample feeding–swallowing difficulties in the general population of French speaking parents/children and begin to identify early indicators of later language disorders based on feeding–swallowing difficulties.

The fact that the rate of response from the developmental language-disordered sample is much lower than that from the all comers sample is perhaps not surprising given that the parents of children with developmental language disorders did not indicate a desire to participate in the study prior to receiving the questionnaire. Further, there was a relatively large time lapse from the target age of the questionnaire to the time of the completion of the questionnaire. Recall that the average age of the children from the language-disordered sample at the time of the completion of the questionnaire was 7 years 11 months. Given this, the 36% return rate for this sample appears acceptable and is comparable with the response rate for previous unsolicited questionnaires sent to parents of children with neurodevelopmental disorders (e.g., Allison et al., 2008; Hastings, Allen, McDermott, & Still, 2002). Given that at least a subset of parents of the children in the developmental language-disordered sample were willing to recall previous history of feeding–swallowing difficulties and return the questionnaire despite being asked to recall events several years earlier may be due to the fact that feeding–swallowing difficulties (Barkmeier-Kraemer et al., 2017; Sanchez et al., 2015) and/or the frustration of parents

related to those difficulties are highly salient to caregivers. These data are encouraging for our current prospective work in which we are sampling parental responses during the development of their children and during times when feeding–swallowing difficulties would be present in their children.

Regarding our second experimental hypothesis that certain feeding–swallowing difficulties would be more common in our two samples, we found that difficulties in sucking and food selectivity were most frequently indicated in the questionnaires from both the all comers and developmental language–disordered samples. Although statistical comparisons among the response categories between these two samples were neither planned nor possible, the fact that similar indicators were present in both experimental samples is perhaps not surprising. Our all comers sample included children born prematurely and most probably included infants that would later have language and potentially other neurodevelopmental difficulties/disorders considering a 12%–16% prevalence of neurodevelopmental disorders in the general population of children within the target age range of the current study (Boyle et al., 2011; McGuire, Tian, Yeargin-Allsopp, Dowling, & Christensen, 2019). Our more frequently occurring categories of sucking and selectivity difficulties were also more frequently observed in the retrospective, questionnaire-based study of Lindberg et al. (1991). And, previous investigations have demonstrated that problems in sucking and/or food selectivity are common in children born prematurely or in young children with neurodevelopmental difficulties (e.g., Cerro, Zeunert, Simmer, & Daniels, 2002; Emond, Emmett, Steer, & Golding, 2010; Field, Garland, & Williams, 2003; Hawdon, Beauregard, Slattery, & Kennedy, 2000; Malas et al., 2015; Mizuno & Ueda, 2005; Motion et al., 2002; van den Engel-Hoek, Harding, van Gerven, & Cockerill, 2017; Zimmerman & Rosner, 2018).

Although the present work suggests the potential utility of the parent-directed questionnaire, there are some obvious limitations in this preliminary work that include the small sample size of children with developmental language disorders and the potential limitation of parents' abilities to recall events several years prior. Historical developmental data are, however, regularly collected by clinicians to have a more thorough developmental profile and parents can recall prior feeding–swallowing difficulties of their children years later (Wenar & Coulter, 1962). Results from the current study combined with our previous retrospective work (i.e., Malas et al., 2015, 2017) provide insights on the potential utility of collecting prior history of feeding–swallowing difficulties in the identification process of developmental language disorders.

The use of parent-directed questionnaires to look at developmentally based feeding–swallowing difficulties, as mentioned previously, is crucial as “parents have more experience with their children, over a longer time, and in many more situations than do professional examiners” (Diamond & Squires, 1993, p. 109). They are therefore more likely to be able to provide ecologically-valid information about their child's feeding–swallowing behaviours than what would be captured during mealtime observations in laboratory or clinical settings (Sanchez et al., 2015). Pediatric healthcare establishments are moving towards professional–patient partnerships in care, which include greater participation of caregivers in the identification of early developmental difficulties (e.g., Barkmeier-Kraemer et al., 2017; Centre Hospitalier Universitaire Sainte-Justine, 2017; Guevara et al., 2013; Schonwald, Huntington, Chan, Risko, & Bridgemohan, 2009). Parent-directed questionnaires have also been shown to be time- and cost-effective (Bricker & Squire, 1989; Centre Hospitalier Universitaire Sainte-Justine, 2017).

Future directions include the application of the questionnaire in an ongoing large-scale, prospective investigation using parents as primary informants, combined with a language questionnaire and clinical measures of language and feeding–swallowing. The goal of this work is to further validate the questionnaire beyond content validation and the present initial step and to provide a more in-depth assessment of potential interactions between feeding–swallowing and speech-language development in young children. With this study, we intend to (a) investigate whether and when in the developmental trajectory feeding–swallowing difficulties might be used as predictors of concurrent and/or later language difficulties and (b) confirm whether individual questions and/or response categories, such as those querying for sucking and/or food selectivity issues, might be used by speech-language pathologists to identify children at risk for developmental language disorders. In this regard, it will be interesting to determine whether certain questions/indicators emerge or whether the persistence of difficulty over developmental stages might be a differentiating factor in identifying feeding–swallowing difficulties signalling later language disorders (Motion, Northstone, Emond, & ALSPAC Study Team, 2001).

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Acknowledgments

The authors would like to thank Vanessa Blouin and Marie Collette for their contributions to data collection. Thanks also to Dr. Emily Zimmerman and three anonymous reviewers for their constructive criticisms.

Disclosures

No conflict of interest, financial or otherwise, are declared by the authors.